

What is the rock cycle?



KEY TERM

rock cycle: series of natural processes by which rocks are slowly changed from one kind of rock to another

LESSON | What is the rock cycle?

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January, February, March, April, . . . You name the next nine. What about spring, summer, . . . ? Which three go next? Months and seasons occur in cycles. A cycle is a series of events that happen over and over.

Nature has many kinds of cycles. The rise and fall of the tides is a cycle that occurs twice each day. Oxygen and carbon dioxide move through the environment in a cycle.

Another natural cycle is the rock cycle. You have learned that there are three classes of rocks: igneous, sedimentary, and metamorphic. However, rocks do not remain in the same form forever. They are constantly changing. In fact, any rock can change to another kind of rock. For example:

- Igneous and sedimentary rocks may be changed to metamorphic rock by great heat and pressure.
- Igneous, metamorphic, and sedimentary rocks can be exposed to the earth's surface. The forces of the weather then break them into fragments. The fragments may then form new sedimentary rock.

All kinds of rocks may become buried where temperatures are so high they melt into magma. In time, the magma can cool and harden into igneous rock.

The endless change of the rocks from one form to another is called the **rock cycle**. You can see a diagram of the rock cycle in Figure A on the next page. Notice that rock changes need not take place in any special order. The two-way arrows show that the changes can take place in any order.

Geologists believe that since the earth began about 4½–5 billion years ago, its crust has undergone several rock cycles.

THE ROCK CYCLE

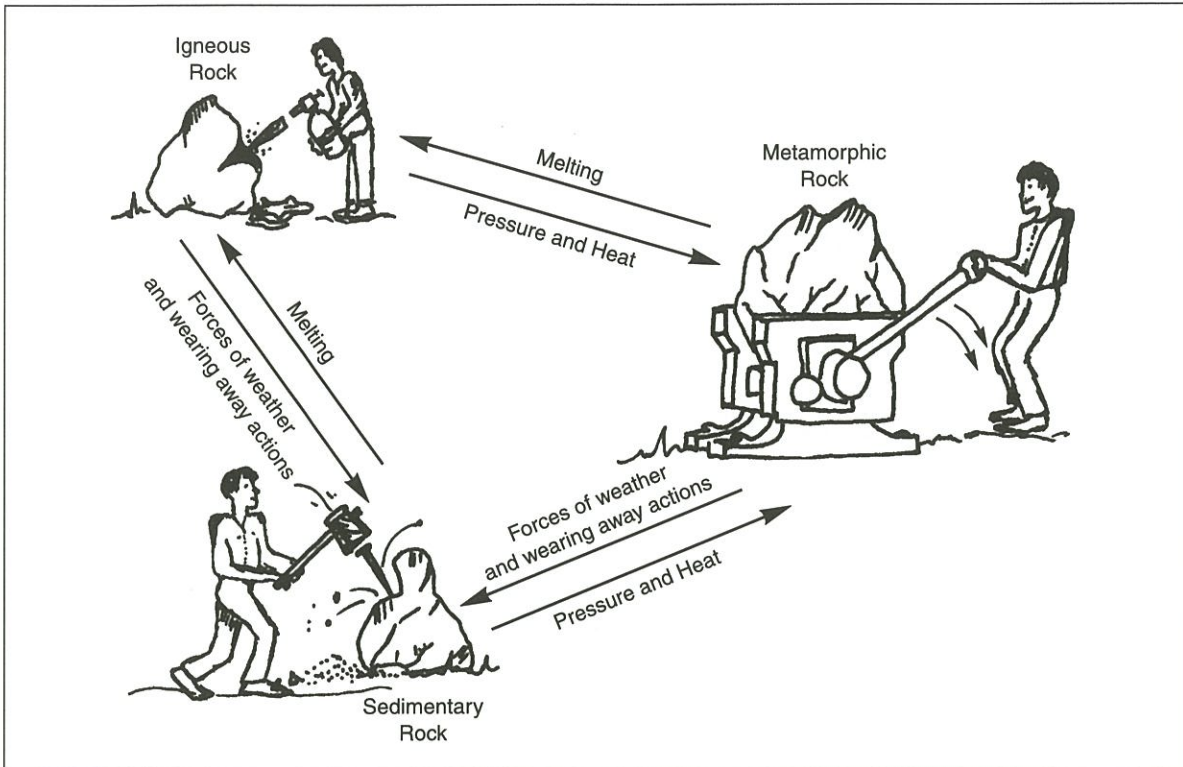


Figure A

Use Figure A to identify the cause or causes for each of the rock changes listed below.

	Change	Cause (or Causes)
1.	Igneous to sedimentary	
2.	Sedimentary to metamorphic	
3.	Sedimentary to igneous	
4.	Metamorphic to igneous	
5.	Igneous to metamorphic	
6.	Metamorphic to sedimentary	

INTERPRETING ROCK CYCLES

Figure A shows the basic rock cycle. However, rock changes are rarely that cut-and-dry. Usually there are in-between steps and shortcuts.

Figures B, C, D, and E show enlarged parts of the rock cycle as it might actually happen. Each diagram shows one or more possible routes. Each route is shown by an arrow.

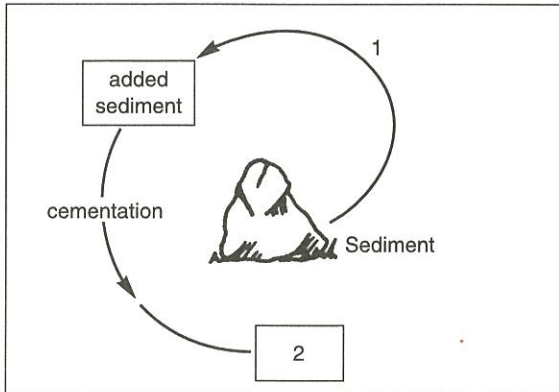


Figure B

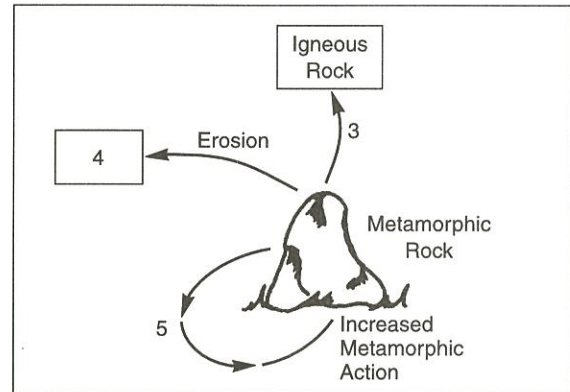


Figure C

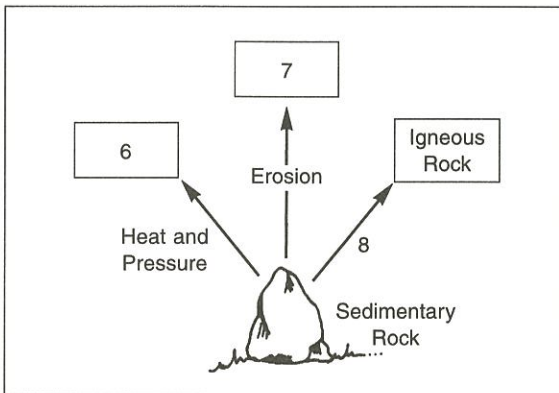


Figure D

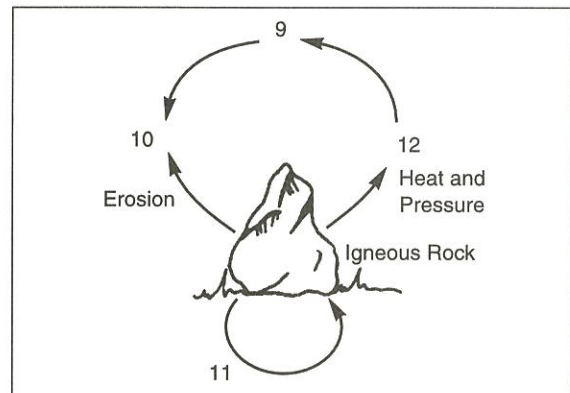


Figure E

Fill in the missing term that best describes each number in the diagrams. Choose from the following terms:

heat and pressure
metamorphic rock
erosion

melting and hardening
sediment
sedimentary rock

1. _____

7. _____

2. _____

8. _____

3. _____

9. _____

4. _____

10. _____

5. _____

11. _____

6. _____

12. _____

FILL IN THE BLANK

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided.

rocks
order
sedimentary

rock cycle
metamorphic
fragments

magma
igneous

1. There are three classes of _____ .
2. Molten rock material is called _____ .
3. Rock formed from rock fragments is called _____ rock.
4. Rock formed from molten minerals is called _____ rock.
5. Rock formed as a result of heat and pressure is called _____ rock.
6. Erosion can break rock into _____ .
7. The unending change of rocks from one form to another is called the _____ .
8. Rock changes can happen in any _____ .

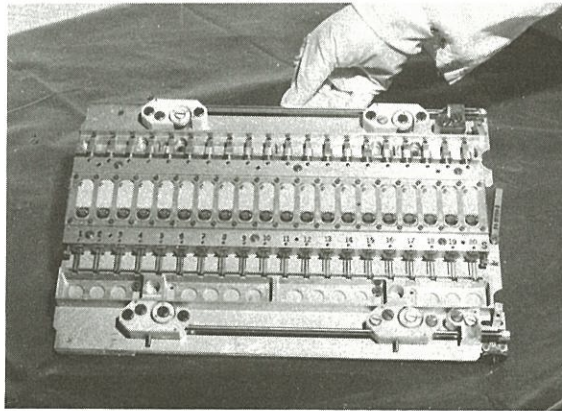
TRUE OR FALSE

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

- _____ 1. Weathering changes metamorphic rock to sediments.
- _____ 2. Magma cools to form sedimentary rock.
- _____ 3. Rocks have been changing since the beginning of the earth.
- _____ 4. Rocks are always changing.
- _____ 5. An increase in temperature will always change an igneous or sedimentary rock to a metamorphic rock.
- _____ 6. Igneous rock can only change into sedimentary rock.
- _____ 7. Some rocks contain materials that were once part of every rock type.
- _____ 8. Heat and pressure change sedimentary rock into igneous rock.

SCIENCE **EXTRA**

Growing Cleaner Crystals



At one time, all watches had to be set and wound up every day. Today, most modern watches are electronic. They operate by electricity supplied by a tiny battery. Do you own a watch? Chances are that it is battery powered. It also is likely that the term "quartz" or "quartz crystal" is printed somewhere on the face of the watch.

Crystals are the key to the electronics industry. Crystals of quartz are semiconductors. A semiconductor is a substance that is neither a conductor nor a nonconductor of electricity. It is "in-between." Such materials can be treated to transmit electricity in precise amounts. Semiconductors are used to manufacture many electronic devices, including transistors, microchips, and integrated circuits. In turn, these devices are used to make radios, television sets, computers, and many of the appliances we use today.

Crystals are found in nature. However, natural crystals are not pure enough for electronic use. They con-

tain too many impurities. Scientists have learned how to "grow" clean crystals in the lab. Clean crystals are more reliable and can be used to make smaller and faster electronics. This is especially important for high-tech computers, such as the ones used in scientific research, big business, and space exploration.

However, even "clean" crystals contain some impurities. The race is now on to remove even more of these impurities. Research has shown that crystals grow larger and cleaner in outer space. In outer space, there is little gravity, winds, and other "upsetting" influences that are found on the earth.

Research on crystal growth is done on the U.S. space shuttle and aboard the Russian space station *Mir*. Perhaps someday, large crystal-growing factories will orbit the earth. The crystals made in these factories will be so pure that devices that are impossible to build today will be commonplace.