Southington Board of Education Meeting

Thursday, March 24, 2022 6:00 PM
John Weichsel Municipal Center Public Assembly Room, 200 North Main Street, Southington, CT 06489
200 North Main Street
Southington, CT 06489

COMMITTEE OF THE WHOLE - OPERATIONS

1. CALL TO ORDER
2. Executive Session
   a. Unaffiliated Compensation
   b. Contract Negotiations - UPSEU
   c. Legal Matter - Attorney-Client Privileged Communication
   d. Student Matters
3. Reconvene Meeting - Regular Session - 7:00 p.m.
4. Pledge of Allegiance followed by the National Anthem sung by SHS student Logan Gillis
5. Celebration of Excellence - Alisha Paul - 2022 CT Winner of the NCWIT Award for Aspirations in Computing; Jillian Christensen - 2022 Student Design Competition Winner Home Builders & Remodelers Association of Central Connecticut
6. Approval of Minutes - February 24, 2022
7. Public Communications
   a. Communications from Student Board Representatives
   b. Communications from Board of Education
   c. Communications from Administration
   d. Communications from Public
8. Committee Reports
   a. Policy & Personnel Committee Meeting - March 2, 2022
   b. Curriculum & Instruction Committee Meeting - March 11, 2022
   c. Finance Committee Meeting - March 22, 2022
      1. Bid Award 2022-10: Lawn Mowing & Trimming Services and Fall/Spring Debris Clean-up & Removal Services.
      2. 2022-2023 Preschool Tuition Rates
      3. 2022-2023 YMCA Lease Rates
9. Superintendent's Report
   a. Personnel Report
10. Old Business
    a. Town Government Communications
    b. Policy 3542.1 Purposes and Facilities - Food Service - *Policy Revision* - Second Reading
    c. Policy 5145.3 Sexual Harassment of Students - *Policy Revision* - Second Reading

d. Science - Grade 1 Units - Second Reading
e. Library Media Proposal for Grades 3-5 - Second Reading

11. New Business
    a. Leonard & Gladys Joll Scholarship Recipient
    b. Approval of Job Descriptions - School Nursing Supervisor; Information Technology Secretary; Technology Secretary
    c. Science - Grade 2 Units - First Reading
    d. Approval of Out of State Field Trip
    e. 2022-2023 Healthy Food Certification
    f. 2022-2023 Food and Beverage Exemption
    g. Student Expulsion
12. Adjournment

The minutes presented within this document provide a summary of the discussion that took place at the Board of Education meeting. For the complete discussion of the agenda items, please view the video of the Board meeting on our website at www.southingtonschools.org. These minutes are considered a draft until approved at the following regular Board of Education meeting.

SOUTHINGTON BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT
REGULAR MEETING

FEBRUARY 24, 2022

The regular meeting of the Southington Board of Education (Committee of the Whole - Operations) was held on Thursday, February 24, 2022, at 7:00 p.m. as a public meeting in the John Weichsel Municipal Center Public Assembly Room, 200 North Main Street, Southington, Connecticut with an Executive Session preceding at 6:30 p.m.

1. CALL TO ORDER

Mrs. Colleen Clark, Chairperson, called the meeting to order at 6:32 p.m.

Board members present were Mrs. Dawn Anastasio, Mr. Joseph Baczewski, Mrs. Terri Carmody, Mr. Sean Carson *(arrived at 6:40 p.m.)*, Mrs. Colleen Clark, Mr. David Derynoski, Mr. Zaya Oshana, and Mr. Jasper Williams. Absent was Mr. James Chrzanowski.

Cabinet administrators present were Mr. Steven Madancy, Superintendent of Schools, and Mr. Frank Pepe, Assistant Superintendent. Also present: Mrs. Sherri DiNello, Consultant *(left the Executive Session at 6:50 p.m.).*

2. EXECUTIVE SESSION – STUDENT MATTERS, UPSEU CONTRACT NEGOTIATIONS, REVIEW AND DISCUSSION OF SPECIAL EDUCATION AUDIT PROPOSAL, AND SUPERINTENDENT'S MID-YEAR EVALUATION

MOTION: by Mr. Derynoski, second by Mr. Oshana:

"Move to go into Executive Session, excluding the public and the press, for the purpose of discussing Student Matters, UPSEU Contract Negotiations, Review and Discussion of Special Education Audit Proposal, and Superintendent's Mid-Year Evaluation, and upon conclusion reconvene to public session."

Motion carried unanimously by voice vote.

Mrs. Clark recessed Executive Session at 7:01 p.m.
The Regular Board Meeting was reconvened at 7:04 p.m.

3. RECONVENE MEETING – REGULAR SESSION

Board members present were Mrs. Dawn Anastasio, Mr. Joseph Baczewski, Mrs. Terri Carmody, Mr. Sean Carson, Mr. James, Mrs. Colleen Clark, Mr. David Derynoski, Mr. Zaya Oshana, and Mr. Jasper Williams. Absent was Mr. James Chrzanowski.

Cabinet administrators present were Mr. Steven Madancy, Superintendent of Schools; Mr. Frank Pepe, Assistant Superintendent; and Mrs. Jennifer Mellitt, Director of Business & Finance.

Student Representatives present were Jhalissa Vincent, Ethan Solury, and Angelina Micacci.

4. PLEDGE OF ALLEGIANCE & MOMENT OF SILENCE

The student representatives led in reciting of the Pledge of Allegiance.

Mrs. Clark called for a moment of silence in memory of:
Mr. Richard Jones who passed away on January 21, 2022. He worked for the Southington Public Schools from September 1982 until his retirement in 2002. During that time, he served as the Department Head for the Southington Regional Agricultural Program.

MOTION: by Mr. Baczewski, seconded by Mr. Derynoski:

"Move to move Agenda Item 11.b 'Approval of Out of State/Overnight Field Trip' to Agenda Item 5.a."

Motion carried unanimously by voice vote.

5. CELEBRATION OF EXCELLENCE – NEO SEBASTIAN REYES

The Board of Education recognized Neo Sebastian Reyes, a student at J. A. DePaolo Middle School, who submitted an essay to the Annual Martin Luther King Jr. Essay Contest sponsored by Senator Christopher Murphy and won. He was one of 15 students chosen out of hundreds of applicants. Mr. Madancy read a part of Neo's Essay regarding discrimination and equality. Mrs. Clark presented Neo with a Certificate of Excellence.

Mrs. Clark called for a short recess at 7:10 - 7:15 p.m.

MOTION: by Mr. Baczewski, seconded by Mr. Oshana:

"Move to move Agenda Item 11.h 'Southington High School Graduation Date' to Agenda Item 5.b."

Motion carried unanimously by voice vote.

6. APPROVAL OF MINUTES

a. January 27, 2022 Meeting

MOTION: by Mr. Derynoski, seconded by Mrs. Anastasio:

"Move to approve the Regular Board of Education Minutes of January 27, 2022, as submitted."

Motion carried unanimously by voice vote.

b. February 8, 2022 Special Meeting

MOTION: by Mr. Baczewski, seconded by Mr. Williams:

"Move to approve the Special Board of Education minutes of February 8, 2022, as submitted."
Motion carried unanimously by voice vote.

Point of Order: Mr. Madancy called for a Point of Order and noted that the two agenda items that were moved up to 5.a. and 5.b. on the agenda were skipped over.

5.a. Approval of Out of State/Overnight Field Trips *(Moved from Agenda Item 11.b)*

Ms. Sandy Spinello, DECA Co-Advisor, Max Hotchkiss, SHS DECA President and A.J. Sena, SHS Vice President of Membership, addressed the request to attend the DECA International Career Development Conference in Atlanta, Georgia in April 2022 if the Southington DECA students win at the upcoming State Competition Conference.

MOTION: by Mr. Oshana, seconded by Mr. Derynoski:

"Move that the Board of Education approve the DECA Out of State/Overnight Field Trip request, as presented by administration."

Mr. Oshana explained the benefits of networking with other participants at the conference.

Motion carried unanimously by voice vote.

5.b Southington High School Graduation Date

Mr. Madancy proposed adopting the Southington High School graduation ceremony date of Friday, June 17, 2022, with a rain date of Saturday, June 18, 2022. The rain date would be held earlier in the day instead of in the evening.

MOTION: by Mrs. Carmody, seconded by Mr. Oshana:

"Move to approve Friday, June 17, 2022, as the date for the Southington High School Graduation with a rain date of Saturday, June 18, 2022."
Motion carried unanimously by voice vote.

7. PUBLIC COMMUNICATIONS

a. Communications from Student Board Representatives

Ethan Solury reported on the following:

- For the first time in two years, Silver Star Band, comprised of fifth grade students, would be meeting again at the high school with the SHS Marching Band.
- The Annual Camp Sloper Polar Plunge takes place on Saturday, February 26. He noted that the high school principal, Mr. Michael Crocco, would be participating.
- The Kelley School fifth grade STEM Ambassadors held their annual Souper Super Bowl Drive in February and collected approximately 1,500 cans that were donated to the Southington Community Services.

- He reported on the athletic sports season to date for the SHS Girls Gymnastic Team, Girl Knights Basketball Team, and Boys Swimming & Drive Team.

Angelina Micacci reported on the following:

- The SHS Drama Club production of The Little Mermaid will be held on March 4 at 7:00 p.m. and March 5 at 3:00 p.m. and 7:00 p.m.
- The Southington Unified Theatre Show will be held on March 18 with the theme Inclusivity through the Decades. Miss Micacci is a co-director of the show and invited all to attend.
- SHS STEM without Boundaries is hosting STEM Day on March 11 for all elementary students with presentations from different STEM organizations. It is a virtual event from 6:00-8:00 p.m. Students can sign-up through an email that was sent districtwide.
- Junior Prom tickets will be sold starting Monday, February 28, from 7:15-7:30 a.m. and from 2:15-2:30 p.m. Table arrangements must be completed before purchasing the $90 per person tickets. Students cannot purchase tickets if they owe money on schoolbooks.
- SAT testing for Juniors will take place on March 23-25. Resources for studying can be found with the Khan Academy.

Jhalissa Vincent reported on the following:

- A Connecticut State Trooper met with Kennedy Middle School students in grade level assemblies for a presentation on healthy decisions, positive communication, and the digital tattoo. This is presentation is given to students throughout the state.
- She reported on the athletic sports season to date for the SHS Cheerleading Team, Wrestling Team, and Boys Co-op Ice Hockey Team.

Mr. Carson attended the Cheerleading competition on Saturday, February 19 and stated that the team put together a fantastic performance.

b. Communications from Board Members

Mrs. Carmody toured the STELLAR Program facility for special education students aged 18-21 years old. She was very proud of the partnership between teachers and the community for the benefit of the students. Mrs. Clark explained that the special education STELLAR Program teaches life skills in a home-like atmosphere.

Mr. Williams thanked the Board members for putting together a letter to send to the state at a Special BOE meeting on February 8. The Board put aside politics and agreed on issues that impact so many children, parents, staff, and administrators across Southington. He spoke about the commitment to democracy and the current worldwide events over the last week with the assault of free speech, assembly and due process in Canada, and Ukrainians fleeing their homes as Russia aims to pull their country back into the clutches of a ruthless dictatorship. As a veteran, he reflected on how precious democracy truly is and that it was up to the Board of Education, parents, administrators, and voters to ensure that students are educated on the beauty and fragility of the United States system of government. They must continue to exercise their rights and responsibilities with respect and honor and remember the sacrifices that so many have made before them and cherish what it means to live free in the USA.

c. Communications from Administration

Administration reported on the following:

1. STEPS/SPD Partnership: Mr. Pepe reported that in December, Mrs. Meghan Albanese and Southington Deputy Chief Palmieri presented a new prevention curriculum, which will begin in fifth grade and then up to grades 6-12 and then down to grades 4-K in subsequent years. The curriculum delivery involves the Southington Police Department working with the students in the classroom. This homegrown curriculum has been picked up by a marketing company and will be made available nationally.

2. STEPS Parent University: Mr. Pepe explained that STEPS (Southington Town-wide Effort to Promote Success) was sponsoring a Parent University on March 10, from 6:00-8:00 p.m. at the Calendar House. Film screening of "Finding Hope" hosted by Christine Gagnon will be shown. Finding Hope is the same short film that the senior class will view during the upcoming Capstone Advisory session.

3. Masks in Schools: Mr. Madancy reported that a letter was sent to staff and families regarding the school district becoming mask optional starting Monday, February 28, 2022. He sent out correspondence today highlighting anticipated questions.

4. SEF Gala: Mr. Madancy announced that the Southington Education Foundation Gala fundraiser will be held on May 7, 2022, in the Pavilion at the Back Nine at the Southington Country Club. The SEF are ambassadors for the Southington Public School students.

5. DECA Gold Certification: Mr. Madancy announced that the high school DECA chapter was one of 461 schools out of 4,000 that received the Gold Star recognition.

6. Cable Advisory and PEGPETIA Grant: Mr. Madancy reported that he has been working on funding to update the audiovisual equipment in the Municipal Center Public Assembly Room and has received a $1,000 Cable Advisory Grant and has applied for and awaiting an answer for a $140,000 grant from the PEGPETIA organization, which would update all the cameras, audiovisual and the rack system in the AV room as well as virtual telecasts.

7. Athletic Facilities and Roof Update: Mr. Madancy invited the Board of Education, Town Council and Board of Finance members to a walking tour of the Southington High School athletic facilities in conjunction with the revised Capital Improvement Plan that the BOE approved at their last Board meeting. His office will be sending an invitation to all elected officials. As a follow-up, Mr. Madancy will present to the Town Council visuals at their March Town Council meeting. He explained that the Town Council authorizes the Town Manager to go to the Bond Council, which occurs in May, in order to get on the Referendum for November of 2022.

d. Communication from Public

There were a number of residents *(Attachment #1)* who came to the podium to voice their comments, recommendations, requests, and concerns regarding the following: Personal questions on a recent survey regarding use of drugs, alcohol, and social behavior administered to 12 year old students; concern with the direction of government and school system mandates moving in the direction of a nameless, faceless bureaucracy without regard for humanity and current local, state, federal, and world events, parent distributed to the Board copies of the book, One Day in the Life of Ivan Denisovich by Aleksandr Solzhenitsyn; parent choice of optional masking and effects on students still wearing masks, questioning of wearing masks on buses; thanking the Board for their mask decision and that the Boards impact and decisions goes beyond the school system; students falling behind in school due to pandemic and mandates put into place and the effects on their mental health, requesting Board to not make medical decisions for students attending school and not repeating history of the past two years; gratitude and

questions regarding new masking guidance, amending mandate that children have to wear masks on school buses.

Please see the YouTube video link of the meeting and public communication that can be found on both the Town of Southington and Southington Board of Education websites.

8. COMMITTEE REPORTS

a. Policy & Personnel Committee Meeting – February 2, 2022

Mr. Williams reported that the committee discussed revising Policy 3542.1, Purposes and Facilities - Food Service, to comply with recent legislative changes. Discussed were procedures for charging for a meal, subsequent collection of owed money, and that no student would be deprived of a reimbursable meal due to forgotten or lost money. Revision of Policy 5145.3, Sexual Harassment of Students, to comply with recent legislative changes. The committee discussed Title IX and the district's responsibility to investigate allegations. These revisions come before the Board as a first read later on the agenda.

b. Curriculum & Instruction Committee Meeting – February 11, 2022

Mr. Pepe reported that the committee received a presentation on First Grade Science Units and the four new units titled, 1) Playground Shadows, 2) Film Animation, 3) Senses in Nature, and 4) Seasonal Changes. These units will keep the students actively engaged in exploration and creation. The committee also received a presentation on three new Library Media Units for grades 3-5 titled, 1) Tech and Digital Citizenship, 2) Research and Info Literacy, and 3) Innovative Design. The committee addressed questions posed from the January 14 Curriculum & Instruction meeting regarding five implicit bias videos utilized in grade eight ELA classes. The lesson is not focused on implicit bias and the video is used to instill the importance of rereading through a turn and talk that identified what was complicated and what was not understood. Mr. Pepe answered the committee's questions on the Citizenship in Action course description, enrollment for the required course for all juniors, and talking points regarding when and if the implicit bias videos are used. The exercise is used as a steppingstone to define and introduce media bias. The committee also discussed Policy 6144, which deals with teaching controversial issues.

Mr. Baczewski stated that he watched the five implicit bias videos and thought there was still uncertainty regarding them. He questioned if the committee should re-evaluate the usefulness of the videos in the curriculum. Mr. Madancy stated that the Board had a policy for the review of curriculum material. A form would need to be filled out and a committee appointed to review the instructional material in question. Any Board member or member of the public could request that. Mr. Baczewski requested a review of the material.

c. Financial Committee Meeting – February 15, 2022

Mr. Oshana reported that the committee discussed the Food Service comparative income statements for June 30, 2020 and June 30, 2021. Losses were incurred due to COVID; however, through the ESSER II funds the losses were covered in a way of a loan from the Board of Education to the Food Service Program. The school district continues to participate in the Seamless Summer Option where students are provided breakfast and lunch at no cost. Because of this, the Balance Sheet shows a significant decrease in cash because of the free meals. He noted

that government reimbursement had increased. In the end, it came out to a virtual wash. The committee discussed the loan it gave to the Food Service Program and the parameters put around potential repayments. Even with all these challenges, the program had a net income of $149,218. Mr. Oshana acknowledged and praised the hard work that Ms. Nya Welinsky, Food Service Director, and her team put into the program during the two pandemic years. With the schools back to full in-person learning and meals being free, the number of meals increased by over 100,000. The committee also received the Board of Education financial update through January 2022 with projected surpluses and deficits. Currently, a large surplus is not anticipated at year end.

Mr. Carson stated that he had concerns about the loan of $300,000 given to sustain the Food Service Program by the previous Board. He recognized that this was a one-time loan, and that Food Service is a high level, self-sustaining, in-house program and the loan was necessary due to COVID. He pointed out that a loan will not be needed and considered moving forward. Mr. Carson noted that Southington was one of the few school districts in the state that runs their own internal Food Service Program. He wanted the public to know that the Board was being fiscally responsible with this.

9. SUPERINTENDENT'S REPORT

a. Personnel Report

MOTION: by Mr. Baczewski, seconded by Mr. Williams:

"Move to approve the Personnel Report, as presented.
Motion carried unanimously by voice vote.

10. OLD BUSINESS

a. Town Government Communications

Mrs. Clark reported that the Board of Education 2022-2023 budget presentation to the Board of Finance was on Wednesday, February 9 and that administration presented the budget in a way that it could be understood. The Budget Questions and Answers grid was being shared between the BOE, Board of Finance, and Town Council. The Budget Public Hearing is at J. A. DePaolo Middle School on March 7 and the Board of Education Workshop is on March 9.

Mrs. Clark reported that the meeting of the Town Board of the Chairs was not held in February due to some Chairpersons being out of town. The next meeting would be in March.

b. Science – Kindergarten Units – Second Reading

MOTION: by Mr. Baczewski, seconded by Mr. Williams:

"Move to approve the Science – Kindergarten Units, as recommended by the Curriculum and Instruction Committee."
Motion carried unanimously by voice vote.

11. NEW BUSINESS

a. Air Quality Discussion

Mr. Peter Romano, Director of Operations, explained that the subject of indoor air quality was broad reaching and that he was going to be as succinct as possible for the public's understanding. He explained that the indoor air quality is programmed and monitored by the school district's staff, outside consulting and monitoring companies, including the regional health district and state Department of Public Health (DPH) with guidance from the state of Connecticut, Department of Energy & Environmental Protection (DEEP), and United States Environmental Protection Agency (EPA).

Mr. Romano spoke at length on the Connecticut General Statutes Chapter 170, Section 10-220, subsection (d) regarding the duties of a Board of Education as it applies to indoor air quality. He identified and spoke in detail on 14 items that could affect air equality, which are monitored. Mr. Romano included and spoke about other areas that are monitored in the school facilities that were not included in the state statute, such as CO2 (Carbon Dioxide) levels. He stated that he also was the Chair of the Safety Committee for the school district that meets quarterly to discuss safety and health concerns districtwide and noted the committee members were from administration, teachers, nurses, paraeducators, food service, custodians, and maintenance employees. He was also a member of the Connecticut School Building & Grounds Association comprised of 97 members across the state that discusses indoor air quality frequently.

Mr. Romano explained that health and safety of the district's staff and students were paramount to what the Operations Department and Maintenance staff do every day. He praised the school district's custodial and maintenance staff who take excellent care of the facilities and are knowledgeable about the areas he discussed that could affect indoor air quality. The plan moving forward was to post operations reports on the Southington Public Schools website, continue to explore opportunities to improve indoor air quality, pursue CO2 monitoring systems for the elementary schools, and get air conditioning into all the elementary schools. In closing, Mr. Romano added that the Southington Public Schools Operation Department would continue to strive for improvement.

Mr. Carson thanked Mr. Romano for the indoor air quality report, which was one of the reasons why he ran for election on the Board of Education. He valued transparency, safety, and excellence, which the report conveyed, as well as Mr. Romano exuding excellence in his job performance including the maintenance and custodial staff, whom he praised. Mr. Carson noted that all the compliance reports were on record and looked forward to them being put on the school district's website for public perusal. He questioned if the school district was cited in the past three years by DPH, DEEP, OSHA, or other agencies, regarding the indoor air quality not meeting standards. Mr. Romano replied that the district had not been cited. Mr. Carson summarized that the Board had been reassured that they were putting the students and staff in environments that had good air quality, met standards and legal requirements, and allowed students to get an education.

Mr. Baczewski asked if there was a particular number on the CO2 levels parts per million (ppm) that a building needed to stay under. Mr. Romano explained that their goal is to have CO2 levels be less than 1,000 ppm and that the state did not have a standard number, which he found shocking. If CO2 levels go above 1,000 ppm, it could affect cognitive abilities and make a person sleepy. He found that the state requirements and standards were outdated regarding CO2 and that Southington can do better than the state standards. Mr. Baczewski addressed filters and

homemade apparatuses. He noted that filters just filter the air in the building and did not make more oxygen. He was pleased that systems were in place for monitoring and creating a better climate control in the elementary schools.

Mr. Oshana pointed out that the issue of indoor air quality was not new and was being monitored pre-COVID and will continue to be monitored. Mrs. Clark praised the report, Mr. Romano, custodial, and maintenance staff for always putting safety first and taking pride in their jobs.

b. Approval of Out of State/Overnight Field Trips *(Moved to Agenda Item 5.a)*
c. Policy 3542.1, Purposes and Facilities – Food Service *(Policy Revision)* – First Reading
d. Policy 5145.3, Sexual Harassment of Students *(Policy Revision)* – First Reading
e. Science – Grade 1 Units – First Reading
f. Library Media Proposal for Grades 3-5 – First Reading

These were first readings and will come before the Board at their next regular meeting for action.

g. Leonard & Gladys Joll Scholarship Committee Appointment

Mr. Madancy explained to the new Board members the background, past practice, responsibilities, and timelines of the Ad-Hoc Joll Scholarship Committee. Mrs. Clark asked for Board volunteers to serve on the committee. She appointed Mr. Derynoski, Mr. Carson, and Mr. Williams.

h. Southington High School Graduation Date *(Moved to Agenda Item 5.b)*

Mrs. Clark reconvened Executive Session at 8:44 p.m. for the Superintendent's Mid-year Evaluation.

All Board members were present except Mr. Chrzanowski. Also present was Mr. Steven Madancy, Superintendent of Schools.

The Board returned to Public Session at 9:39 p.m.

12. ADJOURNMENT

MOTION: by Mr. Derynoski, seconded by Mr. Oshana:

"Move to adjourn."
Motion carried unanimously by voice vote.

The meeting adjourned at 9:40 p.m.

Respectfully submitted,
Linda Blanchard
Recording Secretary

ATTACHMENT #1 – PUBLIC COMMUNICATIONS

From: FRANK PEPE
Sent: Friday, February 25, 2022 3:15 PM
To: LINDA BLANCHARD
Subject: Speaker list

Sent from Mail for Windows

Timestamp	Name	First Name	Address	Reason to Speak
2/24/2022 19:15:04	Colleen Dabkowski		363 Mulberry Street	parent's choice
2/24/2022 19:15:32	Britt E Lynch		12 Sheldon Road	thank you for mask decision
2/24/2022 19:15:54	jennifer Couture		181 prospect st plansville	survey
2/24/2022 19:16:41	tyler young		berkley ave	masks
2/24/2022 19:17:22	Jayme Krisak		21 Candlewood ln	gratitude and questions regarding new masking guidance
2/24/2022 19:18:04	Michael Kryzanski		27 Hitching Post Drive	Concern with direction of schools

Board of Education

Administrative Report

March 24, 2022

1. Last Day of School
2. Rolling back of mitigation strategies
3. DECA- States
4. SEF Gala
5. Kindergarten Information Session 2-28
6. Unified Sports Event on March 16th

STEVEN G. MADANCY
SUPERINTENDENT OF SCHOOLS

FRANK M. PEPE
ASSISTANT SUPERINTENDENT OF SCHOOLS

200 NORTH MAIN ST.
SOUTHINGTON, CT 06489

WWW.SOUTHINGTONSCHOOLS.ORG

OFFICE TELEPHONE
(860) 628-3202

FAX
(860) 628-3205

SOUTHINGTON PUBLIC SCHOOLS

Board of Education
Southington, Connecticut

Policy & Personnel Committee Meeting Minutes
Wednesday, March 2, 2022 - 5:30pm
Superintendent's Conference Room

Members Present: Committee Chair Jasper Williams, Dawn Anastasio, Zaya Oshana **Absent:** David Derynoski

Mr. Williams called the meeting to order at 5:33 p.m.

1. The School Nursing Supervisor Job Description revision was reviewed. The additional qualifications could be considered characteristics. The Committee decided to leave as qualifications.

2. The Information Technology Secretary Job Description and the Technology Secretary Job Description revisions were presented. A recent retirement in the office prompted a review of both descriptions which were last revised in 2006. Restructuring of the office as well as the evolution of the district's student and staff technology use has redefined both existing positions. The suggested revisions accurately capture current job responsibilities respectively.

3. Capstone at SHS requires oversight of student online portfolios. As this is the first year of implementation, the administration actively monitors the time needed to oversee student progress and ultimately, successful completion of this graduation requirement. A time study demonstrates 2.5 hours required to review one "C" in 50 portfolios. Assuming during any month, 10% of the Freshman (502 students), Sophomore (486 students) and Junior (530 students) classes may require this additional oversight, 7.5 hours covers solely the review of information and does not include student meeting time and parent contact. Mr. Pepe proposed addressing this need through a Memorandum of Understanding with the SEA. This MOA would provide a current staff member appropriate reimbursement during the 2022-2023 school year, funded via grant monies. The administration will continue to monitor the time needed and return to the committee next year with further recommendations.

4. Meeting Adjourned at 5:54 p.m.

Respectfully Submitted,

Frank Pepe

STEVEN G. MADANCY
SUPERINTENDENT OF SCHOOLS

FRANK M. PEPE
ASSISTANT SUPERINTENDENT OF SCHOOLS

200 NORTH MAIN ST.
SOUTHINGTON, CT 06489

WWW.SOUTHINGTONSCHOOLS.ORG

OFFICE TELEPHONE
(860) 628-3202

FAX
(860) 628-3205

SOUTHINGTON PUBLIC SCHOOLS

Board of Education
Southington, Connecticut
Curriculum & Instruction Committee Meeting Minutes
Friday, March 11, 2022 - 9:00 a.m.
Technology Training Lab

Members Present: Dawn Anastasio, Committee Chair Joseph Baczewski, Terri Carmody; Absent: Jasper Williams

Administration Present: Assistant Superintendent Frank Pepe, Principal Rick Terino, Asst Principal Sue Vitcavage, Director of Teaching and Learning for Secondary Education Dianne Holst-Grubbe, Coordinator PreK-8 English Language Arts / PreK-5 Social Studies Stephanie Lawlor.

School Staff Present: K-5 Science Leader Melissa O'Neil

Meeting called to order at 9:04 a.m.

Grade 2 Science Units

Melissa O'Neil provided an overview of proposed second grade units. The first is titled "*The 4th Little Pig*". This unit possesses a strong engineering basis and challenges students to consider what other materials could be used to rebuild if there were no more bricks. The second unit uses the Koa tree in Hawaii to discover seed dispersal and pollination. Students also conduct investigations around trees requiring different amounts of light and water. The third unit on Beavers considers how they affect the environment. Students explore the concepts of erosion, and water flow.

Rick Terino, Sue Vitcavage, and Stephanie Lawlor offered an update on the JFK Intervention Block pilot which was approved last school year. The block was proposed because students who require reading, or math intervention are forced to miss art, social studies, or technology education. The time dedicated to the daily intervention block was found by shaving two minutes from each period and combining with the dedicated sustained silent reading time. The administration met regularly with teacher teams to guide their understanding for structure and implementation. The intervention block has also been used to provide extension activities to those students who do not require interventions or who do not need additional assistance. As this is a learning year, Rick and Sue will establish a committee to consider:

- What does intervention block look like?
- How can it be improved?
- How can the effective practices be solidified?
- How often are students engaged in extension activities versus interventions?

Southington Public Schools

Steven G. Madancy
Superintendent of Schools

Frank M. Pepe
Assistant Superintendent of Schools

200 North Main St.
Southington, CT 06489

www.southingtonschools.org

Office telephone
(860) 628-3202

Fax
(860) 628-3205

Using the takeaways from JFK, JAD will institute a version of the intervention block model during the third trimester this year, Mr. Palmieri explained the planned structure in which students experience the intervention block twice a week. The two models will each provide a set of data to compare and analyze. This data will help to inform future structure of the block, including meeting time frequency.

Meeting adjourned at 9:57am.

Mention Next Mtg is April 22. The date change is to avoid meeting on Good Friday.

Respectfully Submitted,

Frank Pepe

SOUTHINGTON BOARD OF EDUCATION
Southington, Connecticut

FINANCE COMMITTEE MEETING

Tuesday, March 22, 2022, 6:00 p.m.
Video Conference

Board Members Present: James Chrzanowski; Sean Carson; Zaya Oshana

Present from Administration: Jennifer Mellitt, Director of Business & Finance; Kaiya Hill, Accounting Manager;

The Finance Committee meeting was called to order at 6:01 p.m.

1. **BID AWARD #2022-10 – LAWN MOWING & TRIMMING SERVICES AND FALL/SPRING DEBRIS CLEAN UP & REMOVAL SERVICES:**

Ms. Hill presented the recommendation for awarding Bid 2022-10. She informed the committee that the Administration had first gone to bid for lawn mowing and trimming services, as well as fall and spring clean up, back in February. Due to budgetary constraints, the first bid was rejected; thus, the Administration had to rebid. Ms. Hill mentioned how, unlike previous bids for these services, the Administration had decided to award lawn mowing/trimming and debris clean up separately for each site. This would allow costs to be decreased.

Mr. Carson asked for further clarification as to why vendors would be awarded for one service at one site but not the other. Mrs. Mellitt explained that lawn mowing is a service performed regularly throughout the growing season, but the grounds debris clean up is a one-time service, so awarding the bid to different vendors at each site will not hinder their ability to perform the services. She also mentioned how tedious this bid was, with one company declining any award just hours before the meeting.

The committee agreed and recommended that the Board of Education award the bid as presented by the Administration.

2. **PRESCHOOL REGULAR EDUCATION TUITION RATES:**

Mrs. Mellitt shared the annual review of preschool tuition rates for the community peer students. The review included the local area preschools and their anticipated tuition rates for 2022-23.

The Administration is not recommending an increase to our tuition rates for the 2022-23 school year.

3. **YMCA BEFORE & AFTER CARE PROGRAM RATES 2022-2023:**

Mrs. Mellitt presented the proposed rental rates for the YMCA before and after care for 2022-23. The rates are developed each year to reflect the increase in MERS and the hourly custodial rates. The YMCA registration is in process and the YMCA will confirm which sites they will use in the coming months.

4. MISCELLANEOUS:

Mrs. Mellitt spoke about the recent increase in claims paid through the self-insurance fund (December 2021-February 2022). A full update on the self-insurance fund will be presented at the next Finance Committee meeting.

The meeting adjourned at 6:24 p.m.

Respectfully submitted,

Jennifer Mellitt
Director of Business & Finance

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only _____ Board Meeting Date March 24, 2022

Decision Requested X Agenda Code 9 a

AGENDA REPORTING FORM

Agenda Topic: Personnel Report

Summary of Issue: This Personnel Report includes appointments, resignations, retirements, and transfers for certified and classified personnel for the 2021-2022 school year. This report includes activity for the month of February 2022.

Background: The human resource department provides the Board of Education with a monthly update of personnel additions/reductions/changes.

Alternative Strategies:

Cost (if applicable): N/A **Funding Source:** Board of Education

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: Recommend that the Board of Education approve the Personnel Report as submitted by the human resource department.

Michelle Passamano
Signature of Staff Member Submitting Report

Peter Madaras
Signature of Superintendent

Included:
Personnel Report

Personnel Report
February 2022

APPOINTMENTS

	NAME	POSITION	SCHOOL	FTE	EFFECTIVE	DEGREE	SALARY
CLASS	Berk-Pocock, Stephanie	Paraeducator, PT	HES	.88	2-23-2022	N/A	$17.67
CERT	Boccia, Eric	Band Director	JAD	1.0	2-28-2022	6th	$75,593
CLASS	Carlson, Mallory	Custodian, PT	STELLAR	.50	1-12-2022	N/A	$15.63
CERT	Castro, Joy	World Lang Spanish	JAD	1.0	2-28-2022	6th	$98,023
CLASS	Harris, Molly	Paraeducator, ACHIEVE	SHS	.88	2-7-2022	N/A	$17.67
CLASS	Landino, Valerie	Paraeducator, PT	HES	.80	2-23-2022	N/A	$17.67
CLASS	Lilien, Jonathan	Math Tutor	JFK	.80	3-7-2022	N/A	$21.35
CLASS	Sakowicz, Teresa	Paraeducator, FT	SHS	1.0	3-7-2022	N/A	$17.67
CLASS	Sousa, Mary Elizabeth	Math/Literacy Tutor	S. END	.80	2-28-2022	N/A	$21.35
CLASS	Suri, Dhriti	Paraeducator, PT	HES	.88	2-23-2022	N/A	$17.67
CLASS	Switala, Jamie	Paraeducator, ACHIEVE	SHS	.88	2-14-2022	N/A	$17.67
CLASS	Szabo, Monique	ABA Therapist	OES	1.0	3-7-2022	N/A	$17.67
CLASS	Walton, Cierra	Paraeducator, PT	JFK	.88	2-28-2022	N/A	$17.67

RESIGNATIONS/RETIREMENTS

	NAME	POSITION	SCHOOL	EFFECTIVE	YRS	RET/RES
CERT	Boudreau, Holly	Language Arts Teacher	JAD	4-1-2022	19	RETIRE
CERT	Brzezinksi, Timothy	Math Teacher	SHS	3-10-2022	6 mo.	RESIGN
CERT	Cumpstone, Mallory	Math Interventionist	SHS	2-24-2022	5	RESIGN
CLASS	DiNeno, Ellesse	Paraeducator, PT	JFK	2-3-2022	18 mo.	RESIGN
CLASS	Emery, James	Custodian, Head	HES	2-16-2022	18	RETIRE
CLASS	Fuoco, Ashlee	Paraeducator, FT	SHS	2-18-2022	2 mo.	RESIGN
CERT	Kalat, Kimberlee	Social Studies Teacher	JAD	2-18-2022	16	RETIRE
CLASS	Kosienski, Ryan	Custodian, PT	KSA	2-17-2022	18 mo.	RESIGN
CLASS	Mamaclay, Blake	ABA Therapist	HES	3-14-2022	19 mo.	RESIGN
CLASS	Martone, Eduardo	Custodian, PT	SHS	2-16-2022	2 mo.	RESIGN
CLASS	Palmieri, Kevin	Coach	SHS	2-9-2022	1.5	RESIGN
CLASS	Pugliese, Lynn	Secretary, Technology	CO	2-12-2022	15	RETIRE
CERT	Salvatore, Kylie	Paraeducator, PT	SES	2-16-2022	5 mo.	RESIGN

ASSIGNMENT CHANGE

	FROM (PREVIOUS ASSIGN)		TO (NEW ASSIGN)		
NAME	POSITION/SCHOOL	FTE	POSITION/SCHOOL	FTE	EFFECTIVE
Dragon, Katie	Custodian, FT/S. End	1.0	Head Custodian, FT/HES	1.0	3-14-2022
Harris, Molly	Paraeducator, PT/SHS	.88	Paraeducator, FT Achieve/SHS	1.0	3-3-2022
Krivca, Afrdita	Paraeducator, PT/OES	.88	Secretary II/Pupil Services	1.0	2-22-2022
Longo, Rachel	Paraeducator, PT/JFK	.88	Paraeducator FT ISS/JFK	1.0	2-9-2022
Paradore, Debra	Paraeducator, PT/HES	.88	Paraeducator, FT/HES	1.0	2-23-2022
Santiago, Dyana	Paraeducator, FT/JAD	1.0	Paraeducator, PT/JAD	.48	2-11-2022

Personnel Report
February 2022

TRANSFERS

	FROM (PREVIOUS ASSIGN)		TO (NEW ASSIGN)		
CERT NAME	**POSITION/SCHOOL**	**FTE**	**POSITION/SCHOOL**	**FTE**	**EFFECTIVE**

None to report

COACHING / STIPENDS

Coaching Stipends

Murphy, Susan	Interim Girl's Tennis Assistant Coach	$2,556	3-19-2022

Other Stipends

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only _____ **Board Meeting Date** **March 24, 2022**

Decision Requested X **Agenda Code** **10b**

AGENDA REPORTING FORM

Agenda Topic: Policy 3542.1–Purposes and Facilities–Food Service-Policy Revision–Second Reading

Summary of Issue: The Policy & Personnel Committee has reviewed Policy 3542.1– Purposes and Facilities – Food Service.

Background: The Policy and Personnel Committee reviews policies with the administration to ensure they are current and appropriate.

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Policy & Personnel Committee is bringing the draft Policy 3542.1 to the full Board for a Second Reading.

Signature of Staff Member Submitting Report

Titles of Attachments:

1. DRAFT Policy 3542.1

Signature of Superintendent of Schools

Policy 3542.1

Purposes and Facilities – Food Service – Policy Revision

Draft

Purposes and Facilities: Food Service

~~The school lunch program shall be an integral part of the total educational program. An attractive, wholesome, well-balanced lunch is essential for the best work from students.~~

~~To accomplish this objective with appropriate economy, all administration of the food services program will be coordinated in the office of the Operations Administrator. Business functions to be centralized will include central purchasing of food and supplies, a district wide salary schedule for all food service employees, centrally planned menus, and regular audit of all accounts.~~

~~The educational aspects of the school lunch program will be the responsibility of each school principal, subject to advice, counsel and direction from the Superintendent of Schools.~~

The goal of the District's food services program is to provide students with nutritious and healthy foods that enhance learning.

The Southington Board of Education (Board) has an agreement with the Connecticut State Department of Education to participate in one or more school Child Nutrition Programs and accepts full responsibility for adhering to the federal and state guidelines and regulations pertaining to these school Child Nutrition Programs. The Board also accepts full responsibility for providing free or reduced-price meals to eligible elementary and secondary students enrolled in the District's schools. Applicants for such meals are responsible to pay for meals until the application for the free or reduced-price meals is completed and approved. All applications for free and reduced-price lunch and any related information is considered strictly confidential and not to be shared outside of the District's food services program.

Meals are planned to meet the specified nutrient standards outlined by the United States Department of Agriculture for children based on their age or grade group.

Purposes and Facilities: Food Service

Charging

Although not required by law, because of the District's participation in the Child
Nutrition Programs, the Board approves the establishment of a system to allow a student to charge a meal.

The Board realizes that funds from the nonprofit school food service account, according to federal regulations, cannot be used to cover the cost of charged meals that have not been paid.

Moreover, federal funds are intended to subsidize the meals of children and may not be used to subsidize meals for adults (teachers, staff and visitors). Adults are not allowed to charge meals and shall pay for such meals at the time of service or through prepaid accounts.

The Board prohibits the public identification or shaming of a child/student for any unpaid charges, including, but not limited to, the following:

- Delaying or refusing to serve a meal to such student,
- Designating a specific meal option for such student or otherwise taking any disciplinary action against such student.

A student needing to charge a meal will be informed of his/her right to purchase a meal, which may exclude a la carte items, for any school breakfast, lunch or other feeding.

To sustain the District's food services program, the District cannot permit the excessive charging of student meals. Therefore, any charging of meals must be consistent with this policy and any accompanying regulations. The Superintendent or his/her designee shall develop regulations designed to effectively and respectfully address family responsibility for unpaid meals.

Purposes and Facilities: Food Service

Charging continued

Any parent/guardian who anticipates a problem with paying for meals is encouraged to contact the Food Services Manager/Director and/or the applicable school Principal for assistance. The Board encourages all families who may have a child eligible for free or reduced-price lunch to apply.

Elementary Students

1. The District uses an automated prepayment system, which allows parents/guardians to view their child's meal account balance and purchases, receive low-balance notifications, as well as, make deposits, to their child's school meal account. Any student whose account has insufficient funds (i.e., is at the charging limit) and does not bring a meal from home may charge any combination of meals up to an amount not to exceed the cost of thirty (30) meals. Negative balance status can be avoided by making a payment in the form of cash, check, or by credit card to the automated prepayment website.

2. Students shall be allowed up to thirty (30) reimbursable meal charges. All other a-la-carte items shall not be charged. After thirty charges, the parents/guardians of such child will be referred to the District's homeless education liaison. When a charge is incurred, a written notification shall be sent home to parents. All credited meals must be repaid.

3. No student shall be deprived of a reimbursable meal due to forgotten or lost meal money. The school Principal is responsible for maintaining a fund of money to loan to students without meal money. The Principal or his/her designee is responsible for collecting money loaned to students. Students will be responsible for repaying all loaned money within an established timeframe. A note shall be given to the student to take home or mailed to the student's home to inform parents of the loan obligation. In situations in which a student is consistently without meal money, the Principal or his/her designee should encourage the parent/guardian to apply for free or reduced price meals.

4. All charges must be paid in 10 days. Parents will be notified and asked for prompt payment after 3 charges.

5. Communications with parents/guardians regarding collection of a child's unpaid meal charges shall include information on local food pantries, application for free or reduced-price meals and the Department of Social Services' supplemental nutrition assistance program and a link to the District's website that lists any community services available to town/city residents.

Purposes and Facilities: Food Service

Charging continued

Secondary Students

1. Students may charge up to two meals at the middle school level and two meals at the high school level and be subtracted from the Food Service House Account.

2. Students shall be allowed to charge up to two meals. The student will be given the same reimbursable meal that other children are provided. Parents of students who charge shall be notified by phone, after their child has received the meal. After charging four meals, the parents shall receive written notification. If a pattern of charging continues, attempts will be made to discuss the issue with the parents/guardians and encourage them to complete a free and reduced meal application.

Delinquent Debt and Bad Debt

The District's efforts to recover from households money owed due to the charging of meals must not have a negative impact on the children involved and shall focus primarily on the adults in the household responsible for providing funds for meal purchases. The school food authority is encouraged to consider whether the benefits of potential collections outweigh the costs which would be incurred to achieve those collections. Money owed because of unpaid meal charges shall be considered "delinquent debt," as defined, as long as it is considered collectable and reasonable efforts are being made to collect it. Such debt must be paid by June 30, effective within the current school year.

After reasonable attempts are made to collect the delinquent debt, and it is determined that further collection efforts are useless or too costly, the debt must be reclassified as "bad debt." Such debt shall be written off as an operating loss not to be absorbed by the nonprofit school food service account but must be restored using non-federal funds.

Definitions

"Delinquent Debt" are unpaid meal charges, like any other money owed to the nonprofit school food service account when payment is overdue, as defined by state or local policies.

"Bad Debt" are when unpaid meal charges are not collected and are considered a loss. Such debt must be written off as an operating loss, which cannot be absorbed by the nonprofit school food service account, but must be restored

Purposes and Facilities: Food Service

Charging continued

using nonfederal funds.

The Board will accept gifts, donations, or grants from any public or private sources for the purpose of paying off any unpaid charges for school meals.

Purposes and Facilities: Food Service

Dissemination of Policy

This policy shall via an electronic post on each school's web page.

This policy shall be available to all households at all times via student/parent handbooks, on online portals that households use to access student accounts, placed on the District's website, on the website of each school, and published at the beginning of each school year at the time information is distributed regarding free and reduced price meals and again to the household the first time the policy is applied to a specific child.

This policy shall be provided to all school staff and/or school food authority staff responsible for its enforcement. In addition, school social workers, nurses, the homeless liaison, and other staff members assisting children in need or who may be contacted by families with unpaid meal charges also should be informed of this policy.

The District's school food authority shall maintain, as required, documentation of the methods used to communicate this policy to households and school or school food authority-level staff responsible for policy enforcement.

Legal Reference: Connecticut General Statutes

10-215 Lunches, breakfasts and other feeding programs for public school children and employees. (as amended by PA 21-46)

10-215a Nonpublic school and nonprofit agency participation in feeding programs.

10-215b Duties of State Board of Education re feeding programs.

State Board of Education Regulations:

State of Connecticut, Bureau of Health/Nutrition, Family Services and Adult Education Operational Memorandum No. 4-17, "Guidance on Unpaid Meal Charges and Collection of Delinquent Meal Payments," Nov. 2, 2016

Operational Memorandum #19-10, State of Connecticut, Bureau of Health/Nutrition, Family Services and Adult Education "Unallowable Charges to No-profit School Food Service Accounts and the Serving of Meals to No-paying Full and Reduced Price Students"

National School Lunch Program and School Breakfast Program; Competitive

Foods. (7 CFR Parts 210 and 220, Federal Register, Vol 45 No. 20, Tuesday, January 29, 1980, pp 6758-6772

USDA Guidance:

SP 46-2016, "Unpaid Meal Charges: Local Meal Charge Policies"

SP 47-2016, "Unpaid Meal Charges: Clarification on Collection of Delinquent Meal Payment"

SP 57-2016 "Unpaid Meal Charges: Guidance and Q and A"

SP 58-2016 "2016 Edition: Overcoming the Unpaid Meal Challenge: Proven Strategies from Our Nation's Schools"

Policy adopted: October 1988

Policy reviewed: April 2003

Policy Revised: ____, 2022

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only _____ **Board Meeting Date** **March 24, 2022**

Decision Requested X **Agenda Code** **10c**

AGENDA REPORTING FORM

Agenda Topic: Policy 5145.3 – Sexual Harassment of Students - Policy Revision –Second Reading

Summary of Issue: The Policy & Personnel Committee has reviewed Policy 5145.3-Sexual Harassment of Students.

Background: The Policy and Personnel Committee reviews policies with the administration to ensure they are current and appropriate.

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Policy & Personnel Committee is bringing the draft Policy 5145.3 to the full Board for a Second Reading.

Titles of Attachments:

1. DRAFT Policy 5145.3

Signature of Staff Member Submitting Report

Signature of Superintendent of Schools

Policy 5145.3

Sexual Harassment of Students – Policy Revision

Draft

Policy 5145.3

Series 5000: Students

Welfare

Civil and Legal Rights and Responsibilities

Sexual Harassment of Students

It is the policy of the Board of Education ~~to create and maintain a learning environment that is free from unlawful sexual harassment and discrimination on the basis of sex~~. that any form of sex discrimination or sexual harassment is prohibited in the Board's education programs and activities, whether by students, Board employees or third parties subject to substantial control by the Board. The Board does not discriminate on the basis of sex in the education programs or activities that it operates, and the Board is required by Title IX of the Education Amendments of 1972 and its implementing regulations ("Title IX") and Connecticut law not to discriminate in such a manner. Students, Board employees and third parties are required to adhere to a standard of conduct that is respectful of the rights of students, employees and third parties. Any student or employee who engages in conduct prohibited by this Policy shall be subject to disciplinary action, up to and including expulsion or termination, respectively.

~~Sexual harassment is prohibited whether on school grounds, school buses or at school-sponsored activities, programs and events.~~ For conduct to violate Title IX, the conduct must have occurred in an education program or activity of the Board; the conduct must have occurred within the United States of America; and the complainant must be participating in or attempting to participate in the education program or activity of the Board. Conduct that does not meet these requirements still may constitute a violation of Connecticut law or another Board policy.

Sexual harassment can occur adult to student, student to student, between members of the opposite sex, or between members of the same sex.

~~The Board of Education encourages all persons who feel they have been sexually harassed and persons with knowledge of sexual harassment to report the harassment immediately. All complainants have the right to be free from retaliation of any kind. Complaints of sexual harassment will be promptly investigated.~~

~~Sexual harassment is defined as unwelcome conduct of a sexual nature, whether physical, verbal or non-verbal, and any other gender-based harassment, whether initiated by students, school employees, or third parties, when:~~

~~· Submission to the conduct is made explicitly or implicitly a term or condition of a student's participation in school-sponsored activities, or another aspect of the student's education;~~

~~· Submission to or rejection of the conduct is used as the basis for decisions affecting a student's academic performance, participation in school-sponsored activities, or any other aspect of a student's education.~~

~~· The conduct has the purpose or effect of unreasonably interfering with a student's academic performance or participation in school sponsored activities, or creating an intimidating, hostile, or offensive educational environment.~~

~~While an exhaustive list is not possible, the following are examples of specific behaviors that could constitute sexual harassment:~~

~~· Unwelcome sexual invitations or requests for sexual activity in exchange for grades, promotions, preferences, favors, selection for extra-curricular activities, assignments, homework, etc.;~~

~~· Any unwelcome communication that is sexually suggestive, sexually degrading or implies sexual motives or intentions, such as sexual remarks or innuendoes about an individual's clothing, appearance or activities; sexual jokes; sexual gestures, public conversations about sexual activities or exploits; sexual rumors and "ratings lists," howling, catcalls, and whistles; sexually graphic computer files, messages or games, etc.;~~

~~· Unwelcome physical contact or closeness that is sexually suggestive, sexually degrading, or sexually intimidating;~~

~~· Any other unwelcome gender-based behavior that is offensive, degrading, intimidating or demeaning.~~

Sex discrimination occurs when a person, because of the person's sex, is denied participation in or the benefits of any education program or activity receiving federal financial assistance.

Sexual harassment under Title IX means conduct on the basis of sex that satisfies one or more of the following:

(1) An employee of the Board conditioning the provision of an aid, benefit, or service of the Board on an individual's participation in unwelcome sexual conduct (*i.e., quid pro quo)*;

(2) Unwelcome conduct determined by a reasonable person to be so severe, pervasive, and objectively offensive that it effectively denies a person equal access to the Board's education programs or activities; or

(3) "Sexual assault" as defined in 20 U.S.C. 1092(f)(6)(A)(v), "dating violence" as defined in 34 U.S.C. 12291(a)(10), "domestic violence" as defined in 34 U.S.C. 12291(a)(8), or "stalking" as defined in 34 U.S.C. 12291(a)(30).

Sexual harassment under Connecticut law means conduct in a school setting that 1) is sexual in nature; 2) is unwelcome; and 3) denies or limits a student's ability to participate in or benefit from a school's educational program. Sexual harassment can be verbal, nonverbal or physical. Sexual violence is a form of sexual harassment.

Reporting Sex Discrimination or Sexual Harassment

It is the express policy of the Board to encourage victims of sex discrimination and/or sexual harassment to report such claims. Students are encouraged to report complaints of sex discrimination and/or sexual harassment promptly in accordance with the appropriate process set forth in the Administrative Regulations. The Board directs its employees to respond to such complaints in a prompt and equitable manner. The Board further directs its employees to maintain confidentiality to the extent appropriate and not tolerate any reprisals or retaliation that occur as a result of the good faith reporting of charges of sex discrimination and/or sexual harassment. Any such reprisals or retaliation will result in disciplinary action against the retaliator, up to and including expulsion or termination as appropriate.

Any Board employee with notice of sex discrimination and/or sexual harassment allegations shall immediately report such information to the building principal and/or the Title IX Coordinator(s), or if the employee does not work in a school building, to the Title IX Coordinator(s).

The Southington Public Schools administration (the "Administration") shall provide training to Title IX Coordinator(s), investigators, decision-makers, and any person who facilitates an informal resolution process (as set forth in the Administrative Regulations), which training shall include but need not be limited to, the definitions of sex discrimination and sexual harassment, the scope of the Board's education program and activity, how to conduct an investigation and grievance process, and how to serve impartially, including by avoiding prejudgment of the facts at issue, conflicts of interest, and bias. The Administration shall make the training materials used to provide these

trainings publicly available on the Board's website. The Administration shall also periodically provide training to all Board employees on the topic of sex discrimination and sexual harassment under Title IX and Connecticut law, which shall include but not be limited to when reports of sex discrimination and/or sexual harassment must be made. The Administration shall distribute this Policy and the Administrative Regulations to staff, students and parents and legal guardians and make the Policy and the Administrative Regulations available on the Board's website to promote an environment free of sex discrimination and sexual harassment.

The Board's Title IX Coordinator(s) are Special Education Coordinator Amy Aresco and Principal Erin Natrass. Any individual may make a report of sex discrimination and/or sexual harassment directly to the Title IX Coordinator(s) using any one, or multiple, of the following points of contact.

Amy Aresco
Erin Natrass

OFFICE ADDRESS
ELECTRONIC MAIL ADDRESS
TELEPHONE NUMBER

Any individual may also make a report of sexual harassment and/or sex discrimination to the U.S. Department of Education: Office for Civil Rights, Boston Office, U.S. Department of Education, 8th Floor, 5 Post Office Square, Boston, MA 02109-3921 (Telephone (617) 289-0111).

~~Legal References: 42 U.S.C. 2000 e ("Title VII")~~

~~.29 C.F.R. 1604.11 (EEOC Guidelines On Sexual Harassment) Connecticut General Statutes 469-60(9)(8)~~

Legal References: Title IX of the Education Amendments of 1972, 20 U.S.C. § 1681, et seq.

Title IX of the Education Amendments of 1972, 34 C.F.R § 106.1, et seq.

Gebser v. Lago Vista Independent School District, 524 U.S. 274 (1998)

Davis v. Monroe County Board of Education, 526 U.S. 629 (1999)

Conn. Gen. Stat. § 10-15c - Discrimination in public schools prohibited.

Policy Adopted: September 1992
Policy Reviewed: August 2002
Policy Revised: March 2005
Policy Reviewed: November 2006

R-5145.3

Series 5000: Students

Welfare

Civil and Legal Right and Responsibilities

Sexual Harassment

It is the express position of the Southington Public Schools to encourage all persons who feel they have been sexually harassed and persons with knowledge of sexual harassment to report such claims. A student who believes that he/she has been subjected to or witness to sexual harassment as defined in Policy 5145.3 may address his/her claims in the following manner:

- Any student who believes that he/she has been the subject of sexual harassment and persons with knowledge of sexual harassment should make a report immediately either orally or by written complaint. The report may be made to the student's teacher and/or the school administration.

· Sexual harassment complaints will be investigated within fourteen (14) calendar days in the same manner as any other allegation of student misconduct. If the complaining student or alleged harasser is a student under the age of 18, the harassment complaint official shall notify the student's respective parent(s)/guardian(s) of the investigation within three (3) school days. Upon completion of the investigation, parent(s)/guardian(s) of both the complainant and alleged harasser will be notified in writing of findings.

· Students found to have engaged in sexual harassment will be subject to disciplinary action in keeping with the established policies, regulations and rules of the school district. Such disciplinary action may include suspension or expulsion from school.

Process

Informal Procedure

It may be possible to resolve a complaint through a voluntary conversation between the complaining student and the alleged harasser which is facilitated

by the principal or designee. If the complaining student and the alleged harasser feel that a resolution has been achieved, then the conversation may remain confidential and no further action needs to be taken. The results of an informal resolution shall be reported by the principal, in writing, to the Superintendent, to the Title IX Compliance Officer, and to the parent(s)/guardian(s) of both the complainant and alleged harasser.

If the complaining student, the alleged harasser, the principal or designee, chooses not to utilize the informal procedure, or feels that the informal procedure is inadequate or has been unsuccessful, he/she may proceed to the formal procedure. Any complaint against a school employee shall be handled through the formal procedure.

Formal Procedure

Step 1

The principal or designee shall fill out a harassment complaint form based on the written or verbal allegations of the complaining student. This complaint form

shall be kept in a centralized and secure location.

a. The complaint form shall detail the facts and circumstances of the incident or pattern of behavior.

b. An investigation shall be completed by the principal or designee within 14 calendar days from the date of the complaint or report.

Step 2
The investigation may consist of personal interviews with the complaining student, the alleged harasser and any other individuals who may have knowledge of the alleged incident(s) or circumstances giving rise to the complaint. In determining whether alleged conduct constitutes a violation of this policy, the principal or designee should consider the surrounding

circumstances, any relevant documents, the nature of the behavior, past incidents or past or continuing patterns of behavior, the relationships between the parties involved and the context in which the alleged incidents occurred. Whether a particular action or incident constitutes a violation of this policy requires a determination based on all the facts and surrounding circumstances.

The investigation will be completed as soon as practicable, but no later than fourteen (14) calendar days from the complaint or report. Parent(s)/Guardian(s) of both the complaining student and alleged harasser will be notified of the complaint within three (3) school days. The principal or designee shall make a written report to the Superintendent and the Title IX Compliance Officer upon completion of the investigation. The report shall include a determination as to whether the allegations have been substantiated as factual and whether they appear to be violations of policy 5143.3.

Step 3
Following the investigation, the principal or designee shall recommend to the Superintendent and/or Title IX Compliance Officer what actions, if any, are required. The School District shall take appropriate action in all cases where the principal or designee concludes that this policy has been violated. Any person who is determined to have violated this policy shall be subject to action, including but not limited to, warning, exclusion, suspension, expulsion, transfer, termination, discharge or any other remedial action, including but not limited

to, training, education, or counseling.

Step 4
The complaining student, the alleged harasser, and the respective parent(s)/guardian(s) shall be informed of the results of the investigation, including whether the allegations were found to be factual, whether there was a violation of the policy, and whether disciplinary action was or will be taken.

If after investigation, sexual harassment by a specific student is verified, the building principal or his/her designee shall notify the parent or guardian of the harasser and complaining student in writing of that finding. If disciplinary consequences are imposed against such a student, a description of such discipline shall be included in such notification to the harasser's parent(s)/guardian(s).

Reporting of Potential Physical and/or Sexual Abuse
Under certain circumstances, alleged harassment may also be possible abuse under Connecticut law. If so, the duties of mandatory reporting under Connecticut General Statutes Section 17a-101 may be applicable.

Nothing in this policy will prohibit the School District from taking immediate action to protect victims of alleged sexual harassment or abuse.

Confidentiality
The Southington Public Schools recognizes that both the complaining student and the alleged harasser have strong interests in maintaining the confidentiality of the allegations and related information. The privacy of the complaining student, the individual(s) against whom the complaint is filed, and the witnesses will be respected as much as possible, consistent with legal obligations to investigate, to take appropriate action, to comply with any discovery or disclosure obligations, and in accordance with regulation herein.

Retaliation
It is a separate and distinct violation of this policy for any member of the school community to retaliate against any person who reports alleged harassment or against any person who testifies, assists or participates in an investigation, proceeding or hearing relating to such harassment. It is possible that an alleged harasser may be found to have violated this anti-retaliation provision even if the underlying complaint of harassment is not found to be a violation of this policy.

Retaliation includes, but is not limited to any form of intimidation, reprisal or harassment and may be redressed through application of the same reporting, investigation, and enforcement procedures as for harassment. If it is found that acts of harassment or retaliation do occur, appropriate disciplinary action will be taken.

Sexual Harassment (continued)

Alternative Complaint Procedures
In addition to, or instead of, filing a harassment complaint through this policy, a person may choose to exercise other options, including but not limited to filing a complaint with outside agencies or filing a private lawsuit.

Notice and Publication
This policy shall be conspicuously posted throughout each school building in areas accessible to students and staff members. A summary of this policy shall also appear in the student handbook. The School District will develop a method of discussing this policy with students and employees.

Review Process
This policy shall be reviewed annually for compliance with state and federal law.

Regulation Approved: September 1992
Regulation Revised: August 2002
Regulation Revised: March 2005
Regulation Reviewed: November 2006

R-5145.3

SOUTHINGTON SCHOOL DISTRICT

STUDENT SEXUAL HARASSMENT COMPLAINT FORM

Date Received: _____

Complainant's Name: Date: Name(s) of Alleged Harasser(s):

Date(s) of Alleged Harassment:

Place of incident:

Name of Witnesses (if any):

Description of misconduct:

Has this incident been reported before?

If yes, when?

To whom?

What was the resolution?

Complainant's Signature: Date:

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only _____ **Board Meeting Date** **March 24, 2022**

Decision Requested X **Agenda Code** **10 d.**

AGENDA REPORTING FORM

Agenda Topic: Science – Grade 1 Units - Second Reading

Summary of Issue: The Curriculum & Instruction Committee has reviewed Science – Grade 1 Units

Background:

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Curriculum & Instruction Committee is bringing the Science – Grade 1 Units to the full Board for a Second Reading.

Titles of Attachments:

1. Course Proposal

Signature of Staff Member Submitting Report

Signature of Superintendent of Schools

Southington Public Schools

Grade 1 Science Units

Melissa O'Neil- *K-5 Science Specialist*
Amy Zappone- *District Math & Science Curriculum Coordinator*

01

Playground Shadows

02

Film Animation

03

Senses in Nature

04

Seasonal Changes

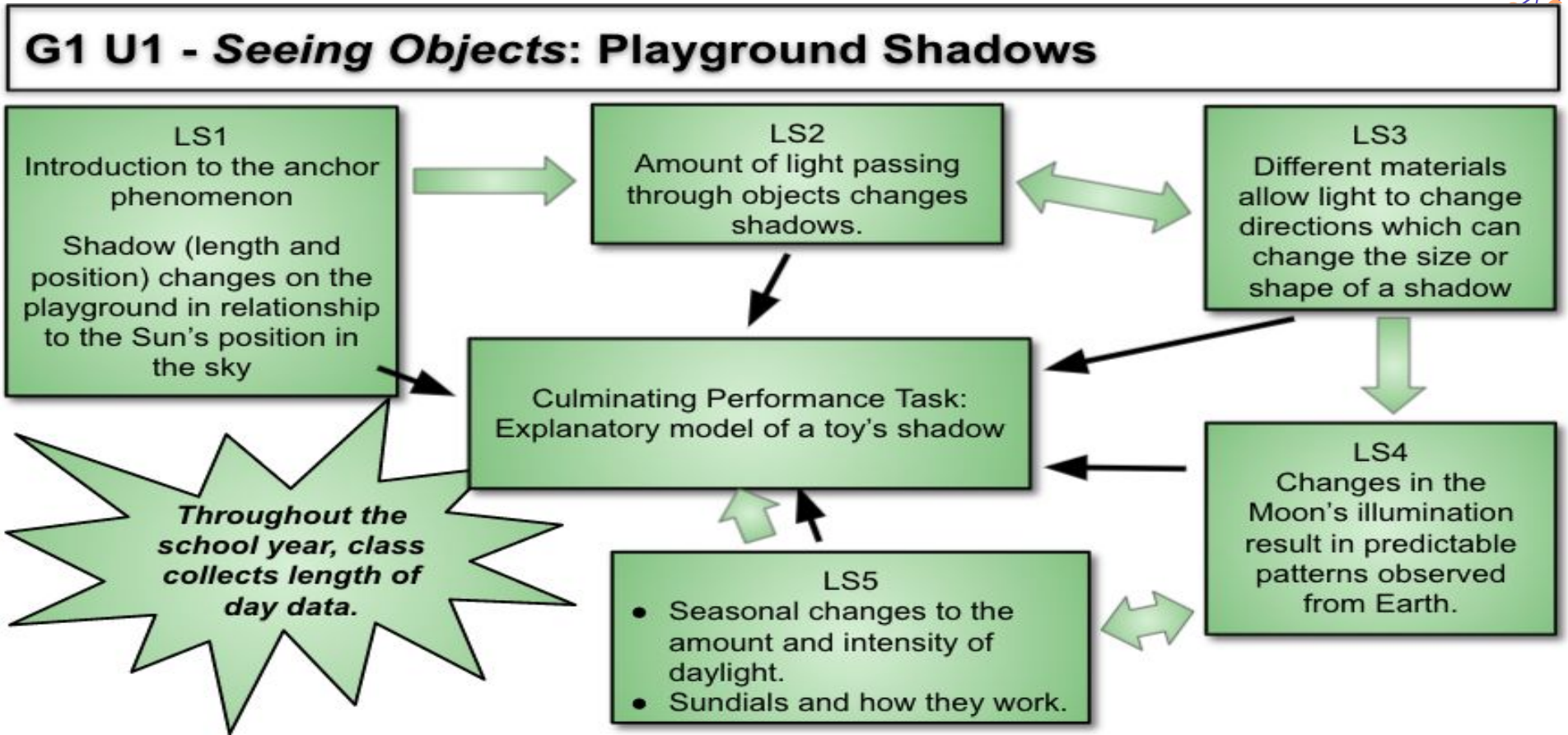
Unit 1 Overview- Playground Shadows

Unit Driving Question: What causes a shadow's length and position to change?

Students start this unit by exploring their own shadows on the playground. They trace their shadows at three specific times during the day to look for observable patterns. They investigate how their shadows change in length and location relative to the position of the sun. This observation of shadows leads to new questions about what makes a shadow and what causes a shadow's length and position to change?

The students experiment with light and explore how some materials allow light to be redirected. They make observations of the moon and observe its pattern over time, learning how shadows affect its appearance. The students begin their year long data recording of the seasonal patterns of how many hours of daylight happen, and start to notice seasonal patterns of overall daylight length. The culminating activity of creating a model that shows how the sun affects a toy's shadow over time further deepens their understanding of sunlight and shadow patterns throughout the day.

Unit Flow Chart



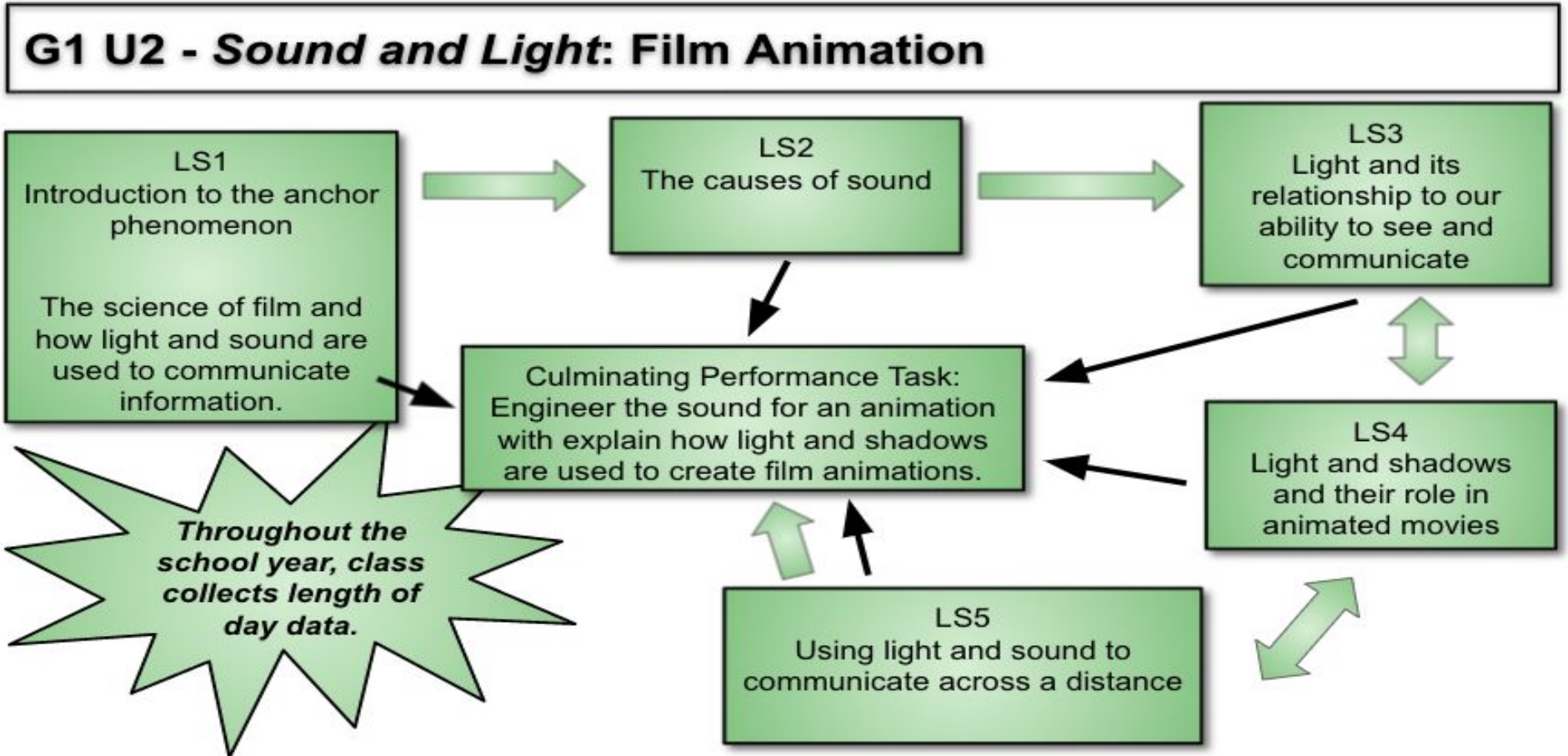
Unit 2 Overview- Film Animation

Unit Driving Question: How do sound and light communicate information?

Students start this unit by viewing an animation of *Mickey's Steamroller* to build a connection between the use of both light and sound in order to better understand how they work together to communicate a message. Students investigate throughout the unit the things needed to produce a sound, what mediums allow light to pass through them to varying degrees (or not at all), what people use to communicate over long distances, and how certain sound and light effects can be used to trigger behaviors and enhance the understanding of the message being communicated.

To demonstrate their understanding of these diverse topics and tie them all together, students are tasked with improving a *Nuggets* animation in their culminating performance task. Students become engineers of both sound and light to create a specific message with a soundtrack for a simple animation to be shared with their class.

Unit Flow Chart



Unit 3 Overview- Senses in Nature

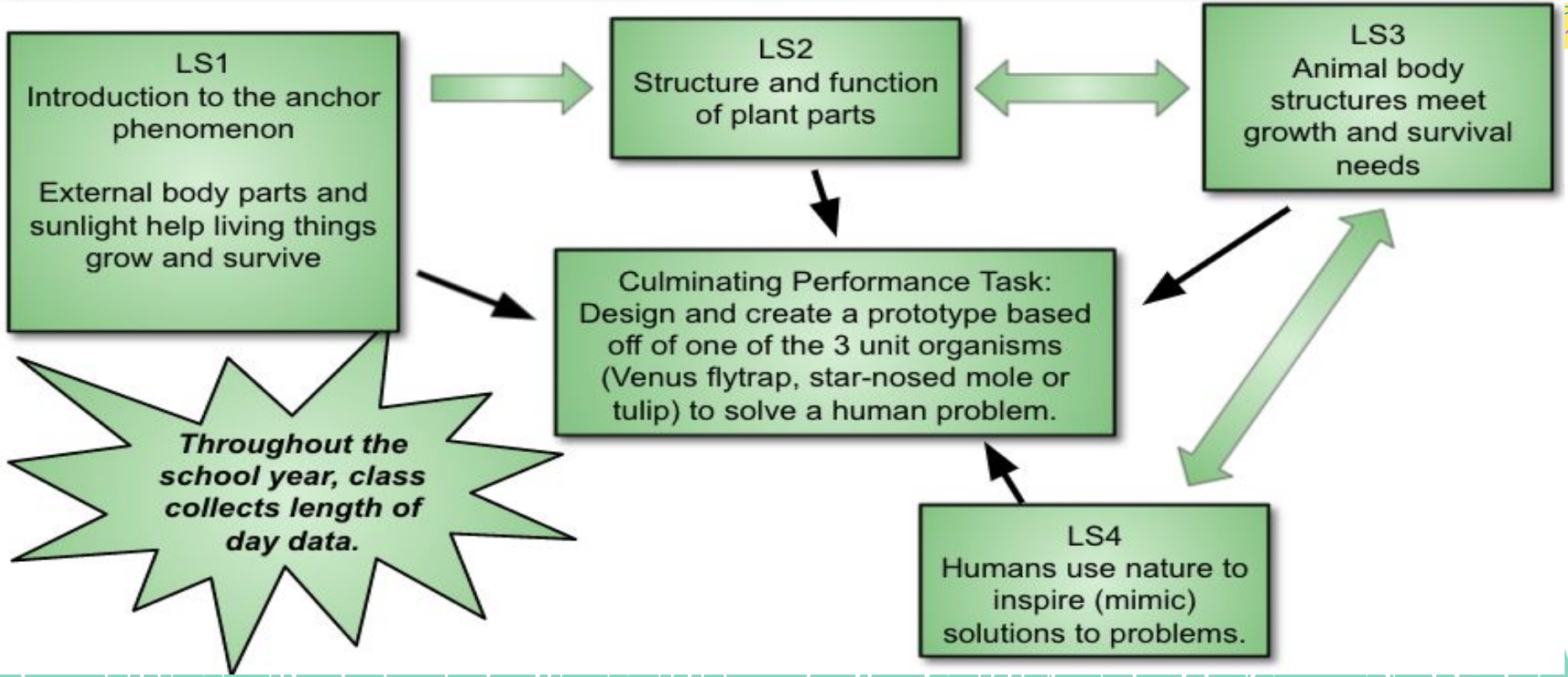
Unit Driving Question:How do external parts and sunlight help living things grow and survive?

Students become plant and animal scientists who use their powers of observation and curiosity on a journey of figuring out how plants and animals use their external parts to help them meet their needs in order to grow and survive. Students will initially view three video clips that show the amazing lives of three organisms; a tulip, venus flytrap and the star-nosed mole. The students will be asked to view the video clips through two lenses: I wonder and I notice. From their observations, students will start to develop initial theories on why these organisms look the way they do and why they behave the way they do.

By the end of this unit, students will be introduced to the concept of biomimicry, learning from nature to make things better. Students will be able to explain the structures and functions of animals and plants as well as identify survival growth needs for both plants and animals. The culminating learning sequence will have the students take all information learned throughout the unit and tie it together to create/engineer a problem that needs to be solved.

Unit Flow Chart

G1 U3 - *Organisms and Sunlight*: Senses in Nature



Unit 4 Overview- Seasonal Changes

Unit Driving Question: How do living things prepare and behave in order to survive in the different seasons?

Through patterns of the sunlight and Earth's seasons, students will explore how living things respond to seasonal changes. Unlike humans, animals and plants have strong biological seasonal cycles that are linked to the amount of sunlight in their day. The response from plants and animals to these changes in daylight through the year include reproduction, denning, migration, hibernation, changes to coat thickness, coloration, leaf production, growth and dormancy. These characteristics and behaviors connect offspring to their parents in both their traits (offspring that are alike and not exactly alike their parents) and their survival.

Students learn what it is like to be a field biologist. They will study the different living things in the local region or deciduous biome in order to generate a field guide. Using a variety of media, students will investigate how living things change with the seasons and record these findings on the pages of the field guide. To continue in their role as field biologists, students record the ways in which parents help their offspring to survive.

Unit Flow Chart

G1 U4 - *Patterns in the Natural World*: Seasonal Changes

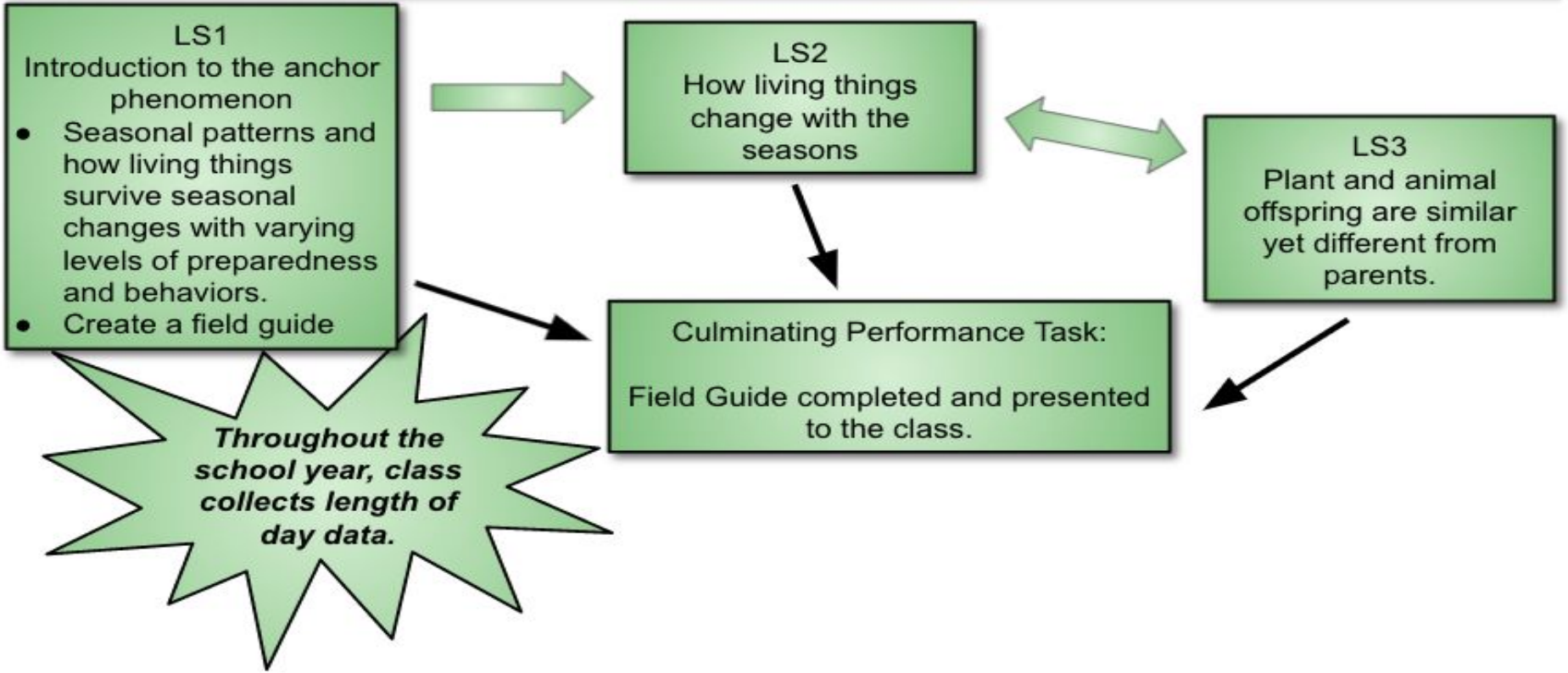


Table of Contents

Back to Top of Page

Unit 1 - Playground Shadows
Students start this unit by exploring their own shadows on the playground. They trace their shadows at three specific times during the day to look for observable patterns. They investigate how their shadows change in length and location relative to the position of the sun. This observation of shadows leads to new questions about what makes a shadow and what causes a shadow's length and position to change? The students experiment with light and explore how some materials allow light to be redirected. They make observations of the moon and observe its pattern over time, learning how shadows affect its appearance. The students begin their year long data recording of the seasonal patterns of how many hours of daylight happen, and start to notice seasonal patterns of overall daylight length. The culminating activity of creating a model that shows how the sun affects a toy's shadow over time further deepens their understanding of sunlight and shadow patterns throughout the day. To access the flowchart for this unit, click here.
Suggested Pacing: 9 -11 hrs
Anchoring Phenomenon/Design Problem: Shadow changes on the playground
Unit Driving Question: What causes a shadow's length and position to change?
Culminating Performance Task: Explanatory Model of a toy's shadow
Three Dimensions that form the Foundation for these NGSS Performance Expectations:
NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements) ● 1-PS4-2 Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. ○ [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.] ■ *This PE is not fully accessible Unit #1, but will be continued in Unit #2. ● 1-PS4-3 Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light. ○ [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] ○ [Assessment Boundary: Assessment does not include the speed of light.] ● 1-ESS1-1 Use observations of the sun, moon, and stars to describe patterns that can be predicted.

Back to Top of Page

- [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.]
- [Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]

- 1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.
  - [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.]
  - [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.

Science & Engineering Practices:

Constructing Explanations and Designing Solutions
- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2)

Analyzing and Interpreting Data
- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)

Planning and Carrying Out Investigations
- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)

Disciplinary Core Ideas:

PS4.B: Electromagnetic Radiation
- Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2)

ESS1.A: The Universe and its Stars
- Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)

ESS1.B: Earth and the Solar System
- Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)

Crosscutting Concepts:

Cause and Effect
- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-2)

Patterns
- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1) (1-ESS1-2)

Common Core State Standards Connections:

ELA/Literacy —
- W.1.2 Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure. (1-PS4-2)
- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-PS4-2) (1-ESS1-1)(1-ESS1-2)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-2) (1-ESS1-1)(1-ESS1-2)
- SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (1-PS4-2

Mathematics —
- MP.2 Reason abstractly and quantitatively. (1-ESS1-2)
- MP.4 Model with mathematics . (1-ESS1-2)

Back to Top of Page

- MP.5 Use appropriate tools strategically. (1-ESS1-2)
- 1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)
- 1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)

PROGRESSION OF LEARNING

ONGOING THROUGHOUT THE SCHOOL YEAR:
Class collects length of day data throughout the school year.

- Plan at least 10 dates (1x/9 month) to collect length of day and graph on a class chart.
- It is suggested to gather the data over the summer and use this data to model how to collect the data for the school year.
- This ongoing observation fully covers the PE (1-ESS1-2 - Make observations at different times of year to relate the amount of daylight to the time of year.)
- Resources:
- Website for data collection
- Sample bar graph
- Optional: amount of daylight each month

Learning Sequence 1:

- Learning Sequence Driving Question
  - What causes a shadow's length and position to change?
- Learning Sequence 1
- Relationship to Anchoring Phenomena/Design Problem:
  - This is the introduction to the anchoring phenomenon of how shadows change on the playground.
- Student Expected Outcomes:
  - Students will make first hand observations to show how the position of the Sun in the sky changes their shadows in length and position.

Learning Sequence 2:

- Learning Sequence Driving Question
  - What do you need to make a shadow?
- Learning Sequence 2
- Relationship to Anchoring Phenomena/Design Problem
  - Students explore how differing amounts of light passing through objects changes shadows.
- Student Expected Outcomes:
  - Students will make observations to understand that some materials will allow all light, some light and no light to pass through.
  - Students plan and carry out investigations on how much light passes through various objects by using simple tests to support their ideas.

Learning Sequence 3:

- Learning Sequence Driving Question
  - How can we change the direction of light? If we change the direction of light, what happens to our shadow?

Back to Top of Page

- Learning Sequence 3
- Relationship to Anchoring Phenomena/Design Problem
  - Different materials allow us to change the direction of light. This change in direction can help to illuminate an object to make it visible or change the size or shape of a shadow cast.
- Student Expected Outcomes:
  - Students will make observations as well as plan and carry out investigations to understand that some materials will allow light to be reflected (mirrors) and that some materials will allow light to be redirected (prisms).

Learning Sequence 4:

- Learning Sequence Driving Question
  - Why does the moon's appearance change?
- Learning Sequence 4
- Relationship to Anchoring Phenomena/Design Problem
  - Changes in illumination of the Moon by the Sun causes its appearance to change on Earth. These changes are predictable patterns. This same effect occurs to the shadows on the playground as the light source (Sun) changes position.
- Student Expected Outcomes:
  - Students will make observations using moon models and calendar to identify and predict patterns.
  - Students will draw a model of what's needed to see the Moon at night from Earth.

Learning Sequence 5:

- Learning Sequence Driving Questions
  - How does the amount and intensity of daylight change with the seasons?
  - How do sundials work?
- Learning Sequence 5
- Relationship to Anchoring Phenomena/Design Problem
  - Student shadows on the playground would change with the seasons. Summer months would produce shadows for more hours during the day than shadows cast in the winter months. Shadows cast with more intense light appear darker. Shadows created by sundials move throughout the day according to the position of the sun in the sky.
- Student Expected Outcomes:
  - Students will be able to observe, describe, and predict the differences in daylight time associated with the seasons.
  - Students will make observations and identify patterns associated with light and shadows.
  - Students will explore how their shadows on the playground change season by season.
  - Students will create a class sundial and explain the inner workings of a sundial using observed data and patterns.

Assessments:

- Culminating Performance Task
  - Students are provided with an explanatory model template, flashlight, and small toy/object to enact the motion of the sun through the sky over their small toy (you will need to turn off the classroom lights) and draw an explanatory model of what happens or present their thoughts verbally to the class.
    - Explanatory Model Template

- Grade 1 Performance Expectations Rubrics and Prompts
- Elementary Assessment Resources

Back to Top of Page

Additional Resources:

- G1 Unit Materials List
  - Click on specific tab for unit-specific materials
- EPIC! Digital Library - G1 U1 List
  - Includes ebooks and videos
  - Must have an educator user account for free access

Back to Top of Page

Learning Sequence 1		
Brief Description: Students will go outside three times throughout the day (sunny day) to observe and record their shadows, paying particular attention to the changes in the size and location of shadow throughout the day. Students explore the patterns of the sun and how their shadows change.		
Suggested Pacing: 1.5 - 1.75 hrs (includes 15 minutes 3x same day morning, noon, afternoon)		
Lesson-Level Phenomenon/Design Problem: Peter Pan's Shadow - How do shadows really behave?		
Relationship to Anchoring Phenomena/Design Problem: This is the introduction to the anchoring phenomenon of how shadows change on the playground.		
Learning Sequence Driving Question: What causes a shadow's length and position to change?		
Student Expected Outcomes: ● Students will make first hand observations to show how the position of the Sun in the sky changes their shadows in length and position.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Analyzing and Interpreting Data** ● Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1) **Planning and Carrying Out Investigations** ● Make observations (firsthand or from media) to collect data that can be	**Disciplinary Core Ideas:** **ESS1.A: The Universe and its Stars** ● Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)	**Crosscutting Concepts:** **Cause and Effect** ● Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-2) **Patterns** ● Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1) (1-ESS1-2)

Back to Top of Page

used to make comparisons. (1-ESS1-2)		

NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements)

- 1-ESS1-1 Use observations of the sun, moon, and stars to describe patterns that can be predicted.
  - [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.]
  - [Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]

Common Core State Standards Connections:

1-ESS1-1:

ELA /Literacy -

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-ESS1-1)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-ESS1-1)

Prior Student Knowledge:

N/A

Possible Preconceptions/Misconceptions:

Students may believe that:

- the Sun is moving across the sky as opposed to the Earth moving.
- the Moon is only present /viewable at night.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Show *Peter Pan Video Clip*.
  - Optional Video Clips (resulting in lesson level phenomenon change): *Fantasia Clip* or *Toddler Video*
- Discuss Peter's shadow and ask:
  - Is that behavior typical of a shadow?
  - Did Peter Pan's shadow behave as expected?

Resources:

- Peter Pan Video Clip (start at 53 seconds)
- Fantasia Clip
- Toddler Video

Teacher Action(s):

Back to Top of Page

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Ask questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- Turn and Talk-What will happen to your shadow at different times of the day?
- How can we figure out how our shadow changes or behaves at different times of the day?
    - Show students sidewalk chalk to get them thinking about ways to investigate their shadow.
    - Through class discussion, students help to develop an investigation to determine how their shadows change throughout the day (make students feel as though they have developed the investigation).
- Prior to going outside to make observations, have students make predictions about what they think will happen if they trace their shadows in the morning, at lunch time, and in the afternoon.
- Students work in pairs to trace their partner's shadow three times in one day:
    - Students go outside three different times in one day, stand in the exact same spot and record their shadow with colored chalk. Trace the student's footprint at the first observation. Each observation, students will use a different color chalk to indicate time of day. Students will stand in the same footprint each time they go out to trace their shadow.
    - Students draw the shape of their entire shadow on Page #1 of the *Observation Sheet* starting from their feet. They need to use a different color for each observation throughout the day.
        - An extra observation could include the position of the Sun in the sky relative to their bodies. (CAUTION: do not let students look directly at the Sun)
    - If space is limited, use any of the following options:
        - Class traces the teacher's shadow
        - Students work in small groups instead of pairs to trace just one shadow.
        - Students can create gingerbread people cutouts from the patterns on page 4 of the Observation Sheet to the shadow on a piece of paper. It is necessary to position the gingerbread men and paper in the exact same place throughout the day to see the change in shadow.
            - Put an X on the paper where the gingerbread man is positioned and outline the paper so the same place is used for each observation.
- Students should compare their observations with other student groups to identify similarities and differences (patterns).
- Students record observations of their shadows three times throughout the day, using their *Observation Sheet.*
- Students make and modify predictions with each new subsequent observation throughout the day.

Teacher Note: This will be further explained in Learning Sequence #2.

Resources:

- Observation Sheet

Back to Top of Page

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Students watch the *How Shadows Change video*.
- Students watch the *Sunrise and Sunset Time-Lapse*
- Students turn and talk about the following questions:
  - Do you think the shadows changing is related to the sun's place in the sky?
  - Why does the sun appear to move across the sky?
- Discuss that the sun's light only shines on half of the Earth at a time and ask: What does that mean?
  - A good demonstration of this is to use a flashlight, a Styrofoam ball with a tack in the spot where Connecticut should be to model day and night. The tack represents where they are standing on Earth. As a volunteer rotates the styrofoam ball, the students observe that sometimes the tack is on the light side of the ball and sometimes it is on the dark side.
- Students read *Day and Night* by Patricia Armentrout on epic! Books.
- Reinforce all of these ideas with another quick demonstration showing how day and night happen on Earth.
  - Ask a student to stand up and face the teacher (who is holding a flashlight).
  - Shine the light toward them and ask: Is it day or night?
  - Tell the class that the sun is now setting and have the student rotate around (so their back is facing the flashlight)
  - Ask the class: Is it day or night?
  - Tell the class that the sun is now rising and have the student rotate around (so they are now facing the flashlight again).
  - Continue to repeat these steps (with new volunteers) until the class can easily predict the pattern of when sunrise, sunset, day and night happen.

Resources:

- How Shadows Change video
- Sunrise and Sunset Time-Lapse
- Day and Night by Patricia Armentrout on epic! Books
- Parts of this activity are taken from BetterLesson

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words

Back to Top of Page

- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: day, night, shadow, sunrise, sunset, rotate, sun

EVALUATE

Formative Monitoring Description(s):

Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence. Please note the following SEP, DCI and CCC need to be monitored throughout the learning sequence.

- ❏ **SEP:** *Analyzing and Interpreting Data; Planning and Carrying Out Investigations*
- ❏ **DCI**: *ESS1.A: The Universe and its Stars*
- ❏ **CCC**: *Cause and Effect; Patterns*

Summative Assessment Description(s):

- As a class, add any new information to the *Summary Table*.

Resources:

- Summary Table

Additional Resources:

- G1 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 2

Brief Description:
Students will explore with a light source and different objects to see if light passes through, if some light passes through, or if no light passes through.

Suggested Pacing:
2 - 2.25 hrs

Lesson-Level Phenomenon/Design Problem:
What do you need to make a shadow?

Relationship to Anchoring Phenomena/Design Problem
Students explore how differing amounts of light passing through objects changes shadows.

Learning Sequence Driving Question:
What do you need to make a shadow?

Student Expected Outcomes:

- Students will make observations to understand that some materials will allow all light, some light and no light to pass through.
- Students plan and carry out investigations on how much light passes through various objects by using simple tests to support their ideas.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:

Planning and Carrying Out Investigations

- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-PS4-3)

Disciplinary Core Ideas:

PS4.B: Electromagnetic Radiation

- Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2)

Crosscutting Concepts:

Cause and Effect

- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-2)

Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1) (1-ESS1-2)

Back to Top of Page

Related Performance Expectation(s) in this Unit:

- 1-PS4-3 Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.
  - [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).]
  - [Assessment Boundary: Assessment does not include the speed of light.]

Possible Common Core State Standards Connections:

ELA/Literacy

- W.1.2 Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure. (1-PS4-2)
- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-PS4-2)(1-PS4-3)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-2)(1-PS4-3)
- SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (1-PS4-2)(1-PS4-3)

Prior Student Knowledge:

N/A

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)
Activity Description:

- Referencing the shadow tracing activity, engage students to share their observations and predict if all objects will cast the same kinds of shadows.
  - Do all objects cast the same kind of shadows?
- The teacher will cast a variety of shadows (without students seeing the objects), students can predict what the characteristics of the object may be based upon the shadow cast. Sample items: ball, toy car, plastic bag, something made of glass, rock/sea shell, a tupperware container, etc.

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)
Activity Description:

- Students shine the flashlight through a variety of cups (translucent, transparent and opaque).

Back to Top of Page

- Students will record their findings on the Recording Sheet.
    - If students test objects other than the cups, they will need access to more than one observation sheet.
- The students generate questions and wonderings about how different materials will affect the light passing through them and the shadow (darker/lighter) it will cast. It may be helpful to turn off the classroom light as the students manipulate the objects and flashlights.
- After students have had time to manipulate and play with the flashlight and cups, prompt student discourse about what they noticed. Record student ideas on the board or chart paper.
    - What did you notice about the shadows cast by the different objects?
    - Why do you think these shadows were different?
    - (Lead students to the idea that different objects allow different amounts of light to pass through)
- Students will form new predictions and hypotheses about what they think will happen with the different objects and the light source and how shadows will change.

Resources:

- Recording Sheet
- Examples of cups

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)
Activity Description:

- Students share their observations of what objects allowed all light to pass through, some light to pass through, or no light to pass through.
- Create a class data table that lists the materials used and the students will share their findings from their exploration and recording sheet.
- Read books on shadows listed in *Resources* or any other media source.
- After students share their findings, the teacher will help the class to come up with definitions for some of the key words/concepts they noted. These terms should at minimum include: light, light source, shadow, all light (transparent*), some light (translucent*), no light (opaque*).
- Create an anchor chart and use the kids' ideas to complete the chart around each of the Vocabulary terms listed. Give students guidance toward proper definitions.

Resources:

- Follow It! Learn About Shadows by Pamela Hall on epic Books!

Back to Top of Page

- Playing with Light and Shadows by Jennifer Boothroyd on epic Books!
- Sample Anchor Chart

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: light, light source, shadow, all light (transparent *), some light (translucent *), no light (opaque *).
* These terms do not have to be used.

ELABORATE (Applications / Extensions)
Activity Description:

- Students engineer a shadow puppet. The teacher can provide printables for students if they can't make their own shapes. Students will need to select appropriate materials to create their shadow puppet and their desired effects (amount of light passing through the puppet).
- Teacher provide materials for students to plan and engineer a shadow puppet. Teacher can explain that some shadow puppets allow light to pass through to create an effect and others block all light from passing through.
    - Materials:
        - popsicle sticks
        - oak tag (heavy paper)
        - glue
        - plastic wrap/cellophane in a variety of colors
        - wax paper
        - scissors
        - hole punch
    - Optional: shape templates (gingerbread man, star, heart, car, animal, etc.) depending on student need -cut and uncut versions
- Students create their shadow puppets and share their expected effects and shapes based on the materials selected PRIOR to applying a light source. As students explain their design concepts they should use appropriate academic vocabulary.
- Teacher note: Save shadow puppets for Unit 2 Shadow Puppet Show.

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Back to Top of Page

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s):

Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence. Please note the following SEP, DCI and CCC need to be monitored throughout the learning sequence.

- ❏ **SEP:** *Planning and Carrying Out Investigations*
- ❏ **DCI:** *PS4.B: Electromagnetic Radiation*
- ❏ **CCC:** *Cause and Effect; Patterns*

Summative Assessment Description(s):

- Students will construct explanations and identify similarities and differences for what occurred on the playground (with their shadow) and what occurred in the classroom with the shadow puppets using the *Model Template Handout.*
- The students will stand in front of the class and explain their shadow puppet, they will compare their light source to the Sun and to the length and location of the shadow that the puppet makes. They can also communicate their reason for choosing one material over another.
- Optional class discussion questions:
  - Where will we see the sun in the sky tomorrow at_____o'clock? How do you know that?
  - What do you expect your shadow to be later in the day? longer or shorter? What is your evidence?
  - In Alaska, there is light all night and all day in the summer. What kind of window would I want in my bedroom during the summer?
  - What kind of glass would I want to have in a bathroom window? Why?
  - What kind of glass would you use for a goldfish that your grandmother bought you? Why?
- As a class, add any new information to the *Summary Table*.

Resources:

- Model Templates Handout
- Summary Table

Additional Resources:

- G1 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 3		
Brief Description: Students experiment with mirrors, prisms, and light (flashlight) in order to explain the ways we can change light.		
Suggested Pacing: 1.5-1.75 hrs		
Lesson-Level Phenomenon/Design Problem: Disco Ball		
Relationship to Anchoring Phenomena/Design Problem Different materials allow us to change the direction of light. This change in direction can help to illuminate an object to make it visible or change the size or shape of a shadow cast.		
Learning Sequence Driving Question: How can we change the direction of light? If we change the direction of light, what happens to our shadow?		
Student Expected Outcomes: • Students will make observations as well as plan and carry out investigations to understand that some materials will allow light to be reflected (mirrors) and that some materials will allow light to be redirected (prisms).		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Constructing Explanations and Designing Solutions** • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2) **Planning and Carrying Out Investigations** • Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)	**Disciplinary Core Ideas:** **PS4.B: Electromagnetic Radiation** • Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2)	**Crosscutting Concepts:** **Cause and Effect** • Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-2)

Back to Top of Page

Related Performance Expectation(s) in this Unit:

- 1-PS4-2 Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.
  - [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]
- 1-PS4-3 Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.
  - [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).]
  - [Assessment Boundary: Assessment does not include the speed of light.]

Possible Common Core State Standards Connections:

ELA/Literacy

- W.1.2 Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure. (1-PS4-2)
- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-PS4-2)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-2)
- SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (1-PS4-2)

Prior Student Knowledge:

N/A

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Show students a few seconds of the *Disco Ball Video*.
- Prompt a class discussion with the following questions:
  - What do you notice?
  - What do you think is happening?
  - What other things can create the same effect?

Resources:

- Disco Ball Video

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

Back to Top of Page

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)
Activity Description:

- Teacher sets up a variety of targets (one for each group) around the room. Be sure to create a space for students to stand (approximately 10 feet away), so that they have to reflect the light in order to hit the target.
    - Depending on the light sources, students may have to adjust their distance to the target.
- Students complete the *Exploration Instructions activity*.
- Students work with partners using a flashlight, small mirror, prism, and sheet of white copy paper.
- Students complete three challenges:
    - students use the materials to get the light from the flashlight to hit a *Target* on the wall without directly pointing the light at the target.
    - students make observations and test predictions to gather evidence on the ways to get the light to hit the target.
    - students get the prism to make a rainbow on the sheet of paper (do not tell the students they will make a rainbow - let them figure that out).
- Safety: Please make sure that students do not shine the flashlight or reflected light into each other's eyes.

Resources:

- Exploration Instructions activity
- Target (teacher copies and displays 5-10 targets randomly around the room)

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)
Activity Description:

- Students share their findings and create a whole class chart to help them understand that a mirror reflects light (and a prism redirects it - optional).
    - What did you notice happened? Teacher will give a basic understanding of how light can be reflected and redirected using diagrams and discussion to solidify understanding.
    - If used optional prism activity: What was the difference between using the prism and using the mirror?
- Introduce vocabulary as students share their explorations with the whole class.

Back to Top of Page

- Look through *Light by Andrea Rivera* and *Light by Ellen Lawrence on epic! Books*.
- Help students to define and depict science terms on the *Note Catcher*.
    - Students may work in cooperative groups to complete the note catcher after an initial discussion relating the exploration to the noted academic vocabulary.
- Recall the shadows cast on the playground phenomenon (learning sequence 1), ask students why they think the size or shape of their shadow changed. See if they can relate the concept to the change in angle of illumination. You may have to prompt students to help them make this connection.

Resources:

- Light by Ellen Lawrence on epic! Books
- Light by Andrea Rivera on epic! Books
- Note Catcher

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: aim, data, illuminate, mirror, *opaque*, organize, prism, rainbow, reflect, spectrum, *translucent*, *transparent*

ELABORATE (Applications / Extensions)
Activity Description:

- Students will construct an *Explanatory Model* to describe the actions/behaviors of light associated with a disco ball.
- Teacher asks students:
    - Why do you think this happened?
    - What do you think the difference was between the mirror and the prism?

Resources:

- Explanatory Model

Teacher Action(s):

- Expect the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design

Back to Top of Page

experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s):

Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence. Please note the following SEP, DCI and CCC need to be monitored throughout the learning sequence.

- ❏ **SEP:***Constructing Explanations and Designing Solutions; Planning and Carrying Out Investigations*
- ❏ **DCI**: *PS4.B: Electromagnetic Radiation*
- ❏ **CCC**: *Cause and Effect*

Summative Assessment Description(s):

- Class Discussion- Post Explore activity
- Student note catchers
- Explanatory model-Disco Ball, see Elaborate section.
- As a class, add any new information to the *Summary Table*.

Resources:

- Summary Table

Additional Resources:

- G1 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 4		
Brief Description: This sequence allows students to conceptualize how shadows create changes in how the Moon looks from Earth. Students match patterns of Moon shadows to Moon phases and explore the patterns over an entire calendar year. The shadows change size and shape in response to the location of the light source. In the case of the Moon, the Sun and Moon and Earth interactions cast shadows affecting the amount of the Moon illuminated.		
Suggested Pacing: 2 - 2.25 hrs		
Lesson-Level Phenomenon/Design Problem: Shadows on the Moon		
Relationship to Anchoring Phenomena/Design Problem: Changes in illumination of the Moon by the Sun causes its appearance to change on Earth. These changes are predictable patterns. This same effect occurs to the shadows on the playground as the light source (Sun) changes position.		
Learning Sequence Driving Question: Why does the Moon's appearance change?		
Student Expected Outcomes: ● Students will make observations using Moon models and calendar to identify and predict patterns. ● Students will draw a model of what's needed to see the Moon at night from Earth.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Constructing Explanations and Designing Solutions** ● Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2) **Analyzing and Interpreting Data** ● Use observations (firsthand or from media)	**Disciplinary Core Ideas:** **ESS1.A: The Universe and its Stars** ● Patterns of the motion of the Sun, Moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1) **PS4.B: Electromagnetic Radiation** ● Objects can be seen if light is available to illuminate them or if they give off their own light.	**Crosscutting Concepts:** **Patterns** ● Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1) (1-ESS1-2) **Cause and Effect** ● Simple tests can be designed to gather evidence to support or

Back to Top of Page

to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)		refute student ideas about causes.

Related Performance Expectation(s) in this Unit:

- 1-ESS1-1 Use observations of the Sun, Moon, and stars to describe patterns that can be predicted.
  - [Clarification Statement: Examples of patterns could include that the Sun and Moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our Sun are visible at night but not during the day.]
  - [Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]
- 1-PS4-2 Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.
  - [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]
    *This PE is not fully accessible Unit #1, but will be continued in Unit #2.

Possible Common Core State Standards Connections:

ELA/Literacy

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-ESS1-1)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-ESS1-1)

Prior Student Knowledge:

N/A

Possible Preconceptions/Misconceptions:

Students may believe that:

- the Moon has its own light source.
- the Moon only exists at night.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Show the students the *Shadows on the Moon* video.
- In small groups, have students complete the *Observation Chart*. They should make observations and write questions about the phenomenon.
- Share and discuss with the class.

Resources:

- Shadows on the Moon
- Observation Chart

Back to Top of Page

Teacher Action(s):
- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):
- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)
Activity Description:
- Shows today's Moon shadow (phase) on the board based on the *Moon Calendar*.
- Students complete the *Shadows on the Moon Activity.*
- Class discusses their observations.
- Students revisit their findings from the Engage activity.
- Show the students *One Year of Moon Phases Slide*.
- Ask students to make observations and identify patterns.
    - Have students use appropriate science vocabulary to construct an explanation of how the different phases occur over the year.
    - Help students identify the patterns of predictability of the moon phases.

Resources:
- Moon Calendar
- Shadows on the Moon Activity
- Lesson adapted from the Moon Phases Matching from Astronomical Society of the Pacific
- One Year of Moon Phases Slide

Teacher Action(s):
- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):
- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)
Activity Description:
- Show the video-*Why does the Moon change?*
    - There are also several nonfiction texts related to the different Moon phases available on epic! Books.
- Teacher explains that the illumination of the Moon requires Sunlight and that the Moon is not a light

Back to Top of Page

source.
- To make the connection between the Moon and the Sun (ongoing data collection-length of day observations), students watch the *Moon Rise Time-Lapse video* and the *Sunrise and Sunset Time-Lapse video* to prompt a discussion about how the pattern of the Moon appearing to rise and set is similar to that of the Sun's.

Resources:
- *Why does the Moon change?* video
- *The Moon Book* by Gail Gibbons available on epic! Books
- Moon Rise Time-Lapse
- Sunrise and Sunset Time-Lapse

Teacher Action(s):
- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):
- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: pattern, moon phase, full moon, new moon, Earth, shadow, sunlight, night sky, Sun's position, light source, illumination

ELABORATE (Applications / Extensions)
Activity Description:
- Students discuss the differences in light, the Sun generates its own light and the Moon is illuminated by the Sun.
- Ask students: When the Sun's light does not reach the Moon, what do we see from Earth?
- Students discuss the questions on Slide #1 of the *Elaborate Slideshow*.
- Students discuss the prompts on Slide #2 of the *Elaborate Slideshow*.
- Students draw a model of what's needed to see the Moon at night from Earth (Slide #3 of the *Elaborate Slideshow*).

Resources:
- Elaborate Slideshow

Teacher Action(s):
- Expect the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think?

Student Action(s):
- Applies new labels, definitions, explanations, and skills in new but similar situations

Back to Top of Page

- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

FORMATIVE MONITORING (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP:** *Constructing Explanations and Designing Solutions*; *Analyzing and Interpreting Data*
- ❏ **DCI:** *ESS1.A: The Universe and its Stars; PS4.B: Electromagnetic Radiation*
- ❏ **CCC:** *Patterns; Cause and Effect*

Summative Assessment Description(s):

- Elaborate-Discussion and Moon model
- As a class, add any new information to the *Summary Table*.

Resources:

- Summary Table

Additional Resources:

- G1 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 5		
Brief Description: Students will observe the differences in light intensity and daylight time associated with the seasons. Students will then apply these ideas to the shadows they produced on the playground and how they change throughout the seasons. Students will create a class sundial to demonstrate how shadows can be used.		
Suggested Pacing: 1.5 - 2 hrs for the 5Es 0.5-0.75 hrs for the Culminating Performance Task		
Lesson-Level Phenomenon/Design Problem: Seasonal activities change because of daylight and sunlight intensity.		
Relationship to Anchoring Phenomena/Design Problem Student shadows on the playground would change with the seasons. Summer months would produce shadows for more hours during the day than shadows cast in the winter months. Shadows cast with more intense light appear darker. Shadows created by sundials move throughout the day according to the position of the sun in the sky.		
Learning Sequence Driving Questions: How does the amount and intensity of daylight change with the seasons? How do sundials work?		
Student Expected Outcomes: ● Students will be able to observe, describe, and predict the differences in daylight time associated with the seasons. ● Students will make observations and identify patterns associated with light and shadows. ● Students will explore how their shadows on the playground change season by season. ● Students will create a class sundial and explain the inner workings of a sundial using observed data and patterns.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Constructing Explanations and Designing Solutions** ● Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2)	**Disciplinary Core Ideas:** **ESS1.A: The Universe and its Stars** ● Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)	**Crosscutting Concepts:** **Patterns** ● Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1) (1-ESS1-2)

Back to Top of Page

Analyzing and Interpreting Data • Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1) **Planning and Carrying Out Investigations** • Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)	**ESS1.B: Earth and the Solar System** • Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)	

Related Performance Expectation(s) in this Unit:

- 1-ESS1-1 Use observations of the sun, moon, and stars to describe patterns that can be predicted.
  - [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.]
  - [Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]
- 1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.
  - [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.]
  - [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.

Possible Common Core State Standards Connections:

ELA/Literacy

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-ESS1-1)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-ESS1-1

Mathematics

- MP.2 Reason abstractly and quantitatively. (1-ESS1-2)
  MP.4 Model with mathematics. (1-ESS1-2)
  MP.5 Use appropriate tools strategically. (1-ESS1-2)
  1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)
  1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)

Back to Top of Page

Prior Student Knowledge:
N/A

Possible Preconceptions/Misconceptions:
- Shadows stay the same in different seasons

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)
Activity Description:
- Students work in collaborative groups to draw examples of their seasonal activities on the Seasonal Activities handout. Students groups will draw their activities on 4 different sheets of paper, one for each season.
    - Students consider how their activities and clothing choices change with the seasons.
    - Students share their rationales about how the amount of sunlight changes with the seasons and why they think the amount of sunlight changes.
    - This activity is meant to elicit ideas and conceptions already known about the season, please do not provide students with any information or lead them to a specific idea about the seasons.

Resources:
- Seasonal Activities

Teacher Action(s):
- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):
- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)
Activity Description:
- Student groups observe, manipulate, and identify patterns in the *daylight hour data* (refer to yearlong data collection bar graph as well).
- Students complete an *I Notice, I Wonder* organizer as they review the data.
- Students will post their group drawings in the specified locations around the classroom, we suggest one wall/area per season.
    - Please assign 4 regions around the room for students to post their season drawings.
- Teacher facilitates a whole group discussion as students *Gallery Walk* the different seasons to discuss how the amount of daylight factors into the activities represented in each season.
    - Please do not debunk student misconceptions at this point, only gather information about misconceptions, preconceptions and where you need to begin when you explain the content later on.
        - What months did you look at for this season?
        - What did you notice about the amount of daylight in this season?

Back to Top of Page

- How do you think the amount of sunlight in this season impacts the activities you participate in and clothes you wear?

Resources:
- Daylight hour data
- Sample Yearlong Data Collection bar graph
- I Notice, I Wonder Organizer

Teacher Action(s):
- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):
- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)
Activity Description:
- Teacher shares from epic! Books one (or a few) books on seasons (some options listed in Resources) and the *Why do we have seasons?* video.
- Class discusses the different seasons and then relates seasonal light levels to how shadows change.
- Show the Shadows throughout the year image (zoom in on the three pictures) and quickly discuss.
  - Ask students to notice the season, the boy's clothes and the length of the shadow in each of the three pictures.

Resources:
- Books on Epic:
  - Why Does Earth Have Seasons? by Marne Ventura
  - Seasons by Robin Nelson
- Why do we have seasons? (stop at 2:09) - This video is a little high-level, but it is short and has great visuals.
- Shadows throughout the year image

Teacher Action(s):
- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):
- Explains possible solutions or answers to others

Back to Top of Page

- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: Fall, winter, spring, summer, sun, daylight, season, shadow, intensity

ELABORATE (Applications / Extensions)
Activity Description:

- Ask students: Can shadows be useful?
- Show students the various types of sundials.
    - Let students know that before clocks were invented, people used sundials to tell time. Help students to identify the common features between the different sundials shown below. Prompt students to explain how they think sundials might work.
        - Stone Sundial
        - Pedestal Sundial
        - Sundial Image
- Elicit responses that uncover what students know about how sundials work. Students should be able to connect how their shadow changed over time with how a sundial works.
- Students watch *Make Your Own Sundial video.*
- Ask probing questions to get students thinking about the necessary parts of a sundial.
- As a class, complete the *Crayola Human Sundial* activity
- Class discusses their observations and questions.

Resources:

- Stone Sundial
- Pedestal Sundial
- Sundial Image
- Make Your Own Sundial video
- Crayola Human Sundial

Optional Activity:

- Students use the Engineering Design Worksheet to complete the activity.
- Show the students a variety of art supplies (markers, crayons, colored pencils, paper plates (various sizes), cardboard, drinking straws, popsicle sticks, sharpened pencils, rulers). Allow students to engineer (plan) their own sundial, based on the ones seen in the engage/explore phase on paper.
- Ask students to share their ideas for their engineered sundial with their peers. Allow students to offer feedback to one another. After eliciting feedback, students should REVISE their designs before they begin their build.
- When students have met the design criteria for their sundial, allow them to begin crafting.
- Upon completion of their designs, students should test their designs outside or with a light source in the classroom. During the testing phase students should collect observations. These observations should help them determine if their sundial works as a clock

Optional Resources:

- Engineering Design Worksheet

Teacher Action(s):

- Expect the students to use formal labels, definitions, and explanations provided previously

Back to Top of Page

- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

FORMATIVE MONITORING (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence:

- ❑ **SEP:** *Constructing Explanations and Designing Solutions; Analyzing and Interpreting Data; Planning and Carrying Out Investigations*
- ❑ **DCI:** *ESS1.A: The Universe and its Stars; ESS1.B: Earth and the Solar System*
- ❑ **CCC:** *Patterns*

Summative Assessment Description(s):

- Explore-Student communication and data analysis of daylight hours and its application to the seasons and the activities that are conducted during that season. Formative monitoring will occur during student discourse and sharing.

Resources:

- Summary Table

Culminating Performance Task:

- Provide student groups with Explanatory Model Template (please print on 11x17 paper), a flashlight and small toy or object (Pez dispensers work great).
- Ask students to enact the motion of the sun through the sky over their small toy (you will need to turn off the classroom lights) and draw an explanatory model of what happens or present their thoughts verbally to the class.
- As a class, add any new information to the *Summary Table*.

Resources:

- Explanatory Model Template

Additional Resources:

- G1 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Back to Top of Page

Unit 2 - Film Animation
Students start this unit by viewing an animation of *Mickey's Steamroller* to build a connection between the use of both light and sound in order to better understand how they work together to communicate a message. Students investigate throughout the unit the things needed to produce a sound, what mediums allow light to pass through them to varying degrees (or not at all), what people use to communicate over long distances, and how certain sound and light effects can be used to trigger behaviors and enhance the understanding of the message being communicated. To demonstrate their understanding of these diverse topics and tie them all together, students are tasked with improving a *Nuggets* animation in their culminating performance task. Students become engineers of both sound and light to create a specific message with a soundtrack for a simple animation to be shared with their class. To access the flowchart for this unit, click here.
Suggested Pacing: 8-10 hrs
Anchoring Phenomenon/Design Problem: The science of film
Unit Driving Question: How do sound and light communicate information?
Culminating Performance Task: Students will engineer the sound for a simple animation and construct an explanation for how film animation works using light and shadows.
NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements) ● 1-PS4-1 Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. ○ [Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.] ● 1-PS4-2 Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. ○ [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.] ● 1-PS4-3 Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light. ○ [Clarification Statement: Examples of materials could include those that are transparent (such

Back to Top of Page

as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).]
    - [Assessment Boundary: Assessment does not include the speed of light.]
- 1-PS4-4 Use tools and material to design and build a device that uses light or sound to solve the problem of communicating over a distance.
    - [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string "telephones," and a pattern of drum beats.]
    - [Assessment Boundary: Assessment does not include technological details for how communication devices work.]
- 1-ESS1-2* *Make observations at different times of year to relate the amount of daylight to the time of year.*
    - *[Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.]*
    - *[Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]*
    - *(This PE is something that will be ongoing from the beginning of the year (making and collecting regular observations) until the collected observations can be analyzed within a later Unit (3 or 4).*
- K-2-ETS1-1 Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Three Dimensions that form the Foundation for these NGSS Performance Expectations:

Science & Engineering Practices:

Planning and Carrying Out Investigations

- Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1) (1-PS4-3)
- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)

Constructing Explanations and Designing Solutions

- Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)

Asking Questions and Defining Problems

- Ask questions based on

Disciplinary Core Ideas:

PS4.A: Wave Properties

- Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1)

PS4.B: Electromagnetic Radiation

- Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (1-PS4-3)

PS4.C: Information Technologies and Instrumentation

- People also use a variety of devices to communicate (send and receive information) over long

Crosscutting Concepts:

Cause and Effect

- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1) (1-PS4-3)

Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1) (1-ESS1-2)

Back to Top of Page

observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1) • Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)	distances. (1-PS4-4) **ESS1.B: Earth and the Solar System** • Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2) **ETS1.A: Defining and Delimiting Engineering Problems** • A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) • Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) • Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)	

Possible Common Core State Standards Connections:

ELA/Literacy —

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-PS4-1)(1-PS4-3) (1-PS4-4)(1-ESS1-2)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-1)(1-PS4-3)
- SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (1-PS4-1)(1-PS4-3)RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (K-2-ETS1-1)
- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (K-2-ETS1-2)
- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (K-2-ETS1-1)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-1)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (1-ESS1-2)(K-2-ETS1-1)
- MP.4 Model with mathematics .(1-ESS1-2)(1-ESS1-2)(K-2-ETS1-1)
- MP.5 Use appropriate tools strategically. (1-ESS1-2)(1-PS4-4)(K-2-ETS1-1)
- 1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of

Back to Top of Page

		adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)
●	1.MD.A.1	Order three objects by length; compare the lengths of two objects indirectly by using a third object.(1-PS4-4)
●	1.MD.A.2	Express the length of an object as a whole number of length units, by layering multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps. (1-PS4-4)
●	1.MD.C.4	Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)
●	2.MD.D.10	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-1)

PROGRESSION OF LEARNING

ONGOING THROUGHOUT THE SCHOOL YEAR: *This refers to the on-going length of day data collection introduced in G1 U1.*

- Plan *at least* 10 dates (1 per month) to collect length of day and graph on a class chart. May do three dates - 1st, 10th, 20th of the month.
- *It is suggested that you gather the data over the summer and use this data to model how to collect the data for the school year.*
- This ongoing observation fully covers the PE: 1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.

Resources:

- Website for data collection, Sample bar graph, and optional: *amount of daylight each month*

Learning Sequence 1

- **Learning Sequence Driving Question**
  - How do sound and light communicate information?
- **Learning Sequence 1**
- **Relationship to Anchoring Phenomena/Design Problem**
  - This is the introduction to the anchoring phenomenon - the science of film.
- **Student Expected Outcome:**
  - Students will make observations about how people use sound and light to send and receive information.

Learning Sequence 2

- **Learning Sequence Driving Question**
  - What causes sound?
- **Learning Sequence 2**
- **Relationship to Anchoring Phenomena/Design Problem**

Back to Top of Page

- To create sound, there needs to be a source of vibration.
- **Student Expected Outcomes:**
  - Students will engage in simple tests to investigate how sound can make matter vibrate.
  - Students will engage in simple tests to investigate how vibrating matter can make sound.

Learning Sequence 3

- **Learning Sequence Driving Questions**
  - Is light necessary to see?
  - How can light be used to communicate a message?
- Learning Sequence 3
- **Relationship to Anchoring Phenomena/Design Problem**
  - Light is necessary to create the animation.
- **Student Expected Outcomes:**
  - Students will conduct simple tests to predict, compare, and explain how a beam of light can be used to communicate information.
  - Students will conduct simple tests to predict, compare and explain how darkness affects how much you can see.
  - Students will investigate what can be seen in the dark.

Learning Sequence 4:

- **Learning Sequence Driving Question**
  - How can we use shadows to tell a story?
- Learning Sequence 4
- **Relationship to Anchoring Phenomena/Design Problem**
  - Light and shadows are used to create the animated figures and items within animated movies.
- Student Expected Outcomes:
  - Students will conduct simple tests to predict, compare, and explain how a beam of light can be used to communicate information.
  - Students will conduct simple tests to predict, compare and explain how darkness affects how much you can see.
  - Students will investigate what can be seen in the dark.

Learning Sequence 5:

- **Learning Sequence Driving Question**
  - How are light and sound used to communicate across a distance?
- Learning Sequence 5
- **Relationship to Anchoring Phenomena/Design Problem**
  - Light and sound are used to communicate different messages across a distance in different ways.
- **Student Expected Outcomes:**
  - Students will explain how people use a variety of devices to receive and send messages in the community.
  - Students will make observations about how people and animals send and receive information.
  - Students will collect data about how different devices are used to communicate.

Back to Top of Page

- Students will make comparisons with the data collected regarding how the different devices are used to communicate.
- Students will design a way of using light and sound to communicate with a friend during a storm.

Optional Learning Sequence:

- **Learning Sequence Driving Question**
  - Can we see in the dark?
- Optional Learning Sequence
- **Relationship to Anchoring Phenomena/Design Problem**
  - How the amount of light impacts what we see.
- **Student Expected Outcomes:**
  - Students will analyze data by recording and sharing observations and using them to describe patterns across everyone's data to determine how many of us could see the number of shapes that were actually at each station in the darker versus better lit parts of the room.
  - Students will ask questions based on observations from this experience and from other prior experiences we've had where (we've seen similar patterns) it has been difficult to see something in a dark place. Define problems and brainstorm solutions related to the question, "how can I make the space I am looking in as dark as possible?"
  - Students will plan and conduct an investigation collaboratively to produce data to help determine which materials will be the best (patterns) for blocking out the light coming through the windows in our classroom.

Assessments:

- **Culminating Performance Task:**
  - Group discussion on Mickey's Steamroller animation focused on light and sound.
  - Students will engineer the sounds for the Birdie animation* using classroom objects. All engineers define the sounds/problem prior to enacting a solution, and must also describe how the animation (from film) works.
    - Birdie animation*
      - *Animation Source: Hykade, Andreas , director. *Nuggets*, Film Bilder, 13 Oct. 2014, www.youtube.com/watch?v=HUngLgGRJpo
    - Student assessment
- Grade 1 Performance Expectation Rubrics and Prompts
- Elementary Assessment Resources

Additional Resources:

- G1 Unit Materials List
  - Click on specific tab for unit-specific materials
- EPIC! Digital Library - G1 U2 List
  - Includes ebooks and videos
  - Must have an educator user account for free access

Back to Top of Page

Learning Sequence 1		
Brief Description: Students are introduced to an animation featuring Mickey Mouse and asked to make observations when the animation is played with sound only, then picture only and again with sound and picture. Students are asked to share their ideas about how sound and light communicate information.		
Suggested Pacing: 0.5 - 1 hr		
Lesson-Level Phenomenon/Design Problem: Mickey's Steamroller		
Relationship to Anchoring Phenomena/Design Problem: This is the introduction to the anchoring phenomenon - the science of film.		
Learning Sequence Driving Question: How do sound and light communicate information?		
Student Expected Outcomes: ● Students will make observations about how people use sound and light to send and receive information.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Asking Questions and Defining Problems *** ● Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1)	**Disciplinary Core Ideas:** **PS4.C: Information Technologies and Instrumentation *** ● People also use a variety of devices to communicate (send and receive information) over long distances.	**Crosscutting Concepts:** **Cause and Effect *** ● Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1) (1-PS4-3) **Patterns *** ● Patterns in the natural world can be observed, used to describe

Back to Top of Page

		phenomena, and used as evidence. (1-ESS1-1) (1-ESS1-2)

Related Performance Expectation(s) in this Unit:

- 1-PS4-4 Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. *
  - [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string "telephones," and a pattern of drum beats.]
  - [Assessment Boundary: Assessment does not include technological details for how communication devices work.]

*Learning Sequence #1 is an incomplete 5-E model, as it is an introduction to the unit's anchoring phenomenon, therefore the three dimensions and PEs will only be partially covered in this Learning Sequence.

Possible Common Core State Standards Connections:

ELA/Literacy —

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-PS4-1)(1-PS4-3) (1-PS4-4)(1-ESS1-2)

Mathematics —

- MP.5 Use appropriate tools strategically. (1-ESS1-2)(1-PS4-4)(K-2-ETS1-1)
- 1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-PS4-4)
- 1.MD.A.2 Express the length of an object as a whole number of length units, by layering multiple copies of shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps. (1-PS4-4)

Prior Student Knowledge:

- K.ETS1.A (1-PS4-4)

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)
EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)
Activity Description:

- Teacher asks students to list different ways people communicate, and then records their ideas on the board.
- Students come to the board with different colored post-it notes to identify which forms of communication use light and which ones use sound?

Back to Top of Page

- Teacher plays the Mickey Steamroller video (approximately 4:50 to 5:50) with AUDIO ONLY. Do not show them the video for this part.
    - Teacher asks: What story is the sound telling you? What different sounds did you hear? How do you know?
    - Use the *Mickey Steamroller Recording Sheet* as a guide.
- Teacher plays the video again of the same video (4:50-5:50 clip) without the sound this time.
    - Teacher asks: Does seeing the video change what you thought was happening when you only heard the sound? How does seeing the video increase your understanding of what is happening?
    - Record ideas using page 2 of the *Mickey's Steamroller Recording Sheet.*
- Teacher plays video for a 3rd (& final) time with both audio and video together.
- Students complete page 3 of the *Mickey's Steamroller Recording Sheet.*
- Class shares their ideas of how animations use light and sound to communicate, and then they discuss page 4 of the *Mickey's Steamroller Recording Sheet*.

Resources:

- Mickey's Steamroller video (approx 4:50 to 5:50) *if video not available Google it*
- Mickey Steamroller Recording Sheet (use pages 1, 2, and 4 as a class discussion tool, might want to print page 3 for student recording)

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept
- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic
- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

Additional Resources:

- G1 Unit Materials List
    - Click on the corresponding tab for unit-specific materials.

Back to Top of Page

Back to Top of Page

Learning Sequence 2		
Brief Description: Students explore how sound is made through vibration.		
Suggested Pacing: 2 - 3 hrs		
Lesson-Level Phenomenon/Design Problem: Cartoon sounds		
Relationship to Anchoring Phenomena/Design Problem: To create sound, there needs to be a source of vibration.		
Learning Sequence Driving Question: What causes sound?		
Student Expected Outcomes: ● Students will engage in simple tests to investigate how sound can make matter vibrate. ● Students will engage in simple tests to investigate how vibrating matter can make sound.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Planning and Carrying Out Investigations** ● Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1) (1-PS4-3) ● Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)	**Disciplinary Core Ideas:** **PS4.A: Wave Properties** ● Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1)	**Crosscutting Concepts:** **Cause and Effect** ● Simple tests can be designed to gather evidence to support or refute student ideas about causes (1-PS4-1) (1-PS4-3)

Back to Top of Page

Related Performance Expectation(s) in this Unit:

- 1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
  - [Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.]

Possible Common Core State Standards Connections:

ELA/Literacy —

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-PS4-1)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-1)
- SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (1-PS4-1)

Prior Student Knowledge:

None can be assumed

Possible Preconceptions/Misconceptions:

- Sound comes from people's mouths.
- Sound can't travel in liquids or solids.
- Sound travels in one direction like a flashlight beam.
- You can see and hear a distant event at the same moment.
- Hitting an object harder changes its pitch.
- Sound can be produced without using any material objects.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Students listen to a variety of sounds, such as *Cartoon Sound Effects* or the *Musical Instruments Sounds For Kids*.
- Students discuss the question: How are these sounds made?
- Students share their ideas.

Resources:

- Cartoon Sound Effects
- Musical Instruments Sounds For Kids (27 Instruments)

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions

Back to Top of Page

- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- Teacher sets up Sound Stations and gives students the *Student Observation Recording Sheets*.
- Students explore different items that produce sound using ruler, rubber bands, tuning forks, and water trying to answer the following questions about sound:
    - What is sound?
    - What makes sound happen?

Resources:

- Sound Stations Description/ Directions
- Student Observation Recording Sheets
- Alternate investigation-Spoon Sounds

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity #1 Description:

- Debrief the Explore activity. Provide students time to share their observations and wonderings by station. Prompt student thinking:
    - What did each station have in common?
    - What happened to the materials at each station that gave off sound?
    - What did you do to the objects to change the sound?
    - How can you make the sound louder? deeper or higher?
- Teacher creates an anchor chart to begin recording some of the students' bigger ideas regarding sound and sound generation. Help students to pair their exploration observations to key vocabulary. Help students to identify things that vibrate/make sound.

Back to Top of Page

- Teacher shares books and videos about sound
    - *Vibrations Make Sound* by Jennifer Boothroyd
    - *What is Sound? video by SciShow Kids*

Activity #1 Resources:

- *Vibrations Make Sound* by Jennifer Boothroyd available on epic Books
- What is Sound? video by SciShow Kids
- Another good resource is *Sounds All Around (Let's-Read-and-Find-Out Science)* by Wendy Pfeffer, Anna Chernyshova (may be available in your school library)

Activity #2 Description:

Students will go on a Listening Walk around the school with the goal of connecting what they hear to what is causing the sounds/vibrations.

- Teacher reads/shows the book "The Listening Walk" by Paul Showers
- Teacher asks: What sounds do we hear in our school?
- Teacher records student responses on chart paper.
- Teacher introduces the Listening Walk using the *Listening Walk Student Sheet* - students circle or color in the appropriate box on their sheets indicating what they hear as they walk with their partner through the hallways of their school; students may create boxes on the back of the sheet for anything not listed on the front.
- When they return, partner's share out their findings with the class - teacher adds any new sounds to the anchor chart and asks:
    - What are causing these sounds?
    - What is vibrating to make these sounds?
    - How are you hearing them?
    - Were the sounds near or far from you? How do you know?
    - What do we already know about sound that can help us understand what is happening?

Activity #2 Resources:

- *The Listening Walk* by Paul Showers (youtube read may be available)
- Listening Walk Student Sheet

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: vibrate, vibration, matter, energy, waves, tuning fork, sound

Back to Top of Page

ELABORATE (Applications / Extensions)

Activity Description:

- Whole group discussion to determine if students have understood the concept of how sounds are made, how sounds change with different positions and different materials.
- Provide time for students to predict what objects may have been used to generate the cartoon noises found in the engagement activity.
- Select one of the noises from the *Sound Cartoon FX* and play it for the students. Let them think about what objects they could use in the classroom to replicate their sound ideas. Have students share their ideas.
- Students are given time and materials to complete the *Design a Sound Maker Performance Task* - What sounds can you make with common objects that can make at least two different kinds of sounds?
    - Students demonstrate an understanding of sound and its connection to vibration through the creation of their own sound makers exploring how to make the pitch higher or lower, and louder or softer.
    - Students can use various materials including: Kleenex boxes, different sized food containers with lids, metal cans, seeds/rice, sticks, spoons.
    - Students share the following:
        - What materials did you use?
        - Explain how your sound maker produces different sounds.
        - Show us how you make sound with your device.
        - Explain how you can change the sounds (high, low, loud, soft) your sound maker creates.
- Allow time for classmates to compare their sound makers to identify the cause and effect trends as well as patterns that occur amongst the instruments.

Resources:

- Cartoon Sound Effects
- Design a Sound Maker Performance Task

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks “What do you already know?”, Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Back to Top of Page

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP**: *Planning and Carrying Out Investigations*
- ❏ **DCI**: *PS4.A: Wave Properties*
- ❏ **CCC:** *Cause and Effect*

Summative Assessment Description(s):

- The Sound Maker Performance Task found in the Elaborate section.

Additional Resources:

- G1 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 3		
Brief Description: Students explore light by conducting an investigation to determine the effects of how light travels in order to then use it to communicate with others.		
Suggested Pacing: 1.25 - 1.75 hrs		
Lesson-Level Phenomenon/Design Problem: Do you need light to see?		
Relationship to Anchoring Phenomena/Design Problem: Light is necessary to create the animation.		
Learning Sequence Driving Questions: Is light necessary to see? How can light be used to communicate a message?		
Student Expected Outcomes: ● Students will conduct simple tests to predict, compare, and explain how a beam of light can be used to communicate information. ● Students will conduct simple tests to predict, compare and explain how darkness affects how much you can see. ● Students will investigate what can be seen in the dark.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Planning and Carrying Out Investigations** ● Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2) **Constructing Explanations and Designing Solutions** ● Use tools and materials	**Disciplinary Core Ideas:** **PS4.B: Electromagnetic Radiation** ● Objects can be seen if light is available to illuminate them or if they give off their own light. ● Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface	**Crosscutting Concepts:** **Cause and Effect** ● Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1) (1-PS4-3) **Patterns** ● Patterns in the natural world can be observed,

Back to Top of Page

provided to design a device that solves a specific problem. (1-PS4-4)	beyond them, where the light cannot reach. ~~Mirrors can be used to redirect a light beam.~~ (1-PS4-3) **PS4.C: Information Technologies and Instrumentation** • People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)	used to describe phenomena, and used as evidence. (1-ESS1-1) (1-ESS1-2)

Related Performance Expectation(s) in this Unit:

- 1-PS4-2 Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.
  - [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]
- 1-PS4-3 Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.
  - [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).]
  - [Assessment Boundary: Assessment does not include the speed of light.]

Possible Common Core State Standards Connections:

ELA/Literacy —

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-PS4-3)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-3)
- SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (1-PS4-3)

Prior Student Knowledge:

None can be assumed

Possible Preconceptions/Misconceptions:

- Light only reflects from mirrors and shiny objects.
- If students are asked what helps you see? Most will answer glasses, seeing-eye dogs, binoculars, hand lenses, or microscopes, not light.
- White light is colorless light.
- Sunlight is red, yellow or orange.
- Light travels from our eyes so we can see.

Back to Top of Page

- Light comes from the object being looked at
- Bright light travels further than dim.
- Light only travels a short way.
- Humans can see in complete darkness after the eyes adjust.
- A shadow is something that exists on its own.
- A mirror reverses everything.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)
Activity Description:

- Teacher gives each student a sticky note.
- Teacher asks: Do you need light to see an object?
- Students write Yes or No on their sticky note and hands it back to the teacher (no names on their papers)
- Teacher creates a vertical bar graph with their responses and discusses the graph.

Resources:

- Adapted from The Looking Tube Lesson - Better Lesson

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)
Activity Description:

- As a class, complete the *Looking Tube Handout.*
  - Teacher gathers materials prior to starting.
  - Students work in pairs

Resources:

- Looking Tube Handout
- Adapted from The Looking Tube Lesson - Better Lesson

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary

Back to Top of Page

- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Teacher will encourage the students to explain concepts about their exploration.
    - In which situation(s) were we able to see the object?
    - What was necessary to see the object?
    - Did the color of the object help us or prevent us from seeing it in the Looking Tube at any time?
- Ask students to share their ideas and to support their ideas with evidence from their partner work, as well as from their *Looking Tube Handout*.
- As a class, read *Light Helps Me See* by Jennifer Boothroyd.

Resources:

- *Light Helps Me See* by Jennifer Boothroyd on epic Books

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: prediction, observe, clear, dark, light, reflect, transparent, translucent, opaque, illuminate, shadow, light source

ELABORATE (Applications / Extensions)

Activity Description:

- Show students a visual of the *Batman signal* and ask:
    - What is this and what message is it communicating?
    - How is it created?
    - Could we see the bat symbol during the day?

Back to Top of Page

    - Why do we see the bat symbol better at night?
    - How can we communicate like a superhero?
- Students design their own Superhero symbol (teacher provides a variety of items such as: laminator scraps and sharpies, oak tag paper, cardboard, plastic lids, color cellophane, transparency sheets, wax/parchment paper, paper towel tubes, construction paper, etc. to choose from)
- Students conduct simple tests of how effective their symbol would be for communicating during the day versus the night using flashlights.
- As a class, discuss the *Looking Tube vs Batman Handout* to compare what they saw in the looking tube to the superhero symbol and identify similarities and differences between the two scenarios and how light is used?
    - Reinforce learning of translucent, transparent and opaque from Unit 1 - Shadows on the Playground..

Resources:

- Batman signal
- Looking Tube vs Batman Handout

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?"

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring (Questioning / Discussion):

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ SEP: *Planning and Carrying out Investigations; Constructing Explanations and Designing Solutions*
- ❏ DCI: *PS4.B: Electromagnetic Radiation; PS4.C: Information Technologies and Instrumentation*
- ❏ CCC: *Cause and Effect; Patterns*

Summative Assessment Description(s):

- Student development of a Superhero communication device using light (Elaborate).
- Student comparison of the looking tube to the Batman Symbol (Elaborate)

Elaborate Further / Reflect / Enrichment: Optional

Activity Description:

- Optional Learning Sequence

Back to Top of Page

Additional Resources: ● G1 Unit Materials List ○ Click on specific tab for unit-specific materials

Learning Sequence 4		
Brief Description: Students will explore how shadows are made by creating a puppet show to determine the effects of how light travels in order to then use it to communicate with others.		
Suggested Pacing: 1.5 - 2 hrs		
Lesson-Level Phenomenon/Design Problem: Jack and the Beanstalk puppet show		
Relationship to Anchoring Phenomena/Design Problem: Light and shadows are used to create the animated figures and items within animated movies.		
Learning Sequence Driving Question: How can we use shadows to tell a story?		
Student Expected Outcomes: ● Students will conduct simple tests to predict, compare, and explain how a beam of light can be used to communicate information. ● Students will conduct simple tests to predict, compare and explain how darkness affects how much you can see. ● Students will investigate what can be seen in the dark.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Planning and Carrying Out Investigations** ● Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1) (1-PS4-3) ● Make observations (firsthand or from media) to collect data that can be	**Disciplinary Core Ideas:** **PS4.B: Electromagnetic Radiation** ● Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. ~~Mirrors can be used to redirect a light beam.~~ (1-PS4-3)*	**Crosscutting Concepts:** **Cause and Effect** ● Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1) (1-PS4-3)

Back to Top of Page

used to make comparisons. (1-ESS1-2)	**PS4.C: Information Technologies and Instrumentation** • People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4) *This portion of the DCI was fully covered in Unit 1.	

Related Performance Expectation(s) in this Unit:

- 1-PS4-3 Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.
  - [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror)
  - [Assessment Boundary: Assessment does not include the speed of light.]

Possible Common Core State Standards Connections:

ELA/Literacy -

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-PS4-3)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-3)
- SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (1-PS4-3)

Prior Student Knowledge:

None can be assumed

Possible Preconceptions/Misconceptions:

- Light only reflects from mirrors and shiny objects.
- If students are asked what helps you see? Most will answer glasses, seeing-eye dogs, binoculars, hand lenses, or microscopes, not light.
- White light is colorless light.
- Sunlight is red, yellow or orange.
- Light travels from our eyes so we can see.
- Light comes from the object being looked at
- Bright light travels further than dim.
- Light only travels a short way.
- Humans can see in complete darkness after the eyes adjust.
- A shadow is something that exists on its own.
- A mirror reverses everything.

Back to Top of Page

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)
Activity Description:

- Students watch the *Jack and the Beanstalk puppet show*.
- Students are asked: How is light being used to tell (communicate) the story of Jack and the Beanstalk?
- Students share their ideas.
- Teacher Note: Remember the goal is to identify prior experiences and misconceptions, not to provide content or instruction during this discussion.

Resources:

- Jack and The Beanstalk puppet show

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)
Activity Description:

- Use shadow puppets student created from Unit 1 or provide students with a variety of materials to create new shadow puppets (possible materials: variety of transparent/translucent/opaque materials, flashlight, small toy, light)
- Allow students to explore how to create a shadow puppet show (with a screen works). Show the Jack and the Beanstalk video to play on the screen as they explore the materials.
  - Where does the light have to be?
  - How should the color selection of the puppets compare to the screen color?
  - Where do the puppets need to be to cast a shadow similar to the one seen in Jack and the Beanstalk?
- Students record their ideas on page #1 of the *Shadow Puppet Show Template*.

Resources:

- Shadow Puppet Show Template

Optional:

- Students create and perform a mini-shadow puppet show. *Shadow Puppet Screen* and shadow puppet templates (print on 11x17 paper).
- Working with small groups, the students will create their own shadow puppets to tell a story. Students will have to come to a consensus about what story they want to tell prior to making their shadow puppets.
- Be sure the students can describe HOW a shadow puppet works. Hold students accountable for using

Back to Top of Page

appropriate academic vocabulary. Fix any student misconceptions as you hear them through questioning tactics.

Optional Resources:

- Shadow Puppet Screen

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Ask students to share their findings from the puppet show exploration.
- Prompt students to share ideas about the set-up necessary for creating a shadow puppet show, the colors of the puppets, the thickness of the screen, the location and strength of the light source. Encourage students to use appropriate vocabulary.
- Students complete page #2 of the *Shadow Puppet Show Template* to explore alternative set-ups that could work for making a shadow puppet show.
    - As students generate different set-up options, allow students to critique the options posed.
    - Help students to understand that scientists often help each other find a solution to a problem by helping them identify strengths and weaknesses in science ideas. Students will need help critiquing others. You may need to provide sentence stems to scaffold the conversation.
    - Make sure that as students critique their peers' ideas and they link their analysis to experience.
        - Students fill in the *Give Me Five* organizer (page #3 of the *Shadow Puppet Show Template*) provides a forum for allowing students to engage in constructive criticism.
- Ask partner groups to join with another partner group - they should describe and swap their models.
- Partners should review the drawing/model and completed *Give Me Five Protocol*.
- Allow time for the groups to share their findings with one another.

Resources:

- Shadow Puppet Show Template

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Back to Top of Page

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: prediction, observe, clear, cloudy, dark, light, reflect, medium, transparent, translucent, opaque, absorbed, illuminate, shadow

ELABORATE (Applications / Extensions)

Activity Description:

- Show students the sample film from *Making Comparisons* activity. Print the slide on transparency film, so students can see transparent components.
- Allow students to manipulate the film with a flashlight as they think of the similarities and differences.

Resources:

- Making Comparisons

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?"

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring (Questioning / Discussion):

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP**: *Planning and Carrying out Investigations*
- ❏ **DCI**: *PS4.B: Electromagnetic Radiation; PS4.C: Information Technologies and Instrumentation*
- ❏ **CCC**: *Cause and Effect*

Summative Assessment Description(s):

- Student discussion with the teacher about the way in which a shadow puppet show works.
- Ask students to compare shadow puppets and Mickey's Steamroller in Elaborate activity

Back to Top of Page

Additional Resources:

- G1 Unit Materials List
    - Click on specific tab for unit-specific materials

Learning Sequence 5		
Brief Description: Students explore the concept of sound and light and how they are used individually and together to communicate messages both near and far.		
Suggested Pacing: 1.75 - 2.25 hrs for 5Es 0.75 - 1 hrs for Culminating Performance Task		
Lesson-Level Phenomenon/Design Problem: Card Sort: How are sound and light used to communicate?		
Relationship to Anchoring Phenomena/Design Problem: Light and sound are used to communicate different messages.		
Learning Sequence Driving Question: How are light and sound used to communicate across a distance?		
Student Expected Outcomes: ● Students will explain how people use a variety of devices to receive and send messages in the community. ● Students will make observations about how people and animals send and receive information. ● Students will collect data about how different devices are used to communicate. ● Students will make comparisons with the data collected regarding how the different devices are used to communicate. ● Students will design a way of using light and sound to communicate with a friend during a storm.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Planning and Carrying Out Investigations** ● Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2) ● Plan and conduct	**Disciplinary Core Ideas:** **PS4.C: Information Technologies and Instrumentation** ● People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)	**Crosscutting Concepts:** **Patterns** ● Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1) (1-ESS1-2)

Back to Top of Page

investigations collaboratively to produce evidence to answer a question. (1-PS4-1) (1-PS4-3) **Asking Questions and Defining Problems** • Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1) • Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)	**ETS1.A: Defining and Delimiting Engineering Problems** • A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) • Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) • Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)	

Related Performance Expectation(s) in this Unit:

- 1-PS4-4 Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.*
  - [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string "telephones," and a pattern of drum beats.]
  - [Assessment Boundary: Assessment does not include technological details for how communication devices work.]
- K-2-ETS1-1 Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Possible Common Core State Standards Connections:

ELA/Literacy —

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-PS4-4)

Mathematics —

- MP.5 Use appropriate tools strategically. (1-PS4-4)
- 1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-PS4-4)
- 1.MD.A.2 Express the length of an object as a whole number of length units, by layering multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps. (1-PS4-4)

Prior Student Knowledge:

Back to Top of Page

K.ETS1.A

Possible Preconceptions/Misconceptions:

- Sound comes from people's mouths.
- Sound can't travel in liquids or solids.
- Sound travels in one direction like a flashlight beam.
- You can see and hear a distant event at the same moment.
- Hitting an object harder changes its pitch.
- Sound can be produced without using any material objects.
- Light only reflects from mirrors and shiny objects.
- If students are asked what helps you see? Most will answer glasses, seeing-eye dogs, binoculars, hand lenses, or microscopes, not light.
- White light is colorless light.
- Sunlight is red, yellow or orange.
- Light travels from our eyes so we can see.
- Light comes from the object being looked at
- Bright light travels further than dim.
- Light only travels a short way.
- Humans can see in complete darkness after the eyes adjust.
- A shadow is something that exists on its own.
- A mirror reverses everything.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Help students to understand that there are forms of communication all around us.
- Provide students with the *Card Sort Activity*.
- Ask students to work together to classify images into groups-LIGHT and SOUND. Some of the images can be represented in both, such as morse code.
- Students share the results of the sorting activity as a group and must have a valid scientific reasoning for the category they select for the image.
- If the teacher notices there are certain pictures that are misclassified, ask the students to share why they chose what they did, and ask students who got it right to explain why they classified the image the way they did.
- Ask students to identify patterns or similarities between the light examples and in sound examples.
- Ask students if they can name some cause and effect relationships in the photos.

Resources:

- Card Sort Activity
- Communicating with Light and Sound Picture Sort Answer Key

Teacher Action(s):

- Creates interest
- Generates curiosity

Back to Top of Page

- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description: Light and Sound Hunt

Students walk around the school and grounds looking for and identifying a variety of communication forms.

- Students design a list of "look fors" and a way of collecting data. Students should work together to share their ideas in collecting data. This is a great way to link to mathematics- tally marks. While a *Light and Sound Hunt* template is provided, the standard specifically asks students to work collaboratively to plan and carry out an investigation. Therefore you may need to modify the document to showcase their ideas.
- Question prompts for class discussion:
  - Where else in the world do we see light sources, light going through different materials, and different materials making shadows?
  - How does light help you see things and communicate with others?
  - How does sound send us different types of messages?
  - How does sound help us communicate with others?
  - How do light and sound work together to make communication more clear?
- Students will take part in a *Light and Sound Hunt* within or around the school building.

Resources:

- Light and Sound Hunt data collection template

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

Back to Top of Page

- Class comes back together as a group to share and explain their findings. Help students to identify which form of communication was most commonly seen in the building. Prompt student thinking:
    - What were some of the examples you drew for light, sound or both?
    - Did the___ (light example) act as a light source or create a shadow?
    - What message was the object communicating?
    - What message was the ___(sound example) communicating?
    - How did light and sound work together to communicate a message?
    - What message did the (light and sound device) communicate to us?
    - What type of communication type was the most/least common? How do you know?
    - What type of communication can be used for closer and farther distances?
    - Would the most popular form of communication within the school work for communicating across town, across the state, and across the country/world? Why or why not?
- Class reads and discusses *Sending Messages with Light and Sound* by: Jennifer Boothroyd on Epic Books

Resources:

- Light and Sound Hunt data collection template
- Sending Messages with Light and Sound by Jennifer Boothroyd on Epic Books

Teacher Action(s):

- Encourages the students to explain their classification choices in their own words.
- Asks for justification (evidence) and clarification from students
- Formally provides explanations of reasons for classifying particular images.
- Uses students' previous experiences as the basis for explaining concepts.

Student Action(s):

- Explain possible answers to others
- Listen critically to others' explanations.
- Questions others' explanations.
- Listens to and tries to comprehend explanations the teacher offers.
- Refers to previous activities.

Vocabulary: light, shadow, light beam, light source, reflective, color, reflect, sound, vibrate, vibration, communication

ELABORATE (Applications / Extensions)

Activity Description:

- Tell students that a bad storm has knocked out the power and phones. Their best friend lives next door, and he/she wants to check on them to make sure they are doing ok with the storm and the power outage. The students are not allowed to go outside because of the weather, so what are the different ways students can use light and sound to communicate with their friend?
- Show students the available materials (some possible examples could be a light source to send signals, paper cups and string to make telephones or drums to create a pattern of beats).
    - Teacher Note: Do not tell the students what the materials can be used for, just let them figure it out.

Back to Top of Page

- Ask students to complete the *Draw a Model Handout* representing how they would communicate and check on their best friend. Ask students to label their models or add zoom out boxes for deeper explanations regarding the use of light and sound.
- Students use a variety of materials to build their ideas from their *Draw a Model Handout*.
- Students share their communication devices.

Resources:

- Draw a Model Handout

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?"

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP**: *Planning and Carrying out Investigations; Asking Questions and Defining Problems*
- ❏ **DCI**: *PS4.C: Information Technologies and Instrumentation; ETS1.A: Defining and Delimiting Engineering Problems*
- ❏ **CCC:** *Patterns*

Summative Assessment Description(s)

- Student models using light and sound to communicate with a friend from Elaborate.

Culminating Performance Task:

- Remind students of Mickey's Steamroller animation. In a group discussion, prompt students to share their ideas about how the animation communicated a message using light and sound.
- Ask students how the light and sound worked together to help the person watching understand what was happening.
- Ask students to think about the importance of the sounds. Could we change the message of the animation by changing the sounds?
- Students will engineer the sounds for the Birdie animation* using classroom objects. All engineers define the sounds/problem prior to enacting a solution.

Back to Top of Page

- Students preview the Birdie animation (WITHOUT SOUND) and brainstorm ways to improve the communication of the animation by adding sounds they can create in the classroom using common and available materials.
- Students must also describe how the animation (from film) works. You can provide time for students to use electronic devices to view the animation and test their sound ideas.
- Student assessment-please print on 11x17 paper.

Resources:

- Birdie animation*
- Student assessment

***Animation Source:** Hykade, Andreas , director. *Nuggets*, Film Bilder, 13 Oct. 2014

Additional Resources:

- G1 Unit Materials List
    - Click on specific tab for unit-specific materials

Back to Top of Page

Optional Learning Sequence
Brief Description: Up until this moment, students may never have considered whether or not they can see in total darkness. This lesson will draw upon their individual experiences to create a shared experience. Students need to figure out how the amount of darkness affects how much they can see. Students will be guided to wonder what we would see if we could make the room as dark as possible. Encourage students to suggest ways to make that happen. Questions being looked at include: What can we see in our room? How can we block the light that's coming into our room through the windows? Which materials will block the light best (to help us make our room as dark as possible)? *Citation: *These materials were developed through with support from the Michigan Department of Education; the Gordon and Betty Moore Foundation, and support from the NGSX Project at Clark University, Tidemark Institute, and Northwestern University* and adapted by the CREC Consortium.
Suggested Pacing: 1-1.5 hrs
Lesson-Level Phenomenon/Design Problem: ● What could we see if we made our room completely dark? ● How can we make our room as dark as possible?
Relationship to Anchoring Phenomena/Design Problem: How the amount of light impacts what we see.
Learning Sequence Driving Question: Is light necessary to see? Can we see in the dark?
Student Expected Outcomes: ● Students will analyze data by recording and sharing observations and using them to describe patterns across everyone's data to determine how many of us could see the number of shapes that were actually at each station in the darker versus better lit parts of the room. ● Students will ask questions based on observations from this experience and from other prior experiences we've had where (we've seen similar patterns) it has been difficult to see something in a dark place. Define problems and brainstorm solutions related to the question, "how can I make the space I am looking in as dark as possible?" ● Students will plan and conduct an investigation collaboratively to produce data to help determine which materials will be the best (patterns) for blocking out the light coming through the windows in our classroom.
CONNECTIONS TO STANDARDS

Back to Top of Page

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:

Planning and Carrying Out Investigations

- Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1) (1-PS4-3)
- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)

Constructing Explanations and Designing Solutions

- Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)

Asking Questions and Defining Problems

- Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1)
- Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)

Disciplinary Core Ideas:

PS4.B: Electromagnetic Radiation

- Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1-PS4-3)

Crosscutting Concepts:

Cause and Effect

- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1) (1-PS4-3)

Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1) (1-ESS1-2)

Related Performance Expectation(s) in this Unit:

- 1-PS4-3 Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.
  - [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).]
  - [Assessment Boundary: Assessment does not include the speed of light.]
- K-2-ETS1-1 Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Back to Top of Page

Possible Common Core State Standards Connections:

1-PS4-3:

ELA/Literacy —

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-PS4-3)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-3)
- SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (1-PS4-3)

K-2-ETS1-1:

ELA/Literacy —

- RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (K-2-ETS1-1)
- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (K-2-ETS1-1)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-1)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (K-2-ETS1-1)
- MP.4 Model with mathematics. (K-2-ETS1-1)
- MP.5 Use appropriate tools strategically. (K-2-ETS1-1)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-1)

Prior Student Knowledge:

N/A

Possible Preconceptions/Misconceptions:

- Light only reflects from mirrors and shiny objects.
- If students are asked what helps you see? Most will answer glasses, seeing-eye dogs, binoculars, hand lenses, or microscopes, not light.
- White light is colorless light.
- Sunlight is red, yellow or orange.
- Light travels from our eyes so we can see.
- Light comes from the object being looked at
- Bright light travels further than dim.
- Light only travels a short way.
- Humans can see in complete darkness after the eyes adjust.
- A shadow is something that exists on its own.
- A mirror reverses everything.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Back to Top of Page

Activity Description:

- Students move around the darkened room trying to see what shapes (that have been strategically placed around the room) they can see and to what degree they can see them - **see pages 2-10** of the Teacher's Guide for directions.
- Students record their responses on **pages 1-3** of the Student Resource.
- Teacher then debrief findings with the students using the questions below.
    - What kinds of patterns are we seeing from our station observations?
    - What are some other experiences you've had when it has been difficult to see in the dark?
    - What could we see in the room if we made it as dark as we possibly could?
    - Could we ever make it completely dark?
    - What more can we find out about this?
- Teacher encourages students to suggest ways to make the room as dark as possible.
- Teacher records the students' ideas for further investigation.

Resources:

- Teacher's Guide
- Student Resource

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- Students investigate how darkness affects how much/how well they can see.
- Students use **page 5** of Student Resource (from Engage) to make predictions.
- Teacher provides materials (cardboard, fabric, paper, tissue paper, towels, construction paper, transparencies, wax paper, mylar, plastic wrap, cardstock, etc.) to test various answers to the question: What could we see in the room if we made it as dark as we possibly could?
- Students work in small groups to test their earlier predictions about what will block the light to try to make the room as dark as possible.
- Students test alternatives and discuss them with their group.
- Teacher asks:
    - How successful were you in blocking out the light coming into our room?
    - What materials worked better than others?
    - If the window was too large what kinds of design solutions can we think of?
- Record their observations on the Student Resource.

Resources:

- Student Resource

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher

Back to Top of Page

- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):
- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)
Activity Description:
- Students discuss their possible solutions and answers as to how best to make the room (or an area entirely dark) so they can see if they can see objects in the dark.
- Students use their recorded observations in explanations.
- Teacher encourages students to explain light concepts about their exploration.
- Record their findings on a teacher made anchor chart and help the class to analyze their data together to come up with any noticeable patterns.
    - Help students to include scientific vocabulary as they share their findings.

Teacher Action(s):
- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):
- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: prediction, observe, clear, cloudy, dark, light, reflect, mediums, transparent, translucent, opaque, absorbed, illuminate, shadow, redirect, light source

ELABORATE (Applications / Extensions)
Activity Description:
- Students work in pairs to discuss possible designs to make the classroom completely dark.
- Pairs complete the Modifications Handout.
- Pairs present their ideas to the class.

Resources:
- Modifications Handout

Back to Top of Page

Teacher Action(s):
- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):
- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s):

Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence. Please note the following SEP, DCI and CCC need to be monitored throughout the learning sequence.

- ❏ **SEP**: *Planning and Carrying Out Investigations; Constructing Explanations and Designing Solutions; Asking Questions and Defining Problems*
- ❏ **DCI**: *PS4.B: Electromagnetic Radiation*
- ❏ **CCC**: *Cause and Effect; Patterns*

Summative Assessment Description(s):
- Students final ideas and presentation to the class from Elaborate.

Resources:
- Modifications Handout

Additional Resources:
- G1 Unit Materials List
  - Click on specific tab for unit-specific materials

Unit 3 - Senses In Nature

Students become plant and animal scientists who use their powers of observation and curiosity on a journey of figuring out how plants and animals use their external parts to help them meet their needs in order to grow and survive. Students will initially view three video clips that show the amazing lives of three organisms; a tulip, venus flytrap and the star-nosed mole. The students will be asked to view the video clips through two lenses: I wonder and I notice. From their observations, students will start to develop initial theories on why these organisms look the way they do and why they behave the way they do.

By the end of this unit, students will be introduced to the concept of biomimicry, learning from nature to make things better. Students will be able to explain the structures and functions of animals and plants as well as identify survival growth needs for both plants and animals. The culminating learning sequence will have the students take all information learned throughout the unit and tie it together to create/engineer a problem that needs to be solved.

To access the flowchart for this unit, click here.

Suggested Pacing:
10-12 hrs

Anchoring Phenomenon/Design Problem:
How do the external parts of the Venus flytrap, star nosed mole, and tulip help them grow and survive?

Unit Driving Question:
How do external parts and sunlight help living things grow and survive?

Culminating Performance Task:
Biomimicry - Students will consider how the external parts of the Venus flytrap, star nosed mole, and tulip help them grow and survive and design an invention that could help solve a human problem

NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements)

- 1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.*
    - [Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]
- 1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.
    - [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.]
    - [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]*
    - *(This PE is something that will be ongoing from the beginning of the year (making and collecting*

Back to Top of Page

regular observations) until the collected observations can be analyzed within a later Unit (3 or 4).

- K-2-ETS1-2 Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- K-2-ETS1-3 Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

*1-ESS1-2 is only partially assessed.

Three Dimensions that form the Foundation for these NGSS Performance Expectations:

Science & Engineering Practices:

Constructing Explanations and Designing Solutions

- Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1)

Planning and Carrying Out Investigations

- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)

Developing and Using Models

- Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)

Analyzing and Interpreting Data

- Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3)

Disciplinary Core Ideas:

LS1.A: Structure and Function

- All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)

LS1.D: Information Processing

- Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1)

ESS1.B: Earth and the Solar System

- Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)

ETS1.B: Developing Possible Solutions

Crosscutting Concepts:

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1) (K2-ETS1-2)

Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-2)

Back to Top of Page

	• Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2) **ETS1.C: Optimizing the Design Solution** • Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)	

Possible Common Core State Standards Connections:

ELA-

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-LS1-1)(1-ESS1-2)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-ESS1-2)
- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (K-2-ETS1-3)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-3)
- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (K-2-ETS1-2)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (1-ESS1-2)(K-2-ETS1-3)
- MP.4 Model with mathematics .(1-ESS1-2)(K-2-ETS1-3)
- MP.5 Use appropriate tools strategically. (1-ESS1-2)(K-2-ETS1-3)
- 1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)
- 1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-3)

PROGRESSION OF LEARNING

ONGOING THROUGHOUT THE SCHOOL YEAR: *This refers to the on-going length of day data collection introduced in G1 U1.*

Back to Top of Page

- Plan *at least* 10 dates (1 per month) to collect length of day and graph on a class chart. May do three dates - 1st, 10th, 20th of the month.
- *It is suggested that you gather the data over the summer and use this data to model how to collect the data for the school year.*
- This ongoing observation fully covers the PE: 1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.

Resources:

- Website for data collection, Sample bar graph, and optional: *amount of daylight each month*

Learning Sequence 1

- **Learning Sequence Driving Question**
  - How do external parts and sunlight help living things grow and survive?
- **Learning Sequence 1**
- **Relationship to Anchoring Phenomena/Design Problem**
  - This is the introduction to the anchoring phenomenon.
- **Student Expected Outcomes:**
  - Students will make observations and ask questions about plants, animals and light to identify that all organisms have different body parts and use their parts in different ways to grow and survive.

Learning Sequence 2

- **Learning Sequence Driving Question**
  - How do plant parts help the plant meet its needs?
- **Learning Sequence 2**
- **Relationship to Anchoring Phenomena/Design Problem**
  - Students use the anchoring phenomena and their questions to discover patterns in the structure and function of plant parts to help them design a solution to a human problem.
- **Student Expected Outcomes:**
  - Students will make and record observations and develop theories to recognize patterns in various plant structures.
  - Students will use evidence of their plant parts observations to develop explanations on how plant parts help a plant meet its needs.

Learning Sequence 3

- **Learning Sequence Driving Question**
  - How do animal body structures help it meet its needs for growth and survival?
- **Learning Sequence 3**
- **Relationship to Anchoring Phenomena/Design Problem**
  - Students use the anchoring phenomena of the star-nosed mole and their questions based on animal structures and functions to discover patterns in the structure and function of animal parts to help them develop a solution to a human problem.
- **Student Expected Outcomes:**
  - Students will make and record observations to recognize patterns in various animal structures.
  - Students will use evidence of their animal part research to develop explanations on how animal parts helps it meet its needs.

Back to Top of Page

Learning Sequence 4

- **Learning Sequence Driving Question**
  - How have humans used nature to solve their problems? How can I mimic nature to develop a solution to my problem?
- Learning Sequence 4
- **Relationship to Anchoring Phenomena/Design Problem**
  - Students use the anchoring phenomena videos and their explorations of animal and plant part structure and function to identify a human problem and design a solution using their knowledge of the natural world.
- **Student Expected Outcomes:**
  - Students will explore how humans have used nature to inspire solutions to their problems.
  - Students will design a solution to a human problem using their knowledge of how plants and animals use their external parts to meet their needs.

Assessments:

- **Culminating Performance Task:**
- Using the structure of the Sandra Markle texts, ask students to create their own biomimicry page. Students choose Venus Flytrap, Star-nosed Mole, Tulip or other plant/animal to mimic.
  - ❏ On the left page identify the structure to mimic from one of the given choices and draw that structure and identify the function.
  - ❏ On the right page draw their invention and label the material they would use. In the zoom out bubble, they will describe how their invention helps humans.
  - ❏ If time allows, have students create a prototype of their ideas.
  - ❏ Student Biomimicry Page
- Grade 1 Performance Expectation Rubrics and Prompts
- Catalyst Elementary Assessment Guide

Additional Resources:

- G1 Unit Materials List
  - Click on specific tab for unit-specific materials
- EPIC! Digital Library - G1 U3 List
  - Includes ebooks and videos
  - Must have an educator user account for free access

Back to Top of Page

Learning Sequence 1		
Brief Description: Students become plant and animal scientists who use their powers of observation and curiosity on a journey of figuring out how plants and animals use their external parts to help them meet their needs in order to grow and survive. Students will initially view three video clips that show the amazing lives of three organisms; a tulip, venus flytrap and the star-nosed mole. The students will be asked to view the video clips through two lenses: I wonder and I notice. From their observations, students will start to develop initial theories on why these organisms look the way they do and why they behave the way they do.		
Suggested Pacing: 0.5 - 1 hr		
Lesson-Level Phenomenon/Design Problem: These videos set the stage for the students to figure out how plants and animals use their external parts to help them meet their needs necessary for growth and survival while considering the role that sunlight plays in their development: ● 22 day life cycle of a tulip plant in a garden ● Venus flytrap Teacher Background on the Venus Flytrap ● Star nosed Mole		
Relationship to Anchoring Phenomena/Design Problem: This is the introduction to the anchoring phenomenon.		
Learning Sequence Driving Question: How do external parts and sunlight help living things grow and survive?		
Student Expected Outcomes: ● Students will make observations and ask questions about plants, animals and light to identify that all organisms have different body parts and use their parts in different ways to grow and survive.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Planning and Carrying Out Investigations** ● Make observations (firsthand or from media) to collect data that can be	**Disciplinary Core Ideas:** **LS1.A: Structure and Function** ● All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp	**Crosscutting Concepts:** **Structure and Function** ● The shape and stability of structures of natural and designed objects are related to their function(s).

Back to Top of Page

used to make comparisons. (1-ESS1-2)	objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1) **LS1.D: Information Processing** ● Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1)	(1-LS1-1) (K2-ETS1-2)

Related Performance Expectation(s) in this Unit:

- 1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.*
  - [Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]

Possible Common Core State Standards Connections:

ELA/Literacy -

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-LS1-1)

Prior Student Knowledge:

K.ETS1.A, K-LS1-1, K-ESS3-1

Possible Preconceptions/Misconceptions:

- Plants do not eat insects.
- Insects eat plants only.
- Moles use their eyes to see.
- Moles use all their senses equally.
- Plants do not move.
- Plants do not need the sun.

Back to Top of Page

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Teacher shows the following videos with little explanation:
  - *Venus Flytrap Video*
  - *Tulip Video*
  - *Star-nosed Mole Video* (show without sound)
- The students should view the videos at least twice while completing an I Notice, I Wonder Student Sheet:
  - to make observations about what they noticed related to plants and animals
  - to generate questions based on each video.

Resources:

- Videos:
  - Venus Flytrap Video
  - Tulip Video
  - Star-nosed Mole Video *(show without sound)*
- I Notice, I Wonder Student Sheet

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- Debrief as a class and record the variety of questions and observations. As students recall the videos and refer to their I Notice, I Wonder Sheet ask:
  - How do animals and plants use their parts to grow and/or survive during different times of the day?
- Record students' questions.
  - Teacher can prompt students to come up with 3 questions they want answered to understand and describe how the structures and functions of plants and animals help them survive, as well as the role sunlight plays in the organism's habitat.
  - Teacher collects student questions and records them under the general themes: Plant Structures, Animal Structures, Behaviors in Light or Dark, and Survival (Growth and Needs)
- Periodically, check off questions that students have answered through their investigations and readings.
  - *Note the goal of this lesson is to get students curious about how structures and their related*

Back to Top of Page

functions help plants and animals live and grow as well as the role sunlight plays in their environment.

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EVALUATE

Formative Monitoring Description(s):

Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence. Please note the following SEP, DCI and CCC need to be monitored throughout the learning sequence.

- ❏ **SEP**: *Planning and Carrying Out Investigations*
- ❏ **DCI**: *LS1.A: Structure and Function; LS1.D: Information Processing*
- ❏ **CCC**: *Structure and Function*

Summative Assessment Description(s):

- Teacher should facilitate the development of an ongoing class *Summary Table* of the learning that progresses throughout the unit. After each learning sequence the teacher should go back to the Summary Table to capture the learning from that sequence making sure connections are made to the progression of learning from the previous sequence. This is a fluid document that should be visible to all students during the instruction of this unit.

Resources:

- Summary Table

Additional Resources:

- G1 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 2		
Brief Description: In this sequence students explore the ideas of plants' structures and function and the role of sunlight in the plant's life cycle. Students will be exploring plants in a variety of learning stations to determine the functions of plant parts. Students will recall from kindergarten that all plants need sunlight, soil and water to grow and survive and that all plants start as a seed, grow into a plant (bush, tree, single plant or vine).		
Suggested Pacing: 2.5 - 3.5 hrs *Station Five - Takes a week for observations*		
Lesson-Level Phenomenon/Design Problem: Lima bean growth video and revisit the tulip video		
Relationship to Anchoring Phenomena/Design Problem: Students use the anchoring phenomena and their questions to discover patterns in the structure and function of plant parts to help them design a solution to a human problem.		
Learning Sequence Driving Question: How do plant parts help the plant meet its needs?		
Student Expected Outcomes: ● Students will make and record observations and develop theories to recognize patterns in various plant structures. ● Students will use evidence of their plant parts observations to develop explanations on how plant parts help a plant meet its needs.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Planning and Carrying Out Investigations** ● Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)	**Disciplinary Core Ideas:** **LS1.A: Structure and Function** ● All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers,	**Crosscutting Concepts:** **Structure and Function** ● The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1) (K2-ETS1-2) **Patterns**

Back to Top of Page

Developing and Using Models • Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)	fruits) that help them survive and grow. (1-LS1-1) **LS1.D: Information Processing** • Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1) **ETS1.B: Developing Possible Solutions** • Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (*This DCI is not fully accessible in this LS, but will be continued in LS3 and LS4.)	• Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-2)

Related Performance Expectation(s) in this Unit:

- 1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.*
  - [Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]
- 1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.
  - [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.]
  - [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]*
- K-2-ETS1-2 Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

*1-ESS1-2 is only partially assessed.

Possible Common Core State Standards Connections:

ELA/Literacy —

- RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (K-2-ETS1-1)
- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (K-2-ETS1-1),(K-2-ETS1-3)

Back to Top of Page

- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-1),(K-2-ETS1-3)
- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (K-2-ETS1-2)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (K-2-ETS1-1),(K-2-ETS1-3)
- MP.4 Model with mathematics. (K-2-ETS1-1),(K-2-ETS1-3)
- MP.5 Use appropriate tools strategically. (K-2-ETS1-1),(K-2-ETS1-3)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-1),(K-2-ETS1-3)

Prior Student Knowledge:

K-LS1-1

K-ESS3-1

Possible Preconceptions/Misconceptions:

Students may believe that:

- all plants look alike (similar to our climate)
- all plants only need sun and water to survive
- plants don't grow/change

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- As a class, read *Plants Can't Sit Still by Rebecca Hirsch*
- Students will observe the *Lima Bean Video and Tulip Video* (again) in a whole group setting and add more questions to the plant structures portion of the class observation and question chart based on the book and videos. Be sure to prompt the students about the role of the sun if this concept doesn't come up during the questioning session.
- Teacher asks students to make connections between the two videos.
- Discuss how the two plants are alike and different with a partner at the carpet.
- After discussing with their partners, have students share their questions and observations with the class. If there is anything new, add it to the class question and observation chart.

Resources:

- Plants Can't Sit Still by Rebecca Hirsch on Epic Books
- Lima Bean Video
- Tulip Video

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions

Back to Top of Page

- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

Students explore four different learning stations and a class demonstration (prior preparation required):

- Utilize the stations in the way that works best for your classroom because each station is not an equal amount of time.
    - Lima Bean Dissection: to show the connection of the seed to the sprout and mature plant.
    - Fruit Exploration: to show the connection between the fruit of a plant and the seeds.
    - Potted Plant Exploration: A tomato plant or another flowering/fruit plant in a pot to show the function of roots securing plants in the ground.
    - Stem Exploration: Students observe different dyed carnations and then explore with celery and food coloring to show the function of a stem absorbing water.
    - Leaf Exploration:
        - Option #1: Have children observe a house plant with some leaves covered with paper to show the function of photosynthesis. This is only developing an awareness, students do ***not*** need to understand the mechanisms of photosynthesis for Station 5 is set up as a whole class observation.
        - Option #2: Students observe the leaves of the grass plant (the blades) reacting to different amounts of sunlight.
- Students will record their explorations in the *My Plant Scientist Evidence Log*.
- After the class has experienced each of the stations, discuss each station's learning.

Resources:

- Plant Exploration
- My Plant Scientist Evidence Log

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

Back to Top of Page

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Students develop their explanations about what they observed in their plant exploration. Start this phase reviewing their observations to develop a consensus understanding of the plant parts and their function as you read *Plant Secrets* by Emily Goodman. Elicit student sharing as you read the text, stopping at these points to encourage students to share their observations of the explore activities. Be sure to refer to anchors developed in Engage and Explore phases of this learning sequence to students to refer to in the next two phases: Explain and Elaborate.
- As you read Plant Secrets (on epic!) refer to the debriefing for each of the stations:
    - Read pages 3-6, elicit student ideas from their Lima Bean Dissection Station, then read pages 7, 8.
    - Read pages 9-20, elicit student ideas from the Potted Plant, Stem and Leaf Exploration Stations
    - Read pages 21-24, elicit student ideas from the Fruit Dissection Station, then read pages 25-26
- Introduce the idea of a plant life cycle and how each of the stations would connect with that. Read pages 28-32, focusing only on the top section of each part and its function.
- Ask students to think about their on-going daylight hour data collection to connect the changes they are seeing to how that would impact plants.
    - Have a quick class discussion on the seasonal impacts of daylight changes to plant growth and life cycles (no tulips in the winter). This topic is covered in Unit 4.

Resources:

- *Plant Secrets* by Emily Goodman available on epic Books
- Further resources on epic! Books:
    - *Exploring Seeds* by Kristin Sterling
    - *Exploring Stems* by Kristin Sterling
    - *Exploring Flowers* by Kristin Sterling
    - *Exploring Roots* by Kristin Sterling
    - *Exploring Leaves* by Kristin Sterling

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: root, leaf, stem, flower, petal, pollen, branch, thorn, fruit, life cycle, growth, survival, soil, sunlight, water, form

ELABORATE (Applications / Extensions)

Activity Description:

Back to Top of Page

- Show students slides #3-6 from the *Plant Structure Slideshow.*
- Students choose one plant slide and explain the form/shape of the parts as well as the function of each part.
    - Students explain that all plants need sunlight, water and soil to grow and survive.
    - Discuss how plant structures across species are similarly shaped to access those necessary elements for growth and survival.
- Ask students to make comparisons among or between the different plants and identify how they are alike and different.
    - Include discussion of patterns.
- Ask students: How do plant parts help the plant meet its needs?
- Students complete the *Plant Structure Model Handout.*
- On the model, students should choose what needs (sun, soil or water) does the structure use to help the plant live and grow. Students should use their plant evidence logs to help them develop their rationale.
    - Bring the discussion back to the tulip plant video. Using what they know about structures and their function, ask the students to identify if the identified structures are necessary for the tulip to live and grow.
- Ask students: What other structures do plants have that help them meet their needs of survival?
- As a class read: *Meat Eating Plants by Mari Schuh*
- Ask students: Can you think of an example of something humans use that we copied from plants? (example could be animal traps)

Resources:

- Plant Structure Slideshow
- Plant Structure Model Handout
- Meat Eating Plants by Mari Schuh on epic! Books
    - Mari Schuh has Plant Power Series available on epic! Books

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks “What do you already know?”, Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

FORMATIVE MONITORING (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP:** *Planning and Carrying Out Investigations; Developing and Using Models*
- ❏ **DCI:** *LS1.A: Structure and Function; LS1.D: Information Processing; ETS1.B: Developing Possible Solutions*

Back to Top of Page

❏ **CCC:** *Structure and Function; Patterns*

Summative Assessment Description(s):

- Teacher should facilitate the development of an ongoing class *Summary Table* of the learning that progresses throughout the unit. After each learning sequence the teacher should go back to the Summary Table to capture the learning from that sequence making sure connections are made to the progression of learning from the previous sequence. This is a fluid document that should be visible to all students during the instruction of this unit.

Resources:

- Summary Table

Additional Resources:

- G1 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 3		
Brief Description: Students will compare the ways that animals use their external parts to perceive their environment and meet their needs to grow and survive. In the first learning sequence, students were introduced to the star nosed mole, whose sense of smell helps it be the world's fastest eater. Students will research different animals to obtain information on how animals use their external parts to perceive their environment and to meet their needs to grow and survive in their environments.		
Suggested Pacing: 3.5 - 4.5 hrs		
Lesson-Level Phenomenon/Design Problem: How are human body parts similar in function to those of the star nosed mole?		
Relationship to Anchoring Phenomena/Design Problem: Students use the anchoring phenomena of the star-nosed mole and their questions based on animal structures and functions to discover patterns in the structure and function of animal parts to help them develop a solution to a human problem.		
Learning Sequence Driving Question: How do animal body structures help it meet its needs for growth and survival?		
Student Expected Outcomes: ● Students will make and record observations to recognize patterns in various animal structures. ● Students will use evidence of their animal part research to develop explanations on how animal parts help it meet its needs.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Planning and Carrying Out Investigations** ● Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2) **Developing and Using Models**	**Disciplinary Core Ideas:** **LS1.A: Structure and Function** ● All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants	**Crosscutting Concepts:** **Structure and Function** ● The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1) (K2-ETS1-2) **Patterns** ● Patterns in the natural

Back to Top of Page

• Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2) **Analyzing and Interpreting Data** • Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3) **Constructing Explanations and Designing Solutions** • Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1)	also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1) **LS1.D: Information Processing** • Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1) **ETS1.B: Developing Possible Solutions** • Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (*This DCI is not fully accessible in this LS, but will be continued in LS4.) **ETS1.C: Optimizing the Design Solution** • Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)	world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-2)

Related Performance Expectation(s) in this Unit:

- 1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.*
  - [Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]
- 1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of

Back to Top of Page

year.
    - [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.]
    - [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]*
- K-2-ETS1-2 Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- K-2-ETS1-3 Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

*1-ESS1-2 is only partially assessed.

Possible Common Core State Standards Connections:

ELA/Literacy —

- RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (K-2-ETS1-1)
- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (K-2-ETS1-1),(K-2-ETS1-3)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-1),(K-2-ETS1-3)
- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (K-2-ETS1-2)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (K-2-ETS1-1),(K-2-ETS1-3)
- MP.4 Model with mathematics. (K-2-ETS1-1),(K-2-ETS1-3)
- MP.5 Use appropriate tools strategically. (K-2-ETS1-1),(K-2-ETS1-3)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-1),(K-2-ETS1-3)

Prior Student Knowledge:

K-LS1-1
K-ESS3-1

Possible Preconceptions/Misconceptions:

- Living objects can change to meet their survival needs.
- Birds, fish, insects and worms are not animals.
- All animals can move from place to place.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Revisit the Star Nosed Mole video and the student generated questions from LS1.

Back to Top of Page

- Ask the students:
  - How are they like the star nosed mole?
  - How are their body parts like the star nosed mole?
    - Generate a list of external body parts for animals and humans
  - How do they (the students) learn about their environment? Senses.
- Record student ideas on an anchor chart, *Double Bubble Comparison* **or** Venn Diagram.
- Listed below are structures common to both humans and star-nosed moles along with an overview of the similar functions.

Teacher Information:

External Body Parts	Function	Senses- Sense Organ
• Eyes • Ears • Nose • Skin/Hair • Tails • Mouths • Feet • Arms/Hands	• seeing • hearing • smelling • protection/touch • protection, • consume food, communicate • move • grasp objects, use tools, communicate	• Sight - Eyes • Hearing-Ears • Smell - Nose • Touch - Skin • Taste - Tongue

Resources:

- Star-nosed Mole Video *(show without sound)*
- Double Bubble Comparison

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

Part 1:

- Introduce the text *What Do You Do With a Tail Like This?* by Steven Jenkins and Robin Page by showing the front cover asking the students:
  - What animal does the tail belong to?
  - Take a few responses and ask the students to cite their reasoning, then flip the back of the book to reveal the lizard.
- Students participate in a *Turn and Talk* to answer the questions:

Back to Top of Page

    - How do you think the lizard might use its tail?
    - How does a tail help an animal find food or stay safe?
- Then ask the partner to share their partner's ideas. Record student ideas.
- Tell the students they are going to play a game with this book today. As they play this game they will discover how many different animals use their external body parts to help them survive
    - *Sample and Blank Anchor Charts* are available in Resources Part 1
    - As you move through the book, pause after reading each double page with a question about an animal body part.
    - Encourage students to guess which animal the part belongs to.
    - Continue reading how the animals use that external body part.
    - Pay particular attention to unusual external body parts such as the lizard and the archerfish.
- Work with your students to complete the data tables (**Animals with the asterisk have complex body structures - Ask the students if they have ideas about how to complete the data table based on their prior knowledge.)*
    - *This lesson and its components are adapted from *Perfect Pairs-Using Fiction and Nonfiction Picture Books to Teach Life Science, K-2* by Melissa Stewart and Nancy Chesley

Resources Part 1:

- *What Do You Do With a Tail Like This?* by Steven Jenkins and Robin Page
- Sample and Blank Anchor Charts

Part 2:

- Divide your class into six groups, assign each group one of the animal parts (discussed in part 1) for the *Discussion Diamond Activity.*
- Urge students to consider why the same body parts on different animals have different shapes and/or functions.
    - Have each group member share their ideas and come to a consensus on the best responses. List those in the center of the diamond.

Resources Part 2:

- Discussion Diamond Activity
- Discussion Diamond Directions

Part 3:

- Students will design, build and test a food gathering device.
- As a class, refer back to the Mouth and Feet anchor charts (or appropriate pages in *What Do You Do With a Tail Like This?* by Steven Jenkins and Robin Page) to discuss how different animals obtain and eat food.
- Show the *Directions Slideshow*
    - Things to consider for the Class Data Chart (slide #8 of the *Directions Slideshow)*
        - Which device picked up the most food? Why?
        - The way (e.g., physical process, qualities of the solution) each device solves the problem.
        - The strengths and weaknesses of each design feature.

Resources Part 3:

- Directions Slideshow

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact

Back to Top of Page

- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Ask students:
  - How does an animal's body parts help it survive?
- Develop a general list of three or four ways the animals in the text depend on their external body parts. For example:
  - safety
  - get food (searching, catching, eating)
  - moving around
  - using their senses
- After discussion around these ideas that body parts help organisms to survive in their environments, ask students to work in small collaborative groups to research animals through nonfiction texts to identify the ways their structure helps the organism live and grow.
  - May need assistance from your library media specialist to pull texts associated with animals from Explore to help students visualize the organisms and their environmental needs.
  - Use video from explore.org to allow students to make live observations of their animal and its structures and environment.
  - Ask students to draw a model of the animal
    - Models should focus on the specialized structures and their proposed functions.
    - Students will need to incorporate visual imagery and explanatory text in these models.
    - Models can be completed on chart paper or 11x17 paper.
- Ask students to think about their on-going daylight hour data collection to connect the changes they are seeing to how that would impact animals.
  - Have a quick class discussion on the seasonal impacts of daylight changes to animal growth and life cycles (bears hibernate in the winter). This topic is covered in Unit 4.

Resources:

- https://explore.org/livecams
- non fiction texts from epic Books

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

Back to Top of Page

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: grow, body, hear, human, survive, shell, animal features, behavior, skin, nose, ears, tail, mouth, eyes, feet

ELABORATE (Applications / Extensions)
Activity Description:

- Bring the discussion back to the star-nosed mole. Using what we know about structures and their function, ask the students to identify which of the mole's structures help it to find food or stay safe.
- On the *Star-nosed Mole Model*, students should provide a rationale for their ideas/classification of the structure as F for Food or S for Safety.
- As a class read: *National Geographic Readers: Animal Armor by Laura Marsh* or *Back Off! Prickly Animals by Nadia Higgins* on Epic Books
- Ask students: Can you think of an example of something humans use that we copied from animals? (example could be bike helmets inspired by turtle or snail shells)

Resources:

- Star-nosed Mole Model
- On epic! Books (be sure to sign in on epic! prior to clicking the links):
  National Geographic Readers: Animal Armor by Laura Marsh
  Back Off! Prickly Animals by Nadia Higgins

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE
FORMATIVE MONITORING (Questioning / Discussion)
Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

Back to Top of Page

- ❏ **SEP:** *Planning and Carrying Out Investigations; Developing and Using Models; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions*
- ❏ **DCI:** *LS2.A: Structure and Function; LS1.D: Information Processing; ETS1.B: Developing Possible Solutions*; ETS1.C: Optimizing the Design Solutions
- ❏ **CCC:** *Structure and Function; Patterns*

Assessment Description(s):

- Teacher should facilitate the development of an ongoing class *Summary Table* of the learning that progresses throughout the unit. After each learning sequence the teacher should go back to the *Summary Table* to capture the learning from that sequence making sure connections are made to the progression of learning from the previous sequence. This is a fluid document that should be visible to all students during the instruction of this unit.

Resources:

- Summary Table

Additional Resources:

- G1 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 4		
Brief Description: In this learning sequence students will investigate how humans have used nature to inspire solutions to either solve a problem that helps them meet their needs or make their lives easier.		
Suggested Pacing: 1.5 - 2 hrs for 5-Es 0.5 - 1 hr for Culminating Performance Task		
Lesson-Level Phenomenon/Design Problem: Biomimicry Inventions		
Relationship to Anchoring Phenomena/Design Problem: Students use the anchoring phenomena videos and their explorations of animal and plant part structure and function to identify a human problem and design a solution using their knowledge of the natural world.		
Learning Sequence Driving Question: How have humans used nature to solve their problems? How can I mimic nature to develop a solution to my problem?		
Student Expected Outcomes: ● Students will explore how humans have used nature to inspire solutions to their problems. ● Students will design a solution to a human problem using their knowledge of how plants and animals use their external parts to meet their needs.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Constructing Explanations and Designing Solutions** ● Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1) **Planning and Carrying Out Investigations** ● Make observations (firsthand or from media)	**Disciplinary Core Ideas:** **LS1.A: Structure and Function** ● All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help	**Crosscutting Concepts:** **Structure and Function** ● The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1) (K2-ETS1-2) **Patterns** ● Patterns in the natural world can be observed, used to describe phenomena, and used as

Back to Top of Page

to collect data that can be used to make comparisons. (1-ESS1-2) **Developing and Using Models** ● Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)	them survive and grow. (1-LS1-1) **LS1.D: Information Processing** ● Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1) **ETS1.B: Developing Possible Solutions** ● Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2)	evidence. (1-ESS1-2)

Related Performance Expectation(s) in this Unit:

- 1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.*
  - [Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]
- K-2-ETS1-2 Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Possible Common Core State Standards Connections:

ELA -

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-LS1-1)(1-ESS1-2)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-ESS1-2)
- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (K-2-ETS1-3)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-3)
- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (K-2-ETS1-2)

Back to Top of Page

Mathematics —

- MP.2 Reason abstractly and quantitatively. (1-ESS1-2)(K-2-ETS1-3)
- MP.4 Model with mathematics. (1-ESS1-2)(K-2-ETS1-3)
- MP.5 Use appropriate tools strategically. (1-ESS1-2)(K-2-ETS1-3)
- 1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)
- 1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-3)

Prior Student Knowledge:

K-LS1-1
K-ESS3-1

Possible Preconceptions/Misconceptions:

- Everything that makes our lives easier has been invented.
- We cannot learn from nature because we are smarter.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Read the text, *Wild Ideas Let Nature Inspire Your Thinking* by Elin Kelsey.
- As you read the story, stop at natural points to elicit student thinking with Think, Pair, Share: How do humans do similar things to the animals represented in the text?
    - Squirrels pg. 5 - What can you learn by watching squirrels?
    - Orangutans pg. 9 - Why do you think orangutans stop and think when they feel puzzled? What do you do?
    - Dung beetles pg. 25 - Why do you think dung beetles look to the stars and steer by the Milky Way?

Resources:

- Wild Ideas Let Nature Inspire Your Thinking by Elin Kelsey on epic! Books

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

Back to Top of Page

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- The focus of this lesson is biomimicry - which is the science of studying nature's best ideas and mimic or copy them to solve our problems.
- Introduce the concept of biomimicry through this activity -
    - Create eight groups and distribute to each group a card from the *Biomimicry Phenomena Cards*.
    - Prompt the students to observe the images of humans and living things.
    - Ask students to identify how the living things structure and function is similar to the engineered device used by humans.
        - briar patch - barbed wire
        - burdock plant - velcro
        - dandelion seed - parachutes
        - tree trunk and branches - coat tree
        - kingfisher's bill - Japan's bullet train
        - gecko feet that allow them to climb walls - suction cups for climbing
        - bluebird bill - needle-nose pliers
        - termite mounds - skyscrapers

Resources:

- Biomimicry Phenomena Cards

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Help students begin to understand that engineers often look to living things to help them solve problems. This is known as biomimicry-innovation inspired by nature. All of the engineered designs in the Explore phase used nature as a means of helping engineers design a solution to a problem. Engineers follow an engineering design process that includes the following stages: (1) Ask, (2) Imagine, (3) Plan, (4) Create, (5) Improve
- Read *How and Why Do People Copy Animals* by Bobbie Kalman on epic! Books
- Refer to the special structures on each of the anchor phenomenon:
    - mole (sensing surroundings through touch)
    - venus flytrap (sensing prey through touch)

Back to Top of Page

    - tulip (sensing sunlight)
        - Teacher Information - phototropism/heliotropism are responsible for a plant's ability to grow towards and track the sun which much of solar technology mimics
- Provide time for the students to discuss some of the specialized features found within three organisms that help they survive and grow. This would be a good time for them to refer to the contents on the summary table.
- Have the students/student group select one of the structures. The goal is for students to brainstorm a way that humans could use ONE structure (or something inspired by it) to solve a human problem. Example: a walking stick helps a blind person navigate the room by acting as a projected feeler, much like the mole's nose. Example: a walking stick helps a blind person navigate the room by acting as a projected feeler, much like the mole's nose.

Resources:

- *How and Why Do People Copy Animals* by Bobbie Kalman on epic Books
- Optional Resources:
    - The Inspired By Nature Series on epic! Books offers great additional resources

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: design, environment, human, engineer, engineering, material, sketch, diagram, mimic, human-made

ELABORATE (Applications / Extensions)

Activity Description:

- Read at least one of the Sandra Markle texts listed below.
- Discuss with class and note text features (will be used in Culminating Performance Task)

Resources:

- Read *ONE* of the following texts by Sandra Markle:
    - *What if You had Animal Feet?*
    - *What if you had Animal Teeth?*
    - *What if you had Animal Eyes?*
    - *What if you had Animal Ears?*
    - *What if you had An Animal Nose?*
    - *What if you had An Animal Tail?*

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations

Back to Top of Page

- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s):

Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence. Please note the following SEP, DCI and CCC need to be monitored throughout the learning sequence.

- ❏ **SEP:** *Constructing Explanations and Designing Solutions; Planning and Carrying Out Investigations; Developing and Using Models*
- ❏ **DCI:** *LS1.A: Structure and Function; LS1.D: Information Processing; ETS1.B: Developing Possible Solutions*
- ❏ **CCC:** *Structure and Function; Patterns*

Summative Assessment Description(s):

- Teacher should facilitate the development of an ongoing class *Summary Table* of the learning that progresses throughout the unit. After each learning sequence the teacher should go back to the Summary Table to capture the learning from that sequence making sure connections are made to the progression of learning from the previous sequence. This is a fluid document that should be visible to all students during the instruction of this unit.

Resources:

- Summary Table

Culminating Performance Task:

- Using the structure of the Sandra Markle texts, ask students to create their own biomimicry page. Students choose Venus Flytrap, Star-nosed Mole, Tulip or other plant/animal to mimic.
  - On the left page identify the structure to mimic from one of the given choices and draw that structure and identify the function.
  - On the right page draw their invention and label the material they would use. In the zoom out bubble, they will describe how their invention helps humans.
  - If time allows, have students create a prototype of their ideas.

Resources:

- Student Biomimicry Page

Additional Resources:

- G1 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Back to Top of Page

Unit 4 - Seasonal Changes

Through patterns of the sunlight and Earth's seasons, students will explore how living things respond to seasonal changes. Unlike humans, animals and plants have strong biological seasonal cycles that are linked to the amount of sunlight in their day. The response from plants and animals to these changes in daylight through the year include reproduction, denning, migration, hibernation, changes to coat thickness, coloration, leaf production, growth and dormancy. These characteristics and behaviors connect offspring to their parents in both their traits (offspring that are alike and not exactly alike their parents) and their survival.

Students learn what it is like to be a field biologist. They will study the different living things in the local region or deciduous biome in order to generate a field guide. Using a variety of media, students will investigate how living things change with the seasons and record these findings on the pages of the field guide. To continue in their role as field biologists, students record the ways in which parents help their offspring to survive.

To access the flowchart for this unit, click here.

IMPORTANT: Learning Sequence 3 - Engage Part #2 requires 30 days of advance prep!

Suggested Pacing:
9-10 hrs

Anchoring Phenomenon/Design Problem:
Time Lapse of Seasons

Unit Driving Question:
How do living things prepare and behave in order to survive in the different seasons?

Culminating Performance Task:

- Students present their Field Guides to the class.
- As students are presenting their Field Guides, the class should be identifying significant patterns that are similar between all organisms (animals and plants).

NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements)

- 1-LS1-2 Read texts and use media to determine patterns in the behavior of parents and offspring that help offspring survive.
  - [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]
- 1-LS3-1 Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.
  - [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.]
  - [Assessment Boundary: Assessment does not include inheritance or animals that undergo

Back to Top of Page

metamorphosis or hybrids.]

- 1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.
  - [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.]
  - [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]

Three Dimensions that form the Foundation for these NGSS Performance Expectations:

Science & Engineering Practices:

Obtaining, Evaluating, and Communicating Information

- Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2) (1-LS3-1)

Constructing Explanations and Designing Solutions

- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-LS2-1) (1-LS3-1)

Planning and Carrying Out Investigations

- Make observations (firsthand or from media) to collect data that can be used to make comparisons.(1-LS3-1)

Disciplinary Core Ideas:

LS1.B: Growth and Development of Organisms

- Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1-LS1-2)

LS3.A: Inheritance of Traits

- Young animals are very much, but not exactly like, their parents. Plants also are very much, but not exactly, like their parents. (1-LS3-1)

LS3.B: Variation of Traits

- Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1)

ESS1.B: Earth and the Solar System

- Seasonal patterns of sunrise and sunset can be observed, described, and predicted.(1-ESS1-2)

Crosscutting Concepts:

Patterns

- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2) (1-LS3-1) (1-ESS1-2)

Possible Common Core State Standards Connections:
ELA/Literacy -

- RI.1.1 Ask and answer questions about key details in a text. (1-LS1-2)(1-LS3-1)
- RI.1.2 Identify the main topic and retell key details of a text. (1-LS1-2)
- RI.1.10 With prompting and support, read informational texts appropriately complex for grade. (1-LS1-2)

Back to Top of Page

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-LS3-1)(1-ESS1-2)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-LS3-1)(1-ESS1-2)

Mathematics -

- 1.NBT.B.3 Compare two two-digit numbers based on the meanings of the tens and one digits, recording the results of comparisons with the symbols >, =, and <. (1-LS1-2)
- 1.NBT.C.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning uses. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. (1-LS1-2)
- 1.NBT.C.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without h having to count; explain the reasoning used. (1-LS1-2)
- 1.NBT.C.6 Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. (1-LS1-2)
- 1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-LS3-1)
- 1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)
- 1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)
- MP.2 Reason abstractly and quantitatively. (1-LS3-1)(1-ESS1-2)
- MP.4 Model with mathematics .(1-ESS1-2)
- MP.5 Use appropriate tools strategically. (1-LS3-1)(1-ESS1-2)

PROGRESSION OF LEARNING

ONGOING THROUGHOUT THE SCHOOL YEAR: *This refers to the on-going length of day data collection introduced in G1 U1.*

- Plan *at least* 10 dates (1 per month) to collect length of day and graph on a class chart. May do three dates - 1st, 10th, 20th of the month.
- *It is suggested that you gather the data over the summer and use this data to model how to collect the data for the school year.*
- This ongoing observation fully covers the PE: 1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.

Resources:

- Website for data collection, Sample bar graph, and optional: *amount of daylight each month*

Learning Sequence 1

- **Learning Sequence Driving Question**

Back to Top of Page

- How can seasonal patterns be described?
- Learning Sequence 1
- **Relationship to Anchoring Phenomena/Design Problem**
  - Students recognize and connect the patterns of seasonal changes to daylight intensity.
- **Student Expected Outcome:**
  - Students will make connections between the changing intensity of daylight over a year to the patterns of seasonal changes in a deciduous forest biome.

Learning Sequence 2

- **Learning Sequence Driving Question**
- How do living things prepare and behave in order to survive in the different seasons?
- Learning Sequence 2
- **Relationship to Anchoring Phenomena/Design Problem**
  - Students learn what it is like to be a field biologist. They study the different living things in the local region in order to generate a field guide. Using a variety of media students investigate how living things change with the seasons and record these findings on the pages of the field guide.
- **Student Expected Outcomes:**
  - Students will use observations to describe and communicate their understanding of seasonal changes/patterns in a deciduous forest biome/local region.
  - Students will describe the patterns of behavior that promote survival in the different seasons.

Learning Sequence 3

- **Learning Sequence Driving Question**
  - How are offspring similar and different from their parents?
- Learning Sequence 3
- **Relationship to Anchoring Phenomena/Design Problem**
  - Students explore how the offspring of both animals and plants are similar, yet different from their parents.
- **Student Expected Outcomes**:
  - Students will observe images or specimens and obtain information from texts to prove that animals and their offspring are similar yet different.
  - Students will describe patterns in behaviors of parents in response to their offspring's cues.

Assessments:

- **Culminating Performance Task**
  - Students present their Field Guides to the class.
  - As students are presenting their Field Guides, the class should be identifying significant patterns that are similar between all organisms (animals and plants).

- **Resources:**
  - Field Guide Template

- Grade 1 Performance Expectation Rubrics and Prompts
- Elementary Assessment Resources

Back to Top of Page

Additional Resources:

- G1 Unit Materials List 2020
  - Click on specific tab for unit-specific materials
- EPIC! Digital Library - G1 U4 List
  - Includes ebooks and videos
  - Must have an educator user account for free access

Back to Top of Page

Learning Sequence 1

Brief Description:
Changes in the amount of sunlight trigger changes in plant responses and animal behaviors. In this sequence, we elicit students conceptions of sunlight, seasonal patterns, and living things. Students revisit the concept of seasonal patterns through the lens of the amount of daylight they investigated in the *Unit 1- Patterns of the Sun and Moon* (Learning Sequence 5) in order to make connections on how living organisms prepare for or respond to seasonal changes.

Students will discuss their ideas about how sunlight affects living things, view a video showcasing seasonal changes in the forest, and engage in science talk to discuss their understanding of how the two (daylight and living things) are related. This sets the stage for exploring how organisms prepare for changing seasons.

Suggested Pacing:
0.5 - 1 hr

Lesson-Level Phenomenon/Design Problem:
Daylight hour data

Relationship to Anchoring Phenomena/Design Problem:
Students recognize and connect the patterns of seasonal changes to daylight intensity.

Learning Sequence Driving Question:
How can seasonal patterns be described?

Student Expected Outcomes:
- Students will make connections between the changing intensity of daylight over a year to the patterns of seasonal changes in a deciduous forest biome.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Constructing Explanations and Designing Solutions ● Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-LS3-1) **Planning and Carrying Out**	**ESS1.B: Earth and the Solar System** ● Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)	**Patterns** ● Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2) (1-LS3-1) (1-ESS1-2)

Back to Top of Page

Investigations		
• Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)		

Related Performance Expectation(s) in this Unit:

- 1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.
  - [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.]
  - [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]

Possible Common Core State Standards Connections:

ELA /Literacy -

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-ESS1-2)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-ESS1-2) Mathematics —
- MP.2 Reason abstractly and quantitatively. (1-ESS1-2)
- MP.4 Model with mathematics. (1-ESS1-2)
- MP.5 Use appropriate tools strategically. (1-ESS1-2)
- 1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)
- 1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)

Prior Student Knowledge:

- K-ESS2-1 Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time.
- K-ESS3-1 Living things need water, air, and resources from the land, and they live in places that have the things they need.

Possible Preconceptions/Misconceptions:

- The amount of daylight is the same every day.
- Students may think that changes in temperature, rather than in light, cause seasonal cycles in plants and animals.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Back to Top of Page

Activity Description:

- Showcase the ongoing class daylight hour data collected throughout the year (If class data is incomplete, use *Hartford Sunrise/Sunset Times Online or Sample bar graph*).
- Engage the students in an *All Class Science Talk* (sitting in a circle).
- Ask students: How do the changing amounts of sunlight affect living things?
    - Ask the students to think about their ideas silently for 1-2 minutes. Then ask all of the students to face one another.
    - In *All Class Science Talk*, students will share their experiences or discuss the data presented.
    - Students should facilitate the discussion. This is not something the students are used to doing.
    - Allow the students to share and relate to the prompt.

Resources:

- Hartford Sunrise / Sunset Times Online or Sample bar graph
- All Class Science Talk

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)
Activity Description:

- After the students share their ideas, show the students the video: *15 month seasonal changes in a forest*.
- As the students watch the video, keep the daylight data posted or accessible to students.
- Break class into eight groups, two groups for each season.
- Assign each group a specific season and instruct each group to watch what happens during their season in order to complete a follow up activity.
    - While video shows the changes to the living things very nicely, the relative amounts of daylight are not readily noticeable. As each season is shown on the video clip, help the students to call attention to the daylight data and to discuss the data and the seasonal changes.
    - Prompt the students to make observations of each season.
        - What did you notice? Both seen and unseen tapping into students' prior knowledge
        - Imagine what animals might live in this forest
        - How intense is the sunlight during each season?
        - What are you wondering?
- Chart the student responses without discussion of ideas. Is the amount of daylight linked to what is occuring to the living things in the video? Tap into what the students know based on their previous work, such as the changes in the amount or intensity of daylight, temperature changes, the life cycle of the vegetation in the video.
- After viewing the video and the daylight data, show the class the provided *Seasons Model* and instruct groups to add to the picture to depict their season.

Back to Top of Page

- Keep posters so that students can add or modify details as new learning occurs.

Resources:

- 15 month seasonal changes in a forest
- Teacher Background for presenting the video
- Seasons Model (print on 11" x 17" sheet)

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

Additional Resources:

- G1 Unit Materials List
    - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 2

Brief Description:
Students learn what it is like to be a field biologist. They will study the different living things in the local region or deciduous biome in order to generate a field guide. Using a variety of media, students will investigate how living things change with the seasons and record these findings on the pages of the field guide. Students will share their research with their peers and differentiate between needs for survival and behaviors for survival.

Suggested Pacing:
4 - 4.5 hrs

Lesson-Level Phenomenon/Design Problem:
First Snow in the Woods by Carl R. Sams II and Jean Stoick: How do living things change with the seasons?

Relationship to Anchoring Phenomena/Design Problem:
Students learn what it is like to be a field biologist. They study the different living things in the local region or deciduous biome in order to generate a field guide. Using a variety of media, students investigate how living things change with the seasons and record these findings on the pages of the field guide.

Learning Sequence Driving Question:
How do living things prepare and behave in order to survive in the different seasons?

Student Expected Outcomes:
- Students will use observations to describe and communicate their understanding of seasonal changes/patterns in a deciduous forest biome/local region.
- Students will describe the patterns of behavior that promote survival in the different seasons.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Obtaining, Evaluating, and Communicating Information • Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2) **Constructing Explanations and Designing Solutions** • Make observations	**LS1.B: Growth and Development of Organisms** • Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1-LS1-2)	**Patterns** • Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2) (1-LS3-1) (1-ESS1-2)

Back to Top of Page

(firsthand or from media) to construct an evidence-based account for natural phenomena. (1-LS2-1)(1-LS3-1)		

Related Performance Expectation(s) in this Unit:

- 1-LS1-2 Read texts and use media to determine patterns in the behavior of parents and offspring that help offspring survive.
  - [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]

Possible Common Core State Standards Connections:

ELA/Literacy -

- RI.1.1 Ask and answer questions about key details in a text. (1-LS1-2)(1-LS3-1)
- RI.1.2 Identify the main topic and retell key details of a text. (1-LS1-2)
- RI.1.10 With prompting and support, read informational texts appropriately complex for grade. (1-LS1-2)

Mathematics -

- 1.NBT.B.3 Compare two two-digit numbers based on the meanings of the tens and one digits, recording the results of comparisons with the symbols >, =, and <. (1-LS1-2)
- 1.NBT.C.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning uses. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. (1-LS1-2)
- 1.NBT.C.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. (1-LS1-2)
- 1.NBT.C.6 Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. (1-LS1-2)

Prior Student Knowledge:

K-ESS2-1, K-ESS3-1, K-LS1-1

Possible Preconceptions/Misconceptions:

Students may believe that:

- changes in temperature, rather than in light, cause seasonal cycles in plants and animals.
- all animals migrate or hibernate in winter.
- that if there is snow it is winter.
- if it is warm, it is summer.
- months are the same as seasons.

Back to Top of Page

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Read/picture walk the text-*First Snow in the Woods* by Carl R. Sams II and Jean Stoick.
  - Questions prompts:
    - What is the weather like in this picture? (snowy, cold)
    - What season is this? (winter) What's your evidence?/How do you know that?
  - Model your thinking about.
    - I wonder how the deer stay warm.
    - I wonder what they eat in the winter.
  - Explain to the students this photo book contains a lot of information about when winter comes to the forest what changes occur and how various animals prepare for winter.
    - What is different in a forest in the winter compared to the summer?
    - Do you think that deer prepare for the winter? How about other animals?
    - Do you wonder about anything else about life in the forest when winter starts?
  - During the Reading: Ask students to turn and talk to a partner - Record student responses.
    - Is it summer, fall or winter? What clues are there in this picture?
    - Can you tell if it is warm or cool? How do you know?
    - What do you notice about the plants?
    - When have you seen plants look like/do that?
    - Are there any changes in the animals/birds/insects?
    - What else do you notice?
- After reading the text, elicit student ideas about animal and plant responses/ behaviors in the different seasons.
- Divide the students into small groups.
  - Provide each group with a different prompt. Some potential prompts are listed below. You may need to help students think of specific animals. Allow students to discuss their ideas about their prompt.
    - How do ANIMALS change throughout the year?
    - How do PLANTS change throughout the year?
    - How do PLANTS know the season is changing?
    - How do ANIMALS know how the season is changing?
- Ask the class to think about any patterns they notice for how the plants and animals are able to survive and how parents help their offspring.
- Chart students initial ideas by season. *(Possible student ideas - temperature changes, weather events, changing tree colors, grass turns brown, trees and shrubs/bushes lose their leaves, see lots of birds flying in groups south, lots of acorns on the ground, flowers coming up, new leaves on trees/bushes/shrubs, longer or short daylight hours, etc. Possible ideas for behaviors: building nests/dens, bringing food back to young, etc)*

Resources:

- *First Snow in the Woods* by Carl R. Sams II and Jean Stoick (may be available as a Youtube read)

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

Back to Top of Page

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- Present these images of summer and winter in a deciduous forest.
- Student groups discuss what plants and animals are seen or could live in each scene.
- Students record their ideas.
- After the students record their thinking, have the different student groups share out their ideas about the living things that would be found in each of the scenes, each group should have two separate lists. As students share out, they should be providing a rationale for their ideas.
    - Teacher Background: Animals and Plants that change with the Seasons - deciduous forest and pond biomes
- Prompt deeper thinking and ask the students:
    - Do plants and animals live/behave differently in summer and winter?
- Allow the students time to turn and talk. After a few minutes, have the students share their ideas with the whole class.
- Let the student know that they are going to research some plants and animals that live in a deciduous forest to better understand how living things change with the seasons.

Resources:

- Images of summer and winter in a deciduous forest
- Teacher Background: Animals and Plants that change with the Seasons

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Show students a variety of field guides (epic! Books has some examples) and point out the important features of a field guide.
    - How do they help people understand all of the different living things in our region?
    - What types of information do the field guides contain?
- Students select a living thing from a deciduous forest or your school yard:
    - Provide students a small list of animals to choose from, include a plant (can select more than one type), mammal, bird, amphibian, fish and reptile if possible - such as: oak tree, squirrel, cardinal, chickadee, bear, trout, frog, snake.

Back to Top of Page

        - *Assign the species to multiple students. The students can generate their own field guide pages (without collaboration). In the Elaborate phase, students with the same species can share their field guide pages and identify the behaviors that the living thing has that help it to survive in the different seasons.*
    - Ask the library media specialist to pull texts on the different living things or find on epic! Books.
    - epic! Books also has a collection of season books:
        - *What happens in Winter?*
        - *What happens in Spring?*
        - *What happens in Summer?*
        - *What happens in Fall?*
        - Each text focuses on a different subset of living things and are "just right" books for grade one.
- Students create a field guide for the changes that these living things exhibit over the different seasons using the *Field Guide Template*.
- Each small student group can focus on a specific living thing, or each student can focus on their own animal or plant.
- In the end, the class will generate its own complete fieldbook for your specific to region or school yard.

Additional Information:
This Explain phase takes several science lessons to complete. Each day can focus on a different season or aspect of the field guide. With the class, generate a page of the field guide together with the students as a model for the content that goes in each of the fields of the guide. Only the season research pages from the *Field Guide Template* should be completed at this point.

- What are the parts of a field guide? What does a complete page look like?
- Season research/writing (slides 3-6)
- Compare parent and offspring (slides 8 or 9) - coming in Learning Sequence 3
- Parents help offspring survive (slide 10) - begin learning in Elaborate but complete slide in Learning Sequence 3

Resources:

- epic! Books
- Field Guide Template

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: deciduous, winter, summer, seasons, changes, biome, hibernation, migration, behavior, survival

ELABORATE (Applications / Extensions)
Activity Description:

Back to Top of Page

- Discuss the term "survival" with the students.
- Ask students to share their ideas about what different living things need to survive. This is a direct connection to Unit 1 in Kindergarten-Mystery Class Pet.
    - Help students to understand that certain behaviors or responses (baby cries/parent brings food) can help living things survive and get the things they need (food and water).
- Students share their field guides with their peers. If multiple students researched the same living thing, have those students share their field guide pages with one another.
    - As a group the students should identify the behaviors or responses their organism has between parents and offspring that help it survive.
    - After the small groups have come to consensus about the behaviors essential to the survival of their living thing, have the group share their findings with the whole class.
- Chart the major behaviors/responses (ex: feeding, comforting, protecting, migrating, hibernating).
- Prompt student discussion about behavior and survival as each living thing is showcased. After the behaviors and response have been charted, encourage the students to identify patterns of survival behaviors/responses (can be seasonally driven).

Resources:

- epic! Books

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s):

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP:** *Obtaining, Evaluating, and Communicating Information; Constructing Explanations and Designing Solutions*
- ❏ **DCI:** *LS1.B: Growth and Development of Organisms*
- ❏ **CCC:** *Patterns*

Summative Assessment Description(s):

- Student field guides and corresponding discussion related to behavior and survival.

Additional Resources:

- G1 Unit Materials List
    - Click on specific tab for unit-specific materials
- How plants change with the seasons

Back to Top of Page

Back to Top of Page

Learning Sequence 3

Brief Description:
In this lesson sequence, students explore how the offspring of both animals and plants are similar, yet different from their parents. Key features distinguish living organisms from each other such as: animals versus plants, size and shape of body parts, color, different structures like hair, leaf shape, stem rigidity, etc. Students identify the similarities and differences between young and adult versions of living things and record these ideas in their field guides. Students also come to understand that there is a pattern of development that all living things experience as they live and grow, in that not only do the offspring look like their parents, but parents and offspring have specific behaviors that help the offspring survive. For example, a baby cries and in response, the parent feeds the child. To continue in their role as field biologists, students record the ways in which parents help their assigned offspring to survive.

Suggested Pacing:
3 - 3.5 hrs for 5Es
0.75 - 1.25 hrs for Culminating Performance Task

Lesson-Level Phenomenon/Design Problem:
Are you my Mother? by PD Eastman - Students engage with the text to determine distinguishing features that help us match offspring to parents.

Relationship to Anchoring Phenomena/Design Problem:
Students explore how the offspring of both animals and plants are similar, yet different from their parents.

Learning Sequence Driving Question:
How are offspring similar and different from their parents?

Student Expected Outcomes:
- Students will observe images or specimens and obtain information from texts to prove that animals and their offspring are similar yet different.
- Students will describe patterns in behaviors of parents in response to their offspring's cues.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Planning and Carrying Out Investigations • Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-LS3-1)	**LS1.B: Growth and Development of Organisms** • Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in	**Patterns** • Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2) (1-LS3-1)

Back to Top of Page

Constructing Explanations and Designing Solutions ● Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-LS2-1) (1-LS3-1) **Analyzing and Interpreting Data** ● Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-LS3-1)	behaviors that help the offspring to survive. (1-LS1-2) **LS3.A: Inheritance of Traits** ● Young animals are very much, but not exactly like, their parents. Plants also are very much, but not exactly, like their parents. (1-LS3-1) **LS3.B: Variation of Traits** ● Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1)	(1-ESS1-2)

Related Performance Expectation(s) in this Unit:

- 1-LS1-2 Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.
  - [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]
- 1-LS3-1 Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.
  - [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.]
  - [Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.]

Possible Common Core State Standards Connections:

ELA/Literacy -

- RI.1.1 Ask and answer questions about key details in a text. (1-LS1-2)(1-LS3-1)
- RI.1.2 Identify the main topic and retell key details of a text. (1-LS1-2)
- RI.1.10 With prompting and support, read informational texts appropriately complex for grade. (1-LS1-2)
- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-LS3-1)(1-ESS1-2)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-LS3-1)(1-ESS1-2)

Mathematics -

- 1.NBT.B.3 Compare two two-digit numbers based on the meanings of the tens and one digits, recording the results of comparisons with the symbols >, =, and <. (1-LS1-2)
- 1.NBT.C.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings

Back to Top of Page

	and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning uses. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. (1-LS1-2)
• 1.NBT.C.5	Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. (1-LS1-2)
• 1.NBT.C.6	Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. (1-LS1-2)
• 1.MD.A.1	Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-LS3-1)
• 1.MD.C.4	Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)
• 1.OA.A.1	Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)
• MP.2	Reason abstractly and quantitatively. (1-LS3-1)(1-ESS1-2)
• MP.4	Model with mathematics.(1-ESS1-2)
• MP.5	Use appropriate tools strategically. (1-LS3-1)(1-ESS1-2)

Possible Preconceptions/Misconceptions:

- All baby animals look the same.
- Baby animals look exactly like the parents and/or baby animals look nothing like their parents.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

Part 1- Animal Focus

- Read aloud *Are you my Mother?* by P.D. Eastman to set the stage for thinking about how we know parents and their offspring.
- Ask students: What characteristics could Baby Bird have looked for before asking "Are you my mother?"
    - List the characteristics that the students brainstorm, such as a bird, not a cow, not a plane, body parts, coloring, feathers, lives in a nest, etc.

Resources:

- *Are you my Mother?* by P.D. Eastman (may be available as a Youtube read)

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

Back to Top of Page

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

Part 1- Animal Focus

- Have the students view the video *Animal Parents and Babies*.
    - Prompt students to share some of the similarities and differences they notice specific to the animals when the video prompts you.
- Ask the students to work in partnerships to create a comparison of parents and offspring from the video through *Similarities and Differences between Animal Parents and their Babies Graphic Organizer*.
- Provide a forum for the students to share their listed similarities and differences.

Resources:

- Animal Parents and Babies video
- Similarities and Differences between Animal Parents and their Babies Graphic Organizer

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

Part 1- Animal Focus

- Read a book about baby animals - there are several series available on epic! Books. Some options are listed in Resources.
- Refer back to the list of characteristics the students created in the Engage and the similarities and differences from the video.
    - Explain that these features help us understand how offspring/babies are similar to their parents.

Resources:

- Baby Gorillas by Mark Elizabeth Salzmann on epic! Books
- Animal Mothers by Bobbie Kalman on epic! Books
- Penguin Chicks by Julie Murray on epic! Books

Teacher Action(s):

Back to Top of Page

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):
- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: parent, similar, different, offspring, patterns, features, same, types, size

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)
Activity Description:
Part 2 - Plant Focus

- *THIS REQUIRES ADVANCE PLANNING!*
  - One month prior to running this lesson, plant a variety of seeds (kale, radish and snap peas are quick to mature).
    - *DO NOT USE COMMERCIAL GRADE SOIL* because it may contain chemicals harmful to students. Organic soil must be used in the classroom.
  - Once the seeds become seedlings, plant a second set of the same plants (2-3 weeks later).
- Once you have a mature plant and a seedling, let the students know that there has been a mix-up and you forgot to label the second set of plants.
  - We need to know which seedling matches the adult plant, so we can put it in the proper place for it to grow into the adult plant in our garden.
  - Let the students know that you are hoping that seedlings and adult plants have similar enough characteristics so that we can determine the type of plant each of the seedlings are.
  - As a class, have the students explore the plants and seedlings, then come back together to decide which plants match which seedlings.
- Ask students: How do I know which seedling is the offspring of the adult plant?
- Chart the student ideas, set it aside as you will refer back to it as you move through the learning sequence.
- If growing plants is not an option, there are several series on epic! Books that show a wide variety of plants growing.

Resources:
- Plant Life Cycles by Julie Lundgren
- See It Grow series on epic! Books - many options
  - Apple (See It Grow) by Dawn Bluemel Oldfield
- Watch A _____ Grow series on epic! Books - many options
  - Watch a Pumpkin Grow by Kirsten Chang

Teacher Action(s):
- Creates interest
- Generates curiosity
- Raises questions

Back to Top of Page

- Elicits responses that uncover what the students know or think about the concept

Student Action(s):
- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)
Activity Description:
Part 2 - Plant Focus:
- Revisit *Plant Secrets* with the class, reviewing Unit 3 LS2 - Elaborate - where the students had to identify the plant parts for the oak tree, the rose bush, the tomato plant and the pea plant. Discuss what features would help them know if the plant was a young beginning plant versus a full grown plant.
- Students work with a partner to look for patterns in the images between an adult plant and a young plant using *Plant Secrets Venn Diagram*.
    - Students should notice patterns in the size of the plant, leaf size, stem size (rigidity - can it support the weight of its leaves and fruit). Have the students use these patterns to their research.
- The students will be creating field guide pages on an animal and a plant with their offspring including an explanation about how the parent and its offspring are alike and different.

Resources:
- *Plant Secrets* by Emily Goodman on epic! Books
- Plant Secrets Venn Diagram

Teacher Action(s):
- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):
- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)
Part 2 - Plant Focus:
Activity Description:
- Students add content to their *Field Guide Template* (slide #8 or 9) that describes how the parent and offspring are similar and how the parent and offspring are different.
- Students need access to online resources featuring parents and offspring or text. Contact the Library Media Specialist for assistance in finding texts related to the species the students are using in their field guides.
    - Key features distinguish living organisms from each other such as: animals versus plants, size and shape of body parts, color, different structures like hair, leaf shape, stem rigidity, etc.

Back to Top of Page

- Students identify the similarities and differences between young and adult versions of living things and record these ideas in their field guides.

Resources:

- Field Guide Template - Slide 8 or 9

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: parent, similar, different, offspring, patterns, features, same, types, size

ELABORATE (Applications / Extensions)

Activity Description:

To continue in their role as field biologists, students record the ways in which parents help their assigned offspring to survive.

- Relate back to the book *Are you my mother?* by P.D. Eastman
  - Help students to understand that many of the potential mothers in the text were not able to help the baby bird to live and grow. There are certain behaviors that a mother and offspring have that helps them meet their needs and survive. Not only do offspring look like their parents, but parents help their offspring survive. In the book, the potential Moms do not have what it takes to help the baby bird survive.
  - Flip through a few of the pages and ask the students,
    - Why might this potential mother be successful or not as a parent to the baby bird?
- After collecting student ideas, share with the students that offspring have certain cues or behaviors that help their parents understand their needs.
  - We know this because naturalists observe animal behavior and with this information they can perhaps tell if the young are being taken care of by the parents or if they have been abandoned.
- Read *What do Bluebirds do?* by Pamela Kirby or *Born in the Wild: Baby Animals* by Rick Raymos. As the students listen, have them identify behaviors that are helping the birds survive or the ways in which the parent helps the offspring.
- After reading the book and discussing in depth the ways in which the parent helps the offspring survive, students complete Slide #10 of their *Field Guide Template*.
  - Students will need access to online resources or texts about their living thing.
- Teacher Notes:
  - To reinforce the Crosscutting Concept of Patterns, be sure to revisit with students that there is a pattern of development that all living things experience as they live and grow, in that not only do the offspring look like their parents, but parents and offspring have specific behaviors that help the offspring survive. For example, a baby cries and in response, the mother feeds the child.

Back to Top of Page

- Plants can actually take care of their offspring Article
  - shading delicate seedlings, making sure that water is absorbed and not evaporated
  - producing lots of seeds
  - producing thick seed coats

Resources:

- *What do Bluebirds do?* by Pamela Kirby
- Born in the Wild: Baby Animals by Rick Raymos on epic! Books
- Field Guide Template - Slide 10
- Teacher Resource: Plants can actually take care of their offspring Article

Teacher Action(s):

- Expects students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

FORMATIVE MONITORING (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP:** *Planning and Carrying Out Investigations; Constructing Explanations and Designing Solutions; Analyzing and Interpreting Data*
- ❏ **DCI:** *LS2.B: Growth and Development of Organisms; LS3.A: Inheritance of Traits; LS3.B: Variation of Traits*
- ❏ **CCC:** *Patterns*

Summative Assessment Description(s):

- Completed student field guides
- Students discussions and ideas relative to parents and offspring

Culminating Performance Task:

- Students present their Field Guides to the class.
- As students are presenting their Field Guides, the class should be identifying significant patterns that are similar between all organisms (animals and plants).

Resources:

- Field Guide Template

Teacher Resources:

Back to Top of Page

- Teacher Background on Animals and their Babies
- Parenting behaviors of Eastern Bluebirds:
    - Prior to mating the pair finds a safe space to build their nest. The male feeds the female when she is roosting. Once the eggs are hatched both the male and the female find and provide food for the hatchlings, although the male initially does more of this. Over a period of 5 weeks, the parents take care of the baby birds, until they reach the fledgling stage where the parents start teaching them how to survive on their own.

Additional Resources:

- G1 Unit Materials List
    - Click on specific tab for unit-specific materials

Back to Top of Page

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only _____ **Board Meeting Date** March 24, 2022

Decision Requested X **Agenda Code** 11 a.

AGENDA REPORTING FORM

Agenda Topic: Leonard and Gladys Joll Scholarship Recipient

Summary of Issue: The Leonard and Gladys Joll Scholarship applications were reviewed by the appointed committee and a recipient was selected to be recommended for Board approval.

Background: Annually the Board of Education selects a recipient for the Leonard and Gladys Joll Scholarship. The recipient's name will not be announced at this meeting, so it will be kept confidential until the Southington High School Awards Ceremony.

Alternative Strategies: Reject

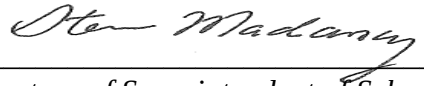
Cost (if applicable): $300.00 **Funding Source:** Joll Scholarship Fund

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education approves the recipient recommended by the Gladys Joll Scholarship subcommittee.

Signature of Staff Member Submitting Report



Signature of Superintendent of Schools

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only X **Board Meeting Date** March 24, 2022

Decision Requested _____ **Agenda Code** 11 c.

AGENDA REPORTING FORM

Agenda Topic: Science – Grade 2 Units - First Reading

Summary of Issue: The Curriculum & Instruction Committee has reviewed Science – Grade 2 Units

Background:

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Curriculum & Instruction Committee is bringing the Science – Grade 2 Units to the full Board for a First Reading.

Titles of Attachments:

1. Course Proposal

Signature of Staff Member Submitting Report

Signature of Superintendent of Schools

Table of Contents

Back to Top of Page

Unit 1 - 4th Little Pig

This unit works under the umbrella of a design problem. Students will plan for and construct the 4th Little Pig's shelter. Students will need to consider the types, changes relative to temperature, and properties of matter in order to construct their final design. Each learning sequence provides students with additional insight in regard to matter and its properties.

To access the flowchart for this unit, click here.

Suggested Pacing:
9.5 - 10.5 hrs

Anchoring Phenomenon/Design Problem:
Design Problem-The 4th Little Pig's House

Unit Driving Question:
What materials are best suited to design a home for the 4th Little Pig?

Culminating Performance Task:
Design, build and test a house for the 4th Little Pig.

NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements)

- 2-PS1-1: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
  - [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]
- 2-PS1-2: Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for the intended purpose.*
  - [Clarification Statement: Examples of properties could include strength, flexibility, hardness, texture, and absorbency.]
  - [Assessment Boundary: Assessment of quantitative measurements is limited to length.]
- 2-PS1-3: Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.
  - [Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]
- K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Three Dimensions that form the Foundation for these NGSS Performance Expectations:

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Planning and Carrying Out Investigations • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. **Analyzing and Interpreting Data**	**PS1.A: Structure and Properties of Matter** • Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties.	**Patterns** • Patterns in the natural and human designed world can be observed. **Cause and Effect** • Simple tests can be designed to gather evidence to support or

Back to Top of Page

• Analyze data from tests of an object or tool to determine if it works as intended. **Constructing Explanations and Designing Solutions** • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. **Asking Questions and Defining Problems** • Ask questions based on observations to find more information about the natural and/or designed world(s). • Define a simple problem that can be solved through the development of a new or improved object or tool.	• Different properties are suited to different purposes. • A great variety of objects can be built up from a small set of pieces. **ETS1.A: Defining and Delimiting Engineering Problems** • A situation that people want to change or create can be approached as a problem to be solved through engineering. • Asking questions, making observations, and gathering information are helpful in thinking about problems. • Before beginning to design a solution, it is important to clearly understand the problem.	refute student ideas about causes. **Energy and Matter** • Objects may break into smaller pieces and be put together into larger pieces, or change shapes.

Possible Common Core State Standards Connections:

ELA/Literacy —

- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (K-2-ETS1-1)
- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-PS1-1)(2-PS1-2) (2-PS1-3)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-PS1-1) (2-PS1-2)(2-PS1-3)(K-2-ETS1-1)
- RI.2.8 Describe how reasons support specific points the author makes in a text. (2-PS1-2)
- RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (K-2-ETS1-1)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (2-PS1-2)(K-2-ETS1-1)
- MP.4 Model with mathematics . (2-PS1-1)(2-PS1-2) (K-2-ETS1-1)
- MP.5 Use appropriate tools strategically. (2-PS1-2)(K-2-ETS1-1)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (2-PS1-1)(2-PS1-2)(K-2-ETS1-1)

PROGRESSION OF LEARNING

Learning Sequence 1

- **Learning Sequence Driving Question**
  - What materials are best suited to design a home for the 4th little pig?

Back to Top of Page

- Learning Sequence 1
- **Relationship to Anchoring Phenomena/Design Problem**
  - This is the introduction to the anchoring phenomenon.
- **Student Expected Outcomes:**
  - Students will explore materials available to build a house for the 4th Little Pig.
  - Students will create an initial plan for the 4th Little Pig's house.

Learning Sequence 2

- **Learning Sequence Driving Question**
  - How do you sort and classify objects based on their properties?
- Learning Sequence 2
- **Relationship to Anchoring Phenomena/Design Problem**
  - Students understand that the materials they will use to build the 4th Pig's house have observable properties of matter, and that these observable properties can help students select the appropriate materials needed to withstand the challenges of the wolf (wind) and weather (rain).
- **Student Expected Outcomes:**
  - Students will be able to sort a variety of objects by their various properties and describe how and why they sorted the objects the way they did.
  - Students will classify objects as solids and liquids based on the properties of matter they observed.

Learning Sequence 3

- **Learning Sequence Driving Question**
  - What happens when materials are heated or cooled?
- Learning Sequence 3
- **Relationship to Anchoring Phenomena/Design Problem**
  - Students will understand that changes in matter can affect the integrity of a structure and that temperature can affect the state of matter. Therefore choosing materials that will not change state in hot or cold weather will be necessary to the function of the designed product.
- **Student Expected Outcomes:**
  - Students will be able to describe and explain how temperature affects different types of matter.

Learning Sequence 4

- **Learning Sequence Driving Question**
  - Why are different materials better suited for certain purposes than others?
- Learning Sequence 4
- **Relationship to Anchoring Phenomena/Design Problem**
  - Students understand that different materials are better for different purposes. The materials the students select in the final pig shelter design have to meet the intended goals of withstanding a hot summer day and a big storm (wind and rain)
- **Student Expected Outcomes:**
  - Students will investigate a variety of materials and test their durability.
  - Students will construct a physical model of a bridge out of chosen materials in order to hold as much weight as possible and meet an intended purpose.

Learning Sequence 5

- **Learning Sequence Driving Question**

Back to Top of Page

- How can objects be made and remade into new objects using existing pieces?

- Learning Sequence 5
- **Relationship to Anchoring Phenomena/Design Problem**
  - Students will understand how a material can be repurposed and used to construct a new and complete object. Students will have to consider how they will repurpose and combine items to build the 4th little pigs home to meet specific requirements.
- **Student Expected Outcomes:**
  - Students will describe how different structures can be assembled and reassembled into new structures using the same objects.
  - Students will describe how the structures are similar and different from the original structure.

Assessments:

- Culminating Performance Task
  - Design, build and test a house for the 4th Little Pig.

- Grade 2 Performance Expectation Rubrics and Prompts
- Elementary Assessment Resource

Additional Resources:

- G2 Unit Materials List
  - Click on specific tab for unit-specific materials
- EPIC! Digital Library - G2 U1 List
  - Includes ebooks and videos
  - Must have an educator user account for free access

Back to Top of Page

Learning Sequence 1

Brief Description:
This unit works under the umbrella of a design problem, and Learning Sequence 1 is the introduction to that problem. Students explore materials and draw an initial model of their idea for their 4th Little Pig's house.

Suggested Pacing:
0.75 - 1.25 hrs

Lesson-Level Phenomenon/Design Problem:
The Big Bad Wolf is back to his old ways. A new little pig has moved into town. She needs a shelter because a big summer storm is coming. She has heard about the story of the Three Little Pigs and is worried. There are no more bricks available in town. Using the materials available in town (our classroom), how would you build a house to keep the new pig safe from the wolf and the weather (hot summer temperatures, wind, water)?

Relationship to Anchoring Phenomena/Design Problem:
This is an introduction to the design problem.

Learning Sequence Driving Question:
What materials are best suited to design a home for the 4th Little Pig?

Student Expected Outcomes:

- Students will explore materials available to build a house for the 4th Little Pig.
- Students will create an initial plan for the 4th Little Pig's house.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Planning and Carrying Out Investigations* • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. **Asking Questions and Defining Problems*** • Ask questions based on observations to find more information about the natural and/or designed world(s). • Define a simple problem that can be solved through the development of a new or improved	**PS1.A: Structure and Properties of Matter *** • Different properties are suited to different purposes. **ETS1.A: Defining and Delimiting Engineering Problems*** • A situation that people want to change or create can be approached as a problem to be solved through engineering. • Asking questions, making observations, and gathering information are helpful in thinking about problems. • Before beginning to design a solution, it is important to	**Cause and Effect*** • Simple tests can be designed to gather evidence to support or refute student ideas about causes. **This element will only be partially met.*

Back to Top of Page

object or tool. **These elements will only be partially met.*	clearly understand the problem **These elements will only be partially met.*	

Related Performance Expectation(s) in this Unit:

- 2-PS1-2: Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.*
  - [Clarification Statement: Examples of properties could include, strength, flexibility, hardness, texture, and absorbency.]
  - [Assessment Boundary: Assessment of quantitative measurements is limited to length.]
- K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Possible Common Core State Standards Connections:

ELA/Literacy —

- RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (K-2-ETS1-1)
- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (K-2-ETS1-1)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-1)(2-PS1-2)
- RI.2.8 Describe how reasons support specific points the author makes in a text. (2-PS1-2)
- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-PS1-2)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (K-2-ETS1-1)(2-PS1-2)
- MP.4 Model with mathematics. (K-2-ETS1-1)(2-PS1-2)
- MP.5 Use appropriate tools strategically. (K-2-ETS1-1)(2-PS1-2)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-1)(2-PS1-2)

Possible Preconceptions/Misconceptions:

- Students need help in differentiating the properties that make up the object from the properties of the material the object is made from.
- Students will have a difficult time constructing a design to meet a specific function. Students will tend to build for aesthetics first.
- Matter is always small.
- Materials can only have properties of one state of matter.
- Gases are invisible.
- Air is not a gas.
- Air has no mass, it is light because we cannot see it, and air does not take up space.

Prior Student Knowledge:

N/A

Back to Top of Page

LESSON PLAN – 5-E Model - *LS1 is an incomplete 5-E model, as it is an introduction to the unit's design problem.*

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Read a traditional version of "The Three Little Pigs" to familiarize students with the story and to then be able to create a plan for a new house design.
    - The James Marshall version is an effective text to use because the images of the houses really shows the engineering design aspect which provides rich conversation about why the houses were either blown down or stayed up.
- Teacher will read the story and present the task of designing the 4th Little Pig's house.
    - The Big Bad Wolf is back to his old ways. A new Little Pig has moved into town. She needs a shelter because a big storm is coming. She has heard about the story of the Three Little Pigs and is worried. There are no more bricks available in town. Using the materials available in town (our classroom), how would you build a house to keep the new pig safe from the Wolf and the weather (wind, water)?

Resources:

- Read-aloud versions of *The Three Little Pigs* by James Marshall can be found on YouTube or epic! Books

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- Students explore a variety of materials in small groups in order to decide what to use in their 4th Little Pig's house design.
    - Suggested materials needed for this learning sequence items such as sponges, paper towels, straws, popsicle sticks, clay, pencils, erasers, blocks.
    - Be sure to have a range of items with a variety of properties: shape, flexibility, absorbency, texture, durability/hardness, adhesiveness/stickiness)

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

Back to Top of Page

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Students create an initial model of their design for the 4th Little Pig's house.
    - Use the *Pre-assessment Worksheet* - Version 1 **or** Version 2.
        - You may need to modify the *Pre-Assessment worksheet* to add or modify items depending on what you make available to students.
    - Instructions are given to the students detailing the parameters of the design, including using the presented materials to design a house that will withstand wind and water, as well as labeling the materials used.
    - Remind students that they will need to explain their reasoning for the material choices.
    - Teacher will collect and observe student sketches for possible misconceptions and background knowledge.
        - Save *Pre-assessment Worksheet* - Version 1 or Version 2 until the Culminating Performance Task. Students revise their designs at the end of the unit in order to build and test a physical model using available classroom materials.
- Students work together to create a design for a physical model (to be built at the close of the unit of study) of the 4th Pig's house using the pre-assessment sheet.
- Students justify why the materials were chosen.

Resources:

- Pre-assessment Worksheet -Version 1

or

- Pre-assessment Worksheet -Version 2

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: engineering, materials, structure, design, model, sketch

EVALUATE

Back to Top of Page

Formative Monitoring Description(s):

Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence. Please note the following SEP, DCI and CCC need to be monitored throughout the learning sequence.

- ❏ **SEP:** *Planning and Carrying Out Investigations; Asking Questions and Defining Problems*
- ❏ **DCI:** *PS1.A: Structure and Properties of Matter; ETS1.A: Defining and Delimiting Engineering Problems*
- ❏ **CCC:** *Cause and Effect*

Summative Assessment Description(s):

- Introduce the *Summary Table*, and add to it after each learning sequence.

Resources:

- Summary Table

Additional Resources:

- G2 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 2

Brief Description:
Given a selection of objects, students will conduct an investigation to describe and classify different kinds of materials by their observable properties.

Suggested Pacing:
2 - 2.5 hrs

Lesson-Level Phenomenon/Design Problem:
Object Sort Activity

Relationship to Anchoring Phenomena/Design Problem:
Students understand that the materials they will use to build the 4th Pig's house have observable properties of matter, and that these observable properties can help students select the appropriate materials needed to withstand the challenges of the wolf (wind) and weather (rain).

Learning Sequence Driving Question:
How do you sort and classify objects based on their properties?

Student Expected Outcomes:

- Students will be able to sort a variety of objects by their various properties and describe how and why they sorted the objects the way they did.
- Students will classify objects as solids and liquids based on the properties of matter they observed.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Planning and Carrying Out Investigations • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.	**PS1.A: Structure and Properties of Matter** • Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties.	**Patterns** • Patterns in the natural and human designed world can be observed.

Related Performance Expectation(s) in this Unit:

- 2-PS1-1: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
  - [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]

Possible Common Core State Standards Connections:

ELA/Literacy —

Back to Top of Page

- RI.2.8 Describe how reasons support specific points the author makes in a text. (2-PS1-2)
- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-PS1-2)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-PS1-2)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (2-PS1-2)
- MP.4 Model with mathematics. (2-PS1-2)
- MP.5 Use appropriate tools strategically. (2-PS1-2)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (2-PS1-2)

Prior Student Knowledge:

N/A

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Students are given an unlabeled, opaque box/bag containing a variety of classroom and household objects.
    - Objects may include: sponges, blocks, pencils, balloons, water bottle, cans of soda, syrup, shampoo, playdough, sand, etc.).
- Students work in small groups to sort the materials given into groups based on attributes. Students will explain their reasoning to the class.
- Prompt students: How can you sort and classify objects based on their characteristics (attributes)?
- Optional: Use *Object Sort* to digitally sort images into categories that make sense to students.

Resources:

- Object Sort

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

Back to Top of Page

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- *Prepare ice, water and air filled balloons ahead of time.* If there are latex allergies in your classroom, a non-latex glove works well.
- Groups of students are given three balloons; one containing ice, one with water and one with air. Using a Q-tip or soft blunted object, students will investigate the objects with this tool to discover more about the objects.
- Student groups complete the *Observation sheet.*

Resources:

- Observation sheet

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Class discusses their observations from both the balloon exploration and object classification.
- Class reads *Many Kinds of Matter: A Look at Solids, Liquids, and Gases* by Jennifer Boothroyd on epic! Books
- Students create anchor charts for: Solids, Liquids, and Gases.
    - The *Sample Anchor Chart* link below provides some ideas
- Teacher should facilitate and incorporate appropriate science terms into the discussion.

Teacher Resource:

- *Many Kinds of Matter: A Look at Solids, Liquids, and Gases* by Jennifer Boothroyd on epic! Books
- Sample Anchor Chart

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations

Back to Top of Page

- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: temperature, gas, solid, liquid, freeze, state, state of matter, change of state, weight, space (*volume), matter

ELABORATE (Applications / Extensions)

Activity Description:

- Students work in cooperative groups with the initial objects (from Engage activity) to design a way of classifying them by state of matter.
- Students complete the *Student Worksheet* and provide rationale for their classifications.
- Teacher verbally collects and graphically displays the class data to facilitate a class discussion about the students' findings (data and patterns observed)
- Based on the data, class creates a usable materials list for the construction of the 4th Little Pig's House.

Resources:

- Student Worksheet

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s):

Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence. Please note the following SEP, DCI and CCC need to be monitored throughout the learning sequence.

- ❏ **SEP:** *Planning and Carrying Out Investigations*
- ❏ **DCI:** *PS1.A: Structure and Properties of Matter*
- ❏ **CCC:** *Patterns*

Summative Assessment Description(s)

- Students identify materials that may be used for developing the 4th pig's house AND can accurately identify the state of matter for that material.
- Students add to the Summary Table any new information.

Back to Top of Page

Resources:

- Summary Table

Additional Resources:

- G2 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 3

Brief Description:
Students will observe changes of matter through media, experiments, or literature which involve temperature changes. As a supplemental activity, students will be given the task to change the shape of water and a piece of chocolate.

Suggested Pacing:
1 - 1.5 hrs

Lesson-Level Phenomenon/Design Problem:
What happens when materials are heated or cooled?

Relationship to Anchoring Phenomena/Design Problem:
Changes in matter can affect the integrity of a structure and that temperature can affect the state of matter. Therefore choosing materials that will not change state in hot or cold weather will be necessary to the function of the designed product.

Learning Sequence Driving Question:
What happens when materials are heated or cooled?

Student Expected Outcomes:

- Students will be able to describe and explain how temperature affects different types of matter.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Planning and Carrying Out Investigations ● Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.	**PS1.A: Structure and Properties of Matter** ● Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties.	**Cause and Effect** ● Events have causes that generate observable patterns **Energy and Matter** ● Objects may break into smaller pieces and be put together into larger pieces, or change shapes.

Related Performance Expectation(s) in this Bundle:

- 2-PS1-1: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
  - [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]

Possible Common Core State Standards Connections:

ELA/Literacy —

- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-PS1-1)(2-PS1-2) (2-PS1-3)

Back to Top of Page

- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-PS1-1) (2-PS1-2)(2-PS1-3)(K-2-ETS1-1)

Mathematics —

- MP.4 Model with mathematics. (2-PS1-1)(2-PS1-2) (K-2-ETS1-1)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (2-PS1-1)(2-PS1-2)(K-2-ETS1-1)

Possible Preconceptions/Misconceptions:

- Students identify solids and liquids as different materials and do not realize that both states are matter.
- Young students have a difficult time differentiating objects from materials.
- Students need help in differentiating the properties that make up the object from the properties of the material the object is made from.

Prior Student Knowledge:

N/A

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Show the *Melting Ice Cream Bar* to the students. Read the prompts to the students and allow them to discuss their ideas with their peers.
- Get the students thinking about what influences the changes in the state of matter and why some materials are affected while others are not. Please remember this is not the time to tell the students why this is happening.
    - The purpose of the Engage is to identify what students already know and to develop their curiosity.
- Prompt students to generate questions that they could investigate (based on their observations) to determine how the shape of some of the materials in the ice pop changed shape while others did not?
- Record student questions on chart paper or whiteboard. Lead students to develop questions that involve temperature.

Resources:

- Melting Ice Cream Bar

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Back to Top of Page

Activity Description:

- Show students a ziplock bag containing 2 or 3 hershey kisses (unwrapped) and a second bag containing ½ cup of water.
- Students devise a plan with their peers to change the shape or state of the materials in the ziploc bags.
- Have the student groups complete an *Investigation Planning Sheet* prior to testing their ideas.
    - Do not distribute bags to students until they have devised a plan.
    - Explain that students are NOT allowed to open the bag at any time during the investigation!
- Students test their ideas and share their results with the class.
    - Teacher Note- you may want to pre-freeze a few bags of water in different shapes that you can distribute if needed, because some students may ask to freeze the water, this will delay the final discussion.
- You may want to allow students to access the states of matter anchor charts generated in Learning Sequence 2.

Resources:

- Investigation Planning Sheet

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Discuss student results during the exploration with water and chocolate. During this discussion, lead the students to understand that liquids can change their shape by changing their container or by changing the temperature.
    - The water could have been frozen into different shapes or placed in a container causing the shape of the water to take the shape of the new container.
    - For the chocolate, a solid, students must realize that to change the shape of the chocolate they need to change the temperature of the chocolate to get it to melt and become more malleable. Help students to understand that different materials change their state at different temperatures. You can use a demonstration with an ice cube and a piece of chocolate to show that at room temperature the ice melts, but the chocolate does not.
        - Some students may have broken the chocolate into smaller pieces to get a shape change. This is acceptable for this age group.
- Collect student ideas and infuse appropriate academic vocabulary during the discussion.
- Class reads *Melting Matter* by Amy S. Hansen on epic! Books.

Back to Top of Page

Resources:

- *Melting Matter* by Amy S. Hansen on epic! Books

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: melt, temperature, heat, cooling, pressure, body temperature, freeze, liquid, solid, state, state of matter

ELABORATE (Applications / Extensions)

Activity Description:

- Students relate the learning from the Explore and Explain phases to explain the melting ice pop through the development of an *Explanatory Model.*
- After students complete their models allow them to share their ideas with the class.
- Prompt further discussion on how these concepts may apply to the development of the 4th Little Pig's shelter.

Resources:

- Explanatory Model

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

Back to Top of Page

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP:** *Planning and Carrying Out Investigations*
- ❏ **DCI:** *PS1.A: Structure and Properties of Matter*
- ❏ **CCC:** *Cause and Effect; Energy and Matter*

Summative Assessment Description(s)

- *Explanatory Model* from Elaborate
- Add any new information to the *Summary Table.*

Resources:

- Explanatory Model
- Summary Table

Elaborate Further / Reflect / Enrichment: Optional

Activity Description:

- Students watch *Inside the Ice Hotel in Quebec City! Video, Inside Sweden's Ice Hotel Video* & read the *You can now spend the night in a hotel made entirely out of CHOCOLATE! Article.*
- Teacher asks students: How does what we have been discussing apply to these videos, the article and the 4th Little Pig's houses we are designing?

Resources:

- Inside the Ice Hotel in Quebec City! Video
- Inside Sweden's Ice Hotel Video
- You can now spend the night in a hotel made entirely out of CHOCOLATE! Article

Additional Resources:

- G2 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 4

Brief Description:
Students look at bridge photographs to expose them to successful bridge designs. Their observations will help them to construct a physical model of a bridge. Students investigate and test materials in order to help them design a bridge to hold as much weight as possible.

Suggested Pacing:
2 - 2.5 hrs

Lesson-Level Phenomenon/Design Problem:
Bridge Structure and Function

Relationship to Anchoring Phenomena/Design Problem:
Students understand that different materials are better for different purposes. The materials the students select in the final 4th Little Pig house design have to meet the intended goals of withstanding a hot summer day and a big storm (wind and rain)

Learning Sequence Driving Question:
Why are different materials better suited for certain purposes than others?

Student Expected Outcomes:

- Students will investigate a variety of materials and test their durability.
- Students will construct a physical model of a bridge out of chosen materials in order to hold as much weight as possible and meet an intended purpose.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Analyzing and Interpreting Data • Analyze data from tests of an object or tool to determine if it works as intended. **Constructing Explanations and Designing Solutions** • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. **Asking Questions and Defining Problems** • Ask questions based on observations to find more information about the	**PS1.A: Structure and Properties of Matter** • Different properties are suited to different purposes. **ETS1.A: Defining and Delimiting Engineering Problems** • A situation that people want to change or create can be approached as a problem to be solved through engineering. • Asking questions, making observations, and gathering information are helpful in thinking about problems. • Before beginning to design a solution, it is important to	**Cause and Effect** • Simple tests can be designed to gather evidence to support or refute student ideas about causes. **Patterns** • Patterns in the natural and human designed world can be observed.

Back to Top of Page

natural and/or designed world(s). ● Define a simple problem that can be solved through the development of a new or improved object or tool.	clearly understand the problem.	

Related Performance Expectation(s) in this Bundle:

- 2-PS1-2: Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for the intended purpose.*
  - [Clarification Statement: Examples of properties could include strength, flexibility, hardness, texture, and absorbency.]
  - [Assessment Boundary: Assessment of quantitative measurements is limited to length.]

- K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Possible Common Core State Standards Connections:

ELA/Literacy —

- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-PS1-1)(2-PS1-2) (2-PS1-3)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-PS1-1) (2-PS1-2)(2-PS1-3)(K-2-ETS1-1)
- RI.2.8 Describe how reasons support specific points the author makes in a text. (2-PS1-2)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (2-PS1-2)(K-2-ETS1-1)
- MP.4 Model with mathematics. (2-PS1-1)(2-PS1-2) (K-2-ETS1-1)
- MP.5 Use appropriate tools strategically. (2-PS1-2)(K-2-ETS1-1)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (2-PS1-1)(2-PS1-2)(K-2-ETS1-1)

Prior Student Knowledge:

N/A

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Students view the slide #1 *Bridge Slideshow*. Allow students to make observations about the materials and predict the function of each bridge based on the structure and material.
- Ask students:
  - What are the similarities between all of these bridges?
  - What are the differences between the bridges?
  - How do you think each bridge is used?
- Students review the scenario on Slide #2 of the *Bridge Slideshow*.
  - The Little Pigs are hungry and need to get their car over the river to the grocery store, but the

Back to Top of Page

river has washed the old bridge away. They need to build a new bridge that is strong enough for big cars and lots of pigs to travel over it. The river floods every spring and dries up late in the summer, so the bridge has to withstand flooding and high summer temperatures.
    - Help students to come to the idea that the properties of the material have to be waterproof and sturdy.

Resources:
- Bridge Slideshow

Teacher Action(s):
- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):
- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)
Activity Description:
- Students work in small groups to explore the absorbency and durability of materials using the *Explore Handout*.
    - Students will need access to (2) 1" x 8 " strips of cloth/felt, aluminum foil, wax paper, construction paper, cardboard, and toilet paper, as well as a spray bottle or dropper, masking tape, pennies or blocks (weights).
    - Students can tape the strips across two desks.
    - Students should devise a way of testing the strength of the material as well as the absorbency.
        - *Teacher Note: Demonstrate with a strip of tissue paper how to test with water. Noting the number of sprays or drops.*
    - Students should make observations of each material. Observations can include how many pennies/blocks the wet strip holds before it breaks compared to how many pennies/blocks the dry strip holds before it breaks.
    - Allow students to analyze their observations to make a determination about what material would be best to construct a bridge (testing over a sink, bucket or bin).

Resources:
- Explore Handout

Teacher Action(s):
- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):
- Thinks freely, within the limits of the activity

Back to Top of Page

- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)
Activity Description:

- Allow students to share their findings from the absorbency and durability tests. Help students to include appropriate science vocabulary as they construct their explanations and share with the class.
- Students may have used different strategies for measuring durability and absorbency. Help students to understand that we can not compare our results if we used different modes of data collection.
    - If one group used pennies to assess weight and another group used wooden blocks, the data cannot be compared. We can just make statements like "fabric held the most weight and toilet paper held the least weight".
    - The same issue may occur with water, some groups may have used 1 drop of water and other groups 10 drops of water before adding weights.
    - Helps students to understand that we can not compare our results when the variables/controls are not the same.
- At the conclusion of the discussion, read the text *Amazing Structures: Bridges* by Rebecca Pettiford on epic Books or *Bridges: Amazing Structures to Design, Build and Test* by Carol Johnson.

Resources:

- *Amazing Structures: Bridges* by Rebecca Pettiford on epic! Books
- *Bridges: Amazing Structures to Design, Build and Test* by Carol Johnson

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: flexible, flexibility, strength, hardness, weight, absorbency, human-made, physical model, material, durability

ELABORATE (Applications / Extensions)
Activity Description:

- Provide students with the *Map*.
    - You may want to laminate the sheets, so they can be used again.

Back to Top of Page

- Students have to develop a bridge, place over the river image on the map, to allow the students to get from their house to the grocery store.
    - Provide students with a variety of design materials.
    - Allow the students to construct the bridges and describe how each design element plays a role in the functionality of the bridge.
    - The ultimate goals of the bridge is to be durable enough to hold a toy car (represents the family vehicle going over the bridge to the store).
    - Materials for bridge construction can include:
        - Pipe cleaners
        - piece of clay
        - blocks/cubes
        - Straws/bendy straws
        - Popsicle sticks/toothpicks
        - cloth/felt
        - aluminum foil
        - wax paper
        - construction paper
        - cardboard
        - toilet paper
- Upon completion of the bridges it is essential to provide a forum for students to share their designs and rationale for materials and structure. This can be done verbally through presentation or gallery walk where students critique designs using academic vocabulary.

Resources:

- Map (print on 11 x 17 paper).

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP:** *Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions; Asking Questions and Defining Problems*
- ❏ **DCI:** *PS1.A: Structure and Properties of Matter; ETS1.A: Defining and Delimiting Engineering Problems*

Back to Top of Page

❏ CCC: *Cause and Effect; Patterns*

Summative Assessment Description(s)

- Bridge construction with material/structure rationale
- Add new information to the *Summary Table*.

Resources:

- Summary Table

Elaborate Further / Reflect / Enrichment: Optional

- Students can be encouraged to look at the history of bridges over time and how the materials being used have evolved and why those changes have taken place. Why were some successful, while others failed?
- Read *Iggy Peck, Architect* by Andrea Beaty on Epic Books about creative bridge building.

Resources:

- *Iggy Peck, Architect* by Andrea Beaty on Epic Books

Additional Resources:

- G2 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 5

Brief Description:
Students will use a variety of materials to build, deconstruct, and reassemble a device.. Students will be able to build and redesign multiple devices throughout the lesson using the same objects.

Suggested Pacing:
1.5 - 2 hrs for 5Es
0.75 - 1.25 hrs for Culminating Performance Task

Lesson-Level Phenomenon/Design Problem:
Text-*Rosie Revere Engineer*

Relationship to Anchoring Phenomena/Design Problem:
Students will understand that materials can be repurposed and used to construct a new and complete object. Students will have to consider how they will repurpose and combine items to build the 4th little pigs home to meet specific requirements.

Learning Sequence Driving Question:
How can objects be made and remade into new objects using existing pieces?

Student Expected Outcomes:

- Students will describe how different structures can be assembled and reassembled into new structures using the same objects.
- Students will describe how the structures are similar and different from the original structure.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Constructing Explanations and Designing Solutions • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. **Asking Questions and Defining Problems** • Ask questions based on observations to find more information about the natural and/or designed world(s). • Define a simple problem that can be solved through the development of a new or improved	**PS1.A: Structure and Properties of Matter** • Different properties are suited to different purposes. • A great variety of objects can be built up from a small set of pieces. **ETS1.A: Defining and Delimiting Engineering Problems** • A situation that people want to change or create can be approached as a problem to be solved through engineering. • Asking questions, making observations, and gathering information are helpful in thinking about	**Energy and Matter** • Objects may break into smaller pieces and be put together into larger pieces, or change shapes

Back to Top of Page

object or tool.	problems. • Before beginning to design a solution, it is important to clearly understand the problem.	

Related Performance Expectation(s) in this Bundle:

- 2-PS1-3: Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.
  - [Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]
- K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Possible Common Core State Standards Connections:

ELA/Literacy —

- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-PS1-1)(2-PS1-2) (2-PS1-3)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-PS1-1) (2-PS1-2)(2-PS1-3)(K-2-ETS1-1)

Possible Preconceptions/Misconceptions:

Students may believe that:

- objects to build a structure can only be designed in a certain way
- the order of similar objects does not create a different structure

Prior Student Knowledge:

N/A

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Read the *Rosie Revere Engineer* by Andrea Beaty.
- Students discuss how Rosie made her inventions.
  - Ask students:
    - Have you ever been an engineer?
    - What did you make?
    - What supplies did you use?

Resources:

- *Rosie Revere Engineer* by Andrea Beaty on epic Books (may also be available on Youtube)

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Back to Top of Page

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- Provide students with a bag of parts.
    - Possible Materials: toilet paper tube, rubber band, straw, plastic wrap, legos, blocks, erasers, string, paper plate, pipe cleaner, etc.) *Do not provide glue or tape, because students will have to dissemble their projects to design something to meet a new need using the same materials.
- Students work in small groups to build a device that could catch a fly.
- Allow students to share their designs with the class and introduce the word *prototype*.
- Explain to the students that sometimes our initial ideas do not work the way they are intended and we have to modify our designs.
- Throw the kids a curve ball and tell them that the problem has changed, we no longer have to catch a fly, but we have to make something that can fly and we have no new parts.
- We have to break apart our fly catcher designs and reuse the parts to make our flying object.
- After students complete their second build, allow them to share their designs with the class and discuss how they repurposed their materials.

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Through discussion about the explorations, help students to understand that pieces can be put together in different ways to build different things.
- Engineers try to solve problems that people or animals may be faced with and they often have to put things together in unique ways to solve the design problem.
- Engineers rarely solve the design problem in their first attempt. Thomas Edison had 1000's of attempts at the light bulb before it worked, but with each iteration, he found out more about what doesn't work.
    - F.A.I.L. = **F**irst **A**ttempt **I**n **L**earning
- Prompts for student discussion:
    - How were your designed structures similar? Different?
    - Did all of the groups come up with the same designs to solve the two design challenges?

Back to Top of Page

- How were the materials used differently in the designs we saw today?
- Can we change the use of a material with a different design challenge?
- Were there any solutions that included only one part/material?
- Is there more than one way to solve a problem?

- Read book(s) on epic Books about Engineers.

Resources:

- Engineering books on epic Books
  - *Engineers Build Models*
  - *Engineers Solve Problems*
  - *How Engineers Find Solutions*
  - *Engineering in our Everyday Lives*

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Apply new labels, definitions, explanations, and skills in new but similar situations
- Use previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

Vocabulary: human-made, physical model, recycle, design, machine, engineer, engineering, design problem, material, prototype

ELABORATE (Applications / Extensions)

Activity Description:

- Students view the *Time Lapse Video of a "Canstruction."*
- Students make note of the materials they saw being used in the completion of the character.
- They should share their lists with their peers in small groups and discuss how the materials were used to produce the final character.
- Prompt the class with this question:
  - How can we change the purpose of an everyday object to meet a new need?
  - What objects could the 4th Little Pig use to protect herself from the Big Bad Wolf, the hot summer days and the bad thunderstorm that is coming?
  - How can different items in the classroom work together to make a strong and weatherproof house for the 4th Little Pig?

Resources:

- Time Lapse Video of a "Canstruction"

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations

Back to Top of Page

- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP:** *Constructing Explanations and Designing Solutions; Asking Questions and Defining Problems*
- ❏ **DCI:** *PS1.A: Structure and Properties of Matter; ETS1.A: Defining and Delimiting Engineering Problems*
- ❏ **CCC:** *Energy and Matter*

Summative Assessment Description(s)

- Student discussion and use of academic vocabulary to respond to the prompts in the elaborate phase of the learning sequence.
- Add to Summary Table

Resources:

- Summary Table

Elaborate Further / Reflect / Enrichment: Optional

- You could run a food drive and create your own food sculpture.

Culminating Performance Task:

Activity Description:

This is a summative assessment of the students' understanding of matter and its interactions relative to the construction and design elements of the 4th Little Pig's home.

- Review the design problem: The Big Bad Wolf is back to his old ways. A new little pig has moved into town. She needs a shelter because a big summer storm is coming. She has heard about the story of the Three Little Pigs and is worried. There are no more bricks available in town. Using the materials available in town (our classroom), how would you build a house to keep the new pig safe from the wolf and the weather (hot summer temperatures, wind, water)?
- Hand out the students' original initial paper and pencil designs (Pre-assessment Worksheet - Version 1 or Version 2 from Learning Sequence #1) for review.
    - Help students to recall the content they learned in each of the learning sequences - refer to the Summary Table.
    - Ask students if scientific understanding is apparent in their designs.
    - Prompt students to make the necessary changes to better align their designs to their new scientific understanding.
- After the students have completed their final paper and pencil designs, students should gallery walk and provide feedback to one another.
    - This feedback should be related to the newly learned science principles.

Back to Top of Page

- You may want to establish groups to review each of the designs under a specific lens (1) material science-durability (2) material science-absorbency, (3) properties of matter, (4) design.
- After reviewing the feedback from their peers students/groups should finalize their designs and begin construction.
  - Have all of the materials out during the final design reviews to remind students what they are allowed to use in their final project.
  - Upon showcasing their final projects, students should explain the structures and functions of the design elements.
  - Students can use the Student Self-Assessment Rubric on page 3 of the Pre-assessment Worksheet - Version 1 to help guide them.
  - Teacher may select to test their designs against the rain (spray bottle), the big bad wolf (fan), or the hot summer temperatures (hair dryer).

Resources:

- Pre-assessment Worksheet -Version 1

or

- Pre-assessment Worksheet -Version 2

Additional Resources:

- G2 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Unit 2 - Koa Tree

Plants and animals are dependent on each other and the environment in order to survive. The koa tree provides a scenario for students to figure out the interdependent relationship between plants, animals and the environment while solving the mystery of the koa tree's presence on Reunion Island. The koa tree is a known species of Hawaii, the species also exists on Reunion Island, off the western coast of Africa. The mystery the students must solve throughout the unit is, how did the tree travel 10,000 miles to appear on both islands?

The unit provides students with experiences that scaffolded their understanding of plants needs (light, water, climate). The koa tree on Reunion Island needed a tropical climate with the appropriate amount of light, water, and temperature to germinate and grow. Although we are not sure where the koa tree originated, we do know that pollination needed to occur in order for new koa trees to grow. We also know that a koa seed needed to be dispersed from one island to another. Like scientists before them, students hypothesize how the seed traveled from island to island. Was it by water? Was it attached to a bird? Was it transported in a bird's body and deposited as scat? This learning sequence provides students with a real life science mystery that gives purpose to their study on plants, animals, and habitats.

To access the flowchart for this unit, click here.

Teacher Note: Consider making this the final bundle of the year.

Suggested Pacing:
14 - 15 hrs

Anchoring Phenomenon/Design Problem:
The Mystery of the koa Tree

Unit Driving Question:
How does the koa tree grow in two places 10,000 miles apart?

Culminating Performance Task:
Students will create a final explanatory model, with zoom out boxes, that describes why the koa can exist in both Hawaii and Reunion Island, a prediction of how the seed was able to travel to Reunion Island using evidence learned from seed dispersal and pollination sequences. Students should also explain why the koa does not grow in other regions such as Connecticut.

NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements)

- 2-PS1-4: Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.
  - [Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.]
- 2-LS2-1: Plan and conduct an investigation to determine if plants need sunlight and water to grow.
  - [Assessment Boundary: Assessment is limited to testing one variable at a time.]
- 2-LS2-2: Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
- 2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.
  - [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.]
  - [Assessment Boundary: Assessment does not include specific animal and plant names in

Back to Top of Page

specific habitats.]

- 2-ESS2-3: Obtain information to identify where water is found on Earth and that it can be solid or liquid.
- K-2ETS-1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Three Dimensions that form the Foundation for these NGSS Performance Expectations:

Science & Engineering Practices:

Engaging in Argument from Evidence

- Construct an argument with evidence to support a claim.

Planning and Carrying Out Investigations

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.
- Make observations (firsthand or from media) to collect data which can be used to make comparisons.

Developing and Using Models

- Develop a simple model based on evidence to represent a proposed object or tool.

Obtaining, Evaluating, and Communicating Information

- Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question.

Disciplinary Core Ideas:

PS1.B: Chemical Reactions

- Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.

LS2.A: Interdependent Relationships in Ecosystems

- Plants depend on water and light to grow.
- Plants depend on animals for pollination or to move their seeds around.

LS4.D: Biodiversity and Humans

- There are many different kinds of living things in any area, and they exist in different places on land and in water.

ESS2.C: The Roles of Water in Earth's Surface Processes

- Water is found in the ocean, rivers, lakes, and ponds.
- Water exists as solid ice and in liquid form.

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. *(secondary)*

Crosscutting Concepts:

Cause and Effect

- Events have causes that generate observable patterns.

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s).

Patterns

- Patterns in the natural world can be observed.

Back to Top of Page

Possible Common Core State Standards Connections:

ELA/Literacy —

- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (K-2-ETS1-2)(2-LS2-2)
- RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-PS1-4)
- RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-PS1-4)
- RI.2.8 Describe how reasons support specific points the author makes in a text. (2-PS1-4)
- W.2.1 Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g., because, and, also) to connect opinion and reasons, and provide a concluding statement or section. (2-PS1-4)
- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (2-ESS2-3)
- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-LS2-1)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-LS2-1)(2-ESS2-3)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (2-LS2-1)
- MP.4 Model with mathematics .(2-LS2-1)(2-LS2-2)
- MP.5 Use appropriate tools strategically. (2-LS2-1)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (2-LS2-2)

PROGRESSION OF LEARNING

Learning Sequence 1

- **Learning Sequence Driving Question**
  - How does the koa tree grow in two places 10,000 miles apart?
- Learning Sequence 1
- **Relationship to Anchoring Phenomena/Design Problem**
  - This is the introduction to the anchoring phenomenon-The koa Tree Mystery.
- **Student Expected Outcome:**
  - Students will generate initial models of koa tree travel and questions necessary for deeper investigation of the koa tree mystery.

Learning Sequence 2

- **Learning Sequence Driving Question**
  - Do all plants need the same amount of water and sunlight?
- Learning Sequence 2
- **Relationship to Anchoring Phenomena/Design Problem**
  - Students investigate the amount of sunlight and water that plants need to survive in their natural habitats.
- **Student Expected Outcomes:**

Back to Top of Page

- Students will plan (with guidance) and carry out investigations (as a group) to describe the cause and effect of how much light and water are needed for plants to grow.
- Students will develop a model to explain which seeds will be successful on the different regions of the school grounds using evidence from their guided investigations and seed packet information.

Learning Sequence 3

- **Learning Sequence Driving Question**
  - Can the koa tree survive and grow in Connecticut?
- Learning Sequence 3
- **Relationship to Anchoring Phenomena/Design Problem**
  - Students come to understand that the habitat in which the koa resides has specific characteristics: appropriate rainfall, temperature and soil types.
- **Student Expected Outcomes:**
  - Students will obtain, organize and evaluate information regarding the habitats associated with Connecticut, Hawaii and Reunion Island.
  - Students will identify similarities and differences (patterns) in the habitats of Reunion Island and Hawaii and construct an argument using scientific reasoning and evidence about whether or not the koa tree can survive and grow in Connecticut.

Learning Sequence 4 *There are 2 Learning Sequences for this sequence!*

- **Learning Sequence Driving Question**
  - How do plants depend on animals?
- Learning Sequence 4A (Pollination)
- Learning Sequence 4B (Seed Dispersal)
- **Relationship to Anchoring Phenomena/Design Problem**
  - Animals and other forces help plants pollinate and/or move their seeds from place to place.
- **Student Expected Outcomes:**
  - Students will investigate how animals help plants in pollination and seed dispersal.
  - Students will create a model to demonstrate how pollination happens. (4A)
  - Students will design a simple sketch or physical model to show how the shape and properties of a seed help it move to a location where it can grow. (4B)

Learning Sequence 5

- **Learning Sequence Driving Question**
  - How does water and temperature determine if a koa seed survives?
- Learning Sequence 5
- **Relationship to Anchoring Phenomena/Design Problem**
  - Reunion Island and Hawaii are both tropical locations. The koa tree needs a tropical habitat in order to grow. Areas that are too cold and freeze water will limit what plants can grow there.
- **Student Expected Outcome:**
  - Students will construct an explanation using evidence about how heating and cooling a substance may cause changes that can be observed, sometimes the changes can be reversible, sometimes not.

Assessments:

- Culminating Performance Task

Back to Top of Page

- Students will create a final explanatory model, with zoom out boxes, that describes why the koa can exist in both Hawaii and Reunion, a prediction of how the seed was able to travel to Reunion Island using evidence learned from seed dispersal and pollinations sequences. Students should also explain why the koa does not grow in other regions such as Connecticut.
  - Final Explanatory Model

- Grade 2 Performance Expectation Rubrics and Prompts
- Elementary Assessment Resource

Additional Resources:

- G2 Unit Materials List
  - Click on specific tab for unit-specific materials
- EPIC! Digital Library - G2 U2 List
  - Includes ebooks and videos
  - Must have an educator user account for free access

Back to Top of Page

Learning Sequence 1

Brief Description:
This learning sequence introduces the mystery of the koa tree and how it is found in two locations on Earth over 10,000 miles apart.

Suggested Pacing:
1.75 - 1.25 hrs

Lesson-Level Phenomenon/Design Problem:
The mystery of the koa tree and world map

Relationship to Anchoring Phenomena/Design Problem:
This is the introduction to the anchoring phenomenon-The Koa Tree Mystery.

Learning Sequence Driving Question:
How does the koa tree grow in two places 10,000 miles apart?

Student Expected Outcome:
- Students will generate initial models of koa tree travel and questions necessary for deeper investigation of the koa tree mystery.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Developing and Using Models ● Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s).*	**LS4.D: Biodiversity and Humans** ● There are many different kinds of living things in any area, and they exist in different places on land and in water.	**Cause and Effect** ● Simple investigations can be designed to gather evidence to support or refute student ideas about causes. *

* These elements are not specific to the unit. Unit of performance expectations.

Related Performance Expectation(s) in this Unit:
- 2-LS2-2: Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
- 2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.
  - [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.]
  - [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]

Possible Common Core State Standards Connections:

ELA/Literacy —

Back to Top of Page

- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (K-2-ETS1-2)(2-LS2-2)

Mathematics —

- MP.4 Model with mathematics. (2-LS2-1)(2-LS2-2)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (2-LS2-2)

Prior Student Knowledge:
K.ETS1.A

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)
Activity Description:

- Share the *koa Tree Slideshow*.
- Students complete the *Discussion Diamond Template.*
  - Allow the students to work in small cooperative groups (no more than 4) to discuss their initial ideas of how the tree is able to exist on Hawaii and Reunion Island.
  - Provide printed images of the trees from both islands and maps for each of the student groups.
  - Students brainstorm ideas for the mystery in their corner of the 11" x 17" discussion diamond sheet. After spending 2-5 minutes in silence recording their ideas, students should share their ideas with the rest of the group.
  - The purpose of this sharing/discussion is to come to a consensus about their initial ideas of how the tree was able to get from one island to the other.
- Once a consensus has been reached, each group draws an initial model of their consensus ideas in the center of their discussion diamond. The model should include both images and explanations for their ideas.

Resources:

- Koa Tree Slideshow
- Discussion Diamond Template

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)
Activity Description:

Back to Top of Page

- Upon completion of the initial models, have each of the cooperative groups share their ideas for how the tree was able to grow in these two locations so far apart.
- After each of the groups has shared their initial models allow students to generate questions they would like to investigate to solve the mystery.
- The *Question Formulation Technique* can be utilized to help students generate the bulk of questions and then hone those questions to be scientific and investigatory.
- Record the scientific questions students generate.
    - These questions could be categorized into themes such as:
        - What do plants need to survive?
        - How do plants depend on animals?
        - How do seeds travel?
        - How does water impact where a plant lives (habitat)?
        - How does temperature impact where a plant lives (habitat)?
            - It is best if students identify the themes and you tweak them. This process builds student ownership and motivation for learning, as the questions generated will drive student learning throughout the unit.

Resources:

- Question Formulation Technique

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

Additional Resources:

- G2 Unit Materials List
    - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 2

Brief Description:
Students will plan and conduct an investigation to identify if varying amounts of water and/or sunlight impact plants. Students will conduct scientifically sound investigations by using consistent measuring and observational tools.

Suggested Pacing:
3.25 - 3.75 hrs

Lesson-Level Phenomenon/Design Problem:
Dead Plant and Live Plant

Relationship to Anchoring Phenomena/Design Problem:
Students investigate the amount of sunlight and water that plants need to survive in their natural habitats.

Learning Sequence Driving Question:
Do all plants need the same amount of water and sunlight?

Student Expected Outcomes:

- Students will plan (with guidance) and carry out investigations (as a group) to describe the cause and effect of how much light and water are needed for plants to grow.
- Students will develop a model to explain which seeds will be successful on the different regions of the school grounds using evidence from their guided investigations and seed packet information.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Planning and Carrying Out Investigations • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. • Make observations (firsthand or from media) to collect data which can be used to make comparisons.	**LS2.A: Interdependent Relationships in Ecosystems** • Plants depend on water and light to grow. **LS4.D: Biodiversity and Humans** • There are many different kinds of living things in any area, and they exist in different places on land and in water.	**Cause and Effect** • Events have causes that generate observable patterns

Related Performance Expectation(s) in this Unit:

- 2-LS2-1: Plan and conduct an investigation to determine if plants need sunlight and water to grow.
  - [Assessment Boundary: Assessment is limited to testing one variable at a time.]
- 2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.
  - [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of

Back to Top of Page

different habitats.]
- [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]

Possible Common Core State Standards Connections:

ELA/Literacy —
- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-LS2-1)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-LS2-1)(2-ESS2-3)

Mathematics —
- MP.2 Reason abstractly and quantitatively. (2-LS2-1)
- MP.4 Model with mathematics. (2-LS2-1)(2-LS2-2)
- MP.5 Use appropriate tools strategically. (2-LS2-1)

Prior Student Knowledge:
K-LS1. C, 1-LS1-1, 1-LS1.A

Possible Preconceptions/Misconceptions:
- All plants need the same amount of water.
- You can't overwater a plant.
- All plants need the same amount of light.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)
Activity Description:
- Show students *Tomato Plant Pictures*. Ask the students to discuss what they think is happening with the plants and why they look the way they do (#1 Alive, #2 Dying, #3 Dead). Guide the discussion and encourage student questioning to determine what plants need to survive or grow in a healthy way. From their investigations in kindergarten, students should know that plants need sunlight and water to live and grow, but they will not know how much light and water are necessary for plant survival. Help students identify that scale, proportion and quantity of sunlight and water can be investigated.
- Students complete the *Pre-assessment.*

Resources:
- Tomato Plant Pictures
- Pre-assessment

Teacher Action(s):
- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):
- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"

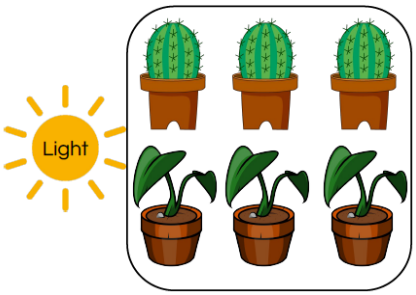
Back to Top of Page

- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

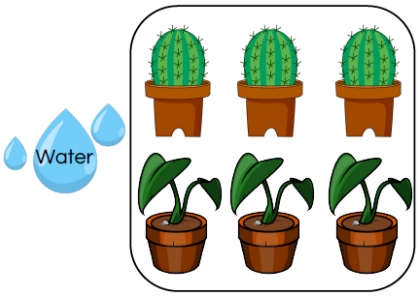
Activity Description:

- Students collaboratively plan and conduct two investigations on the amount of sunlight and water 2 varieties of plants need using a *Data Table* (sample provided).
- Show students the plants: 2 varieties (succulent/bean) - 6 of each variety is suggested for data collection
- Assign groups of students to collect observations for either inquiry (1) sunlight, succulent; (2) sunlight, bean; (3) water, succulent or (4) water, bean.
    - Ultimately different groups will be responsible for data collection on ONE of the four data tables. Each group will share their observations with the entire class.
    - *While there is a sample Data Table provided, PLEASE allow students to have input in what content should be present in the table and make the necessary modifications. Students need to plan this investigation.*
- All plants (within the same variety) should be of the same relative size and age. Help students to plan an investigation to determine the effects of different amounts of water or sunlight on plants.
    - Measurements should be consistent across groups (1) and (2) and groups (3) and (4).
    - Scaffold the discussion to include variables and controls.- class will need to focus on one investigation (sunlight or water) at a time
- Teacher Note:
    - Possible student investigation design for amount of sunlight: full sun (on windowsill), partial sun (mid classroom location) and no sun (in cabinet)
    - Possible student investigation designs for amount of water: students determine what their initial amount of water is going to be, then they will provide all of that amount to one plant, half to the second and none to the third



- Prompts to get students thinking:
    - How can we measure the amount of light? (ex: hours, minutes, distance from light source...)
    - How much sunlight should we give each plant?
    - What observations will we make? (make sure all observations are consistent color, height, # leaves…)
    - How will we know what sunlight amount is best for the plant?
    - Do both plants need the same amount of sunlight?
- As students respond to the prompts help students to develop a data table to track their observations over a minimum of two weeks.

Back to Top of Page



- Prompts to get students thinking:
  - How can we measure water? (ex: spoonful, droppers, cups…)
  - How much water should we give each plant? (help students to make incremental measurements 2 droppers full, 4, droppers full, 6, droppers full...)
  - How often should we water the plant? (make sure all plants have the same watering schedule-daily, hourly, weekly…)
  - What observations will we make? (make sure all observations are consistent color, height, # leaves…)
  - How will we know what water amount is best for the plant?
  - Do both plants need the same amount of water
- As students respond to the prompts help students to develop a data table to track their observations over a minimum of two weeks.
- Teacher Note: If plants do not die as a result of investigation design, there should still be an observable change (yellow leaves, rotting stem, plant growing toward light source) that supports the Crosscutting Concept of *Cause and Effect.*

Resources:

- Data Tables (sample)

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- At the completion of the investigation, help students to share their data and observations with the class. Generate a class data set.
- Students discuss what they notice about the data (identify patterns).

Back to Top of Page

- Students discuss the data in small groups before sharing their ideas with the whole class. Students will need to look at patterns in their observations in order to make a claim. The following prompts can be used to get students to review the data for specific patterns.
    - How was the (succulent/bean) affected by the different amounts of water?
    - How was the (succulent/bean) affected by the different amounts of sunlight?
    - Which (succulent/bean) appeared to be the healthiest? What is the evidence?
    - Did the succulent and bean need the same amount of (water/sunlight)?
- Once the students have made some claims based on their evidence, help students to understand that different types of plants have different needs (in terms of water and sunlight quantity).
    - These needs are met in different habitats. Discuss with students that not all plants and animals can live in the same habitats. (2-LS4-1 - Make observations of plants and animals to compare the diversity of life in different habitats.)
- As a class read the Desert books and one other book pair shown in Resources and discuss how this information applies.
    - Identify that cactus plants are succulents and their needs are different from those of a bean plant.
    - Students describe the habitat and the organisms that live there and compare habitats.

Resources:

- Desert
    - From Seed to Cactus by Lisa Owings on epic! Books
    - Life in a Desert by Kari Schuetz on epic! Books
- Wetland
    - From Seed to Cattail by Lisa Owings on epic! Books
    - Life in a Wetland by Laura Hamilton Waxman on epic! Books
- Forest
    - From Cone to Pine Tree by Emma Carlson Berne on epic! Books
    - Life in a Forest by Laura Hamilton Waxman on epic! Books

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: grow, survive, plant, light, drought, growth, survive, temperature, seasonal, water, habitat

ELABORATE (Applications / Extensions)

Activity Description:

- Read *Jack's Garden* - by Henry Cole.
- Provide students with a variety of seed packets; have students observe the packets and make note of the needs for the different plant varieties.

Back to Top of Page

- Please select seed packets that have both pictorial and textual representation of the plants needs, such as Burpee seed packets like the example of a *Seed Packet (Slide 5 from Data Tables (sample)*
- Encourage the students to apply or extend the concepts learned from Explore (amount of water and sunlight needed for different plants) and the information presented on the seed packets to the school garden scenario.

- Students will use the seed packet information to create a grow zone map of the school yard identifying which plants will need to grow in shade, partial sun, and full sun and watering instructions for their plants.
  - Draw reasonable conclusions from evidence provided by the seed packets (Slide 5)
  - Teacher Note: create a map of your school grounds or use the *Schoolyard Map Sample* (print on 11x17 paper) and have students analyze the map and place plants in appropriate locations with explanation.
- *Save grow zone maps for LS3 Elaborate*

Resources:

- *Jack's Garden* by Henry Cole (might be available as a youtube read)
- Seed Packet (Slide 5 from Data Tables (sample)
- Schoolyard Map Sample (print on 11x17 paper)

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

Elaborate Further / Reflect / Enrichment: Optional

Activity Description:

- Students create a seed packet design (no seeds needed) with a picture of the koa tree on the front and the growing facts on the back using the information provided in *Resources* and the *Seed Packet Design* slide.

Resources:

- Native Plants Hawaii
- Teacher Resource:
  - USDA: Koa Plant Fact Sheet. Use the *Establishment* and *Management* sections from this source
- Seed Packet Design

EVALUATE

Back to Top of Page

Formative Monitoring Description(s) (Questioning / Discussion)
Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP:** *Planning and Carrying Out Investigations*
- ❏ **DCI:** *LS2.A: Interdependent Relationships in Ecosystems; LS4.D: Biodiversity and Humans*
- ❏ **CCC:** *Cause and Effect*

Summative Assessment Description(s)

- Assess student understanding of differing plant needs (scale, proportion and quantity) of water and sunlight through the elaborate activity. Assess student placement and explanations of plant placement on the school grounds.
- Help students to track their learning over the course of the unit with the *Summary Table*. The *Summary Table* should be completed at the end of each learning sequence.

Resources:

- Summary Table

Additional Resources:

- G2 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 3

Brief Description:
Students explore how the location of different species is dependent on the characteristics of the habitat (average annual temperature, rainfall, etc). In this lesson students obtain and evaluate information about the habitats of Reunion Island and Hawaii. Students then communicate (using scientific reasoning and evidence) as to whether or not the koa tree could survive and grow in Connecticut.

Suggested Pacing:
2 - 2.5 hrs

Lesson-Level Phenomenon/Design Problem:
Can the koa tree survive and grow in Connecticut?

Relationship to Anchoring Phenomena/Design Problem:
Characteristics of a koa tree's habitat

Learning Sequence Driving Question:
Can the koa tree survive and grow in Connecticut?

Student Expected Outcomes:

- Students will obtain, organize and evaluate information regarding the habitats associated with Connecticut, Hawaii and Reunion Island.
- Students will identify similarities and differences (patterns) in the habitats of Reunion Island and Hawaii and construct an argument using scientific reasoning and evidence about whether or not the koa tree can survive and grow in Connecticut.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Obtaining, Evaluating, and Communicating Information • Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. **Engaging in Argument from Evidence** • Construct an argument with evidence to support a claim.	**LS2.A: Interdependent Relationships in Ecosystems** • Plants depend on water and light to grow. **LS4.D: Biodiversity and Humans** • There are many different kinds of living things in any area, and they exist in different places on land and in water. **ESS2.C: The Roles of Water in Earth's Surface Processes** • Water is found in the ocean, rivers, lakes, and ponds.	**Patterns** • Patterns in the natural world can be observed.

Back to Top of Page

Planning and Carrying Out Investigations ● Make observations (firsthand or from media) to collect data which can be used to make comparisons.	● Water exists as solid ice and in liquid form.	

Related Performance Expectation(s) in this Unit:

- 2-ESS2-3: Obtain information to identify where water is found on Earth and that it can be solid or liquid.
- 2-LS2-1: Plan and conduct an investigation to determine if plants need sunlight and water to grow.
  - [Assessment Boundary: Assessment is limited to testing one variable at a time.]

Possible Common Core State Standards Connections:

ELA/Literacy —

- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (K-2-ETS1-2)(2-LS2-2).
- RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-PS1-4)
- W.2.1 Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g., because, and, also) to connect opinion and reasons, and provide a concluding statement or section. (2-PS1-4)
- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-LS2-1)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-LS2-1)(2-ESS2-3)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (2-LS2-1)
- MP.4 Model with mathematics. (2-LS2-1)(2-LS2-2)
- MP.5 Use appropriate tools strategically. (2-LS2-1)

Prior Student Knowledge: ***(click link to see specific performance expectations from previous grades)***
K.LS1.C ; K.ESS3.A

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)
Activity Description:

- Show slides #1-2 of the *Slideshow.*
- Allow students to review the *koa fact sheet* and generate a list of observations and questions related to the prompt:
  - Can the koa survive and grow in Connecticut?
- Students can complete an *I notice, I wonder* chart while reviewing the koa data sheet.
  - These observations and questions can be used in class discussion to leverage student ownership. Help students to share their observations and questions;
  - generate a class list of items they would need to know more about in order to determine if the koa could survive and grow in Connecticut.

Back to Top of Page

- Scaffold discussion so students mention, at minimum temperature, rainfall (water), relate this back to what they learned in the previous learning sequence.

Resources:

- Slideshow
- koa Fact Sheet
- I notice, I wonder chart

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- Set up three location stations around the classroom. Each station (Connecticut, Hawaii, and Reunion Island) should include the two coordinating, printed slides #4-9 of the *Slideshow* and any additional resources.
  - Students work in small cooperative groups to identify the similarities and differences of climate and water sources throughout Connecticut, Hawaii and Reunion Island.
  - Students record their research on the *Exploration Sheet.*
- Teacher Note: It might be helpful to have the Library Media Specialist pull resources about these three locations specific to the types of plants and animals that live in the ecosystem, geography, geology and climate.

Resources:

- Slideshow (print slides 4-9 for location stations)
- Exploration Sheet

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

Back to Top of Page

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Teacher posts the *Agree-Disagree Line Claims* on opposite sides of the classroom.
- Prompt students to stand next to the claim that best matches their own claim from Explore.
    - Students should share their claims and provide feedback to the other students who selected the same claim.
    - Students in these groups should generate a list of evidence to rationalize their claim.
    - The two groups should share their ideas and evidence with the whole class.
- Students share the similarities and differences between the three locations.
    - Teacher Notes:
        - Use student generated evidence as a prompt for the discussion.
        - The goal of the discussion is to help students realize that living things have specific conditions that make them successful in a region. Success is measured by a plant or animal's ability to survive, grow and reproduce. Students collected their own evidence on what makes the koa successful.
- Students view the *USDA grow zone map and legend.* The koa tree can only survive and grow in **zones 9-11**. Ask students to share how their claims match up to the map presented, and if this new data would cause them to modify their claim. Please point out Hawaii and Connecticut, help students to understand that the location of Hawaii on the map is not accurate. You may need to refer to the previous map of Hawaii, Reunion and Connecticut to help students get the correct perspective on the location of Hawaii.
- Prompt student thinking and ask students:
    - How did the USDA decide on these grow zones?
    - What do they think was the biggest factor-temperature or rainfall?
    - Where would you always find liquid water?
    - Where would you find solid and liquid water?
    - Where would you always find solid water?
        - Teacher Note: Connect back to states of matter and explain to students that in extreme cold water bodies are mostly frozen, in moderate regions water bodies are sometimes frozen and sometimes liquid, and in warm regions water bodies are always liquid. Use the Grow Zone Legend to help identify patterns.

Resources:

- Agree Disagree Line Claims
- koa tree information for teachers only!
- USDA grow zone map and legend
- Slideshow (Slide #10)

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations

Back to Top of Page

- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: temperature, thermometer, heat, cool, plant, living, ecosystem, life, survive, grow, species, drought, habitat, drought-resistant, grow-zone

ELABORATE (Applications / Extensions)

Activity Description:

- Refer back to the school yard garden plot maps (generated in G2 U2 LS2).
- Show Slide #1 from the *Citrus Tree Slideshow.*
- May be done as a whole class or small groups with Slides #3-#7 printed for each group.

Resources:

- Citrus Tree Slideshow

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP:** *Obtaining, Evaluating, and Communicating Information; Engaging in Argument from Evidence; Planning and Carrying Out Investigations*
- ❏ **DCI:** *LS2.A: Interdependent Relationships in Ecosystems; LS4.D: Biodiversity and Humans; ESS2.C: The Roles of Water in Earth's Surface Processes*
- ❏ **CCC:** *Patterns*

Summative Assessment Description(s)

- Assess student claims on the Elaborate activity.
- Help students to track their learning over the course of the unit with the *Summary Table*. The *Summary Table* should be completed at the end of each learning sequence.

Resources:

- Summary Table

Back to Top of Page

Additional Resources: ● G2 Unit Materials List ○ Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 4A

Brief Description:
Students watch videos of animals pollinating flowers. They observe and generate questions about what is happening. Students then closely observe bees and determine the structure and function of bees that are involved in pollination. By the end of the lesson students review the koa flowers structure and the structures of various animals and determine which animal was most likely to pollinate the koa flower.

Suggested Pacing:
2.5 - 3 hrs

Lesson-Level Phenomenon/Design Problem:
Pollination Video

Relationship to Anchoring Phenomena/Design Problem:
Animals and other forces help plants pollinate and/or move their seeds from place to place.

Learning Sequence Driving Question:
How do plants depend on animals?

Student Expected Outcomes:
- Students will investigate how animals help plants in pollination.
- Students will create a model to demonstrate how pollination happens.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Developing and Using Models • Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2)	**LS2.A: Interdependent Relationships in Ecosystems** • Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)	**Structure and Function** • The shape and stability of structures of natural and designed objects are related to their functions. . (2-LS2-2)

Related Performance Expectation(s) in this Unit:
- 2-LS2-2: Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.*

Possible Common Core State Standards Connections:

ELA/Literacy —
- SL.2.5 Create audio recordings of stories or poems; and drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (2-LS2-2)

Mathematics —
- MP.4 Model with mathematics. (2-LS2-2)

Back to Top of Page

- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (2-LS2-2)

Prior Student Knowledge:
K.ETS1.A

Possible Preconceptions/Misconceptions:

- Students consider large animals to be the main characters in an ecosystem. They do not understand the roles of smaller organisms in the success of an ecosystem.
- Students assume all ecosystems are composed of the same plants and animals. They do not realize that different regions have different species.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)
Activity Description:

- Students watch the *The Beauty of Pollination Video*.
    - Observe animals helping plants and record your observations on the *Observations of Animals Helping Plants Worksheet*.
- Students pair-share their observations and choose two observations of animals helping plants to share with the whole class along with an initial explanation of how the animal is helping the plant.
    - Students may not have the correct terminology to share their initial ideas. Please only introduce pollination as a means of animals helping plants. Do not define the word further for the students, we want them to make sense of the idea in their own time.
- Students generate questions about what they saw in the video.
    - Possible student questions could include:
        - What is the dusty stuff?
        - What are the animals doing?
        - What body parts are being used?
        - What does this do for the plant? Does it harm the plant?
    - Guide student questions to include:
        - What is pollination?
        - Why is pollination important?
    - Scaffold student questioning to promote the concepts of structure and function.
        - What kinds of animals pollinate flowers?
        - What parts of the animals and plants are involved in pollination?

Resources:

- The Beauty of Pollination Video
- Observations of Animals Helping Plants Worksheet

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

Back to Top of Page

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description: *(these explorations may be completed over several days)*

- Students watch the *Bee Pollinating Flowers Video* on a loop in the classroom.
- As the video runs, students complete the *Pollen Delivery Activity* to explore a variety of textured materials to determine which textures are the best at collecting "pollen" (baking soda).
    - Ask the students to share their ideas about the different textures and how effective they were in collecting and delivering pollen.
    - Help the students to begin to connect the ideas that the textures found on the bees (and other animals who pollinate) are not a coincidence, and that those textures serve a specific function.
    - **This exploration is adapted from engineering is elementary*

Resources:

- Bee Pollinating Flowers Video
- Pollen Delivery Activity
- Flower sheets (print for use in Pollen Delivery Activity)

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Students read *Bees and Flowers* by Kevin Cunningham.
- Students discuss how this book connects to their Explore activity.
- As a class, make observations of the structures on a honeybee (specimen with magnifying lense or picture - Slide #1 from the *Structure and Function Slides*) and a flower (specimen or picture - Slide #2 from the *Structure and Function Slides*).
    - Draw each part on the board or show slide #3 and #5 from the *Structure and Function Slides*
        - Teacher note: The actual vocabulary is NOT the focus but can be included:
            - Petals - colorful, attract animals, protect the pistil and stamens.
            - Pistil - the female part of the flower that has a sticky top and ovules in the base, (produces the seeds).
            - Stamen - the male part of the flower that produces the pollen.

Back to Top of Page

- Pollen - the plant's male reproductive cells.
- Pollination - the transfer of pollen from the stamen to the pistil of the same flower or different flowers of the same kind of plant.

- Students review the labeled diagrams of the structures and relate those structures to pollination.
- Students complete the *Pollination Model*. Students add zoom-out boxes to describe how the bee and flower work together for pollination, and explain how the bee's parts and plant's parts help in the pollination process.

Resources:

- Bees and Flowers by Kevin Cunningham on epic! Books
- Structure and Function Slides
- Additional resources on epic! Books
  - *National Geographic Readers: Bees* by Laura Marsh
  - Insect Pollinators by Jennifer Boothroyd
  - What Is Pollination? by Bobbie Kalman
  - Incredible Insect Pollination video
  - Who Are Flowers Trying to Attract? Video by MinuteEarth
  - SciShow Kids: Pollination: How Bees Help Make Fruit! video
- Pollination Model

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: Pistil, stamen, petal, stem, flower, pollen, pollination, pollinate, structure, function, plant, grow, seed, insect, nectar, reproduction, abdomen, thorax, pollen basket, antennae

ELABORATE (Applications / Extensions)

Activity Description:

- Students read the text *Flowers are Calling* by Rita Gray or *Animal Pollinators* by Jennifer Boothroyd.
- Students discuss their observations about structures and functions of each of the animals that are seen pollinating the flowers. Then reverse the discussion and allow the students to take notice of the plants structures and how the plant is suited to the characteristics of the animal used to pollinate the flower.
- Ask students:
  - What adaptations do flowers have to help make sure they get pollinated by animals?
    - Shape - wide open (wind), narrow passages (animals)
    - Color and patterns - make flowers easy to see.
    - Smell - sweet smell draws animals

Back to Top of Page

        - Nectar- sugar and sweet taste
    - What adaptations do animals have in order to pollinate the flowers?
        - Furry bodies
        - Tongue shapes
        - Beak shapes
        - Pollen baskets
- Provide students with the *Koa Tree Pollination Worksheet*. In this assessment, students are asked to identify which creature would pollinate a koa flower. Students must use structure and function evidence to back up their claim.

Resources:
- *Flowers are Calling* by Rita Gray (available on YouTube)
- Animal Pollinators by Jennifer Boothroyd
- Koa Tree Pollination Worksheet

Teacher Action(s):
- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):
- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP:** *Developing and Using Models*
- ❏ **DCI:** *LS2.A: Interdependent Relationships in Ecosystems*
- ❏ **CCC:** *Structures and Functions*

Summative Assessment Description(s)
- Assess student claims on the Elaborate activity.
- Help students to track their learning over the course of the unit with the *Summary Table*. The *Summary Table* should be completed at the end of each learning sequence.

Resources:
- Summary Table

Additional Resources:
- G2 Unit Materials List
    - Click on specific tab for unit-specific materials

Back to Top of Page

Back to Top of Page

Learning Sequence 4B

Brief Description:
Students learn that plants depend on animals to move their seeds around (dispersal) and how the characteristics of a seed aid in its dispersal. Plant seed structures serve the function of their seed dispersal needs and type.

Suggested Pacing:
3 - 3.5 hrs

Lesson-Level Phenomenon/Design Problem:
Video of apples growing from a pollinated flower, picture of deer eating apples, and apple dissection

Relationship to Anchoring Phenomena/Design Problem:
Animals and other forces help plants pollinate and/or move their seeds from place to place.

Learning Sequence Driving Question:
How do plants depend on animals?

Student Expected Outcomes:

- Students will investigate how animals help plants in seed dispersal.
- Students design a simple sketch or physical model to show how the shape and properties of a seed help it move to a location where it can grow.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Developing and Using Models • Develop a simple model based on evidence to represent a proposed object or tool. **Planning and Carrying Out investigations** • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.	**LS2.A: Interdependent Relationships in Ecosystems** • Plants depend on animals for pollination or to move their seeds around. **ETS1.B: Developing Possible Solutions** • Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (secondary)	**Cause and Effect** • Events have causes that generate observable patterns. **Structure and Function** • The shape and stability of structures of natural and designed objects are related to their function(s).

Related Performance Expectation(s) in this Unit:

- K-2ETS-1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Back to Top of Page

- 2-LS2-2: Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.*

Possible Common Core State Standards Connections:

ELA/Literacy —

- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (K-2-ETS1-2)(2-LS2-2)

Mathematics —

- MP.4 Model with mathematics. (2-LS2-1)(2-LS2-2)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (2-LS2-2)

Prior Student Knowledge:

K.ETS1.A

Possible Preconceptions/Misconceptions:

- Students consider large animals to be the main characters in an ecosystem. They do not understand the roles of smaller organisms in the success of an ecosystem.
- Students assume all ecosystems are composed of the same plants and animals. They do not realize that different regions have different species.
- Students may not realize that pollination leads to seed formation
- Students will think of nuts and fruit/vegetables as food, not as seeds.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Students watch the *Flower to Fruits (Apple Timelapse)* video of apples growing from a pollinated flower (this is a direct connection to lesson 4A)
- Students watch the *Apple Life Cycle* video and view the *Picture of Squirrel Eating Apple.*
- Students complete an apple dissection, and if needed, watch the *Apple Dissection Demonstration*.
    - Allow students to view the different parts of the apple and count the number of seeds inside the apple. Remind them of the taste of apples from eating them in the past (Safety Note: Do not allow students to taste the apples. Eating food as part of a science lesson is never permitted.)
- Prompt students:
    - Why are the seeds embedded in such a "yummy" fruit?
    - How does having the seeds in the fruit help the plant move its seeds to a new location?
    - Why would a plant want the seeds to move to a new location? What are some other ways plants move their seeds?

Resources:

- Flower to Fruits (Apple Timelapse)
- Apple Life Cycle video
- Picture of Squirrel Eating Apple
- Apple Dissection Demonstration

Back to Top of Page

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- Teacher sets up one picture and one *I Notice/I Wonder Chart* at 5 separate stations around the room.
    - Each station will have a different example of how plants and animals work together to distribute seeds.
        - ***Station 1****: Sock with seeds stuck to it.*
        - ***Station 2****: Picture of an animal with seed stuck to it*
        - ***Station 3****: Video of a squirrel burying a seed*
        - ***Station 4:*** *Picture of a bird with seed in beak*
        - ***Station 5:*** *Picture of ant moving a seed*
    - While photos/videos of the seed and animal interactions will work, supplying hands-on experiences with seeds at each station would be beneficial for students to consider the structures and functions of the seeds.
- Students work in small groups to add comments to the *I notice, I wonder* chart at each station.
- After visiting each station, have students share their observations and questions in a discussion circle.

Resources:

- **Station 1**: Picture of a Sock with seeds stuck to it.
- **Station 2**: Picture of an animal with seed stuck to it
- **Station 3**: Video of a squirrel burying a seed
- **Station 4:** Picture of a bird with seed in beak
- **Station 5:** Picture of an ant moving a seed
- I notice, I wonder Chart

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas

Back to Top of Page

- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- The class reads the *Seed Dispersal Texts* listed in Resources.
- Students view the *Seed Dispersal Slideshow*.
- Students examine a variety of seeds (purchase a seed dispersal set or compile your own seeds) using magnifying glasses.
    - Students identify features in each seed that would help it travel in a specific way.
    - Students place the seeds in the correct box on the *How Do Seeds Move? Worksheet.*
    - Students share their seed dispersal determinations and evidence.
    - Scaffold the discussion so that students gain access to appropriate vocabulary use in their descriptions.
- If available, students examine the koa seeds or show Slide #4 in the *Seed Dispersal Slideshow*.
    - Students work in small cooperative groups to observe the seed's structures.
    - Students participate in a *Discussion Diamond Activity* to come to consensus on the mode of dispersal for the koa seed.
        - Students write their initial ideas on their corner, discuss their ideas with the whole group, and determine what content to include in the center of the diamond.
    - Student groups share their decisions and rationales with the whole class.
    - Share with the students that in order for the koa seed to sprout into a seedling, the seed coat must be scratched.
    - Ask students how the different types of seed dispersal may help with scratching the seed coat.
    - *Optional - Consider sprouting one of the koa seeds by scratching it with tweezers or nail clippers and placing it in a plastic bag with a moist paper towel in the window. Heavier seeds are more likely to sprout than lighter seeds. By sprouting the koa, you will be able to bring the seedling into the engagement exercise in learning sequence 5.*

Resources:

- Seed Dispersal Texts:
    - Planting the Wild Garden by Kathryn Osebold Galbraith on epic! Books
    - Who Will Plant a Tree? by Jerry Pallota on epic! Books
    - *Flip, Float, Fly: Seeds on the Move* by Joann Early Macken (may be available as a YouTube read aloud)
- Seed Dispersal Slideshow
- Teacher Resource: Pictures of possible seeds to collect
- How Do Seeds Move? Worksheet
- Discussion Diamond Activity

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations

Back to Top of Page

- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: seed, seedling, fruit, pollen, pollination, dispersal, wind, float

ELABORATE (Applications / Extensions)

Activity Description: Engineer a model seed

- Students complete the *Seed Engineering Challenge* using a variety of arts and crafts materials to design, build and test a seed model for the following scenario:
  - There is a seed on a desert island. The island is overcrowded and there is no space for more plants to grow. The next closest island is 60 miles away. Design a way for your seed to survive and grow on the next island without human help.
  - Optional : Teachers may develop other unique scenarios with various plant needs and locations to allow different groups to embed different dispersal types.
- Students must rationalize their designs and test their solutions, like an engineer would do in the real world. Remind students that engineers rarely get their desired outcome on the first try. They often have to redesign their ideas incorporating what they learn during each trial to eventually solve their problem.

Resources:

- Seed Engineering Challenge

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP:** *Developing and Using Models; Planning and Carrying Out Investigations*
- ❏ **DCI:** *LS2.A: Interdependent Relationships in Ecosystems; ETS1.B: Developing Possible Solutions*
- ❏ **CCC:** *Cause and Effect; Structures and Functions*

Summative Assessment Description(s)

- Seed Design Challenge from Elaborate

Back to Top of Page

- Help students to track their learning over the course of the unit with the *Summary Table*. The *Summary Table* should be completed at the end of each learning sequence.

Resources:

- Summary Table

Elaborate Further / Reflect / Enrichment:

- Sock Walk: Have children tuck their pants into their socks, keeping their shoes on! Take them for a walk in a grassy or wooded area. As students walk, have them look at different plants and what kinds of seeds you see. Pick up larger seeds and have students place them in a paper bag. When the students return to the classroom have students examine closely their socks and pants. Use magnifying glasses to see the seeds close up, draw and record the structures that allowed the seed to stick to their socks. Use a lint roller to remove seed and insects (i.e. ticks) from student clothing.

Additional Resources:

- G2 Unit Materials List
    - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 5

Brief Description:
Students observe romaine lettuce or other frost sensitive plants to see how below freezing temperatures and climate impact plants.

Suggested Pacing:
1.75 - 2.25 hrs for the 5Es
0.5 - 1 hr for the Culminating Performance Task

Lesson-Level Phenomenon/Design Problem:
Fresh leaves of romaine vs frozen leaves of romaine

Relationship to Anchoring Phenomena/Design Problem:
Reunion Island and Hawaii are both tropical locations. The koa tree needed a tropical habitat in order to grow. Areas that are too cold and freeze water will limit what plants can grow there.

Learning Sequence Driving Question:
How does water and temperature determine if a koa seed survives?

Student Expected Outcomes:

- Students will construct an explanation using evidence about how heating and cooling a substance may cause changes that can be observed, sometimes the changes can be reversible, sometimes not.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Engaging in Argument from Evidence • Construct an argument with evidence to support a claim.	**ESS2.C: The Roles of Water in Earth's Surface Processes** • Water is found in the ocean, rivers, lakes, and ponds. • Water exists as solid ice and in liquid form. **PS1.B: Chemical Reactions** • Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.	**Cause and Effect** • Events have causes that generate observable patterns.

Related Performance Expectation(s) in this Unit:

- 2-ESS2-3: Obtain information to identify where water is found on Earth and that it can be solid or liquid.
- 2-PS1-4: Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.
    - [Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking

Back to Top of Page

an egg, freezing a plant leaf, and heating paper.]

Possible Common Core State Standards Connections:

ELA/Literacy —

- RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-PS1-4)
- RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-PS1-4)
- RI.2.8 Describe how reasons support specific points the author makes in a text. (2-PS1-4)
- W.2.1 Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g., because, and, also) to connect opinion and reasons, and provide a concluding statement or section. (2-PS1-4)

Prior Student Knowledge:

N/A

LESSON PLAN – 5-E Model

Prior Preparation for Learning Sequence 5

Engage

- Freeze romaine lettuce or celery prior

Explore:

- Freeze romaine lettuce or celery
- Place a piece of romaine/celery in colored water at least a full day before the activity

Explain

- Freeze water in ice cube tray or 3 ounce paper cup

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Teacher Note: be sure to have frozen romaine lettuce or celery
- Students review the *Koa Tree Fact Sheet*, making note of the fact that freezing or cold weather can impact a seedling's growth.
- Show students a fresh leaf of romaine and a frozen piece of romaine (or some comparable plant like celery).
- Students turn and talk to predict ways in which freezing might impact a plant or seedling, and then pairs share their ideas with the whole class.

Resources:

- Koa Tree Fact Sheet

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Back to Top of Page

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

Part #1:

- Teacher note: Be sure to have prepared (fresh, frozen, microwaved and colored) romaine lettuce or celery
- Students examine a fresh romaine leaf/celery stalk, a previously frozen leaf/ stalk and a microwaved leaf/stalk and complete *Explore Activity*.
    - May use hand lens
    - Identify the similarities and differences.

Part #2:

- Students participate in an *Agree/Disagree Line* with the two statements (Slide #2 and #3 in *Explore Activity*) posted on either side of the classroom:
    - Romaine lettuce/Celery CAN be returned to its original state
    - Romaine lettuce/Celery CANNOT be returned to its original state
- Students move to the statement they agree with and discuss with their like-minded classmates why they believe the statement is accurate and come up with evidence to support their claim. (Remember the Hershey Kiss activity (LS3) from the 4th Little Pig.)
- Each claim group shares their ideas and evidence with the class. If after the sharing someone wishes to change positions, they may do so.
- As a class, brainstorm together other examples of how adding heat and cold changes an original form (i.e., snowman melting, cake batter to cooked cake, popcorn kernels to popcorn, etc), and ask students if the change can be reversed.

Part #3:

- As a class, record observations from Part #1 on the triple venn diagram on Slide #4 of the *Explore Activity* and discuss why there are differences in the leaves/stalks and their structure.
    - Scaffold the discussion to include water.
- Use the piece of romaine/celery that is in the colored water to show how plants have water in their bodies.
    - Ask students to predict if the water played a role in how the different leaves/stalks looked and felt?
    - Was it only the water that played a role in the changes in the romaine leaf/celery stalk?
    - What other factors may have played a role in the changes?
    - Continue to prompt students until the idea of temperature is brought into the discussion.

Resources:

- Explore Activity
    - Agree/Disagree Line Directions

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems

Back to Top of Page

- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Teacher note: Be sure to have prepared frozen and liquid water in ice cube tray or cup
- Students compare the ice cube tray/cup of frozen water to liquid versions to predict how those differences might impact a plant/seed.
    - An alternative way to do this could be done with students measuring a volume of water and marking the cup with a permanent marker, then freezing it and seeing where the water level is in the container once it is a solid
- Teacher explains the causes of the damage which is due to expansion of water (up to 9%) when it freezes and points out that the frozen cubes are mounded and taller than the liquid form.
    - *Teacher background information:* Damage occurs to the plants because water in the cells expands when it freezes and ruptures the cell walls. The cell walls give the leaf structure when filled with fluid. When the cell walls break the fluids escape, causing the leaf to become wet to the touch, as well as limp. (Imagine a stack of water balloons filled, then poke some holes in them, water drains out and limp balloons remain.) The vocabulary terms cell and cell wall do not have to be introduced to students. Help students to understand that just like the balloon, water is held in little "pockets" inside the plant. If the water expands it breaks the pockets and weakens the leaf.

Resources:

- Teacher background information

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: frozen, thaw

Back to Top of Page

ELABORATE (Applications / Extensions)

Activity Description:

- Students look at maps of the world showing Hawaii, Reunion and Connecticut found in the *Slideshow* (used in LS3).
- Students discuss the different types of weather in Connecticut.
    - Is the koa tree sensitive to freezing? Can we grow a koa tree in Connecticut?
    - Where do you think water will freeze on Earth?
- Prompt deeper student thinking by prompting:
    - What adaptations do plants have to prevent the weather in an area from damaging the plants?
    - Where on earth does water not freeze?
    - How could we grow a koa tree in connecticut?
    - If cold weather impacts plants, do you think hot weather impacts plants?
    - How do plants respond to hot weather?

Resources:

- Slideshow

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP:** *Engaging in Argument from Evidence*
- ❏ **DCI:** *ESS2.C: The Roles of Water in Earth's Surface Processes; PS1.B: Chemical Reactions*
- ❏ **CCC:** *Cause and Effect*

Summative Assessment Description(s)

- Help students to track their learning over the course of the unit with the *Summary Table*. The *Summary Table* should be completed at the end of each learning sequence.

Resources:

- Summary Table

Culminating Performance Task:

Back to Top of Page

- Students will create a *Final Explanatory Model*, with zoom out boxes, that describes why the koa can exist in both Hawaii and Reunion, a prediction of how the seed was able to travel to Reunion Island using evidence learned from seed dispersal and pollination sequences. Students should also explain why the koa does not grow in other regions such as Connecticut.

Resources:

- Final Explanatory Model

Additional Resources:

- G2 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Unit 3 - Beavers

The beaver is the largest rodent in North America. One of the most notable traits of this species, however, is not its size but its ability to transform its environment to suit itself. Most animals have at least some effect on the environment around them. Spiders weave webs to catch passing insects. Woodpeckers chip cavities in the trunks of trees to build their nests. But few animals (except for humans) have as much of an impact on their environment as the beaver does. In fact, a single family of beavers can in a matter of weeks turn a small, rushing stream into acres of deep, still, interconnected ponds, creating a wetland that would otherwise not exist.

Besides humans, beavers are the only species on earth that know how to construct dams. Scientists often refer to beavers as the engineers of the animal world. But unlike humans, who must be taught how to design and build dams, beavers know instinctively how to interweave sticks to create a strong and durable structure and how to seal a dam with mud to make it impermeable to water. They are born knowing how, just as birds know how to sing songs or build nests without ever having done so.

A beaver's work is critical to the survival of its family. The deep ponds that beaver dams create offer refuge from predators and from the freezing temperatures of winter. As long as a beaver dam is tall enough and the resulting pond deep enough, a family of beavers will have underwater access to food throughout the winter.

Perhaps more importantly, beaver dams and ponds provide habitat that wouldn't otherwise exist for many other species. Ducks, geese, herons, turtles, and frogs are just a few of the species that benefit from the deep and wide waterways that beavers create. Unfortunately, this is where the dam-building accomplishments of beavers and humans diverge. While small ponds constructed by humans can be just as beneficial as a beaver pond, huge dams, including the Hoover Dam, serve more often to flood vital habitat than to create it. Dams as large as this create incredibly deep reservoirs that lack the diversity and richness of the ecosystems created by beavers.

Throughout this unit, students explore the natural processes of weathering and erosion at the hands of beavers other natural phenomena including water and wind. Students will investigate these events through the lenses of both quick and slow change. Throughout the sequences, students will gain an understanding of how landforms and water features change as a result of beavers (water) and wind. Students will be exposed to photos, videos, and maps that illustrate these ideas. Students will experience the core ideas by investigating, constructing models, constructing explanations, and designing solutions.

Just as beavers engineer dams, so do humans. The function of a human designed dam is different from a beaver dam. A man-made dam is a barrier that stops or restricts the flow of water or underground streams. Reservoirs created by dams not only suppress floods but also provide water for activities such as irrigation, human consumption, industrial use, aquaculture, and navigability. Hydropower is often used in conjunction with dams to generate electricity. A dam can also be used to collect water or for storage of water which can be evenly distributed between locations. Dams generally serve the primary purpose of retaining water, while other structures such as floodgates or levees (also known as dikes) are used to manage or prevent water flow into specific land regions.

Beaver dams can reduce the effects of erosion along a stream bed or riverbed. Significant erosion occurs along ditches and water runways but there were some areas where erosion was minimal. Where there are beaver dams, the erosion is much less severe. Dams will form ponds about 2 meters deep. During the summer water evaporates and seeps out. This allows the subsequent heavy rainfall to be contained, filling the pond to overflow levels, keeping water on the land longer, slowing stream flow and reducing erosion. Without slowing fast waters from the spring melt or storms, excessive sedimentation, caused by erosion, can cover aquatic plants and wildlife living along the natural l water bodies or even fill in these areas and destroy adjoining wetlands. Beaver dams help maintain healthy ecosystems by reducing the effects of erosion and allowing plant species to thrive along river banks, therefore protecting against erosion even further.

Back to Top of Page

To access the flowchart for this unit, click here.

Suggested Pacing:
11-12 hrs

Anchoring Phenomenon/Design Problem:
Beavers - Nature's Engineers

Unit Driving Question:
How do beavers change the landscape?
How do we prevent wind or water from changing the land?

Culminating Performance Task:

- Students will create a map of Beaver Falls, which includes aspects from each of the learning sequences: beaver dam information, engineering content, landforms, erosion and map symbols.

NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements)

- 2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
  - [Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.]
  - [Assessment Boundary: Assessment does not include quantitative measurements of timescales.]
- 2-ESS2-1: Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.*
  - [Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.]
- 2-ESS2-2: Develop a model to represent the shapes and kinds of land and bodies of water in an area.
  - [Assessment Boundary: Assessment does not include quantitative scaling in models.]
- K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Three Dimensions that form the Foundation for these NGSS Performance Expectations:

Science & Engineering Practices:

Constructing Explanations and Designing Solutions

- Make observations from several sources to construct an evidence-based account for natural phenomena.
- Compare multiple solutions to a problem.

Developing and Using Models

- Develop a model to represent patterns in the natural world.

Analyzing and Interpreting Data

Disciplinary Core Ideas:

ESS1.C: The History of Planet Earth

- Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.

ESS2.A: Earth Materials and Systems

- Wind and water can change the shape of the land.

ESS2.B: Plate Tectonics and Large-Scale System Interactions

- Maps show where things are

Crosscutting Concepts:

Stability and Change

- Things may change slowly or rapidly.

Patterns

- Patterns in the natural world can be observed.

Back to Top of Page

• Analyze data from tests of an object or tool to determine if it works as intended.	located. One can map the shapes and kinds of land and water in any area. **ETS1.C: Optimizing the Design Solution** • Because there is always more than one possible solution to a problem, it is useful to compare and test designs. *(secondary)*	

Possible Common Core State Standards Connections:

ELA/Literacy —

- RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-ESS1-1)
- RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-ESS1-1)(2-ESS2-1)
- RI.2.9 Compare and contrast the most important points presented by two texts on the same topic. (2-ESS2-1)
- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (2-ESS1-1)(K-2-ETS1-3)
- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-ESS1-1)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-ESS1-1)(K-2-ETS1-3)
- SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. (2-ESS1-1)
- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (2-ESS2-2)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (2-ESS1-1) (2-ESS2-2)(K-2-ETS1-3)
- MP.4 Model with mathematics . (2-ESS1-1)(2-ESS2-2)(K-2-ETS1-3)
- MP.5 Use appropriate tools strategically. (2-ESS2-1)(K-2-ETS1-3)
- 2.NBT.A Understand place value. (2-ESS1-1)
- 2.NBT.A.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. (2-ESS2-2)
- 2.MD.B.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem. (2-ESS2-1)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-3)

PROGRESSION OF LEARNING

Learning Sequence 1

- **Learning Sequence Driving Question**
  - How do beavers change the landscape?
- Learning Sequence 1

Back to Top of Page

- **Relationship to Anchoring Phenomena/Design Problem**
  - This is the introduction to the anchoring phenomenon.
- **Student Expected Outcomes:**
  - Students will share their ideas about beavers and their homes and the impact of the species on the landscape.
  - Students will model their initial ideas about how beavers impact a forest or ecosystem (this is based on prior knowledge or experiences).
  - Students will generate questions about beavers and their role as ecosystem engineers.

Learning Sequence 2

- **Learning Sequence Driving Question**
  - Why do beavers need dams?
- Learning Sequence 2
- **Relationship to Anchoring Phenomena/Design Problem**
  - A beaver's work changes the land for their survival, but also has far reaching impacts on the surrounding environment.
- **Student Expected Outcomes:**
  - Students will explore the similarities (patterns) in human and beaver homes.
  - Students will make observations from several sources to identify the animals that benefit from beaver dam construction.

Learning Sequence 3

- **Learning Sequence Driving Questions**
  - What is an engineer? How are beavers nature's engineers?
- Learning Sequence 3
- **Relationship to Anchoring Phenomena/Design Problem**
  - Students compare and contrast the world's two main dam engineers: humans and beavers and the structures each builds.
- **Student Expected Outcomes:**
  - Students will identify the characteristics of an engineer.
  - Students will compare and contrast (patterns) beaver and human designed dams.
  - Students will make observations from a map showing the world's largest beaver dam and compare those observations to an aerial photo of the Hoover dam.

Learning Sequence 4

- **Learning Sequence Driving Question**
  - How do rivers and dams change the land? How quickly does this happen?
- Learning Sequence 4
- **Relationship to Anchoring Phenomena/Design Problem**
  - Beaver and human dams change the flow of water and the overall timeline of erosion.
- **Student Expected Outcomes:**
  - Students will investigate and observe erosion due to water.
  - Students will construct a model to explain how time and water impact the shape of the land.

Learning Sequence 5

- **Learning Sequence Driving Question**
  - What are the other ways that landforms can be created, besides erosion along river beds?
- Learning Sequence 5

Back to Top of Page

- **Relationship to Anchoring Phenomena/Design Problem**
  - Students will generate a map of Beaver Falls (a fictional location) and identify landforms and features relative to the region of a beaver dam. Students will map their ideas using mapping symbols and tools learned in the sequence.
- **Student Expected Outcome:**
  - Students will develop and use models to represent the patterns of land and water in an area.

Assessments:

- **Culminating Performance Task**
  - Students will make a map of a fictional location called Beaver Falls. Let students know that their map must include the following:
    - beaver dam
    - variety of landforms and types of water bodies (relevant to the area - as beavers created wetlands, a desert is probably not applicable and should not be included). Each landform should have an explanatory feature:
      - The _____ is near the _____ because_____
    - other explanatory features describing how the landscape has changed relative to the beaver dam.
    - a key
  - Students Gallery Walk with Post-its to add comments to each of their peer's maps. Revise maps as needed based on peer feedback.
  - *Resources*
  - Gotta Have It Checklist

- Grade 2 Performance Expectation Rubrics and Prompts
- Elementary Assessment Resource

Additional Resources:

- G2 Unit Materials List
  - Click on specific tab for unit-specific materials
- EPIC! Digital Library - G2 U3 List
  - Includes ebooks and videos
  - Must have an educator user account for free access
- Teacher Resources
  - Video on beavers for greater background content.
  - *Background content adapted from PBS Learning Media*
  - Beavers

Back to Top of Page

Learning Sequence 1

Brief Description:
Students will model their understanding of beavers and predict how they impact the landscape.

Suggested Pacing:
0.75 - 1.25 hrs

Lesson-Level Phenomenon/Design Problem:
Beaver Slideshow and Corresponding Discussion

Relationship to Anchoring Phenomena/Design Problem:
This is the introduction to the anchoring phenomenon.

Learning Sequence Driving Question:
How do beavers change the landscape?

Student Expected Outcomes:

- Students will share their ideas about beavers and their homes and the impact of the species on the landscape.
- Students will model their initial ideas about how beavers impact a forest or ecosystem (this is based on prior knowledge or experiences).
- Students will generate questions about beavers and their role as ecosystem engineers.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Developing and Using Models ● Develop a model to represent patterns in the natural world.	**ESS2.B: Plate Tectonics and Large-Scale System Interactions** ● Maps show where things are located. One can map the shapes and kinds of land and water in any area.	**Patterns** ● Patterns in the natural world can be observed.

Related Performance Expectation(s) in this Unit:

- 2-ESS2-2: Develop a model to represent the shapes and kinds of land and bodies of water in an area.
  - [Assessment Boundary: Assessment does not include quantitative scaling in models.]

Possible Common Core State Standards Connections:

ELA/Literacy —

- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (2-ESS2-2)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (2-ESS1-1) (2-ESS2-2)(K-2-ETS1-3)
- MP.4 Model with mathematics. (2-ESS1-1)(2-ESS2-2)(K-2-ETS1-3)
- MP.5 Use appropriate tools strategically. (2-ESS2-1)(K-2-ETS1-3)

Back to Top of Page

- 2.NBT.A.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. (2-ESS2-2)

Prior Student Knowledge:
K.ETS1.A

Possible Preconceptions/Misconceptions:
- Land always stays the same
- Water can't move something heavy, such as sand or rock

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)
Activity Description:
- Students share what they know about beavers.
- As a class, students create an anchor chart of their initial ideas about beavers (using Slide #1 to prompt ideas).
- Scaffold the discussion to include ideas about beaver homes (using Slide #2 to prompt ideas).
    - Beavers engineer their homes just like students did for the 4th Little Pig.

Resources:
- Slideshow

Teacher Action(s):
- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):
- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)
Activity Description:
- As a class, students discuss Slides #3 and #4 from the *Slideshow* to predict how the beaver will change the forest.
- Students work in small groups to draw an initial model of how beavers change forests or landscapes
    - Provide students with a print out of Slide #5. These can be printed on 11x17 paper.
- Students share their ideas with the whole class.
- Class completes an I Notice/I Wonder chart from Slide #6 based on their observations and shared ideas.

Resources:
- Slideshow

Teacher Action(s):
- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact

Back to Top of Page

- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

Additional Resources:

- G2 Unit Materials List
    - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 2

Brief Description:
Students draw a picture of their home and label the parts of their home that help them live, grow and survive. Students compare the parts of their home to the parts of a beaver complex including the beaver pond, dam, lodge and food cache. Students also research/investigate how the beaver's complex can become home to many other living things.

Suggested Pacing:
2 - 2.5 hrs

Lesson-Level Phenomenon/Design Problem:
My house-students describe how their homes protect them and provide what they need to live,grow, and survive.

Relationship to Anchoring Phenomena/Design Problem:
A beaver's work changes the land for their survival, but also has far reaching impacts on the surrounding environment.

Learning Sequence Driving Question:
Why do beavers need dams?

Student Expected Outcomes:
- Students will explore the similarities (patterns) in human and beaver homes.
- Students will make observations from several sources to identify the animals that benefit from beaver dam construction.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Constructing Explanations and Designing Solutions ● Make observations from several sources to construct an evidence-based account for natural phenomena.	**ESS1.C: The History of Planet Earth** ● Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.	**Patterns** ● Patterns in the natural world can be observed.

Related Performance Expectation(s) in this Unit:
- 2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
  - [Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.]
  - [Assessment Boundary: Assessment does not include quantitative measurements of timescales.

Possible Common Core State Standards Connections:

ELA/Literacy —

Back to Top of Page

- RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-ESS1-1)
- RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-ESS1-1)
- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (2-ESS1-1)
- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-ESS1-1)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-ESS1-1)
- SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. (2-ESS1-1)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (2-ESS1-1)
- MP.4 Model with mathematics. (2-ESS1-1)
- 2.NBT.A Understand place value. (2-ESS1-1)

Prior Student Knowledge:

N/A

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Students draw a picture of their house.
  - Prompt students to label the parts of the house that help them/their family to live, grow, and survive (this connects to the Koa seed unit).
  - Help students think deeper by prompting them to include their ideas about how their house protects them from weather, helps the family remain safe from predators/unsafe situations, stores food, provides access to water, etc.
- Students share their ideas with the class about what a home offers to help people live, grow, and survive.

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

- Prompt students to share their ideas about why beavers build dams.
  - How does the dam help the beaver get what it needs for survival?
  - How does the dam protect the beaver from predators?

Back to Top of Page

- Students work in small groups to label the beaver dam and lodge in the *Beaver Model*
    - Students label the beaver's home with similar titles to those found within their homes (i.e., kitchen-food storage, walls and roof-shelter from weather, etc.).
- Students discuss how the beaver's home is similar to their home. Students refer back to their Engage pictures.
    - What are the different parts of a beaver's complex ?
    - What do you think each part of the complex is similar to a human home?
    - Record your ideas.

Resources:

- Beaver Model
- Beaver's complex (resource for teacher)

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Read the text *Beavers* by Gail Gibbons (please note that this text was a potential reading in Kindergarten-Unit 1). As the students engage with the text, have them pay attention to the structures and to listen carefully about how that structure helps the beaver live, grow and survive.
    - Show pages 8-9 in *The Beaver's Lodge: Building with Leftovers* by Adam Reingold
- Refer back to the image from the Exploration activity. As a class, identify the structures and how those structures help the beaver grow and survive.
    - Add ideas that relate the portions of the beaver complex to the parts of our homes. Identifying these similarities and patterns will help students better retain the importance of each of the structures in the beaver's complex.

Resources:

- Beavers by Gail Gibbons (available on epic! Books)
- The Beaver's Lodge: Building with Leftovers by Adam Reingold on epic! Books

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Back to Top of Page

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: lodge, dam, beaver, food cache, beaver pond, lodge floor, walls, roof, air vent, tunnel, plunge holes, wetland

ELABORATE (Applications / Extensions)

Activity Description:

- Teacher Background Information: Beavers, as nature's engineers, are responsible for the creation of beaver ponds and wetlands. Beavers are a keystone species, meaning that the ecosystems would not be the same without them. The ecosystem is dependent on the species for maintaining ecosystem sustainability. These wetlands are home to a variety of species, such as muskrats, deer, geese, frogs, bears, wood ducks, raccoons, birds, and porcupines. Just as beavers and humans need homes to provide shelter, food, water and protection, so do other animals in the beaver pond ecosystem (see page 8 and 9 in Gibbons Beaver book).
- Students work in small groups to access epic! Books to find *Beavers* by Gail Gibbons or other books on beavers
- Groups generate a list of animals that live in the beaver pond and wetland area.
    - Connect to Koa Tree Unit - LS4.D: There are many different kinds of living things in any area, and they exist in different places on land and in water
- Students complete either slide #2 or #3 in the *CER Slideshow* then share their ideas with the class and as they are sharing, complete slides #4 and #5 together.
    - Ask the students to share their claims, evidence and reasoning with the class.
    - As the students present their ideas, add pictures of animals that students deem a part of the beaver pond ecosystem to a large anchor chart/slideshow.

Resources:

- Beavers by Gail Gibbons (available on epic! Books)
- CER Slideshow
- Watchable Wildlife (additional resource, if needed)

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments

Back to Top of Page

- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP:** Constructing Explanations and Designing Solutions
- ❏ **DCI:** *ESS1.C: The History of Planet Earth*
- ❏ **CCC:** *Patterns*

Summative Assessment Description(s)

- Student claims generated in the Elaborate activity.

Additional Resources:

- G2 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 3

Brief Description:
Students identify the characteristics of the engineering design process and use those characteristics to make a claim (supported by evidence) as to whether or not a beaver is an engineer. Students engage in a small engineering design project and explore human-designed dams and beaver-designed dams.

Suggested Pacing:
3 - 3.5 hrs

Lesson-Level Phenomenon/Design Problem:
Agree-Disagree Line - Is a beaver an engineer?

Relationship to Anchoring Phenomena/Design Problem:
Students compare and contrast the world's two main dam engineers: humans and beavers and the structures each builds.

Learning Sequence Driving Questions:
What is an engineer? How are beavers nature's engineers?

Student Expected Outcomes:

- Students will identify the characteristics of an engineer.
- Students will compare and contrast(patterns) beaver and human designed dams.
- Students will make observations from a map showing the world's largest beaver dam and compare those observations to an aerial photo of the Hoover dam.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Constructing Explanations and Designing Solutions • Make observations from several sources to construct an evidence-based account for natural phenomena. **Analyzing and Interpreting Data** • Analyze data from tests of an object or tool to determine if it works as intended.	**ESS1.C: The History of Planet Earth** • Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe **ESS2.A: Earth Materials and Systems** • Wind and water can change the shape of the land. **ESS2.B: Plate Tectonics and Large-Scale System Interactions** • Maps show where things are located. One can map the shapes and kinds of land and water in any area.	**Stability and Change** • Things may change slowly or rapidly. **Patterns** • Patterns in the natural world can be observed.

Back to Top of Page

	ETS1.C: Optimizing the Design Solution ● Because there is always more than one possible solution to a problem, it is useful to compare and test designs. *(secondary)*	

Related Performance Expectation(s) in this Unit:

- 2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
  - [Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.]
  - [Assessment Boundary: Assessment does not include quantitative measurements of timescales.
- 2-ESS2-1: Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.*
  - [Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.]
- K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Possible Common Core State Standards Connections:

ELA/Literacy —

- RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-ESS1-1)
- RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-ESS1-1)
- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (2-ESS1-1)
- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-ESS1-1)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-ESS1-1)
- SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. (2-ESS1-1)
- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (2-ESS2-2)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (2-ESS1-1) (2-ESS2-2)(K-2-ETS1-3)
- MP.4 Model with mathematics. (2-ESS1-1)(2-ESS2-2)(K-2-ETS1-3)
- 2.NBT.A.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. (2-ESS2-2)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-3)

Back to Top of Page

Prior Student Knowledge:
N/A

Possible Preconceptions/Misconceptions:
- Water does not destroy objects.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)
Activity Description:
- Use the Agree-Disagree Line strategy to prompt student thinking by posting the *Agree Disagree Claims* on either side of the room.
    - Ask students to stand near the sign that best matches their ideas. If students have a different idea, have them stand wherever it best fits between the two signs.
    - Have the students in the different regions of the room discuss why they agree with the posted statement, or to discuss their ideas if they don't agree with either statement.
    - Students must use reasoning to back up their ideas.
- Ask each student group to share out the major points of their discussion. What was their reasoning for selecting the claim?
    - Make sure the discussion leads students to develop questions about the role of an engineer.
    - Students may think that an engineer needs tools to make or design something. This will be a common misconception. Do not fix the misconception at this point, wait until the explain phase to help students understand that the beaver does have tools that allow it to build and design. The beaver's tools are his tail, teeth, strength and overall body structure.

Resources:
- Agree Disagree Claims
- Agree-Disagree Line strategy

Teacher Action(s):
- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):
- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)
Activity Description:
Students will design and test ways to slow or stop water from moving through a river bed.
- Provide students with the *Engineering a Dam Worksheet*.
- Students work in small cooperative groups to design a LEGO river bed.
    - Students explore their river's water flow by placing their base plate on an incline inside a sink or plastic tray.
    - Students gently pour water down their LEGO designs to observe the water flow through the river bed.
- Once students have generated a working LEGO river, prompt the students to design a way to slow or stop the flow of water down the river bed using LEGO blocks similar to what a beaver does.
    - Students record their ideas FIRST on the worksheet, then decide which to construct and test.

Back to Top of Page

- Once students have constructed the dam, they should once again observe how water flows through the system. Did the water flow stop or slow at the location of the "dam"? Ask the students to describe if their river dams worked and to provide evidence for their claims.
- Allow student groups to share their designs with the class and to describe the aspects of their designs that worked and the ways that they could improve their designs to make them better in the future.
  - Optional: If time allows, students can redesign their dams based on the information they discussed and retest their new designs.
- Students share their ideas about whether or not they were acting as engineers throughout the exploration.

Resources:

- Engineering a Dam Worksheet

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

Activity #1: Define the term engineer for the students.

- Use Slide #1 from the *Explain Slideshow* to create an anchor chart with the students to represent the roles of an engineer and the engineering cycle.
  - Solicit student ideas and represent them on the anchor chart.
    - Ideas could include:
      - Solves problems
      - Explores ideas
      - Listens
      - Makes things
      - Creates
      - Makes a plan
      - Improves the plan
      - Thinks and imagines
      - Asks questions
      - Never gives up
- Show Slide #2 from the *Explain Slideshow* and ask students to think about their list of characteristics they used to define an engineer.
  - Make revisions to the anchor chart based on student discussion around the engineering design cycle.
  - Read a text about engineering from the Resources listed below.
  - Students have already engaged in some engineering design with Unit 1, much of this conversation should be recapping their experiences.

Back to Top of Page

Resources Activity #1:

- Explain Slideshow
- Possible text ideas:
  - How Engineers Find Solutions by Robin Johnson on epic! Books
  - I'll Be An Engineer by Connie Colwell Miller on epic! Books
  - *What do you do with an idea?* or *Engineering: Feats and Failures*

Activity #2: Comparing beaver dam design to human dam design

- Show Slides #3 and #4 from the *Explain Slideshow.*
- Ask the students to discuss the facts about the largest beaver dam and the Hoover Dam listed on the slides.
  - Do any of these facts surprise you? Why?
  - Discuss the timeline for the beaver dam (work in progress for over 40 years) and Hoover Dam (completed in 5 years). How do these timelines compare to other Earth event timelines (i.e., earthquakes, volcanic eruptions, floods)?
    - ESS1.C: The History of Planet Earth Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.
  - Show Slide #5 so that the students can locate the two dams and Connecticut on the map.
    - Note where land and water are on the map.
- Read a text about engineering from the Resources listed below.
- Show the videos for the construction of the Hoover Dam and the beaver dam on Slides #6 and #7 of the *Explain Slideshow*.
  - Ask students to share their ideas about how the engineering design process may be embedded in both beaver and human action in developing and extending dams.
  - Ask students to identify patterns in the behaviors or designs for both the human-made and beaver made dams. Patterns may be similarities and differences.
    - What problems do beavers solve by creating a dam?
    - What problems do humans solve by creating a dam?
    - Are these problems the same or different?
- As a class, complete the *Beaver Dam and Human Dam Double Bubble Thinking Map*.

Resources Activity #2:

- Explain Slideshow
- Possible text ideas:
  - A Dam Holds Back by Crystal Sikkens on epic! Books
  - *How Did They Build That? Dam*
  - The Science of Dams
- Beaver Dam and Human Dam Double Bubble Thinking Map
- Teacher Information-World's largest beaver dam

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers

Back to Top of Page

- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: engineer, design, construct

ELABORATE (Applications / Extensions)

Activity Description:

Reassessing previous claims

- Ask students to reassess their previous claim using Slide #9 or #10 from the *Explain Slideshow*.
  - Students should use scientific evidence to support their ideas.
- As students work, post:
  - The "What is an engineer" Anchor Chart?
  - The Engineering Design Cycle
  - Graphic Organizer comparing a beaver dam to the Hoover Dam

Resources:

- Explain Slideshow

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP:** Constructing Explanations and Designing Solutions; *Developing and Using Models; Analyzing and Interpreting Data*
- ❏ **DCI:** *ESS1.C: The History of Planet Earth; ESS2.A: Earth Materials and Systems; ESS2.B: Plate Tectonics and Large-Scale System Interactions; ETS1.C: Optimizing the Design Solution*
- ❏ **CCC:** *Stability and Change; Patterns*

Summative Assessment Description(s)

- Elaborate activity-Student claims, using evidence, are beavers engineers?

Additional Resources:

- G2 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Back to Top of Page

Learning Sequence 4

Brief Description:
Students compare changes in the land caused by water running through undammed rivers and dammed rivers.

Suggested Pacing:
3 - 3.5 hrs

Lesson-Level Phenomenon/Design Problem:
River Simulation Video

Relationship to Anchoring Phenomena/Design Problem:
Beaver and human dams change the flow of water and the overall timeline of erosion.

Learning Sequence Driving Question:
How do rivers and dams change the land? How quickly does this happen?

Student Expected Outcomes:

- Students will investigate and observe erosion due to water.
- Students will construct a model to explain how time and water impact the shape of the land.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Constructing Explanations and Designing Solutions • Make observations from several sources to construct an evidence-based account for natural phenomena. • Compare multiple solutions to a problem. **Developing and Using Models** • Develop a model to represent patterns in the natural world. **Analyzing and Interpreting Data** • Analyze data from tests of an object or tool to determine if it works as intended.	**ESS1.C: The History of Planet Earth** • Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. **ESS2.A: Earth Materials and Systems** • Wind and water can change the shape of the land. **ETS1.C: Optimizing the Design Solution** • Because there is always more than one possible solution to a problem, it is useful to compare and test designs.	**Stability and Change** • Things may change slowly or rapidly.

Related Performance Expectation(s) in this Unit:

- 2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly.

Back to Top of Page

- [Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.]
- [Assessment Boundary: Assessment does not include quantitative measurements of timescales.]

- 2-ESS2-1: Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.*
  - [Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.]
- 2-ESS2-2: Develop a model to represent the shapes and kinds of land and bodies of water in an area.
  - [Assessment Boundary: Assessment does not include quantitative scaling in models.]
- K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Possible Common Core State Standards Connections:

ELA/Literacy —

- RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-ESS1-1)
- RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-ESS1-1)
- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (2-ESS1-1)
- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-ESS1-1)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-ESS1-1)
- SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. (2-ESS1-1)
- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (2-ESS2-2)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (2-ESS1-1) (2-ESS2-2)(K-2-ETS1-3)
- MP.4 Model with mathematics. (2-ESS1-1)(2-ESS2-2)(K-2-ETS1-3)
- 2.NBT.A.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. (2-ESS2-2)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-3)

Prior Student Knowledge:

N/A

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Show students the *Simulation of a Flowing River*.
- Ask students to record observations on the I Notice side of an *I Notice, I Wonder Chart*.
- Students work with a peer to devise questions about the simulation.
- Students share their questions with the class.

Back to Top of Page

- Post questions pertaining to differences in flow of water, changes in river bed shape, depth of the river, width of the river, etc.

Resources:
- Simulation of a Flowing River
- I notice, I wonder chart

Teacher Action(s):
- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):
- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)
EXPLAIN (Concepts Explained / Vocabulary Defined)

Safety Note: Students MUST wear goggles while working with sand and stream tables.

Explore Activity #1:
- Students explore the effects of water on a river bank by conducting an investigation to collect data about the changes to a river. Set up a tub filled with sand (moist) pressed to one side of the tray.
  - Provide students with plastic water bottles and droppers. Ask students to use their fingers to carve a river bed into the sand.
  - Have students measure the width of the river (use measuring tools consistent with current math practices) before water runs through it and after the water runs through it on Slide #1 of the *Observation Sheet*. You may want to take some pictures to help students recall the results or make comparisons in a later lesson.
  - Students run water down the river bed using the bottle or dropper.
  - Students record their observations on Slide #1 of the *Observation Sheet* and, on the class data table on Slide #2, fill in the No Dam table with their groups measurements.
  - As a class, discuss how the water changed the shape of the land and use evidence (measurements) to support ideas.

Explain Activity #1:
- Read the *Rivers* by Rebecca Pettiford on epic! Books
- Compare the features from the book to those created in the Explore Activity.
  - Reinforce how water widens the river bed, carries sediment away and changes the overall appearance of the land.

Resources for Explore/Explain #1:
- Observation sheet
- Rivers by Rebecca Pettiford on epic! Books

Explore Activity #2:
- Ask students what can be used to reduce or prevent water's erosional impacts on the land. (Be sure to prompt them to include a dam.)
- Ask students to share their predictions about how a dam would affect erosion caused by the river.

Back to Top of Page

    - Make sure that students provide reasoning for their predictions.
- Drain and smooth the sand in the tubs and have the students repeat the initial exploration investigation except this time provide students with a variety of dam making materials such as craft sticks, pebbles, twigs, legos, rocks, moss, etc. (You may want to take some pictures to help students recall the results or make comparisons.)
    - Students once again trace a river bed in the sand
    - Students choose a location for their dam and select appropriate materials for their design.
    - Students build a dam.
    - Ask students to measure the width of the river bed above and below the dam and record their data on Slide #3 of the *Observation Sheet.*
    - Students run water through the river bed using the same technique they used in Activity #1.
    - Students measure above and below the dam after the water runs through it, and they record their data on the Slide #3 of the *Observation Sheet* and, on the class data table on Slide #4, fill in the Dam table with their group measurements.

Explain Activity #2:

- Class discusses and uses evidence (measurements) to support ideas.
    - How did the depth and width of the river change when the dam was added?
    - Use the data collected from the Explore phases to compare the effects of erosion downstream in both scenarios (with and without a dam).
- Post photos taken from both explorations.
- Prompt students to share their ideas about what happened:
    - Which stream/river changed the most downstream?
    - What was the reason for the change?
    - What types of events may make the erosion take place faster?
    - How did the addition of a dam change the shape of the river downstream?
    - Was the change as drastic as previous investigations?
    - Why is the level of erosion less downstream?
    - What about changes upstream from the dam?
    - Teacher Information: In nature, beaver dams raise the water table alongside a stream, aiding the growth of trees and plants that stabilize the banks and prevent erosion. They improve fish and wildlife habitat and promote new, rich soil.
- Ask students to think about the images on the *Dam Changes the System Slide*.
    - What did they notice about the amount of water at the top of the dam, compared to below the dam, how do the living things change?
    - How can living things prevent erosion?
    - Record student thinking.

Resources for Explore/Explain#2:

- Observation sheet
- Dam Changes the System Slide

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students
- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

Back to Top of Page

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement
- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: erosion, land forms, river, stream, sediment, riverbank

ELABORATE (Applications / Extensions)

Activity Description :

- Students use the *Explanatory Model Organizer* to describe the outcomes related to the construction of a dam.
    - Have them consider previous lessons as they develop these models.
    - You can prompt student thinking by posting a "gotta have it" list (for example the damn, change in the river, change in vegetation, change in animal life) for the models. See the teacher resource component to gauge student prompts.
    - Make sure students embed the concept of time in their models. They will need to define the length of time in which these changes occur as a part of their explanatory model.
    - Teacher notes:
        - You may want to do this as a whole class activity to prompt student thinking.
        - Students will be making another map model of a beaver impacted area in the next learning sequence. Do not spend too much time on this Elaborate model because it is a stepping stone/draft for the next learning sequence.

Resources:

- Explanatory Model Organizer

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

Elaborate Further / Reflect / Enrichment:

Safety Note: Students MUST wear goggles while working with sand and stream tables.

Activity Description:

Back to Top of Page

- As a class discuss what other elements can change the shape of the land - be sure to include wind.
- What effect does wind have on sand? (Demonstration or class exploration)
    - Spread a cup of sand in a plastic tub or shoebox.
    - With a rolled up piece of paper (to mimic a straw) blow 5 puffs of air to represent the wind.
    - Discuss with the class the movement of the sand and how the surface changed.
- Read pages 4-11 in *How Do Wind and Water Change Earth* by Natalie Hyde on epic! Books
- Ask students to compare water erosion to wind erosion and the methods used to prevent both.

Resources:

- How Do Wind and Water Change Earth by Natalie Hyde on epic! Books (pages 4-11)
- Optional Reading: Wind and Water At Work: A Book About Change by Thomas Sheehan on epic! Books (pages 14-18)
- Teacher Demonstration Information: Wind Erosion Experiment

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP:** Constructing Explanations and Designing Solutions; *Developing and Using Models; Analyzing and Interpreting Data*
- ❏ **DCI:** *ESS1.C: The History of Planet Earth; ESS2.A: Earth Materials and Systems; ETS1.C: Optimizing the Design Solution*
- ❏ **CCC:** *Stability and Change*

Summative Assessment Description(s)

- Student models constructed in Elaborate.

Additional Resources:

- G2 Unit Materials List
    - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 5

Brief Description:
In this learning sequence, students will be figuring out other ways that landforms are created besides erosion along river beds.

Suggested Pacing:
1.5 - 2 hrs for 5Es
0.75 - 1.25 hrs for Culminating Performance Task

Lesson-Level Phenomenon/Design Problem:
Landform sorting activity

Relationship to Anchoring Phenomena/Design Problem:
Students will generate a map of Beaver Falls (a fictional location) and identify landforms and features relative to the region of a beaver dam. Students will map their ideas using mapping symbols and tools learned in the sequence.

Learning Sequence Driving Question:
What are the other ways that landforms can be created, besides erosion along river beds?

Student Expected Outcome:
- Students will develop and use models to represent the patterns of land and water in an area.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Developing and Using Models • Develop a model to represent patterns in the natural world. (2-ESS2-2)	**ESS1.C: The History of Planet Earth** • Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. **ESS2.A: Earth Materials and Systems** • Wind and water can change the shape of the land. **ESS2.B: Plate Tectonics and Large-Scale System Interactions** • Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2)	**Patterns** • Patterns in the natural world can be observed. (2-ESS2-2),(2-ESS2-3)

Back to Top of Page

Related Performance Expectation(s) in this Unit:

- 2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
  - [Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.]
  - [Assessment Boundary: Assessment does not include quantitative measurements of timescales.]
- 2-ESS2-2 Develop a model to represent the shapes and kinds of land and bodies of water in an area.
  - [Assessment Boundary: Assessment does not include quantitative scaling in models.]

Possible Common Core State Standards Connections:

ELA/Literacy —

- RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-ESS1-1)
- RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-ESS1-1)(2-ESS2-1)
- RI.2.9 Compare and contrast the most important points presented by two texts on the same topic. (2-ESS2-1)
- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (2-ESS1-1)(K-2-ETS1-3)
- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-ESS1-1)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-ESS1-1)(K-2-ETS1-3)
- SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. (2-ESS1-1)
- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (2-ESS2-2)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (2-ESS1-1) (2-ESS2-2)(K-2-ETS1-3)
- MP.4 Model with mathematics. (2-ESS1-1)(2-ESS2-2)(K-2-ETS1-3)
- MP.5 Use appropriate tools strategically. (2-ESS2-1)(K-2-ETS1-3)
- 2.NBT.A Understand place value. (2-ESS1-1)
- 2.NBT.A.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. (2-ESS2-2)
- 2.MD.B.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem. (2-ESS2-1)

Prior Student Knowledge:

K.ETS1.A

Possible Preconceptions/Misconceptions:

Any landform can be found anywhere.
Landforms always stay the same.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

Back to Top of Page

- Class views and discusses the Slide #1 of the *Pirate Map Slideshow.*

Resources:

- Pirate Map Slideshow

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- Ask students to work in small cooperative groups to match the landform pictures with the correct descriptions from the *Bodies of Water and Landforms Handout*. DO NOT paste or tape them down. As the students work elicit their ideas as to which landforms were created as a result of moving water, much like the erosion of a river bead or system. Record their ideas.

Resources:

- Bodies of Water and Landforms Handout

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

- Have the students keep their *Bodies of Water and Landforms Handout* in front of them.
    - Read L*ooking at Landforms* by Ellen Mitten on epic! Books. As you read, collect student ideas relative to each of the landforms.
    - Discuss the landforms and bodies of water not mentioned in the book.
    - Allow students to revise their landform description cards and glue when consensus about placement is decided.
- Using Slide #1 of the *Pirate Map Slideshow,* discuss where on those maps the various Explore landforms could be found.

Back to Top of Page

- Maps often include keys to help readers identify water and landforms. Ask students to work with their peers to create a key for Slide #2 of the *Pirate Map Slideshow*.

Resources:

- Bodies of Water and Landforms Handout
- Looking at Landforms by Ellen Mitten on epic! Books
- Pirate Map Slideshow

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: landform, map, key

ELABORATE (Applications / Extensions)

Activity Description:

- Read *Earth's Changing Surface* by Conrad J. Storad on epic! Books.
- As a class, discuss how each of the Earth events/landforms in the book would be either a slow change or a quick change using the Slide #1 of the *Elaborate Slideshow*.
- As a class discuss where beaver dams would fit into this classification.
- As a class, discuss where dams made by humans would fit into this classification.
    - Teacher Note: There can be a case made for either slow or quick change for the beaver and human dams. There is no wrong answer.

Resources:

- Earth's Changing Surface by Conrad J. Storad on epic! Books
- Elaborate Slideshow

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

Back to Top of Page

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ **SEP:** *Developing and Using Models*
- ❏ **DCI:** *ESS1.C: The History of Planet Earth; ESS2.A: Earth Materials and Systems; ESS2.B: Plate Tectonics and Large-Scale System Interactions*
- ❏ **CCC:** *Patterns*

Culminating Performance Task:

- Students will make a map of a fictional location called Beaver Falls. Let students know that their map must include the following:
  - beaver dam
  - variety of landforms and types of water bodies (relevant to the area - as beavers created wetlands, a desert is probably not applicable and should not be included). Each landform should have an explanatory feature:
    - The _____ is near the _____ because_____
    - The beaver dam changed the landscape by _____.
  - a key
- Students Gallery Walk with Post-its to add comments to each of their peer's maps. Revise maps as needed based on peer feedback.

Resources:

- Gotta Have It Checklist

Additional Resources:

- G2 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only _____ **Board Meeting Date** March 24, 2022

Decision Requested X **Agenda Code** 11 d.

AGENDA REPORTING FORM

Agenda Topic: Out of State: Approval of Out of State Field Trip

Summary of Issue: The Board of Education must give approval for field trips that are over 200 miles in distance from Southington, trips to foreign countries, or overnight field trips. Presented here is the following trip:

- FES- 5th Grade – Roger Williams Zoo – Providence, RI
  April 29, 2022

Background: N/A

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** _____

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: Move that the Board of Education approve the field trip request as presented by the administration.

Titles of Attachments:
1. Field Trip Application

Frank Ryan
Signature of Staff Member Submitting Report

Peter Madarasz
Signature of Superintendent of Schools

Flanders Elementary School
Mrs. Bowen & Mrs. Padroff - 5th Grade

Roger Williams Zoo – Providence, RI

April 29, 2022

R-6153

Southington Public Schools
Southington, Connecticut

Application for Out-of-State/In-State/Overnight Field Trip

Submit to Assistant Superintendent

Date: 3.1.22

Out of State: Yes ☑ No ☐

Overnight: Yes ☐ No ☑

Miles Round Trip: (108) per 216 RT

Flanders Elementary (School) | Mrs. Bowen + Mrs. Padroff 5th (Class/Group) | 4/29/22 (Date of Trip)

Name and Address of Destination Roger Williams Zoo 1000 Elmwood Ave Providence RI 02907

Reasons for Field Trip Early Field Trip - Curriculum based from ELA Unit - Should there be zoo's

Itinerary (attach if needed)

Departure Date/Time 4/29/22 8:15 a.m **Return Date/Time** 4/29/22 4:15 p.m

# of Students 44 **# of Teacher/Chaperones** 5 **# of Buses** 1

Have definite arrangements been made at the field trip destination? ☐ Yes ☑ No

☐ **Have met with nurse to address student health needs.**
Nurse's Signature _____ *Date* _____

☑ **Have NOT met with the nurse. Will meet with the nurse to address student health needs when the student roster is complete. This meeting will take place approximately one-month prior to the scheduled trip.**

Destination is handicap accessible: Yes ☑ No ☐ **Lift Van Needed?** Yes ☐ No ☑

****

COST AND FINANCING

Source of Funds	Totals	Additional Notes
TOTAL Anticipated Cost of Trip	$ 1,596.11	(Bus 1,052.11) (11.95×44, 17.95×1)
Board of Education Contribution	$ —	
Other PTO $20 per Kid	$ 880.00	
Fundraising Activity	($)	
BALANCE	$ 716.11	
Student Contribution		
Transportation	$ 716.11	Students @ $ 17.00
Entrance Fees, Room & Board	$	Students @ $
TOTAL Cost of Trip to Each Student	$ $17.00	

SIGNATURES

Teacher Kim Padroff (5th grade teacher) **Date** 3/2/22

Dept. Head _____ **Date** _____

Principal Mike Guerrette **Date** 3/8/2022

Comments _____

Assistant Superintendent Frank Lipe **Date** 3/15/22 **Approved** ☑ Pending COVID Restrictions **Not Approved** ☐

Board of Education Approval* YES☐ NO☐ **Date** _____

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only _____ Board Meeting Date March 24, 2022

Decision Requested **X** Agenda Code 11 e. & 11 f.

AGENDA REPORTING FORM

Agenda Topic: 2022-2023 Healthy Food Certification – 2022-23 Food and Beverage Exemption

Summary of Issue: Section 10-215f of the Connecticut General Statutes requires that all districts must take action to certify whether all food items sold to students separately from reimbursable meals will or will not meet CSDE's Connecticut Nutrition Standards. For the 2022-2023 school year, the state requires the HFC statement to be part of the CSDE's online. Application and Claiming System for Child Nutrition Programs. The Board of Education must vote at a Board meeting whether to implement the healthy food option or not by June 30, 2022and the Board meeting minutes are uploaded on the HFC application module.

Background: The Board of Education has participated in the Healthy Food Certification Program since the 2014-2015 school year.

Alternative Strategies: To participate in the program.

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: July 1, 2022

Ending Date of Program or Project: June 30, 2023

Recommendation or Comment: (Two motions needed)

1) Pursuant to C.G.S. Section 10-215f, the Board of Education or governing authority certifies that all food items offered for sale to students in the schools under its jurisdiction, and not exempted from the Connecticut Nutrition Standards published by the Connecticut State Department of Education, will comply with the Connecticut Nutrition Standards during the period of July 1, 2022, through June 30, 2023. This certification shall include all food offered for sale to students separately from reimbursable meals at all times and from all sources, including but not limited to school stores, vending machines, school cafeterias, culinary programs, and any fundraising activities on school premises sponsored by the school or non-school organizations and groups.

2) The Board of Education or governing authority will allow the sale to students of food items that do not meet the Connecticut Nutrition Standards and beverages not listed in Section 10-221q of the Connecticut General Statutes provided that the following conditions are met: 1) the sale is in connection with an event occurring after the end of the regular school day or on the weekend; 2) the sale is at the location of the event; and 3) the food and beverage items are not sold from a vending machine or school store. An "event" is an occurrence that involves more than just a regularly scheduled practice, meeting, or extracurricular activity. For example, soccer games, school plays, and interscholastic debates are events but soccer practices, play rehearsals, and debate team meetings are not. The "regular school day" is the period from midnight before to 30 minutes after the end of the official school day. "Location" means where the event is being held and must be the same place as the food and beverage sales.

Jennifer Mellott
Signature of Staff Member Submitting Report

Steven Madaras
Signature of Superintendent of Schools

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only _____ Board Meeting Date March 24, 2022

Decision Requested **X** Agenda Code 11 e. & 11 f.

AGENDA REPORTING FORM

Agenda Topic: 2022-2023 Healthy Food Certification – 2022-23 Food and Beverage Exemption

Summary of Issue: Section 10-215f of the Connecticut General Statutes requires that all districts must take action to certify whether all food items sold to students separately from reimbursable meals will or will not meet CSDE's Connecticut Nutrition Standards. For the 2022-2023 school year, the state requires the HFC statement to be part of the CSDE's online. Application and Claiming System for Child Nutrition Programs. The Board of Education must vote at a Board meeting whether to implement the healthy food option or not by June 30, 2022and the Board meeting minutes are uploaded on the HFC application module.

Background: The Board of Education has participated in the Healthy Food Certification Program since the 2014-2015 school year.

Alternative Strategies: To participate in the program.

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: July 1, 2022

Ending Date of Program or Project: June 30, 2023

Recommendation or Comment: (Two motions needed)

1) Pursuant to C.G.S. Section 10-215f, the Board of Education or governing authority certifies that all food items offered for sale to students in the schools under its jurisdiction, and not exempted from the Connecticut Nutrition Standards published by the Connecticut State Department of Education, will comply with the Connecticut Nutrition Standards during the period of July 1, 2022, through June 30, 2023. This certification shall include all food offered for sale to students separately from reimbursable meals at all times and from all sources, including but not limited to school stores, vending machines, school cafeterias, culinary programs, and any fundraising activities on school premises sponsored by the school or non-school organizations and groups.

2) The Board of Education or governing authority will allow the sale to students of food items that do not meet the Connecticut Nutrition Standards and beverages not listed in Section 10-221q of the Connecticut General Statutes provided that the following conditions are met: 1) the sale is in connection with an event occurring after the end of the regular school day or on the weekend; 2) the sale is at the location of the event; and 3) the food and beverage items are not sold from a vending machine or school store. An "event" is an occurrence that involves more than just a regularly scheduled practice, meeting, or extracurricular activity. For example, soccer games, school plays, and interscholastic debates are events but soccer practices, play rehearsals, and debate team meetings are not. The "regular school day" is the period from midnight before to 30 minutes after the end of the official school day. "Location" means where the event is being held and must be the same place as the food and beverage sales.

Jennifer Mellott
Signature of Staff Member Submitting Report

Steven Madaras
Signature of Superintendent of Schools