

CLASTS

Science Concept:

Conglomerates and breccia clasts form from erosion.

Objectives:

The student will:

- describe two differences between conglomerate and breccia clasts;
- predict and communicate where conglomerate and breccia clasts would be found; and
- infer, describe and diagram characteristic differences between conglomerate and breccia clasts.

GLEs Addressed:

Science

- [7] SD1.1 The student demonstrates an understanding of geochemical cycles by describing the rock cycle and its relationship to igneous, metamorphic, and sedimentary rocks.
- [7] 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

- [7] 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 or describe.

Vocabulary:

breccia – rock made up of angular fragments of other rocks held together by mineral cement or a fine-grained matrix. Volcanic breccia is made of volcanic rock fragments, generally blown from a volcano or eroded from it. Fault breccia is made by breaking and grinding rocks along a fault

clasts – fragments of a pre-existing rock or fossil embedded within another rock

clay - a family of platy silicate minerals that commonly form as a product of rock weathering

conglomerate – a sedimentary rock made of rounded rock fragments, such as pebbles, cobbles, and boulders, in a finer-grained matrix. To call the rock a conglomerate, some of the constituent pebbles must be at least 2 millimeters (about 1/13th of an inch) across

erode – material removed by water, wind, or ice

erosion– removal of material by water, wind, or ice

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

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

sediment – 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

Materials:

- Towels (one pair per student)
- Safety goggles (one per student)
- Hammer (one per student)

- Various sedimentary cobbles, scored for easy breaking (one per student)
- Sugar cubes (several per group)
- Sand
- Silt
- Clay
- Gravel
- Water
- Two-liter plastic bottles with wide mouth
- Science journal
- STUDENT WORKSHEET: "Assessment Task Map"

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. Distribute a scored rock, towel, hammer, and safety goggles to each student. Ask students to predict what will happen when they break the rock. Write predictions on the board.
2. Discuss safety procedures. Demonstrate how to wrap the rock in the towel and break it with a hammer. Allow students to break their rocks, and then examine them.
3. Ask students to write an observation about the rock breaking or results from being broken on the board. Go through the observations and ask which were observations and which were inferences.
4. Introduce the vocabulary by terms and have students help define them. Leave the defined words on the board for future reference.

Explore

Process Skills: observing, inferring, communicating, and describing

5. Divide students into groups of three. Assign student roles: scribe, presenter, and materials manager. Explain students will place various materials in a bottle along with a sugar cube and shake it to mimic erosion processes. Ask students to predict which material, or combination of materials, will erode square sugar cubes into rounded sugar spheres.
6. The scribe in each group should be tasked with keeping written records. Next, have the materials manager gather the needed materials (sand, silt, clay, gravel, or combination, and water) and try their exploration by pouring the material(s) into a bottle, adding the sugar cube, capping, and shaking the bottle to mimic erosion processes.
7. Each student should record at least two observations and draw a diagram in their science journals. Students should share their diagrams and observations with their group members.

Generalize

Process Skills: inferring, communicating, describing, and observing

8. The presenter in each group should share his or her group's observations.
9. Ask the following questions and list student responses on the board. Then discuss as a class.
 - a. What are some common observations from each group?
 - b. What are some different observations from each group?
 - c. What process or combination of processes worked the best to round the sugar cube?
 - d. Can we come to a consensus on what the best material is to round our cubes?
 - e. What can we infer about eroding clasts?
 - f. What would we be looking for in beds of rocks to determine how much erosion has taken place?
 - g. What process forms conglomerate and breccia clasts?

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Apply

Process Skills: inferring, communicating, and predicting

10. Ask students to write a one paragraph response for each sample based on the prompt: You are going on a hike in search of prime samples of breccia and conglomerate. Your hike starts at a small stream delta and heads up to a glacier. At what locations along the stream would you expect to find prime specimens of each sample? Make sure you include why the samples would be found in that location.

Assessment Task:

In your journal, describe at least two differences between conglomerate and breccia clasts. Using the STUDENT WORKSHEET: "Assessment Task Map," make at least one prediction (and support your reasoning) about where samples 2, 3, 4 would be located using the given information and your knowledge of clast formation. Write at least one-paragraph description, for each sample, of how clasts would be formed in the conglomerate and breccia samples from the "Assessment Task Map." The paragraph must include at least one inference as to how the conglomerate/breccia formed. At least one diagram, per sample, must be included.

Rubric:

Objective	GLE	Below Proficient	Proficient	Above Proficient
The student describes two differences between conglomerate and breccia clasts.	[7] SD1.1	The student describes less than two observations in his or her science journal.	The student describes two differences between conglomerate and breccia in his or her science journal.	The student describes more than two differences between conglomerates and breccia and includes a diagram or other observations.
The student predicts and communicates where conglomerate and breccia clasts would be found.	[7] SA1.1	The student does not make predictions for each sample or does not support his or her reasoning.	The student makes one prediction for each sample and supports his or her reasoning.	The student makes more than one prediction for each sample and supports his or her reasoning.
The student infers, describes and diagrams characteristic differences between conglomerate and breccia clasts.	[7] W3.2.2	The student does not write one paragraph or does not include a diagram for each sample.	The student writes one paragraph describing how clasts would be formed in the conglomerate and breccia sample. The student also includes one diagram for each sample.	The student writes more than one paragraph describing how clasts would be formed in the conglomerate and breccia sample. The student also includes one or more diagrams for each sample.

NAME: _____
ASSESSMENT TASK MAP

STUDENT WORKSHEET
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