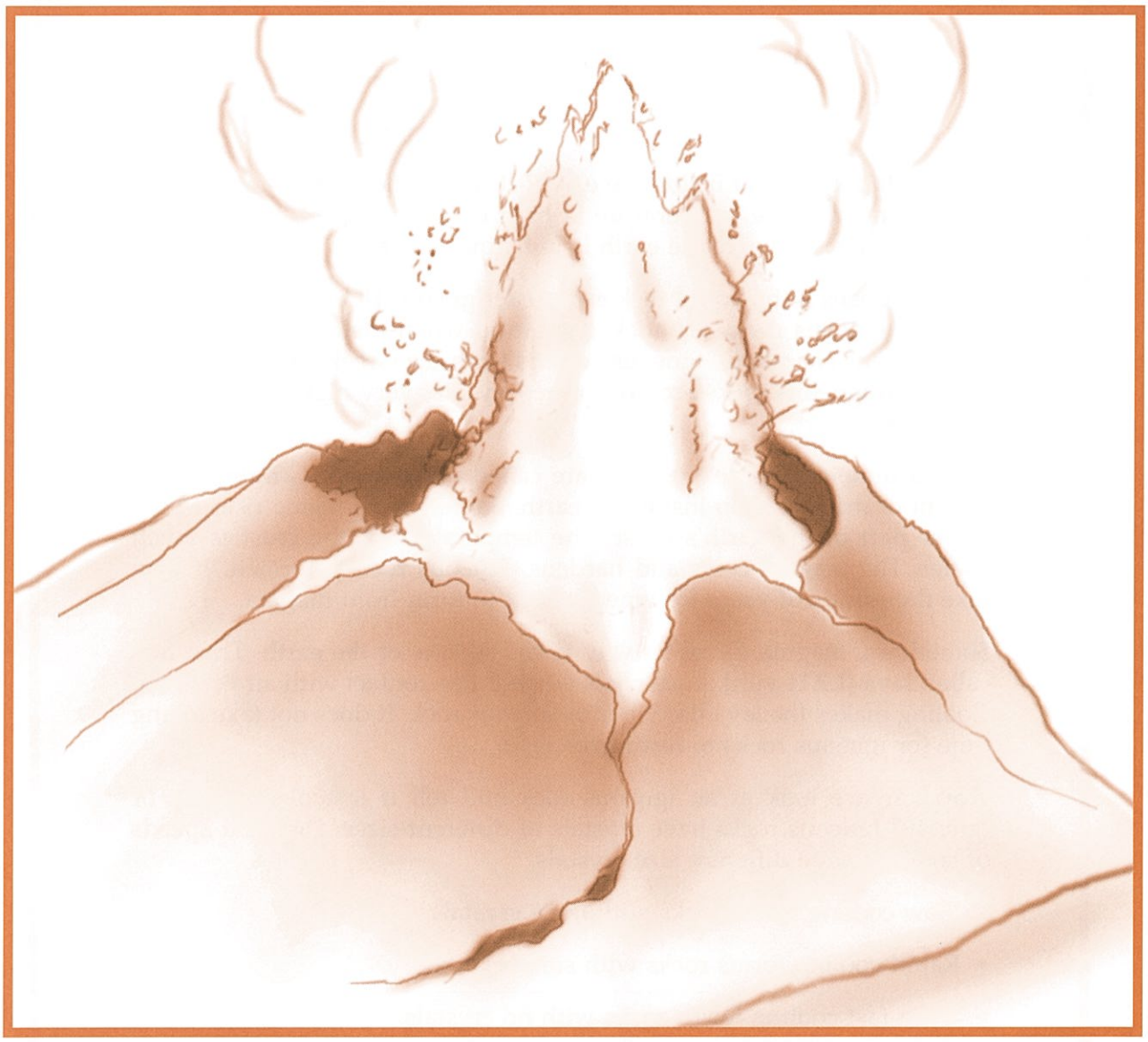
Lesson 9

What are igneous rocks?



KEY TERMS

igneous rocks: rocks that form from melted minerals

magma: molten rock inside the earth

lava: magma that reaches the earth's surface

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Do you think it is hot inside the earth? It is very hot. Between the crust and the mantle, the temperature is high enough to melt minerals. So, some of the rock inside the earth is in a liquid state.

What happens if the liquid rock is cooled? **Igneous** [IG-nee-us] **rocks** are formed. Igneous rocks are rocks that form when melted minerals cool and harden. The word "igneous" comes from the Greek word for "fire." Although igneous rocks are not formed by fire, very high temperatures melt rock.

Melted minerals inside the earth are called **magma** [MAG-muh]. There is a lot of magma deep inside the earth. Sometimes, magma rises to the upper part of the earth's crust. The temperature of the crust is much cooler. The magma cools and hardens. Igneous rock is formed. It may take thousands of years for igneous rock to form from magma.

Sometimes, magma forces its way to the surface of the earth. Then it is called **lava** [LAH-vuh]. Lava cools when it has contact with air or water. Cooling makes the lava harden into igneous rock. It does not take a long time for igneous rocks to form from lava.

How can we look at an igneous rock and tell if it cooled slowly or quickly? Igneous rocks have crystals of different sizes. Different speeds of cooling made different size crystals.

- Slow cooling forms rocks with large crystals.
- Rapid cooling forms rocks with small crystals.
- Extra-fast cooling forms rocks with no crystals.

The slower the cooling, the larger the crystals. The faster the cooling, the smaller the crystals.

SOME IGNEOUS ROCKS

Figure A *Granite*

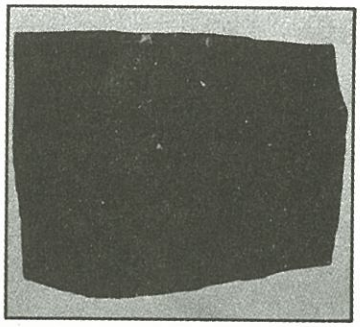

Figure B *Basalt*

Granite is the most common rock on the earth's surface. Granite has large crystals that you can see and feel. Igneous rocks with large crystals also are said to have large grains and a coarse texture. Basalt crystals are very tiny. You need a microscope to see them. Igneous rocks with small crystals have a fine texture.

1. Which igneous rock above has larger crystals? _____

2. This shows that it cooled _____ .
   slowly, quickly

3. Which rock above has small crystals? _____

4. This shows that it cooled _____ .
   slowly, quickly

5. Granite has a _____ texture. Basalt has a _____ texture.
   coarse, fine coarse, fine

Figure C *Pumice*

Pumice has many holes. But these holes are not crystals. They were made by gases.

Figure D *Obsidian*

Obsidian is called "natural glass."

6. Pumice and obsidian cooled _____ .
   extra fast, extra slow

WHAT DOES THE DIAGRAM SHOW?

Study Figure E. Then answer the questions below. You will have to figure out the answers from facts you have learned.

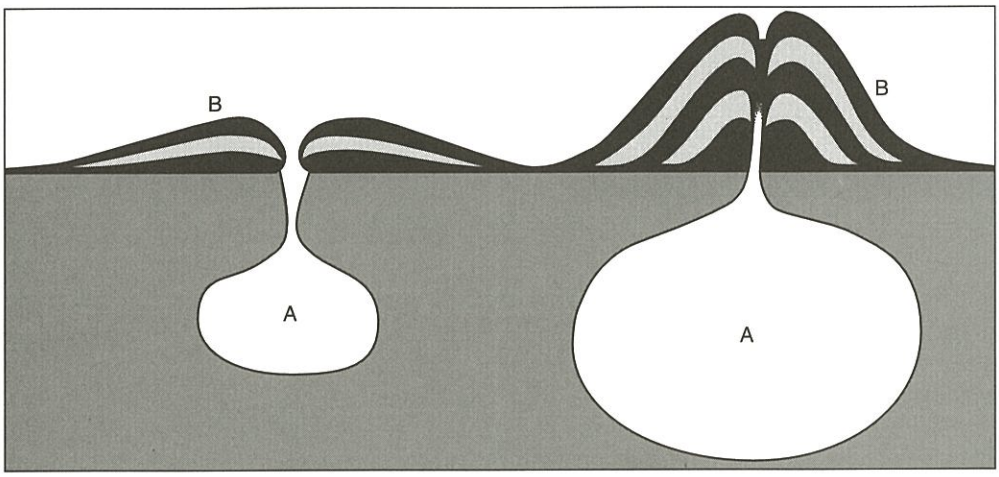

Figure E

This diagram shows two cone-shaped mountains formed by lava. Most people call these mountains volcanoes.

1. Lava is found at _____ (A, B).
2. Magma is found at _____ (A, B).
3. Magma cools _____ (slowly, quickly) because it is _____ (under the ground, on the earth's surface).
4. Lava cools _____ (slowly, quickly) because it is _____ (under the ground, on the earth's surface).
5. Igneous rocks with large crystals form from _____ (lava, magma).
6. Igneous rocks with small crystals or no crystals at all form from _____ (lava, magma).
7. Granite has _____ (large, small, no) crystals.
8. Pumice has _____ (large, small, no) crystals.
9. Granite may form at _____ (A, B).
10. Pumice may form at _____ (A, B).

FILL IN THE BLANK

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some words may be used more than once.

large	melted	granite
magma	lava	crystal
small	volcano	slowly

1. Igneous rocks were formed from _____ minerals.
2. Melted rock under the ground is called _____.
3. Melted rock that has come to the surface is called _____.
4. Lava may form a mountain called a _____.
5. An example of an igneous rock formed from magma is _____.
6. Granite crystals are _____ in size because granite cooled _____.
7. Grain size is another way of saying _____ size.
8. Basalt crystals are _____ in size.
9. Melted minerals that cool slowly form _____ size crystals.
10. Melted minerals that cool rapidly form _____ size crystals.

MATCHING

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

	Column A	Column B
_____	1. magma	**a)** from super-fast cooling
_____	2. lava	**b)** from fast cooling
_____	3. no crystals	**c)** melted minerals on the surface
_____	4. large crystals	**d)** melted minerals below the ground
_____	5. small crystals	**e)** from slow cooling

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

_____ **1.** Magma is solid.

_____ **2.** Magma contains minerals.

_____ **3.** Obsidian is called "natural glass."

_____ **4.** Magma is melted rock that has come to the surface.

_____ **5.** Lava cools faster than magma.

_____ **6.** Granite formed underground.

_____ **7.** Granite cooled rapidly.

_____ **8.** Granite has small crystals.

_____ **9.** Lava rocks usually have large grains.

_____ **10.** Fast cooling causes small grains.

_____ **11.** Basalt is an igneous rock.

_____ **12.** Basalt cooled slowly.

_____ **13.** Basalt has extra small crystals.

_____ **14.** Pumice was formed deep underground.

_____ **15.** Pumice has no crystals.

REACHING OUT

One of the igneous rocks discussed in this lesson can float on water.

1. Which rock is it? _____

2. Why can it float? _____