SCIENCE

LENGTH OF TIME: One semester

GRADE LEVEL: 2

DESCRIPTION OF COURSE:
This course contains two units.

1) The Properties of Materials: Designing Glue unit will help students master disciplinary core ideas in physical science while supporting students' development of key science practices such as designing solutions, planning and carrying out investigations, and engaging in argument from evidence. 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 Changing Landforms: The Disappearing Cliff unit will help students master disciplinary core ideas in Earth science while supporting students' development of key science practices such as developing and using models and constructing scientific explanations. The unit incorporates an explicit focus on the crosscutting concepts of Scale, Proportion, and Quantity and Stability and Change, 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 (PreK-3)

A. Physical Sciences (3.2)

Students will:

1. Demonstrate how heating and cooling may cause changes in the properties of materials. (3.2.2.A3)
2. Experiment and explain what happens when two or more substances are combined and separated. (3.2.2.A4)
3. Recognize that everything is made of matter. (3.2.2.A5)
4. Observe and describe what happens when substances are heated or cooled. (3.2.1.A4)

B. Earth and Space Sciences (3.3)

Students will:

1. Identify and describe types of fresh and salt-water bodies. (3.3.1.A4)
2. Recognize that the surface of the earth changes due to slow processes and rapid processes. (3.3.4.A1)

3. Describe how landforms are the result of a combination of destructive forces such as erosion and constructive erosion, deposition of sediment, etc. (3.3.5.A1)

C. Science as inquiry (3.1.2.A9, 3.1.2B6, 3.1.2.C4, 3.2.2.A6, 3.2.2.A7, 3.2.2.B3, 3.3.2.B7)

PERFORMANCE ASSESSMENTS/EXPECTATIONS:

1) Properties of Materials
   - Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties
   - Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose
   - Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot
   - Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
   - 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
   - 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.
2) Changing Landforms
   - Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
   - Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.
   - Develop a model to represent the shapes and kinds of land and bodies of water in an area.
   - Obtain information to identify where water is found on Earth and that it can be solid or liquid.

TITLES OF UNITS:

1) Properties of Materials — Marking Period 3
2) Changing Landforms — Marking Period 4

SAMPLE INSTRUCTIONAL STRATEGIES:

Each second 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/CROSSCUTTING CONCEPTS:

1) Properties of Materials
   - Do. Throughout the unit, students observe and test glue mixtures in order to determine the effect that adding particular ingredients has had—whether the cause of adding the ingredients had the effect of giving the glue the desired properties. In addition, students engage in several digital card sorts during which they apply their understanding of cause and effect as it relates to chemical changes and to designing mixtures.
   - Talk. There are multiple opportunities for students to discuss cause and effect in a whole-class setting and with partners. Students reflect on their glue-making, the digital card sort, and their own everyday experiences at home to identify cause–and–effect relationships.
   - Read. Students read an informational text about the effect that the cause of heating or cooling a substance (and returning it to its original temperature) can have on the substance. As they read, they make predictions about whether or not the effects are reversible.
   - Write. During the course of the unit, students write design arguments in which they reason about the effect that the cause of adding particular ingredients will have on a glue mixture.
2) Changing Landforms
   - Do. Students observe models of erosion for landforms composed of different materials and observe the size of particles that are moved by water and compare the timescales of change. The class uses a model in which pom-poms are removed, one by one, from a model landform in order to gather evidence about how small changes can add up to much larger changes over very long time spans.
   - Talk. Multiple opportunities for student-to-student talk engage the class in considering erosion at different timescales and spatial scales.
   - Read. Students read several books that highlight the way in which erosion moves tiny particles but can cause large-scale changes. The reference book, Handbook of Land and Water, contrasts slow and fast changes to landforms.
   - Write. During the course of the unit, students write several scientific explanations about erosion. Each successive explanation includes a more complex consideration of scale.

- Visualize. As students read, use models, and construct explanations, they visualize the process of erosion at different scales.