

Glacial Erosion



How Do Glaciers Form and Move?
7.2.7, 7.NS.8

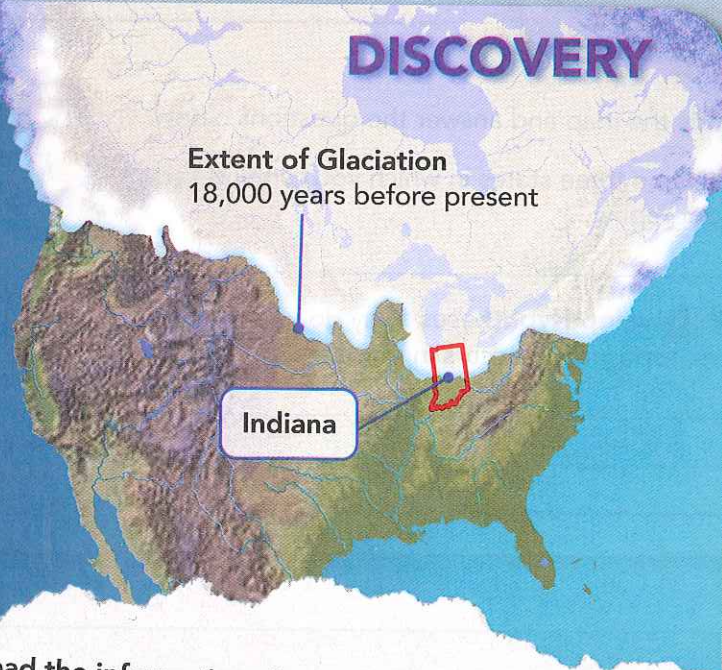
How Do Glaciers Cause Erosion and Deposition?
7.2.7

my planet DiARY for Indiana

Sculpting Rivers Into Lakes

Imagine a world covered in ice! Most of Indiana was exactly that during the last Ice Age. For a great part of the last 2 million years, a period geologists call the Pleistocene epoch, our planet went through long periods of extreme cold. During the last Ice Age, which ended about 10,000 years ago, the northern two-thirds of Indiana was covered by huge, continent-sized sheets of ice. These glaciers extended south to large, ancient rivers that ran along what would become the U.S.-Canada border. The ice masses advanced into the valleys and wore away the soft rock around them. The basins eventually filled with water as the glaciers melted, becoming the Great Lakes.

DISCOVERY



Read the information about the formation of the Great Lakes. Then answer the question below.

1. How did the Great Lakes form?

PLANET DIARY Go to Planet Diary to learn more about glacial erosion and deposition.



Do the Inquiry Warm-Up
How Do Glaciers Change the Land?

Vocabulary

- glacier • continental glacier
- ice age • valley glacier • plucking
- till • moraine • kettle

Skills

- 🎯 Reading: Relate Cause and Effect
- 🔺 Inquiry: Draw Conclusions

How Do Glaciers Form and Move?

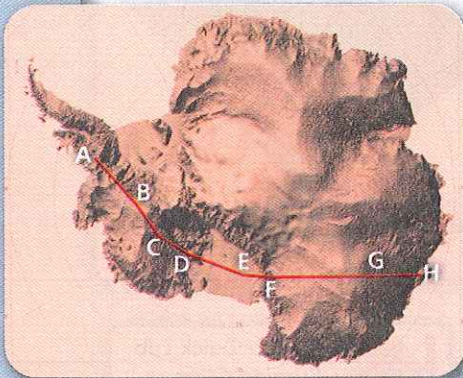
On a boat trip off the coast of Alaska you sail by evergreen forests and snowcapped mountains. As you round a point of land, you see an amazing sight. A great mass of ice winds like a river between rows of mountains. This river of ice is a glacier. Geologists define a **glacier** as any large mass of ice that moves slowly over land. 🗝️ **Glaciers can form only in an area where more snow falls than melts.** There are two kinds of glaciers—continental glaciers and valley glaciers.

Continental Glaciers A **continental glacier** is a glacier that covers much of a continent or large island. It can spread out over millions of square kilometers.

Today, continental glaciers cover about 10 percent of Earth's land. They cover Antarctica and most of Greenland.

🗝️ **Continental glaciers can flow in all directions as they move.** They spread out much as pancake batter spreads out in a frying pan. Many times in the past, continental glaciers have covered larger parts of Earth's surface. These times

are known as **ice ages.** About 1 million years ago, continental glaciers covered nearly one third of Earth's land. The glaciers advanced and retreated, or melted back, several times. They most recently retreated about 10,000 years ago.



Academic Standards for Science

7.2.7 Use geological features such as karst topography and glaciation to explain how large-scale physical processes have shaped the land.

7.NS.8 Analyze data.

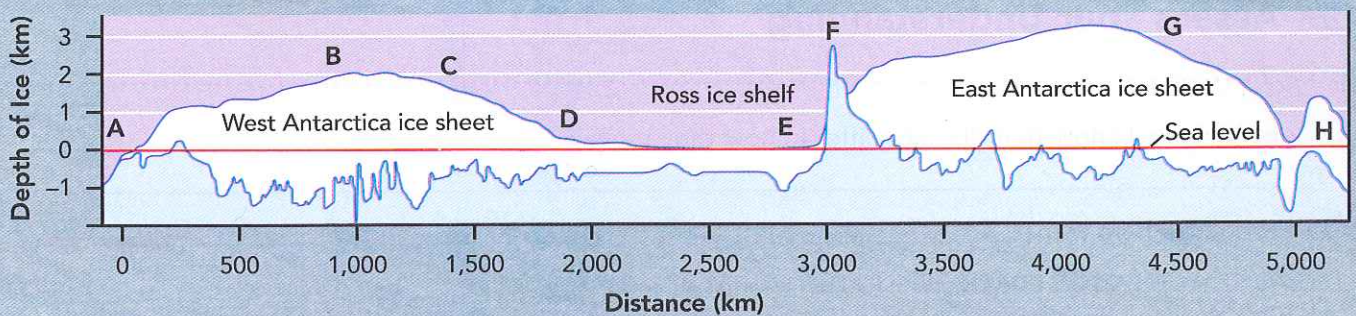
FIGURE 1

Continental Glaciers

You're traveling across Antarctica from Point A to Point H on the route below. The cross section shows changes in the ice sheet along your journey.

🖋️ **Interpret Diagrams** What changes in elevation and ice depth will you encounter?

7.NS.8





Valley Glaciers A **valley glacier** is a long, narrow glacier that forms when snow and ice build up high in a mountain valley. The sides of mountains keep these glaciers from spreading out in all directions. Instead, they usually move down valleys that have already been cut by rivers. Valley glaciers are found on many high mountains. Although they are much smaller than continental glaciers, valley glaciers can be tens of kilometers long.

High in mountain valleys, temperatures rarely rise above freezing. Snow builds up year after year. The weight of more and more snow compacts the snow at the bottom into ice.

Key Gravity constantly pulls a glacier downhill. Once the layer of snow and ice is more than about 30 to 40 meters deep, the glacier begins to move.

Valley glaciers flow at a rate of a few centimeters to a few meters per day. But a valley glacier that surges, or slides quickly, can move as much as 6 kilometers in a year.

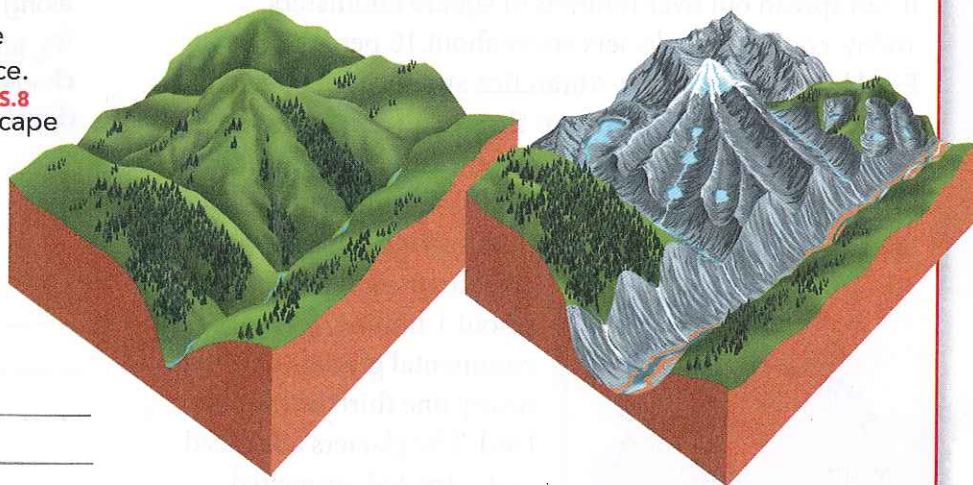
apply it!

When glaciers recede, they leave behind evidence of their existence.

7.NS.8

1 Observe What was the landscape like before glaciers formed?

2 Draw Conclusions What did the glaciers do to the area?



Before glaciers form

After glaciers have melted



Do the Quick Lab
Surging Glaciers.

Assess Your Understanding

got it?

I get it! Now I know that glaciers differ in how they move: _____


I need extra help with _____

Go to **my science** **COACH** online for help with this subject.

7.2.7

How Do Glaciers Cause Erosion and Deposition?

The movement of a glacier changes the land beneath it. Although glaciers work slowly, they are a major force of erosion.

 The two processes by which glaciers erode the land are **plucking and abrasion**.

Glacial Erosion As a glacier flows over the land, it picks up rocks in a process called **plucking**. Beneath a glacier, the weight of the ice can break rocks apart. These rock fragments freeze to the bottom of the glacier. When the glacier moves, it carries the rocks with it, as shown in **Figure 2**. Plucking can move huge boulders.

Many rocks remain on the bottom of the glacier, and the glacier drags them across the land. This process, called abrasion, gouges and scratches the bedrock.



Academic Standards for Science

7.2.7 Use geological features such as karst topography and glaciation to explain how large-scale physical processes have shaped the land.

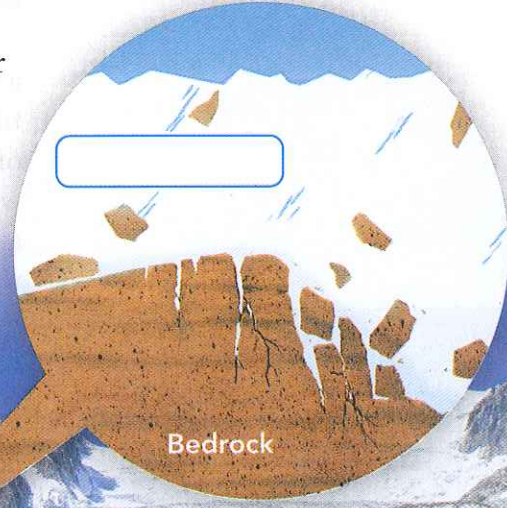
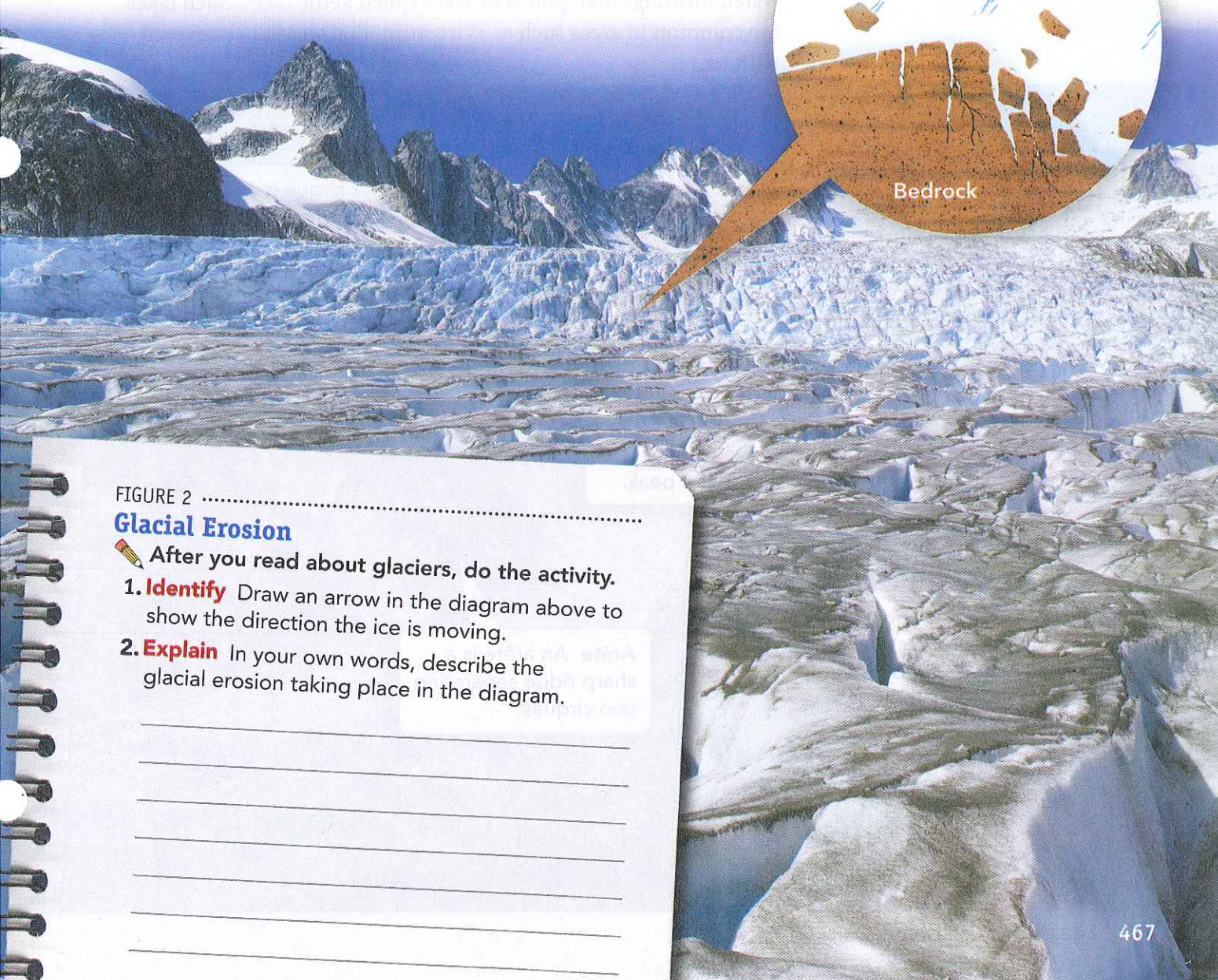



FIGURE 2


Glacial Erosion

 After you read about glaciers, do the activity.

1. **Identify** Draw an arrow in the diagram above to show the direction the ice is moving.
2. **Explain** In your own words, describe the glacial erosion taking place in the diagram.



Relate Cause and Effect As you read, underline the cause of glacial deposition and circle the effects.

Glacial Deposition A glacier gathers a huge amount of rock and soil as it erodes the land in its path.  When a glacier melts, it deposits the sediment it eroded from the land, creating various landforms. These landforms remain for thousands of years after the glacier has melted. The mixture of sediments that a glacier deposits directly on the surface is called **till**. Till is made up of particles of many different sizes. Clay, silt, sand, gravel, and boulders can all be found in till.

The till deposited at the edges of a glacier forms a ridge called a **moraine**. A terminal moraine is the ridge of till at the farthest point reached by a glacier. Part of Long Island in New York is a terminal moraine from the continental glaciers of the last ice age.

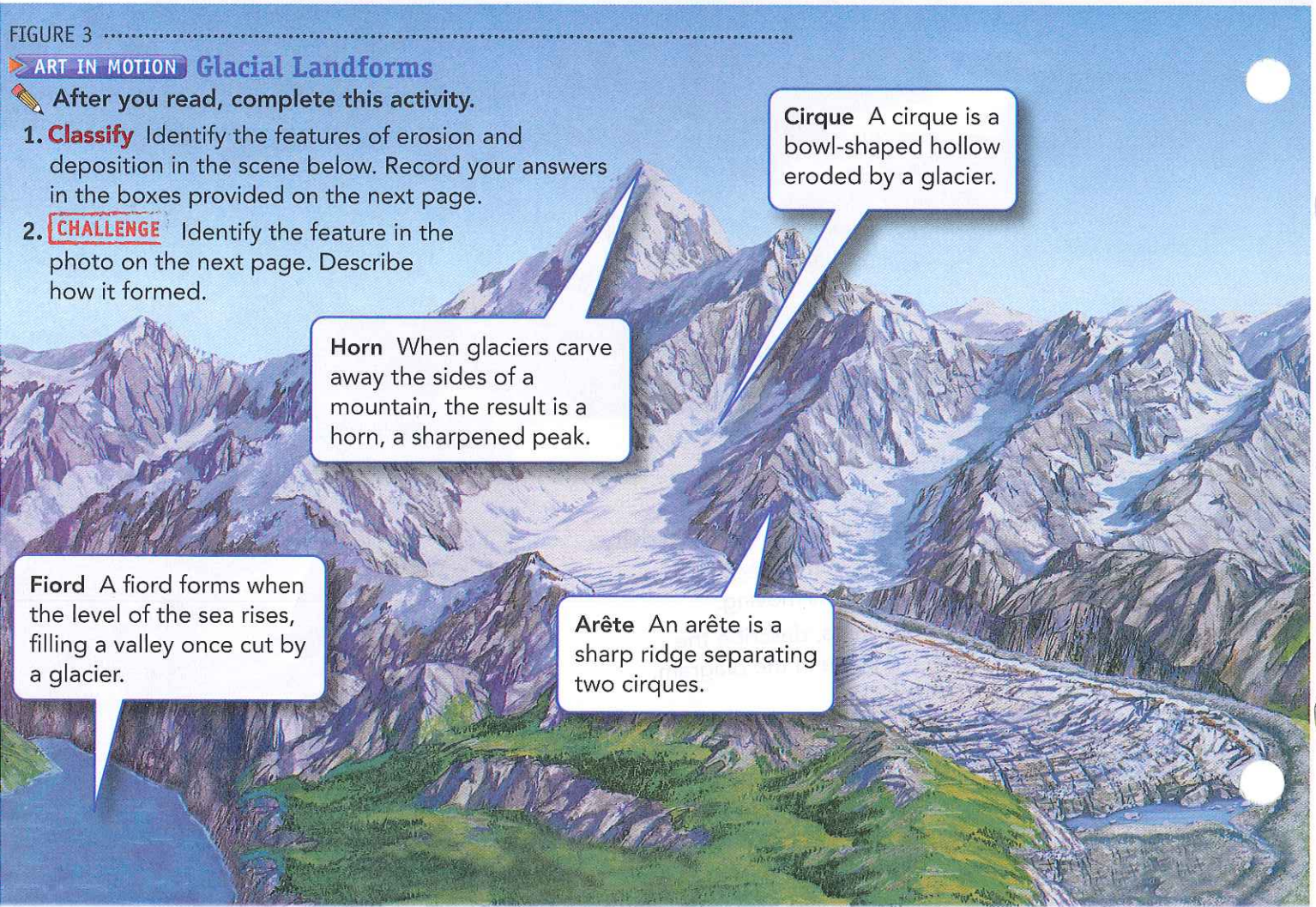
Retreating glaciers also create features called kettles. A **kettle** is a small depression that forms when a chunk of ice is left in glacial till. When the ice melts, the kettle remains. The continental glacier of the last ice age left behind many kettles. Kettles often fill with water, forming small ponds or lakes called kettle lakes. Such lakes are common in areas such as Wisconsin, that were once covered with ice.

FIGURE 3

ART IN MOTION Glacial Landforms

 After you read, complete this activity.

- Classify** Identify the features of erosion and deposition in the scene below. Record your answers in the boxes provided on the next page.
- CHALLENGE** Identify the feature in the photo on the next page. Describe how it formed.



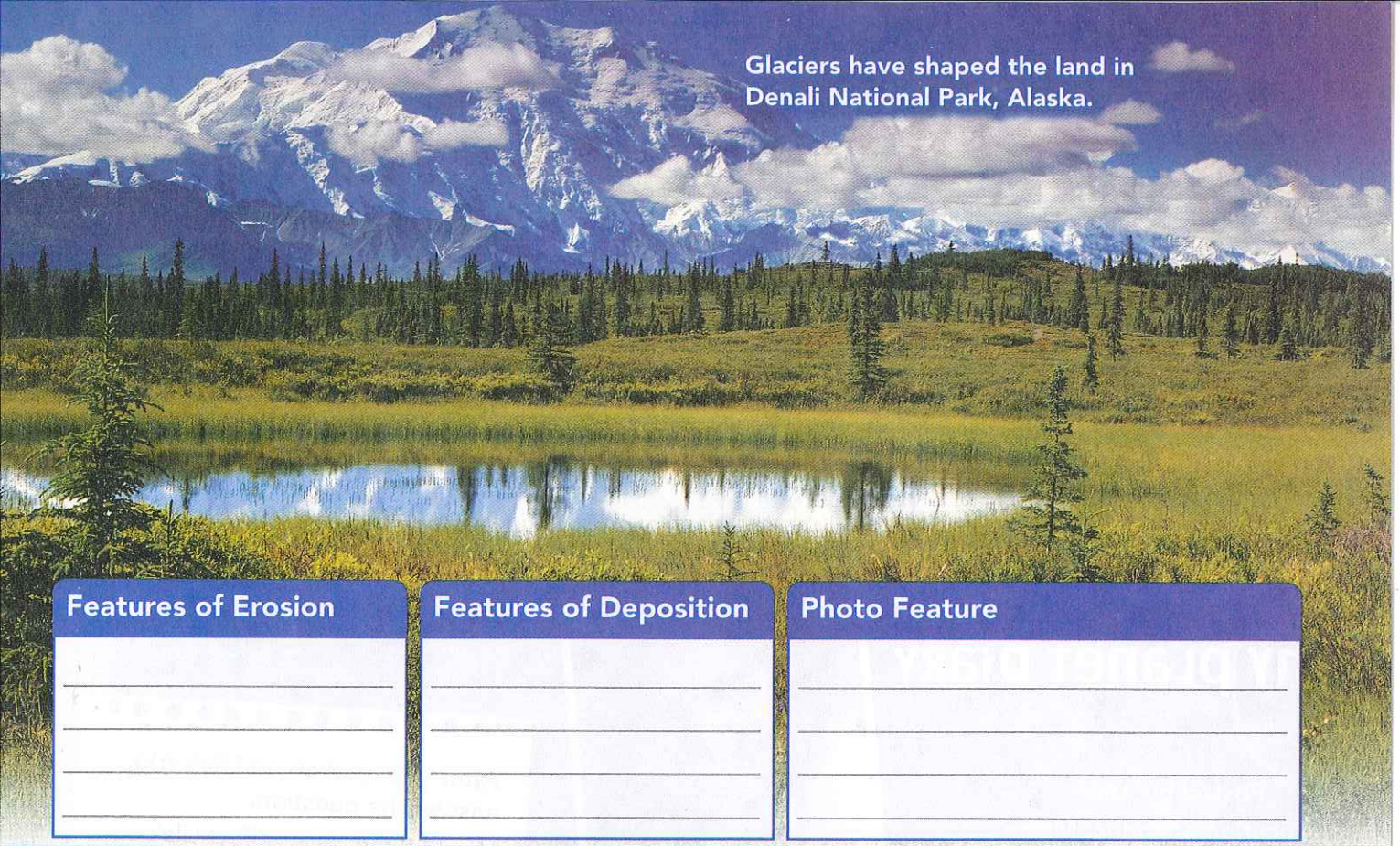
Cirque A cirque is a bowl-shaped hollow eroded by a glacier.

Horn When glaciers carve away the sides of a mountain, the result is a horn, a sharpened peak.

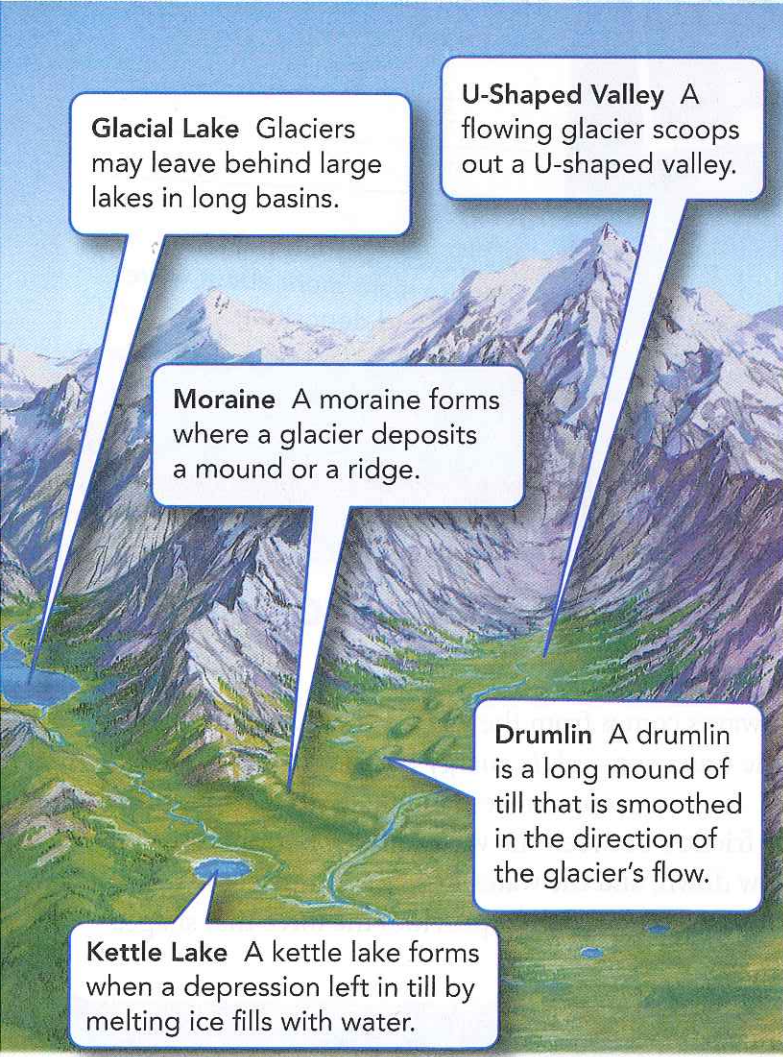
Fiord A fiord forms when the level of the sea rises, filling a valley once cut by a glacier.

Arête An arête is a sharp ridge separating two cirques.

Glaciers have shaped the land in Denali National Park, Alaska.



Features of Erosion	Features of Deposition	Photo Feature



Glacial Lake Glaciers may leave behind large lakes in long basins.

U-Shaped Valley A flowing glacier scoops out a U-shaped valley.

Moraine A moraine forms where a glacier deposits a mound or a ridge.

Drumlin A drumlin is a long mound of till that is smoothed in the direction of the glacier's flow.

Kettle Lake A kettle lake forms when a depression left in till by melting ice fills with water.

Lab[®] zone Do the Quick Lab *Modeling Valleys.*

Assess Your Understanding

1a. **Review** How do glaciers erode by abrasion?

 _____ **7.2.7**

b. **Describe** How does a moraine form?

 _____ **7.2.7**

got it?

- I get it! Now I know that glaciers shape the landscape through the processes of _____

- I need extra help with _____

Go to **my science COACH** online for help with this subject. **7.2.7**