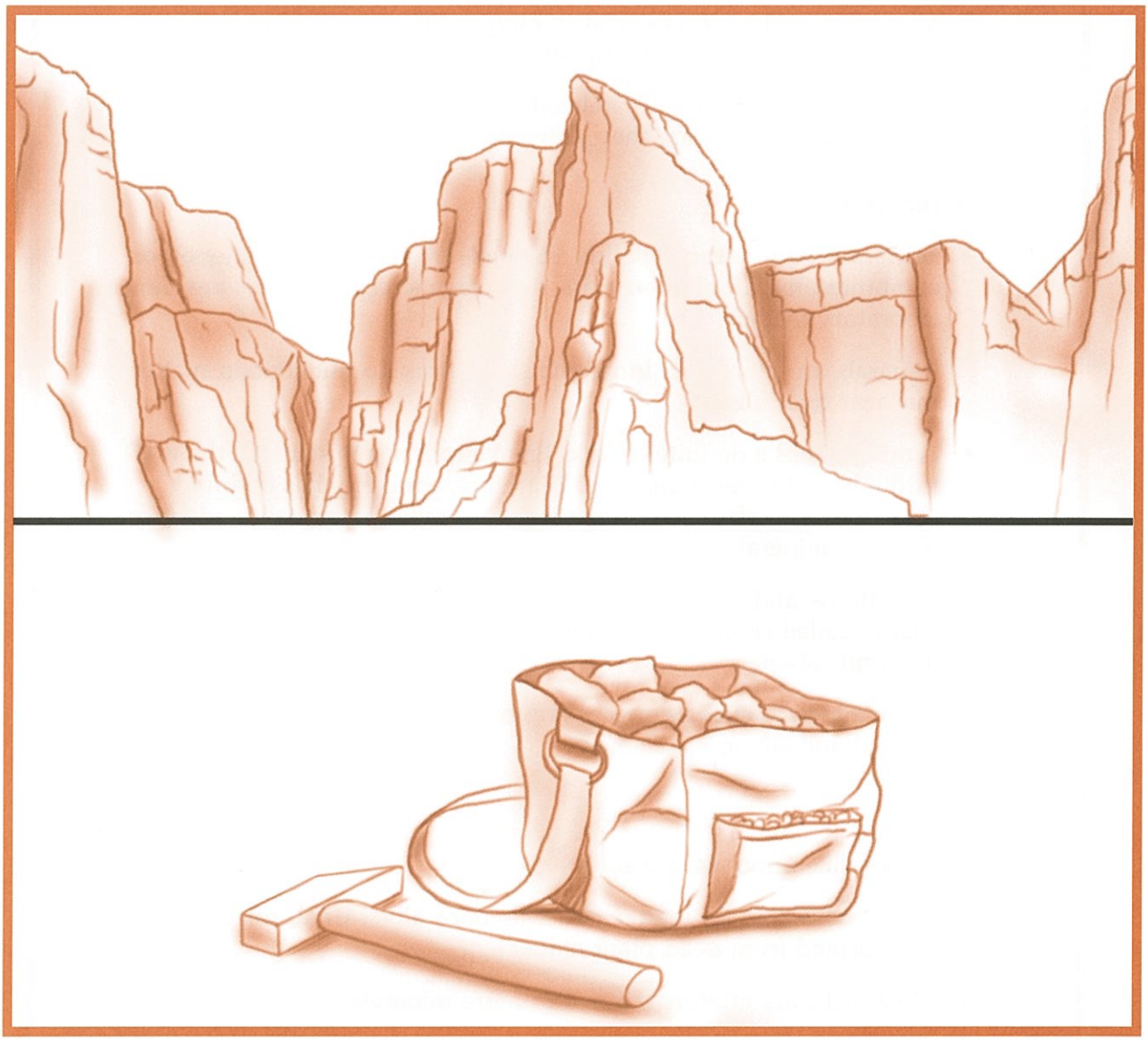
Lesson 6

What makes up the earth's surface?



KEY TERMS

minerals: natural solids formed from single elements or combinations of elements in the earth's crust

crystal: natural solid substance that has a definite shape

rock: natural solid formed from a single mineral or combination of minerals

LESSON 6 | What makes up the earth's surface?

Many people collect rocks and minerals. They are found almost everywhere. Did you ever pick up an interesting rock and study it?

Rocks and minerals are closely related, but they are not the same. How are they the same? How are they different?

MINERALS

- **Minerals** are natural solids formed from single elements or combinations of elements in the earth's crust. They are not laboratory made.
- Minerals are inorganic. Inorganic substances do not contain matter that was once alive.
- A mineral has a definite chemical makeup. It is the same all the way through, and it never changes. Therefore, a mineral has definite chemical and physical properties. Properties help us to identify different minerals.
- The atoms and molecules of most minerals are joined in regular shapes called crystals. A crystal is a natural solid substance that has a definite shape.
- Some minerals, such as quartz, are compounds. Other minerals, such as gold and silver, are elements.

ROCKS

- **Rocks,** like minerals, are solid.
- Some rocks contain matter that was once alive. Coal, for example, was formed from dead plant matter.
- Most rocks are mixtures of two or more minerals.
- A rock has no definite composition. One part may be different from another part. Therefore, a rock has no definite properties. Rocks cannot be grouped by properties.
- Rocks are grouped by the way they were formed. Rocks are formed in three ways; (1) when melted minerals cool and harden; (2) when pieces of rocks and minerals become cemented together; and, (3) when existing rocks are slowly changed by heat and pressure.

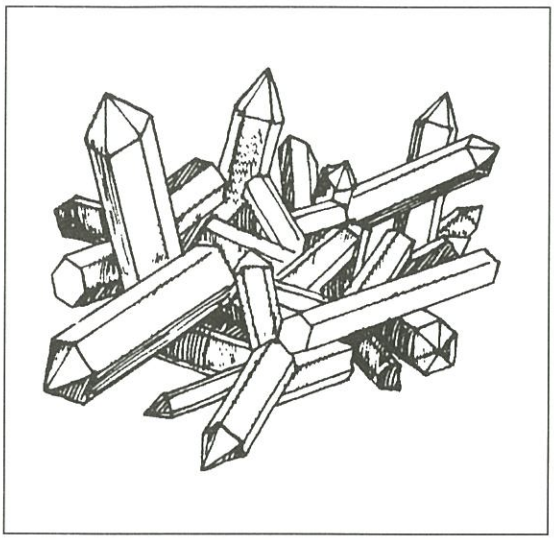


Figure A *Quartz*

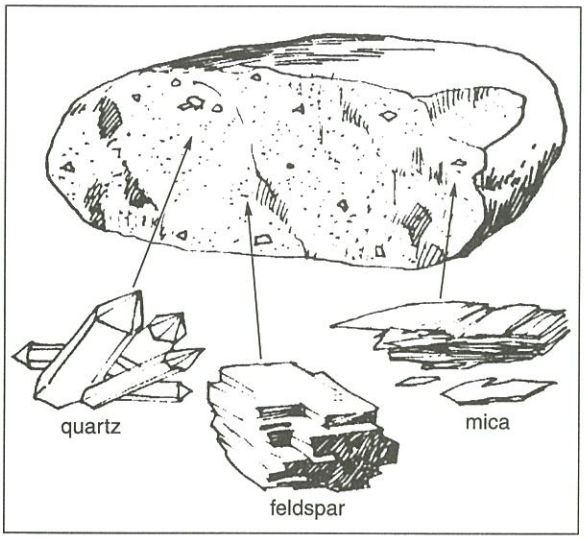


Figure B *Granite*

Quartz is a common mineral.

Quartz comes in many colors and sizes . . . but its natural shape is always the same.

The natural shape of most minerals is called its crystal form. The shape of a mineral's crystals helps us identify the mineral.

Use Figure A to answer the following.

1. How many sides does the mineral quartz have? _____
2. Does a quartz crystal always have this many sides? _____
3. What do we call the natural shape of a mineral? _____

Quartz also is known as silicon dioxide (SiO_2). Quartz is made up of silicon and oxygen.

4. Does the chemical makeup of quartz ever change? _____
5. Is every part of quartz the same? _____

Granite is common rock. Granite is a mixture of minerals quartz, feldspar, and at least one other material, such as mica, or hornblende.

Use Figure B to answer the following.

6. Is every part of granite the same? _____
7. Does granite have a definite chemical makeup? _____

CRYSTAL

As you already learned, almost all minerals are made up of tiny crystals. The atoms in a crystal are arranged in a certain pattern to form the shape. This pattern is repeated over and over. The crystals that make up a mineral always have the same shape, but may differ in size. For example, quartz crystals are hexagonal (six-sided). If you have a large piece of quartz, the crystals are hexagonal. If you have a small piece of quartz, the crystals are still hexagonal.

Usually the crystals of a mineral are very small. Large, single crystals are rare.

Each kind of mineral has a specific crystal shape. There are six basic shapes of crystals. Scientists use X rays to study the structure of a crystal. They can use the structure of the crystal to help identify minerals. Figure C shows the six basic crystal shapes.

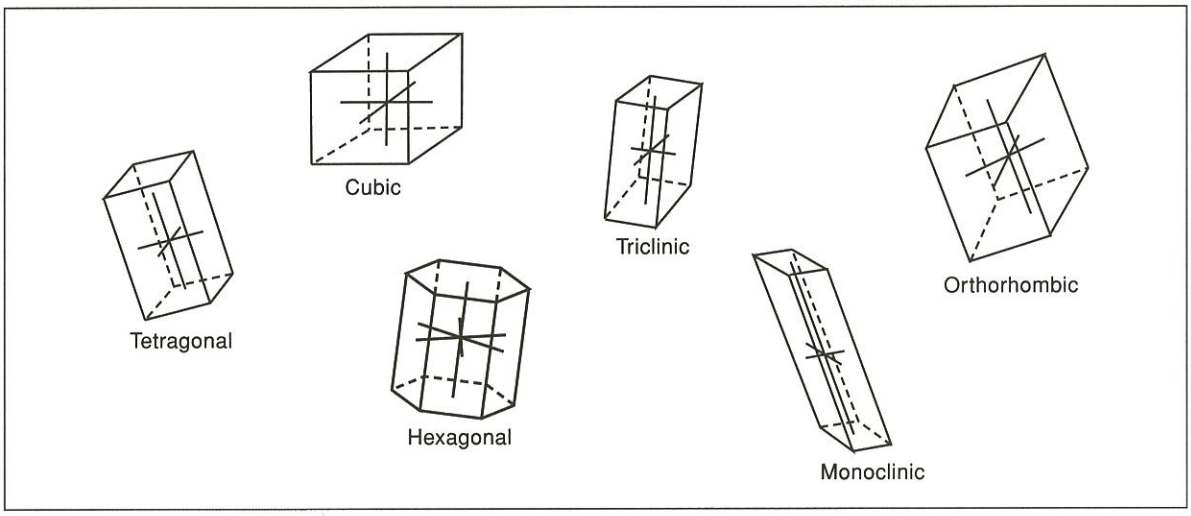


Figure C *The six basic crystal shapes*

Using Figure C and the preceding information, answer the following questions.

1. What are crystals? _____

2. What are the six main crystal shapes? _____

   _____

3. Why is it important to know the shape of a mineral's crystals? _____

   _____

4. How do you think the cubic crystal shape got its name? _____

   _____

5. What do scientists use to study crystal structure? _____

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.

six	do not	does
minerals	found in nature	formed
alive	crystal	properties

1. Minerals are always _____ .
2. Rocks _____ have definite _____ .
3. A mineral _____ have a definite chemical makeup.
4. Minerals have definite _____ that help us identify them.
5. There are _____ basic crystal forms.
6. Rocks contain matter that was once _____ .
7. Most rocks are mixtures of two or more _____ .
8. Rocks _____ have a definite chemical makeup.
9. Rocks are grouped by how they were _____ .
10. A _____ is a natural solid that has a definite shape.

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.** mineral	**a)** help us identify substances
_____	**2.** rock	**b)** a rock
_____	**3.** properties	**c)** definite chemical makeup
_____	**4.** a mixture of two or more minerals	**d)** made up of rocks and minerals
_____	**5.** earth's crust	**e)** grouped by how it was formed

TRUE OR FALSE

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

_____ **1.** The earth's crust is made up only of rocks.

_____ **2.** Minerals are made from rocks.

_____ **3.** Every part of a mineral is the same.

_____ **4.** Every part of a rock is the same.

_____ **5.** A mineral has a definite chemical makeup.

_____ **6.** A rock has a definite chemical makeup.

_____ **7.** The shape of a mineral's crystals help us identify the mineral.

_____ **8.** Quartz has hexagonal crystals.

_____ **9.** Minerals contain material from dead plants and animals.

_____ **10.** Rocks are grouped according to how they are formed.

MINERAL OR ROCK?

Complete the chart by putting a check mark, (✔) in the correct box.

	MINERAL	ROCK
1. definite chemical makeup		
2. no definite chemical makeup		
3. made of matter that was never alive		
4. sometimes has matter that was once alive		
5. properties always the same		
6. mixture of minerals		
7. coal		
8. granite		
9. quartz		
10. talc		