

Minerals and Rocks ▪ *Guided Reading and Study*

MacGregor

Properties of Minerals (pp. 44–52)

This section explains what minerals are and how they can be identified.

Use Target Reading Skills

As you read about properties of minerals, use the headings to complete the outline below.

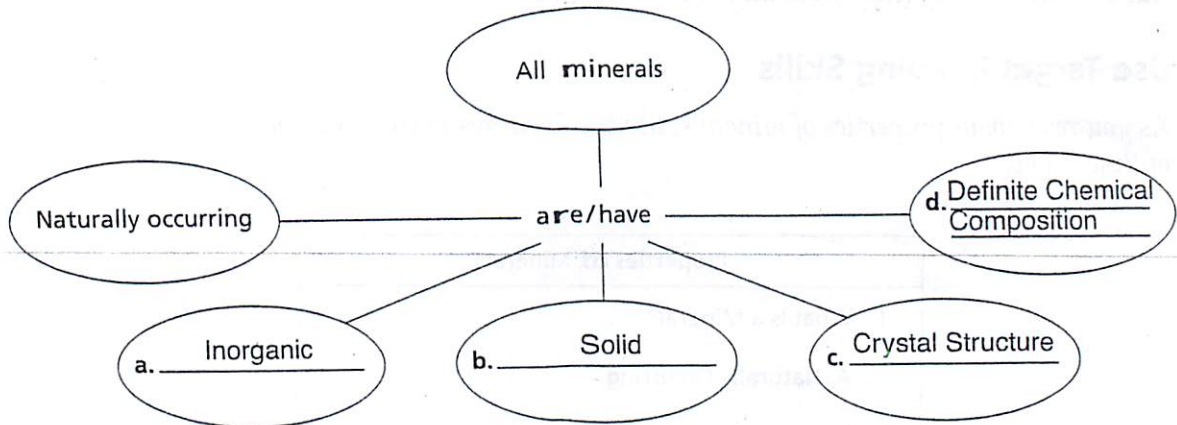
Properties of Minerals	
I. What Is a Mineral?	
A. Naturally Occurring	
B. Inorganic	
C. <u>Solid</u>	_____
D. <u>Crystal Structure</u>	_____
E. <u>Definite Chemical Composition</u>	_____
II. Identifying Materials	
A. Color	
B. <u>Streak</u>	_____
C. <u>Luster</u>	_____
D. Density	
E. <u>Hardness</u>	_____
F. <u>Crystal Systems</u>	_____
G. <u>Cleavage and Fracture</u>	_____
H. Special Properties	

What Is a Mineral? (pp. 44–45)

1. Because minerals are formed by processes that occur in the natural world, they are said to be _____ naturally occurring.
2. Complete the concept map that shows characteristics of minerals.

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Properties of Minerals (continued)



e. Use the concept map to write a definition of a mineral in your own words. You may use more than one sentence.

A mineral is naturally occurring, inorganic, and solid. It has a crystal structure and a definite chemical composition.

3. Because minerals do not come from living things, they are said to be inorganic.
4. A substance that keeps its shape because its particles can't flow freely is a(n) solid.
5. A solid with flat sides that meet at sharp edges and corners is called a(n) crystal.

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6. Is the following sentence true or false? A mineral always contains certain elements in definite proportions. true

7. Is the following sentence true or false? Almost all ~~Very few~~ minerals are compounds. false true

8. A substance formed when two or more elements combine and lose their distinct properties is a(n) compound .

9. In what two ways can elements occur in nature?

 in a pure form and as part of a compound

10. What are some examples of minerals that occur as elements instead of compounds? copper, silver, and gold

Identifying Minerals (pp. 46–52)

11. Is the following sentence true or false? Geologists have identified about 3,800 ~~500~~ minerals. false

12. Is the following sentence true or false? Each mineral has its own specific properties. true

13. Why can't color alone be used to identify most minerals?
 Different minerals may have the same color.

14. The color of a mineral's powder is its streak .

15. The term that describes how a mineral reflects light from its surface is luster .

16. Is the following sentence true or false? Minerals containing metals often have a shiny luster. true

17. Circle the letter of each sentence that is true about the density of a mineral.

- a. A given mineral can have varying densities.
- b. The larger the sample of a mineral, the greater its density.
- (c.) Each mineral has a characteristic density.
- (d.) The density of a mineral is its mass divided by its volume.

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Properties of Minerals (continued)

18. What is the Mohs hardness scale? _____
_____ a scale that ranks ten minerals from softest to hardest
19. The softest known mineral is talc. The hardest known mineral is diamond.
20. Is the following sentence true or false? A mineral can scratch any mineral ~~harder~~ softer than itself. false true
21. Is the following sentence true or false? Each piece of a mineral has the same crystal structure. true
22. How do geologists classify crystal structures? _____
_____ into six groups based on the number and angle of the crystal faces

Match the term with its definition.

Term	Definition
<u>a</u> 23. cleavage	a. A mineral's ability to split easily along flat surfaces
<u>c</u> 24. fracture	b. A mineral's ability to glow under ultraviolet light
<u>b</u> 25. fluorescence	c. The way a mineral looks when it breaks

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Classifying Rocks (pp. 54–57)

This section explains how geologists classify rocks.

Use Target Reading Skills

As you preview the headings in this section, complete the graphic organizer with questions in the left column. Then as you read, fill in the answers in the second column.

Question	Answer
What does a rock's color tell about the rock?	It can provide clues about the rock's mineral and chemical composition.
How do geologists describe a rock's texture?	Geologists use terms based on the size, shape, and patterns of the grains.

Introduction (p. 54)

1. Earth's crust is made of _____ rock.
2. Circle the letter of each characteristic that geologists use to classify rocks.

- a. texture
- b. mineral composition
- c. hardness
- d. color

Mineral Composition and Color (p. 55)

3. What are rocks made of? _____ mixtures of minerals and other materials

4. Circle the letter of each mineral that is found in granite.
 - a. quartz
 - b. feldspar
 - c. mica
 - d. hornblende

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Classifying Rocks (continued)

Texture (p. 56)

5. Is the following sentence true or false? Most rocks ^{cannot} be identified by color alone. false

6. The look and feel of a rock's surface is its texture.

7. Particles of minerals and other rocks that make up a rock are called grains.

8. Is the following sentence true or false? A rock's grains give the rock its texture. true

9. Circle the letter of each sentence that is true about the grain size in rock.

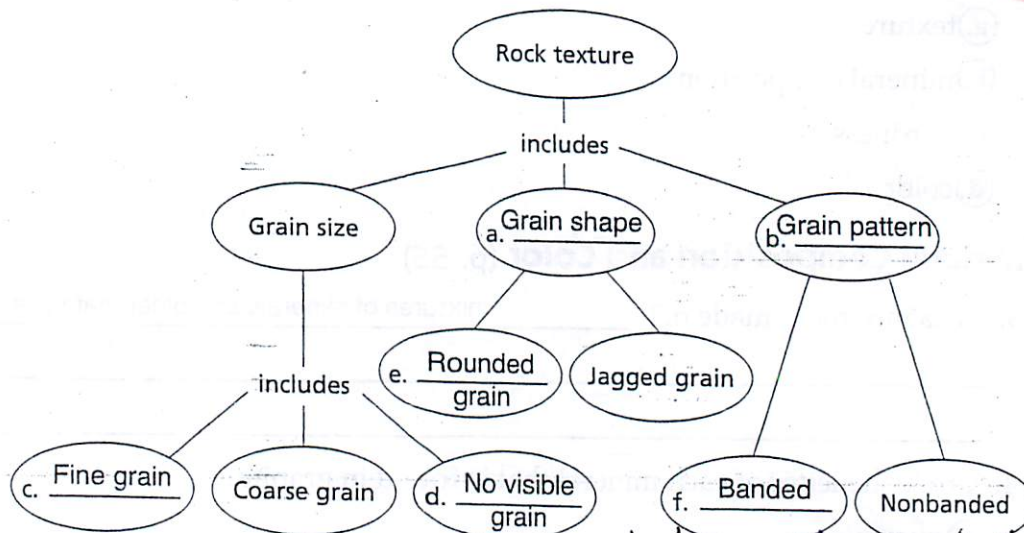
(a) An example of a coarse-grained rock is diorite.

(b) An example of a fine-grained rock is slate.

c. Grains in fine-grained rock are easy to see.

d. Grains in coarse-grained rock are microscopic.

10. Complete the concept map showing the characteristics of rock texture.



g. Is the following sentence true or false? ^{Banded or Nonbanded} Coarse grain is a term that describes a rock's grain pattern. false ^{are}

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11. Circle the letter of the choice that determines the grain shape of a rock such as granite.
- (a) Shape of the rock's crystals b. Size of the rock's crystals
c. Shape of fragments of other rock d. Coarseness of the rock's grains
12. Circle the letter of the choice that determines the grain shape of a rock such as conglomerate.
- a. Fineness of the rock's grains b. Size of the rock's grains
c. Shape of the rock's crystals (d) Shape of fragments of other rock
13. Circle the letter of the description of the grain pattern of gneiss.
- (a) It looks like different colors in bands.
b. It looks like a stack of pancakes.
c. It looks like waves.
d. It looks like rows of squares and rectangles.
14. Circle the letter of the sentence that is true about rocks with no visible grain.
- no → (a) Some rocks without crystal grains cooled very quickly.
(b) Some rocks have no visible grain even under a microscope.
c. Rocks without crystal grains look rough and coarse.
d. An example of a rock with a glassy texture is slate.

How Rocks Form (p. 57)

15. How do geologists classify a rock? _____ according to its origin
- _____
- _____

16. List the three major groups of rock.

- a. _____ igneous
b. _____ sedimentary
c. _____ metamorphic

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Classifying Rocks (continued)

17. Complete the compare/contrast table to show the similarities and differences among the types of rocks and how they form.

How Rocks Form	
Type of Rock	How It Forms
a. Igneous	Molten rock cools.
b. Sedimentary	Particles are pressed and cemented.
c. Metamorphic	Existing rock is changed.

d. What do the three major types of rocks have in common? The three groups are alike because they are all rock, which means they are mixtures of minerals and other materials.

e. How are they different? They are different in the ways they are formed.

18. The type of rock that forms from magma or lava is igneous rock.

19. The type of rock that forms in layers is sedimentary rock.

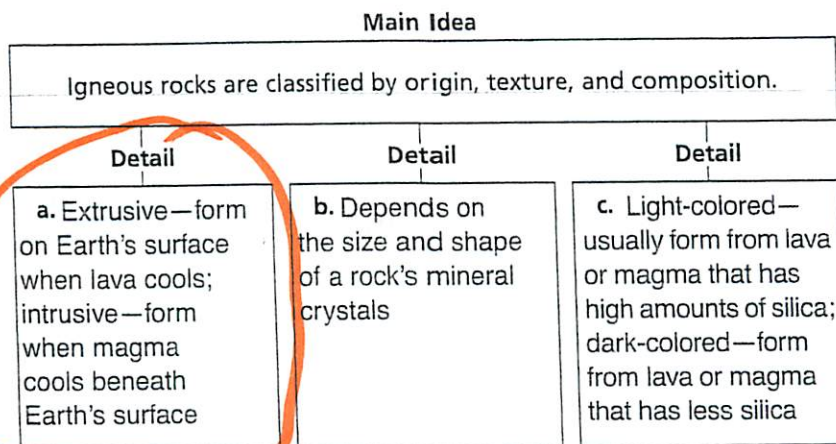
20. Is the following sentence true or false? Most metamorphic rocks form deep underground close to the surface. false true

Minerals and Rocks ▪ *Guided Reading and Study***Igneous Rocks** (pp. 58–61)

This section describes the characteristics and uses of igneous rocks.

Use Target Reading Skills

As you read about igneous rocks, fill in the detail boxes that explain the main idea in the graphic organizer below.

**Classifying Igneous Rocks** (pp. 58–60)

1. Circle the letter of the definition of igneous rock.

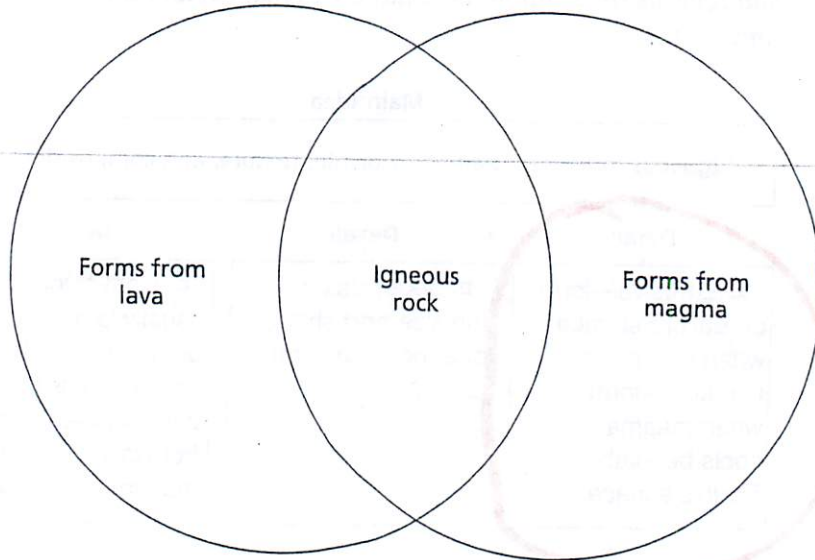
- a. Rock that forms from minerals
- b. Rock that contains iron
- c.** Rock that forms from magma or lava
- d. Rock that contains crystals

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Igneous Rocks (continued)

2. Complete the Venn diagram by labeling each circle with the type of rock it represents.

a. Extrusive Rock b. Intrusive Rock



c. Use the Venn diagram to explain how the types of rock shown are alike and different. The two types of rock are different because they form in different ways. The two types are alike because they are both igneous rock.

3. Is the following sentence true or false? Extrusive rock forms ~~beneath~~ from lava Earth's surface. false true that erupted onto Earth's surface

4. Circle the letter of each sentence that is true about basalt.

- (a) It forms oceanic crust.
- b. It is the most common intrusive rock.
- (c) It forms from lava.
- d. It forms beneath Earth's surface.

5. Circle the letter of each sentence that is true about granite.

- (a) It is the most abundant intrusive rock in continental crust.
- (b) It forms the core of many mountain ranges.
- (c) It forms from magma.
- d. It forms on top of the crust.

6. The texture of an igneous rock depends on the size and shape of its crystals.

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7. Is the following sentence true or false? Igneous rocks with similar mineral compositions ~~always have the same textures.~~
_____ false may have very different

Match the type of texture of igneous rocks with how rocks of that texture form.

Type of Texture	How Rocks of That Texture Form
<u>b</u> 8. fine-grained	a. Magma cools in two stages.
<u>c</u> 9. coarse-grained	b. Lava cools rapidly.
<u>a</u> 10. porphyry rock	c. Magma cools slowly.

11. Is the following sentence true or false? Intrusive rocks have ~~smaller~~ larger crystals than extrusive rocks. _____ ~~false~~ true

12. A rock with large crystals surrounded by small crystals is called _____ porphyry.

13. What type of texture do extrusive rocks such as basalt have?
_____ fine-grained or glassy texture

14. What is obsidian? _____ an extrusive rock that cooled very rapidly without forming crystals

15. Describe the texture of obsidian. _____ It has the smooth, shiny texture of a thick piece of glass.

16. Circle the letter of each sentence that is true about the silica composition of igneous rocks.
- a. Igneous rocks low in silica are usually dark-colored.
 - b. An example of an igneous rock low in silica is granite.
 - c. Igneous rocks high in silica are usually light-colored.
 - d. An example of an igneous rock high in silica is basalt.

17. Describe the different minerals that determine the color of granite.
_____ Granite that is rich in reddish feldspar is a speckled pink. Hornblende and dark mica give the color of light gray with dark specks. Quartz crystals add light gray or smoky specks.

18. How do geologists determine the mineral composition of granite?
_____ They make very thin slices of granite and study each type of crystal in the rock under a microscope.

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Igneous Rocks (continued)

Uses of Igneous Rocks (p. 61)

19. Why have people throughout history used igneous rocks for tools and building materials? Igneous rocks are hard, dense, and durable.

20. Describe three ways granite has been used throughout history. coarse-grained crystals of different shapes

- a. Egyptians used granite for statues.
- b. The Incas of Peru fitted together great blocks of granite and other igneous rocks to build a fortress near their capital city.
- c. In the United States during the 1800s and early 1900s, granite was widely used to build bridges and public buildings and for paving streets with cobblestones.

21. Complete the table that shows the ways igneous rocks are used.

How Some Igneous Rocks Are Used	
Type of Igneous Rock	Way It Is Used
Basalt	Gravel for construction
a. Pumice	Cleaning and polishing
b. Basalt	Soil mixes

c. Use the information in the table to draw a conclusion about the uses of igneous rocks. You may use more than one sentence.

Different types of igneous rocks have characteristics that make them suitable for specific uses. Igneous rocks are used in a wide variety of ways.

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Sedimentary Rocks (pp. 62–66)

This section describes how sedimentary rocks form and how they are classified and used.

Use Target Reading Skills

As you read about sedimentary rocks, use the headings to complete the outline below.

Sedimentary Rocks	
I. From Sediment to Rocks	
A. Erosion	
B. <u>Deposition</u>	
C. <u>Compaction</u>	
D. Cementation	
II. Types of Sedimentary Rock	
A. <u>Clastic Rocks</u>	
B. Organic Rocks	
C. <u>Chemical Rocks</u>	
D. _____	
III. <u>Uses of Sedimentary Rocks</u>	

From Sediment to Rock (pp. 62–63)

1. What remains of living things may sediment include? _____
_____ shells, bones, leaves, and stems
2. Small, solid pieces of material that come from rocks or living things are called _____ sediment _____.
3. Is the following sentence true or false? Sedimentary rocks form from particles deposited by water and wind. _____ true _____

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Sedimentary Rocks (continued)

4. List three forces that can carry sediment.
- a. running water
 - b. wind
 - c. ice

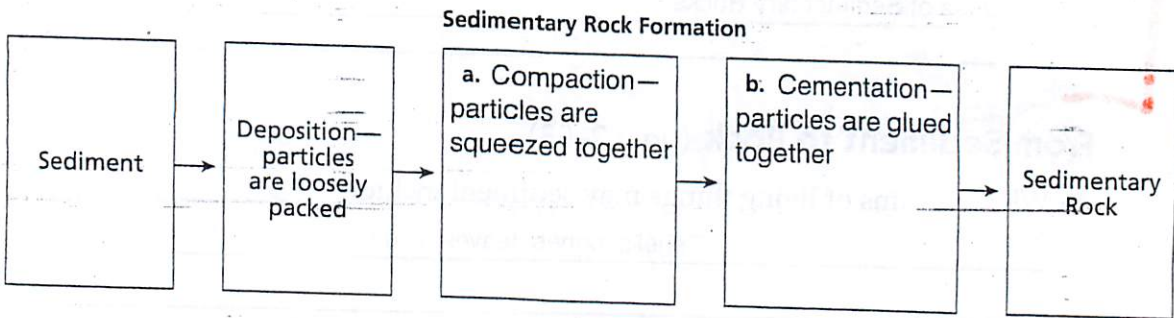
Match the process with its description.

Process	Description
<u>c</u> 5. erosion	a. Dissolved minerals glue sediments together.
<u>d</u> 6. deposition	b. Sediments are pressed together in layers.
<u>b</u> 7. compaction	c. Water or wind loosen and carry away fragments of rock.
<u>a</u> 8. cementation	d. Sediments settle out of water or wind.

9. What happens to rock fragments and other materials carried by water?
They sink to the bottom of a lake or ocean.

- 10.** The process in which thick layers of sediment press down on the layers beneath them is called compaction.

- 11.** Complete the flowchart to show how sediment is turned into sedimentary rock and what happens to it at each step.



- c. Describe what happens to sediment as it is changed to sedimentary rock. The particles in sediment are being exposed to greater pressure at each step.

- 12.** Is the following sentence true or false? It takes millions of years for sedimentary rock to form. true

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Types of Sedimentary Rock (pp. 64–65)

13. How do geologists classify sedimentary rock? _____
 _____ according to the type of sediments that make up the rock

14. List the three major groups of sedimentary rock.

- a. _____ clastic _____
- b. _____ organic _____
- c. _____ chemical _____

Different processes from each

15. Is the following sentence true or false? ~~The same process forms all types~~
 of sedimentary rock. _____ false _____

16. Is the following sentence true or false? Clastic rocks form when rock
 fragments are squeezed together. _____ true _____

17. How are clastic rocks classified? They are grouped by the size of the rock fragments, or
particles of which they are made.

18. Complete the table to show the different materials from which clastic
 rock forms.

How Clastic Rock Forms	
Type of Clastic Rock	Material From Which It Forms
a. Shale	Tiny particles of clay
b. Sandstone	Small particles of sand
c. Conglomerate	Different-sized rock fragments <i>rounded</i>

d. How are the types of clastic rocks shown in the table similar and
 different? ~~They are similar in that they are formed from other rocks.~~ They are different in
 that the particles of rocks from which they are made have different sizes.

19. The type of rocks that form where the remains of plants and animals are
 deposited in thick layers is called _____ organic _____ rock.

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Sedimentary Rocks (continued)

20. List two important organic rocks.
- a. _____ coal
 - b. _____ limestone
21. Organic rock that forms from the remains of swamp plants buried in water is _____ coal
22. How does organic limestone form? Coral, clams, oysters, and other living things in the ocean that have hard shells or skeletons made of calcite die. Their shells pile up on the ocean floor in layers. Over millions of years, compaction and cementation change the sediment to limestone.
23. Circle the letter of each sentence that describes a way that chemical rocks can form.
- a. Minerals that are dissolved in a solution crystallize.
 - b. Sediments of plants and animals form oil and other chemicals in rock.
 - c. Mineral deposits form when seas or lakes evaporate.
 - d. Tiny particles of clay are cemented together with chemicals.
24. Is the following sentence true or false? Some limestone is considered to be a chemical rock. _____ true
25. Rock salt crystallizes from the mineral _____ halite

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Uses of Sedimentary Rocks (p. 66)

26. Why have sandstone and limestone been used as building materials for thousands of years? Both types of stones are soft enough to be cut easily into blocks or slabs.

27. Is the following sentence true or false? The White House in Washington, D.C., is built of limestone. ^{sand stone} false

28. What are some ways that builders today use sandstone and limestone?
for decorating or for covering the outside walls of buildings

29. Is the following sentence true or false? Limestone is used for making cement. true

Breccia is a sedimentary rock with jagged rock fragments cemented together

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Metamorphic Rocks (pp. 67–69)

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 minerals in sandstone cause them to recrystallize grains to form quartzite.

Introduction (p. 67)

1. List the two forces that can change rocks into metamorphic rocks.
 - a. _____ heat - from the mantle
 - b. _____ pressure

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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 appearance, texture, 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~~ ^{more} pressure there is on that rock. _____ false _____

Types of Metamorphic Rocks (pp. 67-68)

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

- fine grained crystals in thin foliated layers

b. quartzite _____

c. gneiss _____

d. marble _____

9. Metamorphic rocks with grains arranged randomly are said to be

_____ nonfoliated _____

do not split into layers

10. List two examples of nonfoliated metamorphic rocks.

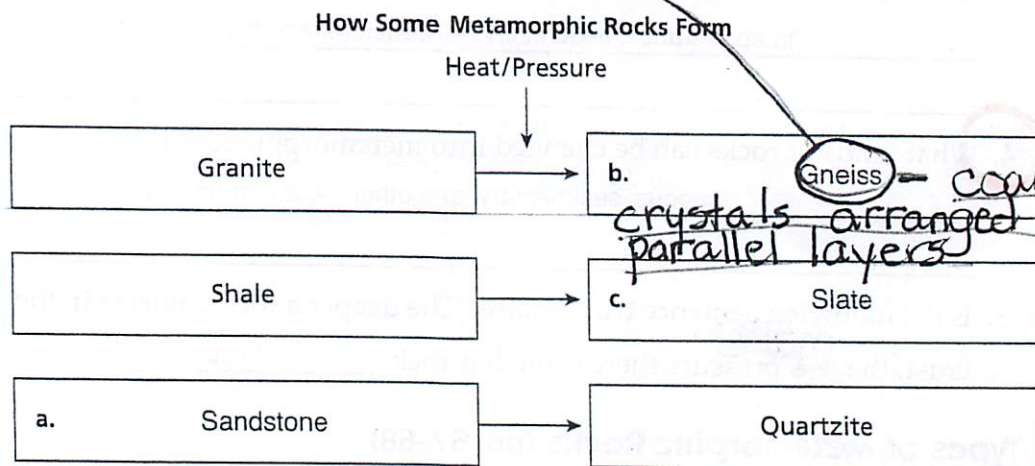
a. _____ marble _____

b. _____ quartzite _____

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Metamorphic Rocks (continued)

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



d. What does the flowchart show is happening to the rocks at the left?

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

Uses of Metamorphic Rock (p. 69)

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, and chalkboards, and as trim for stone buildings.

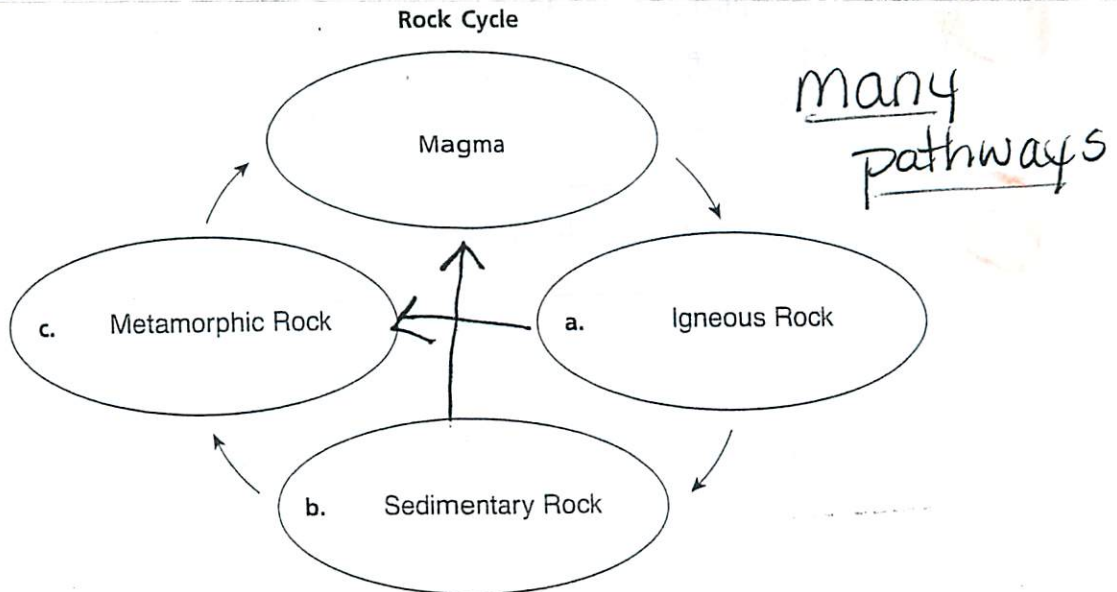
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The Rock Cycle (pp. 70–72)

This section describes the cycle that builds, destroys, and changes rocks in Earth's crust. The section also explains how this cycle is related to movements in Earth's crust.

Use Target Reading Skills

As you read about the rock cycle, fill in the cycle diagram below. Write each stage of the rock cycle in a separate circle.



Introduction (p. 70)

1. What forces move rocks through the rock cycle?

forces deep inside Earth and at the surface

movement of tectonic plates
mantle = liquid rock

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Rock Cycle *(continued)*

A Cycle of Many Pathways (pp. 70–72)

- 2. The series of processes that slowly change rocks from one kind to another is referred to as the _____ rock cycle.
- 3. Is the following sentence true or false? ~~All~~ ^{may} rocks follow ^{many different} the same pathway through the rock cycle. True ~~false~~
- 4. How could granite be changed into sandstone? Water and wind wear away the granite.
The granite particles become sand and are carried by streams to the ocean. Over time, layers of sandy sediment pile up on the ocean floor. The sediment changes to sandstone.
- 5. How do forces inside Earth drive the rock cycle? Forces inside Earth cause motions of the crust that help to form sedimentary and metamorphic rocks. They also help to form magma, the source of igneous rocks.