

Rocks ▪ Guided Reading and Study

Metamorphic Rocks

This section explains how metamorphic rocks form, how they are classified, and how they are used.

Use Target Reading Skills

Look at Figure 17 and write two questions you have about the visuals in the graphic organizer below. As you read about metamorphic rocks, write the answers to your questions.

Q. Why do the crystals in gneiss line up in bands?
A. Gneiss is a type of metamorphic rock that is foliated - the crystals are flattened to form parallel layers.
Q. How does quartzite form from sandstone?
A. High temperature and pressure on the mineral in sandstone cause them to recrystallize grains to form quartzite.

Introduction

- List the two forces that can change rocks into metamorphic rocks.
 - heat
 - pressure

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Metamorphic Rocks *(continued)*

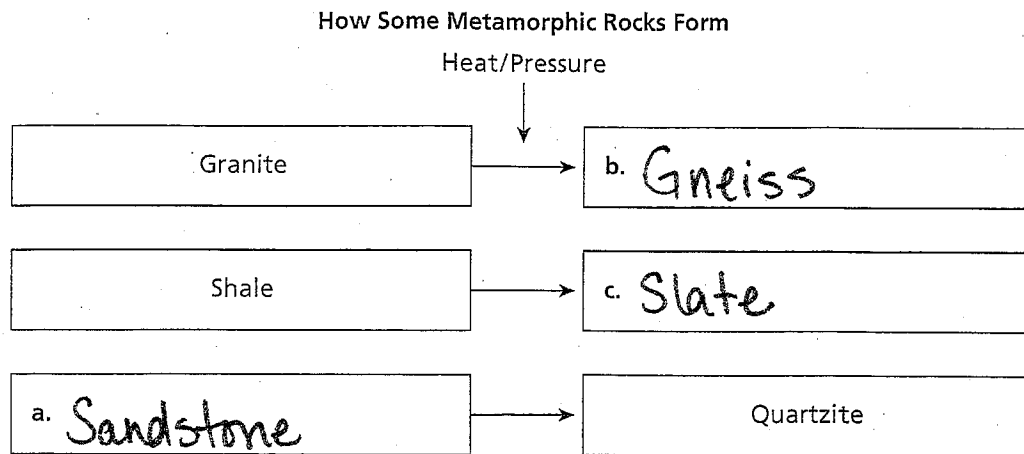
2. Is the following sentence true or false? Metamorphic rocks form deep beneath Earth's surface. true
3. How do rocks change when they become metamorphic rocks?
in texture, appearance, crystal structure, and mineral content
4. What kinds of rocks can be changed into metamorphic rocks?
igneous, sedimentary, and other metamorphic rock
5. Is the following sentence true or false? The deeper a rock is buried in the crust, the less pressure there is on that rock. false

Types of Metamorphic Rocks

6. Is the following sentence true or false? Geologists classify metamorphic rocks by the arrangement of grains making up the rocks.
true
7. Metamorphic rocks with grains arranged in parallel layers or bands are said to be foliated.
8. Circle the letter of each type of metamorphic rock that is foliated.
 a. slate
b. quartzite
 c. gneiss
d. marble
9. Metamorphic rocks with grains arranged randomly are said to be nonfoliated.
10. List two examples of nonfoliated metamorphic rocks.
a. marble
b. quartzite

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11. Complete the flowchart to show the metamorphic rocks that are formed.



d. What does the flow chart show is happening to the rocks to the left?

The rocks have been changed into different rocks by heat and pressure.

Uses of Metamorphic Rock

12. Why is marble useful for buildings and statues? Marble can be cut into thin slabs or carved into many shapes, and it is easy to polish.

13. What are some of the ways that slate is used? Slate splits easily into flat pieces that can be used for flooring, roofing, outdoor walkways, chalkboards, and as trim for stone buildings.

Rocks • Enrich

The Metamorphic Rocks

Tremendous pressure and high temperatures can change any rock into metamorphic rock. In addition, hot magma flows upward into rock near these boundaries. Such intense conditions change one kind of rock into another, such as shale, a sedimentary rock, into slate, a metamorphic rock. But what happens if the pressure and temperature continue to increase after shale becomes slate? Look at Figure 1 below. Increasing pressure and temperature change the slate into schist, and the schist changes into gneiss.

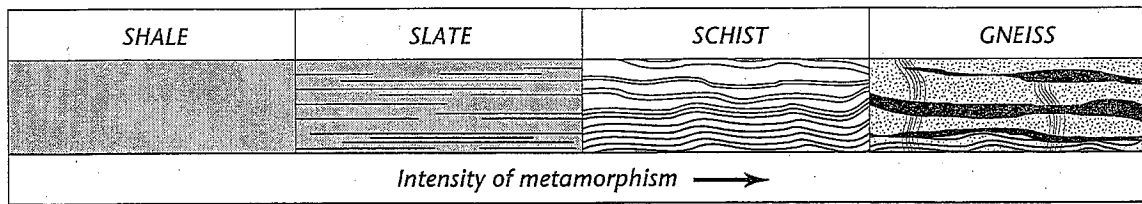


Figure 1

Gneiss and schist are the most common metamorphic rocks. Gneiss is a foliated rock usually composed of quartz and feldspar. Schist is also foliated, but its mineral composition varies. The terms gneiss and schist actually describe certain textures of metamorphic rock. That's why both shale and granite can change into gneiss, and both granite and basalt can change into schist. Figure 2 shows common metamorphic rocks to the right. The rocks on the left are igneous and sedimentary rocks. The arrows represent the pressure and temperatures that cause the formation of metamorphic rocks.

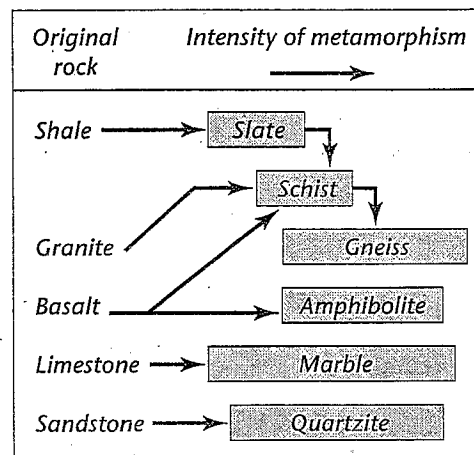


Figure 2

Answer the following questions on a separate sheet of paper.

1. What causes shale to change into slate? *Tremendous pressure and high temperatures*
2. What happens to the slate if these conditions increase?
Slate → schist → gneiss
3. What are gneiss and schist? *These are foliated metamorphic rocks*
4. How do tremendous pressures and high temperatures affect limestone? *changes it to marble*
5. How does metamorphism affect basalt? *changes to amphibole or schist*
6. What rocks can change into schist? *slate, granite and basalt*
7. How does increased metamorphism affect schist?
Schist changes into Gneiss