SCIENCE

LENGTH OF TIME: One semester

Grade Level: 1

DESCRIPTION OF COURSE:
This course consists of two units from Amplify Science, Lawrence Hall of Science, Berkeley, CA

1) The Light and Sound: Puppet-Theater Engineers unit will help students master disciplinary core ideas in physical science while supporting students' development of key science practices such as analyzing and interpreting data, designing solutions to problems, and making explanations. The unit incorporates an explicit focus on the crosscutting concept of Cause and Effect, with opportunities to address the crosscutting concept of Patterns.

2) The Animal and Plant Defenses: Spikes, Shells, and Camouflage unit will help students master disciplinary core ideas in life science while supporting students' development of key science practices such as developing and using models, analyzing and interpreting data, and constructing explanations. The unit incorporates an explicit focus on the crosscutting concept of Structure and Function, with opportunities to address the crosscutting concept of Cause and Effect.

Both units provide substantial experience with Pennsylvania's Common Core State Standards (PACCSS) for English Language Arts (ELA) as they relate to reading and writing informational text. The unit includes opportunities to address some PACCSS for Mathematics, with optional extensions that allow further standards coverage.

COURSE STANDARDS:
PA Academic Standards for Science and Technology and Engineering Education (Grades PreK-3)

A. Biological Sciences (3.1)

Students will:

1. Grow plants from seed and describe how they grow and change. Compare to adult plants (3.1.1.B1)
2. Understand that plants and animals closely resemble their parents. (3.1.3.B1)
3. Identify characteristics that appear in both parents and offspring. (3.1.3.B5)

B. Physical Sciences (3.2)

Students will:

1. Compare and contrast how light travels through different materials. (3.2.1.B5)
2. Demonstrate how vibrating objects make sound and sound can make things vibrate. (3.2.4.B5)

3. Compare the characteristics of sound as it is transmitted through different materials. (3.2.5.B5)
4. Relate the pitch of the vibration to the pitch of the sound. (3.2.5.B5)

C. Science as inquiry (3.1.1.A9, 3.2.1.B6, 3.3.1.C4, 4.1.1.F, 4.2.1.D, 4.3.1.C, 4.4.1.E, 4.5.1.F)

PA Academic Standards for Environment and Ecology (Pre-K-3)
Ecology (4.1)
Students will:

1. Identify how a plant or an animal is depending on living and nonliving things (4.1.2.A)
2. Identify how living things survive changes in their environment. (4.1.2E)

PERFORMANCE ASSESSMENTS/EXPECTATIONS:

1) Light and Sound

- Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.
- Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate
- Make observations to construct an evidence-based account that objects can be seen only when illuminated.
- 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.
- Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.
- 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.
- Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

2) Animal and Plant Defenses

- 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.
- Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. metamorphosis or hybrids.
- Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. protecting the offspring.
- 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.
- 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.

TITLES OF UNITS:

1. Light and Sound Marking Period 3
2. Animal and Plant Defenses Marking Period 4

SAMPLE INSTRUCTIONAL STRATEGIES:

Each first grade unit contains an extensive selection of varied instructional strategies for the teacher to integrate into the classroom.

MATERIALS:

1. Materials contained in each Amplify kit
2. Chromebooks for simulations

METHODS OF ASSISTANCE AND ENRICHMENT:

1. Peer assistance/parent helpers
2. Special projects
3. Cooperative groups

METHODS OF EVALUATION:

1. Completed investigation notebook pages
2. Critical juncture assessments
3. End of unit assessment

INTEGRATED ACTIVITIES/CROSS CUTTING CONCEPTS

1) Light and Sound
    - Do. Students have multiple opportunities to explore connections between observable causes and effects, such as exploring how to make surfaces brighter, exploring how to make shadows on a surface, and observing the effects of different materials placed in front of a light source.
    - Talk. Each of these explorations is followed by opportunities for student-to-student talk, through which students develop an understanding of the mechanisms that connect those causes to their effects: light coming from sources and the materials that block the light or allow the light to pass through.
    - Read. In Let's Test!, students read about two children who are trying to find the right material to shade their lemonade stand. Students reflect on how the children in the book are figuring out the effects of using different materials in their tests. • Write. Students connect causes and effects in oral and written explanations with the support of explanation language frames—sentence structures that support linking specific causes and mechanisms to effects by using the words so or because.

- Visualize. Through participating in kinesthetic models and constructing diagrams, students work to visualize how different materials interact with light and how those interactions result in different areas of brightness on a surface.

2) Animal and Plant Defenses

- Do. Students have multiple opportunities to explore structure and function by observing photographs and videos and by building and using physical models.
- Talk. Each opportunity to gather evidence—by reading, observing, or building models—is supported by opportunities for student-to-student talk, through which students develop an understanding of how body parts help living things meet survival needs and of animal and plant defenses, including for offspring.
- Read. Tortoise Parts highlights the structure and function of each of several tortoise body parts. Whose Lunch Is This? shows how the sharp, hard structures of teeth, claws, and beaks help animals catch and eat food. Frog Models describes how two children model and explain the structure and function of two defenses that frogs have against being eaten. Spikes, Spines, and Shells: A Handbook of Defenses describes a wide range of animal defenses, with a focus on the structure and function of each.
- Write. Students' written explanations of animal defenses include a focus on using relationships between structure and function to explain organisms' survival.
- Visualize. Students focus on the strategy of visualizing as they read and investigate the structure and function of animal and plant defenses.