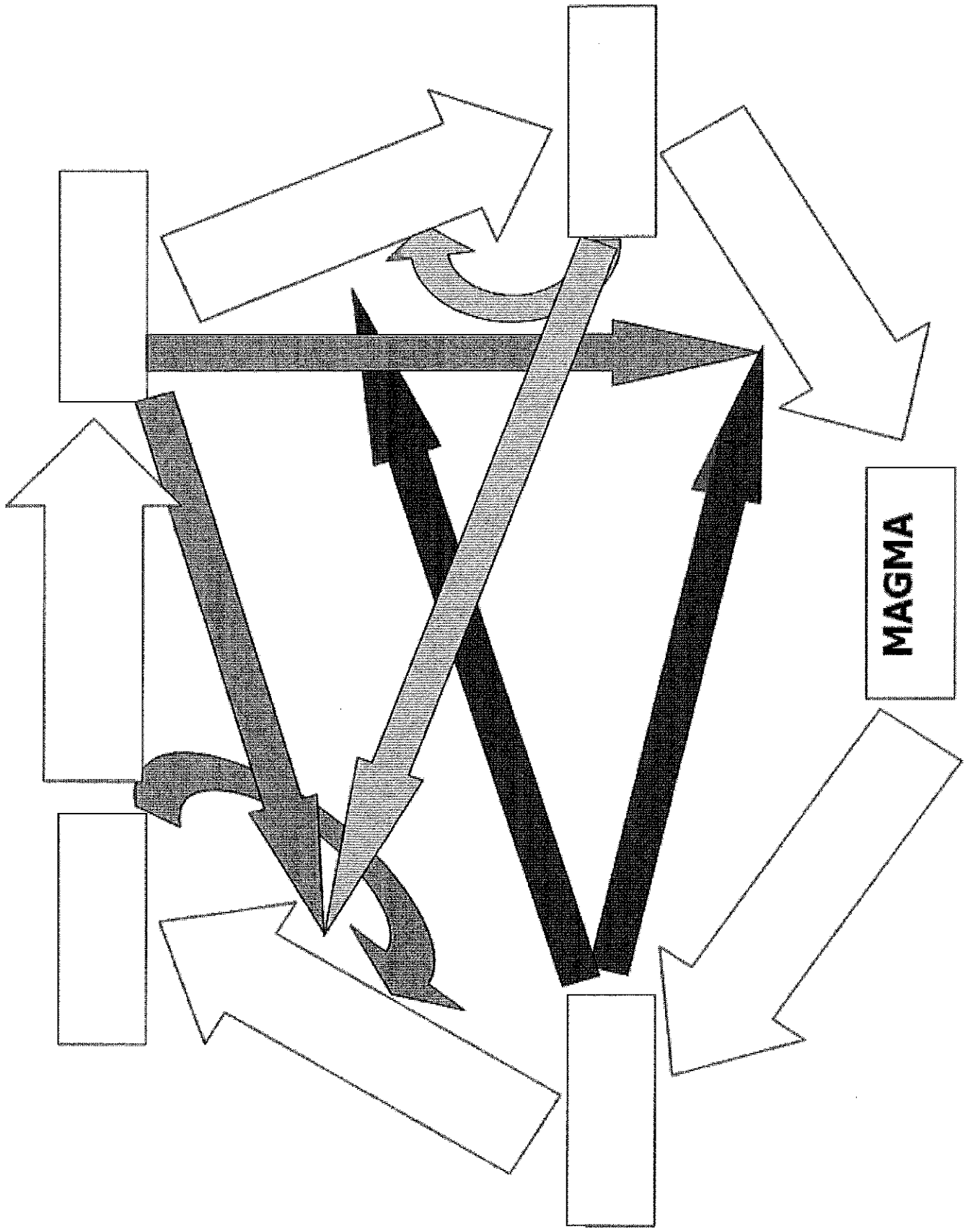


Rock Cycle Video Questions/Notes

Answer the questions as the video plays. Fill in the Rock Cycle Chart on back when prompted.

1. T or F : The rock cycle is a continuous cycle in one direction that is easily predictable.
2. The igneous rock granite began as a hot fluid called _____ beneath the earth's surface.
3. The cooling of magma is called _____.
4. A rock like basalt which is made up of tiny crystals formed by the cooling of _____ at or near the earth's surface.
5. The breakdown of rocks is called _____.
6. The movement of rock material from one location to another is called _____.
7. The process of sediment cementing and compacting to form a hard rock. _____.
8. Metamorphic means "_____."
9. The rock that precedes a metamorphic rock is called a _____.
10. The rock cycle is powered by a world wide process called plate _____.
11. T or F : Magma only reaches the Earth's surface where two crustal plates are coming together.

The Rock Cycle



Rocks:

What is a rock?

James Hutton – “The _____ is the key to the _____.”

What are the 3 major types of rock?

Rock – A group of _____ bound together in some way.

- A) _____ – cooling/hardening of _____ or _____.
- B) _____ – hardening, cementing, and compacting of _____
Sedimentary rock is often found in distinct _____
- C) _____ – existing rocks changed by _____ and pressure.

Describe how an Igneous rock is formed.

Igneous Rocks

- A) _____ or Plutonic – Rocks that form _____ the surface from cooled magma. Usually form large interlocking _____.
(example: Granite)
- B) _____ or Volcanic – Rocks that form when lava cools at or near the surface. Cools more quickly and have _____ grains.
(example: Basalt)

Magma

- A) _____ - (granitic) – light-colored high in silica.
- B) _____ - (basaltic) – dark-colored high in Magnesium and Iron

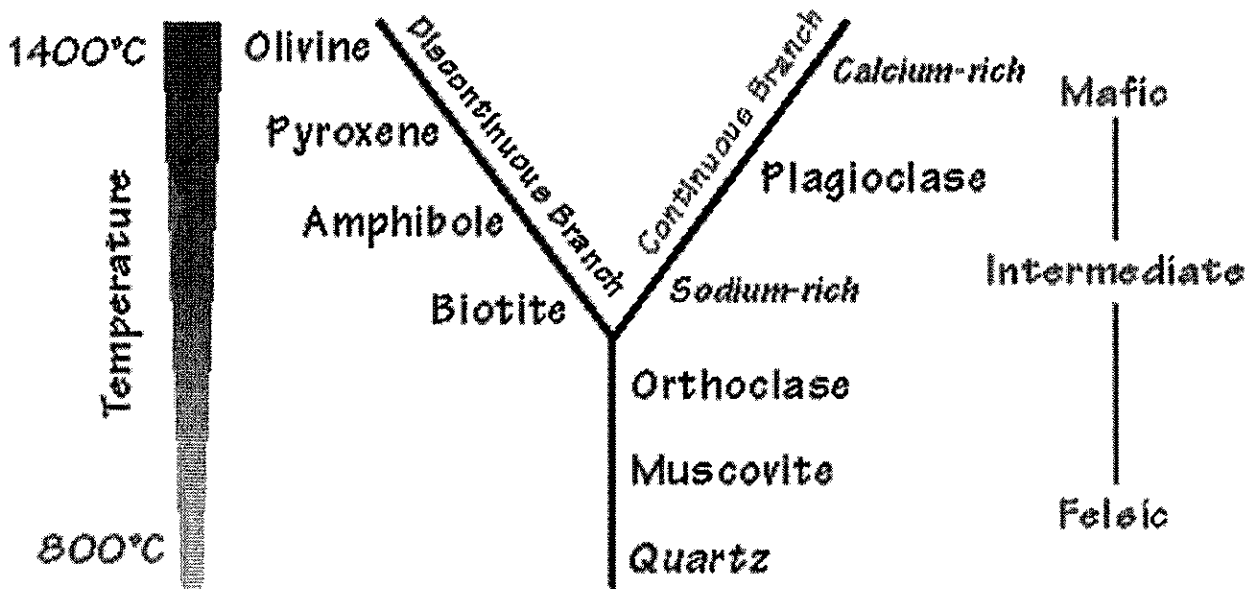
What characteristics does one look for when identifying Igneous rocks?

Texture – depends on size, shape, and _____ of crystals.

- A) Course-Grained – crystals are the size of _____ or larger. Cooled very _____ (\pm 50,000 years) at great depth.
- B) Fine-Grained – crystals are smaller than _____ or not able to be seen with unaided eye. Cooled _____ (within minutes up to a few months) at or near surface.
- C) _____ – Larger crystals on a background of much smaller crystals. Cools _____ at first, then is _____ close to the surface where remaining liquid crystallizes into fine grains.
- D) Glassy – Like Obsidian. Cooled very _____ at surface. Sometimes due to contact with _____.
- E) Vesicular - Has _____ due to rising gas _____ while cooling.

BOWEN'S REACTION SERIES

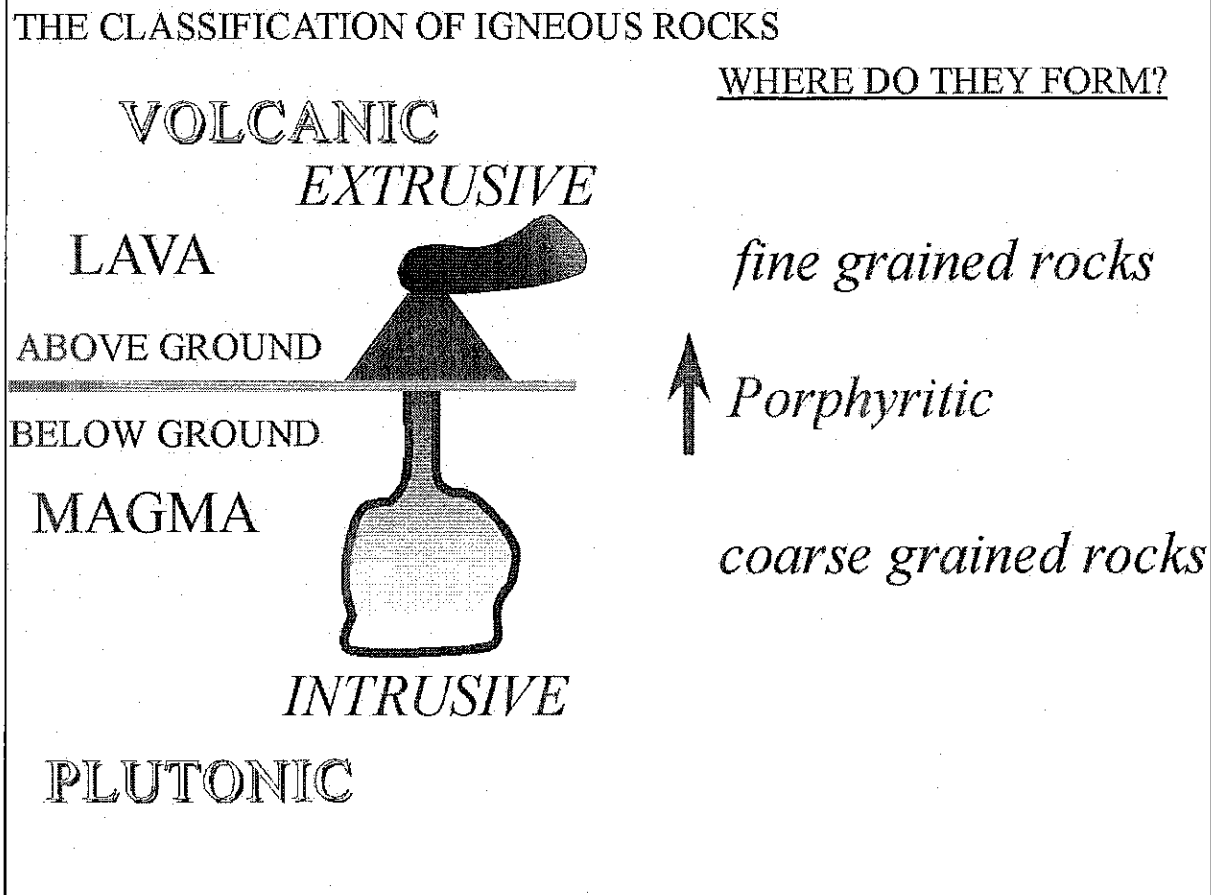
- Compares the different _____ stages of common rock-forming minerals.
(Over)



Bowen's Reaction Series

Within the field of geology, Bowen's reaction series is the work of the petrologist, Norman L. Bowen who was able to explain why certain types of minerals tend to be found together while others are almost never associated with one another.

Some minerals, like Olivine, crystallize at higher temperatures, while others, like Quartz, crystallize at lower temperatures. This means that Quartz and Olivine will not be found in the same igneous rock.



Sedimentary Rocks

<p>Describe the 3 types of sed. rocks.</p> <p>What are the common natural cements?</p>	<p>A) <u>Clastic</u> – fragments of other _____ (example – sandstone)</p> <p>Cemented together by:</p> <ol style="list-style-type: none"> 1. <i>silica</i> 2. _____ 3. _____ <p>Particles are usually sorted by size:</p> <ol style="list-style-type: none"> 1. Conglomerate – large sized _____ 2. _____ – sand sized particles 3. _____ – smaller than sand sized particles <p>B) <u>Chemical</u> – precipitation of dissolved _____ (example – limestone)</p> <p>C) <u>Organic</u> – remains of animals or plants (example – _____)</p>
<p>In what ways do sed. rocks reveal info about ancient climates?</p>	<p>Other info about Sedimentary Rx:</p> <p><u>Stratification:</u> Sediments are usually deposited in visible _____</p> <p>Almost all _____ are found in sedimentary rocks</p> <p>_____ reveal information about an ancient river</p> <p>Mud Cracks preserved in sedimentary rock can reveal information about ancient _____.</p> <p>_____ – hollowed out limestone with calcium or quartz deposited inside.</p>

Define Key Terms:

Cementation _____

Lithification _____

Metamorphic Rocks

<p>What are the 2 types of meta. rocks, and how do they form?</p>	<p>Means " _____ "</p> <p>Changes are made by heat, _____, and/or chemicals.</p> <p><u>Regional Metamorphism:</u></p> <p>Occurs when large areas of rock are under intense _____ and _____ - Usually during mountain building.</p> <p>Grains of rock are squeezed closer together making them more _____.</p> <p>Particles are ' _____ '</p>
<p>Explain the difference between regional metamorphism and contact metamorphism</p>	<p>Because any rock can be metamorphosed in many different ways, there are _____ of different kinds of metamorphic rocks.</p> <p>Metamorphic Rocks are classified into two groups: <u>Foliated</u> and _____</p> <p>Foliation = Parallel layers, sheets, or bands of color.</p> <p><u>Contact Metamorphism:</u></p> <p>Magma is forced up and bakes the surrounding rocks that are in contact with it – without bringing them to the _____ point.</p> <p><u>Contact vs. Regional:</u></p> <ul style="list-style-type: none"> - Changes in contact metamorphism are less _____. - Contact Metamorphism does not effect a _____ area like regional metamorphism does. - Rocks changed by contact do not have _____. <p>Metamorphic Rx like _____ and _____ can reveal information about the _____ of the earth. (We'll cover more about that in Chapter 21!)</p>

Define Key Terms:

Foliated _____

Nonfoliated _____

Igneous Rocks

Use this as a resource to match the words in the blanks.

Origin of Igneous Rocks

When molten material from a volcano or from deep inside the Earth cools, it forms igneous rocks. Temperatures reach about 1400°C at depths between 60 to 200 km below Earth's surface. The rocks at this depth are under great pressure from overlying rocks.

Radioactive elements in the rocks generate thermal energy, heating the rocks. In certain locations on Earth, the temperature and pressure are just right to melt the minerals and form magma.

The magma is less dense than the surrounding solid rock, so it is forced upward toward Earth's surface flows from volcanoes as lava.

Magma that's trapped below Earth's surface is insulated by the rocks surrounding it. This holds in the heat and causes the magma to cool very slowly. Remember, magma is made up of atoms of melted minerals. When it cools, these atoms rearrange themselves into new mineral crystals. If the magma cools slowly, the atoms have time to arrange into large crystals. These crystals are called mineral grains.

Rock forms as these mineral grains grow together. Rocks that form below Earth's surface are intrusive igneous rocks. Generally, intrusive igneous rocks have large mineral grains. Intrusive rocks are found at Earth's surface when the kilometers of rock and soil that once covered them have been removed, or when forces in Earth have pushed them up. You will be investigation these forces in later chapters.

Extrusive igneous rocks are formed when lava cools on Earth's surface. When lava flows on Earth's surface, it is exposed to air and moisture. Lava cools quickly under these conditions. The quick rate of cooling keeps large mineral grains from growing. The atoms don't have time to arrange into large crystals. Extrusive igneous rocks have a fine-grained texture. Often, the individual grains are too small to be seen without a magnifying glass.

Classification of Igneous Rocks

You've learned that igneous rocks are called intrusive or extrusive depending on where they formed. A way to further classify these rocks is by the types of minerals in them. An igneous rock can be either basaltic or granitic.

Basaltic igneous rocks are dense, heavy, dark-colored rocks that form from basaltic magma or lava. Basaltic magma and lava are rich in iron and magnesium. Basaltic lava flows from the volcanoes in Hawaii. How does this explain the black beach sand of Hawaii?

Granitic igneous rocks are light-colored rocks of a lower density than basaltic rocks. Granitic magma and lava are thick and stiff and contain a lot of silicon and oxygen. Granitic magma can build up a great deal of pressure, which is released during violent volcanic eruptions.

The classification of an igneous rock tells you quite a bit about its origin, formation, and composition. Granite, for example, is an intrusive, granitic igneous rock. This means that it formed deep in Earth, where cooling was very slow and large mineral grains had a chance to grow. The rock has a high concentration of silicon and oxygen because it formed from granitic magma.

Igneous rocks are the most abundant type of rock on Earth. They've been classified to make them easier to study. By studying all rocks, geologists and other scientists have been able to hypothesize how Earth formed.

Igneous Rocks

Use the word bank to fill in the blanks.

200
1400
abundant
basaltic
crystals
dense
extrusive
fine
formation
granitic
igneous
intrusive
iron
large
lava
lighter
magma
magnification
minerals
pressure
radioactive
silicon
slow
surface

Rocks formed from molten Earth materials are _____ rocks. There are two kinds of molten materials: magma and _____. Most _____ originates 60 to _____ km below Earth's surface. Temperatures reach about _____ °C at these depths. _____ and heat caused by overlying rocks and _____ elements produce magma.

When magma cools below Earth's surface, it forms _____-grained, _____ igneous rocks. The _____ of these common rocks grow large because of the _____ rate of cooling. When magma moves to Earth's _____, it is called lava. When lava cools on Earth's surface, it forms _____-grained, _____ igneous rocks.

Minerals of extrusive rocks are so small that _____ is needed for identification. Igneous rocks can be classified by their _____. They can also be classified by the types of _____ in them. _____ igneous rocks are dark-colored, heavy, and _____. They contain _____ and magnesium. _____ igneous rocks are _____-colored and less dense. They contain a lot of oxygen and _____. Igneous rocks are the most _____ on Earth.

ROCKS

Directions. Use your notes, including the rock cycle chart from your notes, and your knowledge of rocks to answer the following questions:

1. Basalt is slowly broken up and carried away by a river. The pieces are deposited many kilometers downstream where they become part of a conglomerate. What type of rock is the basalt now?

- a. Igneous b. Sedimentary c. Metamorphic

Explain your answer: _____

2. If heat and pressure of regional metamorphism caused rock to melt, would the rock that results still be considered a metamorphic rock? [Yes / No]

Why? _____

3. Can an igneous rock be changed directly into a metamorphic rock? [Yes / No]

Why? _____

4. Can sedimentary rock be changed directly into igneous rock? [Yes / No]

Why? _____

5. Explain how a sedimentary rock can become...

a metamorphic rock: _____

another sedimentary rock: _____

6. Can sedimentary rock be made from metamorphic rocks? [Yes / No]

Why? _____

7. Why are fossils less likely to be found in metamorphic rocks than in sedimentary rocks from which those metamorphic rocks were formed?

Matching Rock Properties

Directions. On the right is a list of rock properties. On the left is a list of rocks. Using page 914 as a reference, match the rocks with their properties by writing the appropriate letters from the right-hand column next to each rock.

In addition, write:

***I* for *Igneous*, *S* for *Sedimentary*, and *M* for *Metamorphic* in the box.**

- | | | |
|---------------------|--------------------------|---|
| ___ 1. granite | <input type="checkbox"/> | a. glassy texture; conchoidal fracture; usually dark color |
| ___ 2. pumice | <input type="checkbox"/> | b. coarse-grained; mostly dark color; heavier than granite |
| ___ 3. sandstone | <input type="checkbox"/> | c. foliated; layers of different minerals; banded appearance; daughter of granite |
| ___ 4. obsidian | <input type="checkbox"/> | d. fine-grained; dark color; most common rock in the oceanic crust |
| ___ 5. gabbro | <input type="checkbox"/> | e. many small holes from rising gases; frothy texture; may float on water |
| ___ 6. conglomerate | <input type="checkbox"/> | f. microscopic grains; composed of clay and silt; dark color appearance of hardened mud |
| ___ 7. slate | <input type="checkbox"/> | g. foliated; well-developed parallel arrangement of flat mineral grains; commonly made from micas |
| ___ 8. basalt | <input type="checkbox"/> | h. sand-sized grains; mostly quartz; various colors |
| ___ 9. marble | <input type="checkbox"/> | i. coarse-grained; mostly light color; shades of pink, gray and white |
| ___ 10. schist | <input type="checkbox"/> | j. gravel- or pebble-sized grains; cemented among clay and sand |
| ___ 11. shale | <input type="checkbox"/> | k. foliated; dense; daughter of shale |
| ___ 12. gneiss | <input type="checkbox"/> | l. nonfoliated; reacts with acid; daughter of limestone |



Rocks Review Questions

True or False.

- _____ 1. The three classes of rock are igneous, sedimentary, and extrusive.
- _____ 2. Sedimentary rock is the parent material for all rocks.
- _____ 3. High temperatures can change sedimentary rock directly into magma.
- _____ 4. Mafic rocks are light-colored rocks that are high in silica.
- _____ 5. Glassy textures form when magma cools very quickly.
- _____ 6. Some sedimentary rocks are formed from the remains of organisms.

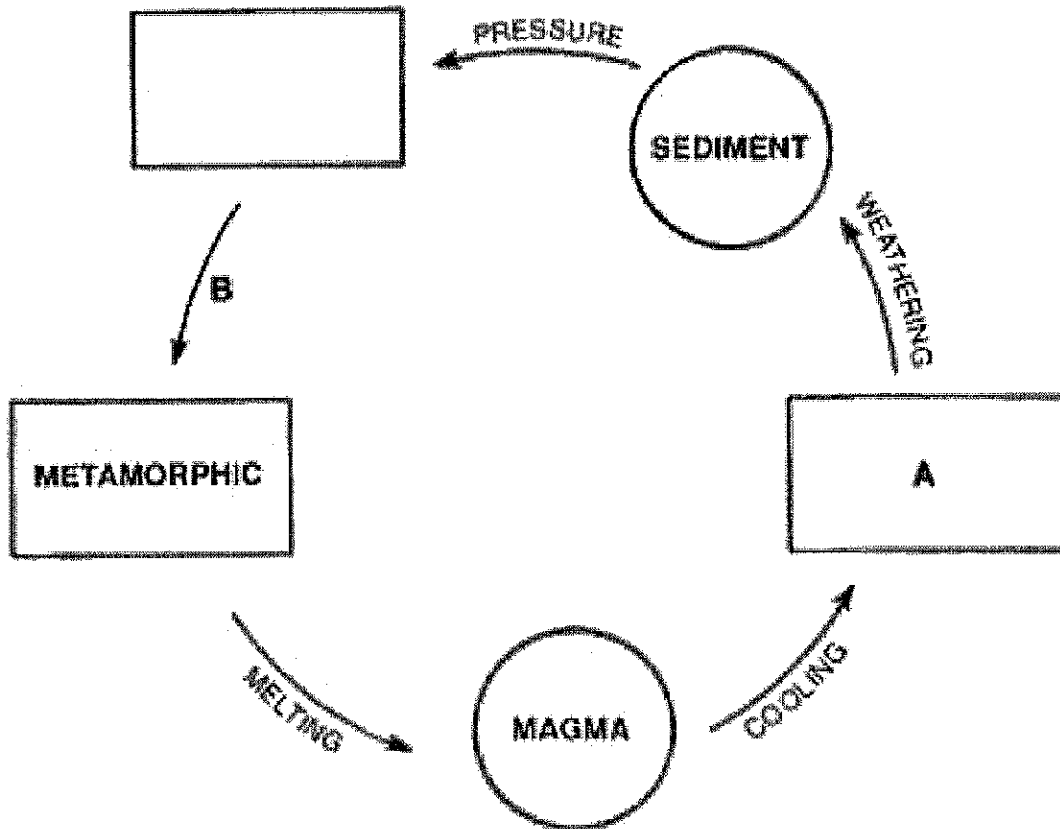
Choose the one best response.

- _____ 7. Rock that forms from magma is called
 - a. igneous
 - b. sedimentary
 - c. metamorphic
 - d. clastic
- _____ 8. Intrusive igneous rocks are characterized by a coarse-grained texture because they contain
 - a. heavy elements
 - b. small crystals
 - c. large crystals
 - d. different fragments
- _____ 9. Light-colored igneous rocks are part of the
 - a. basalt family
 - b. partridge family
 - c. felsic family
 - d. mafic family
- _____ 10. Sedimentary rock formed from rock fragments is called
 - a. organic
 - b. chemical
 - c. clastic
 - d. granite
- _____ 11. Contact metamorphism is a result of
 - a. plate movement
 - b. hot magma
 - c. sedimentation
 - d. foliation
- _____ 12. Felsic rocks are high in:
 - a. quartz
 - b. silica
 - c. biotite
 - d. calcite

13. Sedimentary rock is formed by the process of cementation and _____.

14. Rocks are changed from type to type in a series of changes called the rock _____.

15. Magma that reaches the earth's surface is called _____.



16. The type of rock represented by rectangle A in the diagram is _____.
17. The arrow labeled B represents heat and _____.
18. Metamorphism that occurs over large areas is called _____.

Critical Thinking

19. What type of rock will be formed from a sedimentary rock that comes under extreme heat and pressure but does not melt? Explain.

20. Explain how a metamorphic rock can change into a sedimentary rock _____
