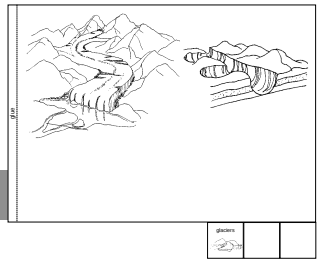
How do glaciers affect the land?

Lithosphere Concepts:

- There are two kinds of glaciers: valley glaciers which form in high mountain valleys, and continental glaciers which form on ice caps in frigid polar regions.
- Layers upon layers of compacted snow form glaciers.
- Glaciers move downhill because of gravity, their weight, and melting ice underneath them.
- As glaciers move, they erode the land, often creating a U-shaped valley with steep sides and a flat floor.

Vocabulary: glacier valley polar regions iceberg *moraines *eskers *arête

Read: *Lots of Science Library Book #18.*

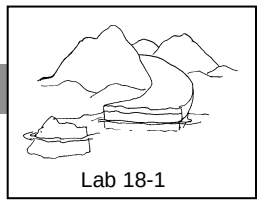


Activities:

Land Features created by a Glacier – Graphic Organizer

Focus Skills: explaining a process, labeling parts
Paper Handouts: a copy of Graphic 18A *Landforms and Surface Features of Earth*
Graphic Organizer: Glue Graphic 18A under the previous page of *Landforms and Surface Features of Earth.*

- ✎ Explain what you have learned about glaciers. Color the illustrations. Draw your own examples on the left page.
- ✎✎ Use the *Lots of Science Library Book #18* to label the illustrations. Write clue words about glaciers: *compacted snow, moves downhill, erodes the land, creates U-shaped valley with steep sides and flat floor.*
- ✎✎✎ Complete ✎✎. Research the *Fascinating Physical Features of Earth* examples from the *Lots of Science Library Book #18* or other examples of glaciers. Write a descriptive or expository paragraph about them on the left page. Research and list geographic locations of several valley glaciers on the left page.


Lab 18-1

A Glacier – Investigative Loop – Lab 18-1

Focus Skills: demonstrating a concept, applying information
Lab Materials: dirt plastic container for the freezer water
Paper Handouts: a copy of Lab Graphic 18-1 8.5" x 11" sheet of paper
Lab Record Cards Lab Book
Graphic Organizer: Make a Pocket Book and glue it side-by-side to the Lab Book. Glue Lab Graphic 18-1 on the left pocket.
Question: How does a glacier change land features?
Research: Read *Lots of Science Library Book # 18* and review the Question.
Procedure: Put 3" of water in the plastic container. Leave it in the freezer until it is completely

frozen. Create a slightly sloped hill of dirt about 5" deep, outside or in a large container. Place the frozen water on the top of the sloped hill, pushing it slightly into the dirt.

Observations: Observe the dirt closely before the ice is placed on it. Observe the slope on a regular basis. If it takes too long to melt, pour some water on the ice.

Record the Data: Label 2 Lab Record Cards "Lab 18-1." On one card, draw the sloped hill before the ice is placed on it. On the other card, draw the sloped hill after the ice has melted. Record any features of the dirt that you observed.

Conclusions: Review the Lab Record Cards and determine how the ice changed the sloped hill. Draw conclusions about glaciers' effect on land, based on this lab.

Communicate the Conclusions: On another Lab Record Card, explain your conclusions about this lab, or write a letter to someone explaining the lab and the conclusions.

Spark Questions: Discuss questions sparked by this lab.

New Loop: Choose one question to investigate further.

\\\ **Design Your Own Experiment:** Select a topic based upon this *Investigative Loop* experience. See page vii for more details.

Fascinating Facts about Earth – Graphic Organizer

Focus Skill: map reading

Paper Handouts: a copy of Graphics 18B-C *Earth Shutter Fold Project*

Graphic Organizer: Cut out Graphics 18B-C and fold on the middle line so that the illustration is on the cover of each little book. Follow the directions below for the inside and glue it to the appropriate place on the world map inside the *Earth Shutter Fold Project.*

\ Draw the cover pictures on the inside and color them.

\\ Copy information from the *Lots of Science Library Book* about the cover pictures.

\\\ Write information about the cover pictures.

18C

Experiences, Investigations, and Research

Select one or more of the following activities for individual or group enrichment projects. Allow your students to determine the format in which they would like to report, share, or graphically present what they have discovered. This should be a creative investigation that utilizes your students' strengths.

1. Investigate glacial deposits called moraines. Explain how Long Island was once a glacial moraine.

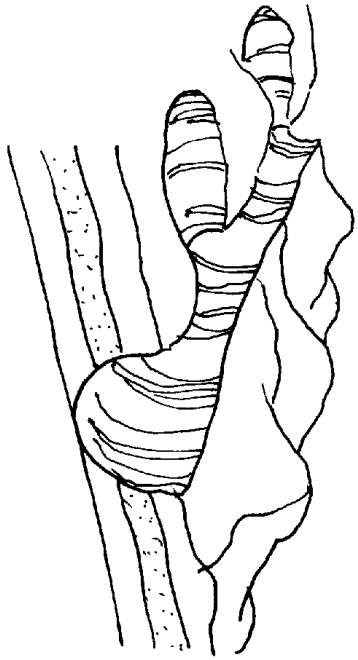
2. Draw and label a diagram of a glacier. Sketch land forms associated with glacial deposits: moraines, drumlins and eskers.

3. Explain why the majority of the world's lakes are in the northern hemisphere.

4. Investigate living organisms that have been preserved in ice. For example, the Ice Man and woolly mammoths.

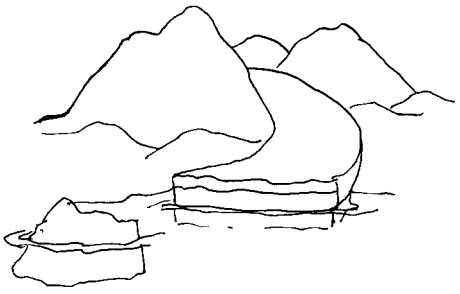
5. Locate these famous glaciers on a map:
   French and Swiss Alps glaciers: Mer de Glace on Mont Blanc, Aletsch Glacier near the Jungfrau.
   Norway: Jostedal Glacier is the largest on the European continent.
   North America: Malaspina Glacier on Yakutat Bay, Alaska.

glue



glaciers

Lab Graphic 18-1



Lab 18-1

18B

18C

Lots of Science Library Books

Each *Lots of Science Library Book* is made up of 16 inside pages, plus a front and back cover. All the covers to the *Lots of Science Library Books* are located at the front of this section. The covers are followed by the inside pages of the books.

How to Photocopy the *Lots of Science Library Books*

Note: These pages are easier to photocopy if they are taken out of the book. The *Lots of Science Library Books* are provided as consumable pages which may be cut out of the *Great Science Adventures* book at the line on the top of each page. If, however, you wish to make photocopies for your students, you can do so by following the instructions below.

Be sure to try one book before you copy the entire set. To photocopy the inside pages of the *Lots of Science Library Books:*

1. Note that there is a "Star" above the line at the top of each *LSLB* sheet.

2. Locate the *LSLB* sheet that has a Star on it above page 16. Position this sheet on the glass of your photocopier so the side of the sheet which contains page 16 is facing down, and the Star above page 16 is in the left corner closest to you. Photocopy the page.

3. Turn the *LSLB* sheet over so that the side of the *LSLB* sheet containing page 6 is now face down. Position the sheet so the Star above page 6 is again in the left corner closest to you.

4. Insert the previously photocopied paper into the copier again, inserting it face down, with the Star at the end of the sheet that enters the copier last. Photocopy the page.

5. Repeat steps 1 through 4, above, for each *LSLB* sheet.

To photocopy the covers of the *Lots of Science Library Books:*

1. Insert "Cover Sheet A" in the photocopier with a Star positioned in the left corner closest to you, facing down. Photocopy the page.

2. Turn "Cover Sheet A" over so that the side you just photocopied is now facing you. Position the sheet so the Star is again in the left corner closest to you, facing down.

3. Insert the previously photocopied paper into the copier again, inserting it face down, with the Star entering the copier last. Photocopy the page.

4. Repeat steps 1 through 3, above, for "Cover Sheets" B, C, D, E, and F.

How to assemble the *Lots of Science Library Books*

Once you have made the photocopies or cut the consumable pages out of this book, you are ready to assemble your *Lots of Science Library Books*. To do so, follow these instructions:

1. Cut each sheet, both covers and inside pages, on the solid lines.

2. Lay the inside pages on top of one another in this order: pages 2 and 15, pages 4 and 13, pages 6 and 11, pages 8 and 9.

3. Fold the stacked pages on the dotted line, with pages 8 and 9 facing each other.

4. Turn the pages over so that pages 1 and 16 are on top.

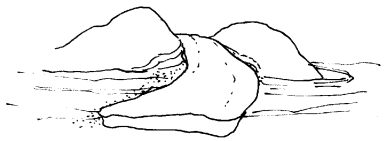
5. Place the appropriate cover pages on top of the inside pages, with the front cover facing up.

6. Staple on the dotted line in two places.

You now have completed *Lots of Science Library Books*.

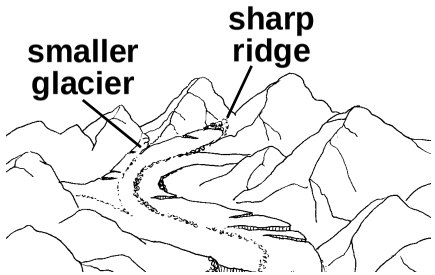
Fascinating Physical Features of Earth

The fastest-moving glacier is the Quarayag Glacier, in Greenland, moving 92 feet (28m) per day.

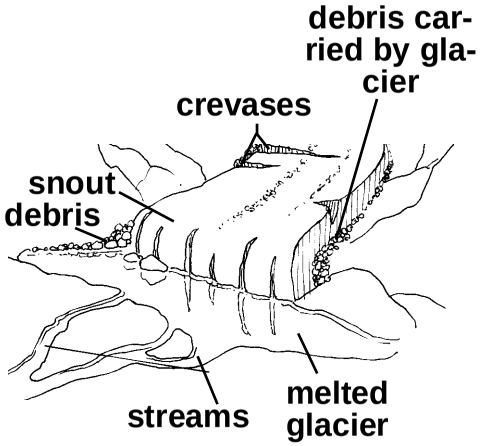


Glaciers are huge sheets of compacted snow and ice crystals found in high mountain valleys and polar regions. Glaciers contain about 75% of Earth's fresh water.

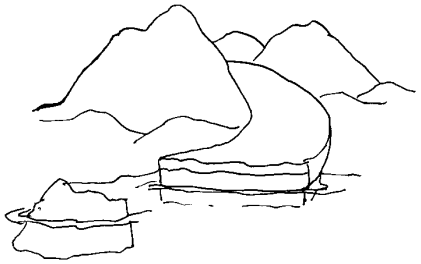
Smaller glaciers often form and merge into larger glaciers. This creates a sharp ridge in the land.



The sharp ridge is called an arête.

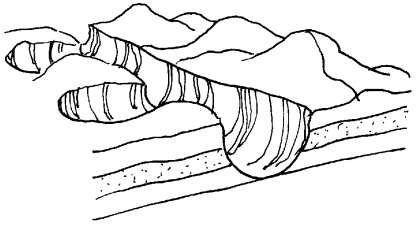


The second type of glacier, a continental glacier, forms on ice caps in the polar regions. Continental glaciers move in the summer when the ice and snow layers on their sides and bottom begin to melt. As these glaciers reach an ocean, huge blocks of ice break off into the water, creating icebergs.

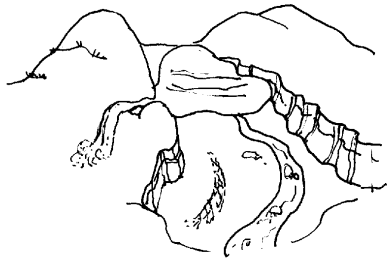


If the surrounding temperature is higher than normal, glaciers may melt early. As a glacier melts, it deposits large boulders and other debris that it has collected over time. Along the edges of a glacier, mounds of dirt and smaller debris are deposited. These areas are called moraines.

Long winding ridges called eskers are formed by moraine.

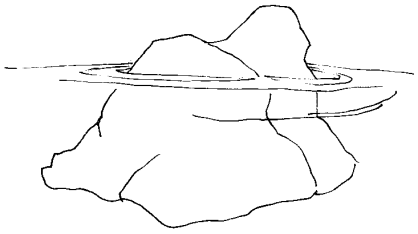


Glaciers move from a few inches to a few feet a day, depending on the slope of the mountain, the amount of snow that falls, and the size of the glacier. As a glacier moves, it erodes the land, creating a U-shaped valley with steep sides and a flat floor.



Sometimes a small lake is left behind in the glacier valley.

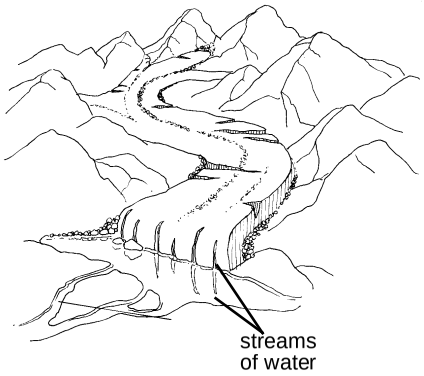
There are two kinds of glaciers: valley glaciers and continental glaciers. Valley glaciers are formed in high mountain valleys. When snow does not melt, it continues to build up over time. The weight and pressure of multiple layers of snow compacts forming glacial ice particles.



iceberg

As moving glaciers reach warmer lower altitudes, they melt, causing streams of water to move ahead of them.

The front of the glacier is called the snout.



Glaciers move downward like a slow-moving river of ice. They move because of gravity and their weight, and sometimes because of ice melting underneath them. As glaciers move, they collect all sizes of debris, from tiny rocks to huge boulders.

When a glacier moves because the bottom layers of ice are melting, it is called "basal slip."

Fascinating Physical Features of Earth

The longest glacier is Lambert/Fisher Ice Passage in Antarctica. It is 320 miles (515 km) long.