EROSION, TRANSPORT, AND DEPOSITION OF DIFFERENT SEDIMENTS CHANGING EARTH'S SURFACE (MODIFIED FOR ADEED)

Science Concept:

Water erodes, transports, and deposits sediments as part of the rock cycle that is locally observable in changing geological environments.

Objectives:

The student will:

- describe how sediment materials can be eroded, transported, and deposited in different areas;
- make generalizations about how water erodes, transports, and deposits sediments; and
- write paragraphs about three different types of sediment materials that are eroded, transported, and deposited in different areas.

GLEs Addressed:

Science

[8] SD1.1 The student demonstrates an understanding of geochemical cycles by making connections between components of the locally observable geologic environment and the rock cycle.

[8] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.

Writing

[8] W3.2.2 The student writes for a variety of purposes and audiences by writing in a variety of nonfiction forms (e.g., letter, report, biography, and /or autobiography) to inform, describe, or persuade.

Vocabulary:

bedrock - the solid rock that lies beneath soil and other loose surface materials

cobbles - loose particles of rock or mineral (sediment) that range in size from 64 - 256 millimeters in diameter. Cobbles are a size of gravel larger than pebbles, but smaller than boulders

deposition - the accumulation of material dropped because of a slackening movement of the transporting medium, e.g., water or wind

deposits - any accumulation of sediment

erode - material removed by water, wind, or ice. As soon as a rock particle (loosened by weathering) moves, by some flowing agent such as air, water or ice, it is eroded

erosion - removal of material by water, wind, or ice. As soon as a rock particle (loosened by weathering) moves, by some flowing agent such as air, water or ice, it is erosion

gravel - all sedimentary particles larger than two millimeters; gravel is subdivided into pebbles, cobbles, and boulders

runoff - that portion of precipitation that moves from the land to surface water bodies; that portion of precipitation which is not intercepted by vegetation, absorbed by the land surface or evaporated, and thus flows overland into a depression, stream lake or ocean

sand - loose particles of rock or mineral (sediment) that range in size from 0.0625-2.0 millimeters in diameter

sediment - the word geologists use for loose pieces of minerals and rock that come in all sizes and go by common names like sand, boulders, clay, silt, pebbles, and cobbles

silt - loose particles of rock or mineral (sediment) that range in size from 0.002 - 0.0625 millimeters in diameter. Silt is finer than sand, but coarser than clay

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valley - an elongated depression between uplands, hills, or mountains, especially one following the course of a stream; an extensive, more or less flat, and relatively low region drained by a great river system

transport - to carry, move, or convey from one place to another

transportation - the act of carrying, moving, or conveying from one place to another

Materials:

- Silt
- Sand
- Gravel
- Cobbles
- 12 inch x 12 inch floor tile or similar large flat object
- Paper plates (2)
- Pitcher
- Small funnel
- Water
- Stream table, purchased or built, or plastic sweater box (storage box) (one per group)
- Collection bucket (one per group)
- Small objects to represent structures, such as unit cubes, chocolate kisses, tiny cars, etc.
- STUDENT WORKSHEET: "Stream Valley Diagram"

Activity Procedure:

Please refer to the assessment task and scoring rubric located at the end of these instructions. Discuss the assessment descriptors with the class before teaching this lesson.

Gear Up

Process Skills: observing, inferring, and communicating

1. Begin a concept map on the board with the word 'transport' written in the center circle. Ask students to brainstorm the meaning of the word transport and add their ideas onto the concept map. Ask students to brainstorm the term transport but eliminate anything that is being driven or was built (mechanical) by humans.
2. In their science journal, instruct students to write what they know about water transporting sediments in their local area.

Explore

Process Skills: observing, inferring, communicating, and describing

3. Divide students into small groups. Ask groups to design a stream valley to test how at least three types of sediment materials of their choice are transported when water flows down the stream valley. Review the materials they'll be choosing from:
    - Sand
    - Silt
    - Gravel
    - Cobbles
    - 12 inch x12 inch floor tile
    - Small objects to represent structures, such as unit cubes, Hershey kisses, tiny cars, etc.
4. Ask students to predict in their journals how the runoff will affect the sediments in the stream valley, and then ask groups to construct and test their stream valley using their stream table, and a pitcher of water and funnel.

5. Students should record at least three observations in their journals using written descriptions, and create and label diagrams after constructing and exploring their stream valley.

Generalize

Process Skills: inferring, communicating, describing, and observing

6. Bring the class back together and ask each group to share the results of their exploration.
7. Ask the following questions and discuss:
    a. What are some of the similarities between each group's observations? List responses on the board.
    b. What are some of the differences in observations? List responses on the board.
    c. What happens to different sediment materials during a) erosion, b) transport, and c) deposition? List responses on the board.
    d. What can we infer about building a structure in a stream valley? What would we be looking for in a building site?

Apply

Process Skills: observing, inferring, communicating, and predicting

8. Distribute STUDENT WORKSHEET: "Stream Valley Diagram." Ask students to use the knowledge gained from this activity, including their journal entries, to examine the diagram of the stream valley, decide which lot they would choose to build their dream home, list their choice and explain their reasoning in their science journal, and explain why they did not select the remaining two lots.
9. If possible, arrange for a field trip to a nearby area to view erosion, transport, and deposition in the local environment.

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RUBRIC

Assessment Task:

Using examples of at least three different types of sediments, describe in writing how sediment materials can be eroded, transported, and deposited in a local area. This should include at least three generalizations about how water erodes, transports, and deposits sediments. Write in paragraphs containing at least five complete sentences.

Rubric:

Objective	GLE	Below Proficient	Proficient	Above Proficient
The student describes how sediment materials can be eroded, transported, and deposited in different areas.	[8] SD1.1	The student uses less than three types of sediment to describe how materials can be eroded, transported, and deposited in different areas.	The student uses three types of sediment to describe how materials can be eroded, transported, and deposited in different areas.	The student uses more than three types of sediment to describe how materials can be eroded, transported, and deposited in different areas.
The student makes generalizations about how water erodes, transports, and deposits sediments.	[8] SA1.1	The student makes less than three generalizations about how water erodes, transports, and deposits sediments.	The student makes three generalizations about how water erodes, transports, and deposits sediments.	The student makes more than three generalizations about how water erodes, transports, and deposits sediments.
The student writes paragraphs about three different types of sediment materials that are eroded, transported, and deposited in different areas.	[8] W3.2.2	The student uses less than five complete sentences in his or her paragraphs.	The student uses five complete sentences in his or her paragraphs.	The student uses more than five complete sentences in his or her paragraphs.

NAME: _____ STUDENT WORKSHEET

STREAM VALLEY DIAGRAM

Directions:

Using the knowledge gained from this activity, including your journal entries, examine the diagram of the stream valley below. Decide which lot you would choose to build your dream home. List your choice and explain your reasoning in your science journal. Also, explain why you did not select the remaining two lots.