

Geological Processes

Summary

This activity is designed as a game board that will allow students to deepen their understanding of the effects of weathering, erosion; uplift, sudden changes (e.g. flash flood, avalanche), earthquakes and volcanoes on the geological features of Earth.

Group Size

Small Groups

Materials

- [Gameboard Cards](#)
- [Gameboard](#)
- Foam Dice
- Centimeter cubes or counters
- Utah Relief Map
- National Atlas Relief Map
- The Dynamic Planet Map

Background for Teachers

Earth's surface is constantly changing. Some changes happen very slowly over long periods of time, such as weathering, erosion, and uplift. Other changes happen abruptly, such as landslides, volcanic eruptions, and earthquakes. All around us, we see the visible effects of the building up and breaking down of Earth's surface.

This activity is designed as a game board that will allow students to deepen their understanding of the effects of weathering, erosion; uplift, sudden changes (e.g. flash flood, avalanche), earthquakes and volcanoes on the geological features of Earth. In this activity students will use a geological processes gameboard and game cue cards to try and build the biggest mountain. The game cue cards use science vocabulary and help students understand the impact of geological forces on the features of Earth's surface.

Intended Learning Outcomes

1. Use science process and thinking skills.
2. Manifest scientific attitudes and interests.
4. Communicate effectively using science language and reasoning.

Instructional Procedures

Invitation to Learn

Invite students to look at the Dynamic Planet Map. Facilitate discussion with the following questions: (Allow time for discussion and reflection).

What do all the dots mean on the map?

Why do you think that a lot of earthquakes and volcanoes are where they are on the map?

Why do you think they call the area around the Pacific Ocean the "Ring of Fire"?

What geological feature do you find at plate boundaries? (Mountains, volcanoes)

What forces build up a mountain?

What forces can break down Earth?

What does erosion do to Earth's surface?

Where do all the rivers drain?

What role does water play in sculpting the surface of Earth?

Inform students that these are all geological processes. In order to deepening their understanding of how these processes impact Earth's surface, invite them to play the Geological Processes Game. Challenge them to be the one to build the biggest mountain.

Instructional Procedures

Students will get into teams of 4 or less. Each team will need a *Gameboard*, *Gameboard Cards*, one die (foam or other) and container of centimeter cubes (about 120). If centimeter cubes are not available paper, counters or another pattern blocks can be used.

Directions for how to play the game are on the gameboard. Remind students they are to move in a forward (not backward) direction. Some adaptations (if needed):

Use a timer to identify length of playing time.

If area on gameboard is too small to build on, have students build on a piece of paper.

Students may need to count out their mountain pieces if a clear winner cannot be established.

Students might be able to work as teams if needed in order for all students to participate.

After game time has ended, have students return supplies to designated area. Initiate a group discussion about what they learned about geological processes as they played the game. In a journal or on the board, allow students to list several of their ideas about concepts they learned from doing this activity. Develop the idea that geological forces of erosion and uplift are responsible for much of Earth's features. Have students identify different types of erosion (wind, water) and weathering (mechanical -- root pry, freezing and thawing; chemical weathering). Review major concepts (volcanoes, earthquakes, uplift, weathering, and erosion reshape Earth's surface.)

To extend the activity have students view the Utah Relief Map, National Atlas Relief Map or the Dynamic Planet Map and see if they can find places on Earth where erosion (drainage basins), uplift (mesas, plateaus), volcanoes and earthquakes (Ring of Fire, plate tectonics) and deposition (deltas) have occurred.

Extensions

Curriculum Extensions/Adaptations/ Integration

Adaptations for learners with special needs: Have student work with a partner so they can play the game without limitations.

Have a team competition and see who can build the biggest mountain.

Social Studies Connection -- Read about the 1906 San Francisco Earth, Mount St. Helens, Hurricane Katrina or other major disasters and examine what impact the geologic features of Earth had on that event.

Family Connections

Provide each student with a gameboard and blacklines of the gameboard cards. Invite them to play the game at home.

Have a classroom set of the *Geological Processes* gameboard available to use when appropriate time is available.

Have a team competition and see who can build the biggest mountain.

Assessment Plan

Participation in a team and successfully building a mountain.

Group discussion participation and recorded list of main concepts.

Ability to locate areas on map, explain what geologic feature is located in that area and what geologic forces impacted that area.

Extension: Invite students to make more game cue cards with additional geologic processes, or

have them write in a science journal or notepad ideas for cards to be added to the geological processes cue cards.

Bibliography

Research Basis

Balasubramanian, N., Wilson, B. G., & Cios, K. J. (2005) *Games and Simulations* Retrieved January 5, 2008, from <http://site.aace.org/pubs/foresite/GamesAndSimulations1.pdf>

This paper examines the opportunities and challenges that games can offer to enrich teaching and learning. Research is based on games developed by the Nobel games. Five guidelines are recommended for games to be meaningful and integrated into the classroom setting.

Teed, R. *Game-based Learning*. Retrieved January 5, 2008, from <http://serc.carleton.edu/index.html>

This is an excellent resource for developing and creating games for the classroom. Elements that comprise well-developed games are explored. Information is based on current research.

Hogle, J. (1996-08-00) *Considering Games as Cognitive Tools: In Search of Effective "Edutainment"* ERIC #: ED425737 Retrieved January 5, 2008, from <http://twinpinefarm.com/pdfs/games.pdf>

This research paper reviews proposed benefits of using games as cognitive tools. Researchers have purported that the use of educational games has the potential to increase interest, motivation and retention, as well as improve higher order thinking and reasoning skills. This paper reviews the benefits of games and what is needed in order for games to be of value in the education setting.

Authors

[Utah LessonPlans](#)