Phoenixville Area School District Understanding by Design (UbD) Science

Grade Level 2 **Unit Name: Pebbles, Sand, and Silt** **D. Krisiewicz, J. Simmons**

Stage 1 Desired Results

Overarching NGSS & PA Standards:

Earth and Space Sciences

3.3.2.A Make observations from several sources to construct an evidence-based account that Earth events can occur quickly or slowly.

3.3.2.B Compare multiple solutions designed to slow or prevent wind or water from changing

Transfer

Students will be able to independently use their learning to…

1. Ask questions and/or define problems
2. Develop and/or use models
3. Plan and/or carry out investigations
4. Obtain, evaluate, and communicate information (supported by evidence)
5. Construct explanations and design solutions

Meaning-Making

Students will understand that…

- Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.
- Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter (i.e., rocks) can be described and classified by its observable properties.
- Different properties are suited for different purposes.
- Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.
- Wind and water can change the shape of the land.
- Maps show where things are located. One can map the shapes and kinds of land and water in any area.
- Asking questions, making observations, and gathering information are helpful in thinking about problems.

ESSENTIAL QUESTIONS
Students will keep considering...

What are properties of rocks and how do they change?

How are small pieces of rock made and moved to change landforms?

How are different sizes of rock used as resources to make useful objects?

How can we apply what we know about the ways that land and water interact?

Knowledge and Skills Acquisition

the shape of the land.

3.3.2.C
Develop a model to represent the shapes and kinds of land and bodies of water in an area.

Physical Sciences

3.2.2.A
Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

3.3.2.B
Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an

UNDERSTANDINGS

Students will know…

- Rocks can be described by their properties.
- Smaller rocks (sand) result from the breaking (weathering) of larger rocks.
- Rocks are the solid material of Earth.
- Rocks are composed of minerals.
- Volcanoes are mountains built up by melted rocks that flow out of weak areas in Earth's crust.
- Rocks are earth materials.
- Rocks can be described by the property of size.
- Rock sizes include clay, silt, sand, gravel, pebbles, cobbles, and boulders.
- Weathering, caused by wind or water, causes larger rocks to break into small rocks.
- Some Earth events happen rapidly; others occur slowly over a very long period of time.
- Earth materials are natural resources.
- The properties of different earth materials make each suitable for specific uses.
- Different sizes of sand are used on sandpaper to change the surface of wood from rough to smooth.
- Earth materials are commonly used in the construction of buildings and streets.
- Earth materials are natural resources.
- Soils can be described by their properties (color, texture, ability to support plant growth).
- Soil is made partly from weathered rock and partly from organic material. Soils vary by location.
- Natural sources of water include streams, rivers, ponds, lakes, marshes, and the ocean. Sources of water can be fresh or salt water.
- Water can be a solid, liquid, or gas.
- Wind and water can change the shape of land.
- The shapes and kinds of land and water can be represented by various models.

(Consider: What facts and basic concepts should students know and be able to recall?)

KEY VOCABULARY

Investigation 1: First Rocks:	**Investigation 3: Using Rocks:**
basalt	asphalt
earth	coarse
material	engineer
geologist	matrix
granite	medium
mineral	natural resources
property	
texture	**Investigation 4: Soil and Water:**
volcano	decay

Students will be skilled at…

Planning and conducting an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.

Analyzing data from tests of an object or tool to determine if it works as intended.

Constructing explanations and designing solutions

Making observations to construct an evidence-based account for natural phenomena

Develop a model to represent patterns in the natural world.

Compare multiple solutions to a problem.

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.

intended purpose.	weathering **Investigation 2: River Rocks:** boulder clay erosion gravel layer mixture separate settle silt	fresh water gas humus liquid retain solid	

Stage 2 – Evidence

Evaluative Criteria	***Assessment Evidence***	
What criteria will be used in each assessment to evaluate attainment of the desired results? Teacher observations notes and rubric	PERFORMANCE TASK(S): 1. Investigations: I. **Performance Task(s):** Students are introduced to the phenomenon that rocks are not all the same. They investigate several kinds of *volcanic rocks* and begin to understand the properties of rocks. Students observe rocks (using hand lenses), rub rocks, wash rocks, sort rocks, and describe rocks. After rubbing two samples together, students find that rock is hard but also susceptible to weathering. Students also begin to organize a class rock collection. **Assessment**: Investigation 1 I-Check II. **Performance Task(s):** Students investigate a mixture of different-sized *river rocks* as a phenomenon. They separate the rocks using a series of three screens to identify five sizes of rocks: large pebbles, small pebbles, large gravel, small gravel, and sand. They add water to a vial of sand to discover silt and clay. Students learn how sand is formed and compare slow landform changes of weathering and erosion to rapid landform changes due to volcanic eruptions.	Differentiation Considerations: • Read tasks and all questions aloud. • Provide embedded notes when possible (via FOSS) • Accept verbal responses in lieu of written responses. If challenges arise with complexity of the task(s): • smaller steps and/or • alternative activities will be provided.

Assessment: Investigation 2 I-Check

III. **Performance Task(s):** Students learn how people use earth materials to construct objects. They make rubbings from sandpaper, sculptures from sand, decorative jewelry from clay, and bricks from clay soil. They go on a schoolyard field trip to look for places where earth materials occur naturally and where people have incorporated earth materials into building materials. Students discover that rock as a resource is a natural phenomenon occurring in predictable locations all over Earth's surface.

Assessment: Investigation 3 I-Check

IV. **Performance Task(s):** Students first investigate a common phenomenon on the surface of Earth—soil. They put together and take apart soils. They are introduced to humus as an ingredient in soil. Homemade and local soils are compared, using techniques introduced in Investigation 2, including water. Students read about sources of natural water, sort images of water sources, both fresh and salt, and discuss where water is found in their community. Students compare different solutions presented in readings to slow the effects of wind and water erosion. They learn about different ways to represent landforms and bodies of water.

Assessment: Investigation 4 I-Check

2. Other Unit Activity: What are Minerals:

Description: In this lesson, students will learn "that rocks are made up of one or more minerals. The minerals are the components and are pure nonliving materials made up from one or more elements... - the cookie is the rock, and the ingredients are the minerals."

	Standards: This lesson aligns to Essential Standard 1.E.2.1, "Summarize the physical properties of Earth materials, including rocks, minerals, soils and water that make them useful in different ways." The essential question for today is **"What is a mineral?"** **Task:** Students will "dissect" a cookie. They will use popsicle sticks, toothpicks, etc. to break apart a cookie. **Assessment:** They will draw diagrams, record their observations, and include labels and realistic observational data.	
What criteria will be used in each assessment to evaluate attainment of the desired results? Rubrics	OTHER EVIDENCE: • Student Notebook Entries	Differentiation Considerations: For journal entries, consider that some students may wish to: • draw instead of write entries • write in their first language If challenges arise with complexity of the task(s): • smaller steps and/or • alternative activities will be provided.