The Physical Geography Series

Glaciation
Ice Shapes the Land

KG1160

TEACHER'S GUIDE

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Answers

1. A glacier gets its start as a large accumulation of snow. The deeper snow gets compressed and in the process it melts its edges which changes the snow to firn or neve. More pressure eventually changes the granular ice to regular ice. The very weight of the ice makes it flow or move. While many glaciers are found in only mountainous areas today they also occur on continents. For example Greenland is covered by a huge mass of glacial ice. Ice also moved across North America.

2. A large accumulation of snow would actually lower the levels of the oceans. Normally evaporation of sea water moves into the atmosphere and later falls as rain or snow. The source of the snow is the ocean and therefore it would lower the level of the seas.

3. There is a range of answers depending on the quality of the snow. If it is very light and powdery it may take 15 inches of snow to equal one inch of water. Regular snow is reduced from about 10 inches to one inch.

4. The material is often clay, sand, gravel, boulders and pebbles. As the glacier moves over a certain area it carries rocks with it. These help scrape and gouge the bedrock and will pluck up more materials as it moves. The clay is actually ground granite. Other materials might have fallen on to the ice as it moved down a mountain and later falls out of the glacier as it melts.

5. This milky water is called Glacial Milk and comes from clay mixed with the flowing water. The clay comes from ground rock, usually the bedrock, as the ice moves over it. Remember the bottom of the glacier is like a giant grinding machine.

6. Aretes, Horns, Outwash Plains, Medial Moraines, Terminal moraines, Glacial grooves, glacial striations.

7. As the brittle ice moves the surface may bend and break. The breaking at the surface is the crevasse.

8. The process of snow turning into ice occurs deep under the glacier. There has to be enough pressure to actually remelt the snow and this occurs deep under the glacier.

9. There are many reasons to believe that another ice age can begin. Recall that the most recent ice melted from the Midwest United States just 12,000 years ago. This is very recent in terms of geological time. But there are many things to trigger an ice age. Global cooling could take place; a large volcanic eruption might block out the sun and trigger another ice age.

Glossary

Alpine Glacier - A glacier that has its origins in the mountains. Named after the Alps where the study of glaciers began.

Ciroue - A steep-walled it niche, shaped like a bolt in a mountainside excavated mainly by ice plucking and frost action.

Crevasse - A deep crack in the upper surface of a glacier.

Erratic - A transported rock fragment different from the bedrock beneath it that was carried by a glacier or floating ice.

Firn - Partially compacted granular snow.

Glacial grooves - Deep scratches made in bedrock as a glacier passed over it.

Glacial lake - A lake formed when a glacier melted.

Glacial "Milk" - Finely ground rock material carried in a glacier which gives the water the appearance of milk. Usually clay material.

Glacial till - Non-sorted glacial material left after a glacier melts.

Glaciation - The alternation of a land surface by the massive movement over it by the ice.

Neve - Granular ice formed from melted snow.

Pothole - A cylindrical hole drilled in the bedrock by a turbulent stream.

Striae - Scratches on bedrock surfaces caused by grinding of rock against rock during movement of glacier ice.

U-shaped valley - Characteristic of a glacier that has carved out and rounded an existing valley.

Suggested Teaching Activities

1. Glacial geologists can use glacial grooves and scratches as an indicator of the direction in which they moved. Trace the movement of the glaciers as they moved through the Great Lakes area.

2. Using a large world map locate areas that have active glaciers present. Make sure to include the Arctic, Greenland, the Antarctic and Alpine Glaciers.

3. Discuss some of the evidence that geologist use to show that there were once glaciers in a certain region. Discuss erosion features as well as the additional features.

4. Have your students locate the closest active GLACIER to your school. Remember that glaciers can occur in mountains (called Alpine Glaciers). For example in Colorado there are two active glaciers, the Arapahoe Glacier which is the source of drinking water and St. Mary's Glacier located near Idaho Springs, Colorado.

Quiz

1. How does a glacier get its start? Does a glacier only occur in mountain areas?

2. What would a large accumulation of snow do to the level of the sea?

3. How many inches of snow would it take to make one inch of rain or melted water?

4. When a large mass of ice melts it usually drops a large load of material. What is this material? Where did it come from?

5. A visitor to the mountains in early spring and summer can often see the streams appearing milky white. Why does this occur?

6. What are some features found in mountains that were caused by glaciers?

7. Why do crevasses form? Draw a diagram showing how this might happen.

8. Explain the process of snow turning into ice. Does this occur at the surface or at deeper levels?

9. Do you think an ice age might occur again? Give some possible explanations as to why or why not this might happen.