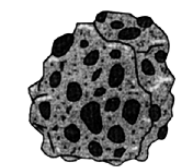


## RR#7 - Multiple Choice

1. Which mineral is mined for its iron content?
  - 1) hematite
  - 2) fluorite
  - 3) galena
  - 4) talc
2. Which rock is composed of the mineral halite that formed when seawater evaporated?
  - 1) limestone
  - 2) dolostone
  - 3) rock gypsum
  - 4) rock salt
3. Which element, found in both biotite mica and muscovite mica, makes up the greatest percent by volume of Earth's crust?
  - 1) nitrogen
  - 2) oxygen
  - 3) potassium
  - 4) silicon

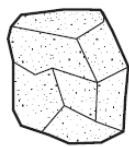
Base your answers to questions 4 and 5 on the drawings of six sedimentary rocks labeled *A* through *F*.



**A**  
Conglomerate



**B**  
Breccia



**C**  
Sandstone



**D**  
Shale



**E**  
Limestone



**F**  
Rock salt

4. Which table shows the rocks correctly classified by texture?

1)

Texture	clastic	bioclastic	crystalline
Rock	A, B, C, D	E	F

2)

Texture	clastic	bioclastic	crystalline
Rock	A, B, C	D	E, F

3)

Texture	clastic	bioclastic	crystalline
Rock	A, C	B, E	D, F

4)

Texture	clastic	bioclastic	crystalline
Rock	A, B, F	E	C, D

## RR#7 - Multiple Choice

5. Which two rocks are composed primarily of quartz, feldspar, and clay minerals?

- 1) rock salt and conglomerate
- 2) rock salt and breccia
- 3) sandstone and shale
- 4) sandstone and limestone

6. The three statements below are observations of the same rock sample:

- The rock has intergrown crystals from 2 to 3 millimeters in diameter.
- The minerals in the rock are gray feldspar, green olivine, green pyroxene, and black amphibole.
- There are no visible gas pockets in the rock.

This rock sample is most likely

- 1) sandstone
- 2) gabbro
- 3) granite
- 4) phyllite

9. Which statement best describes a general property of rocks?

- 1) Most rocks have a number of minerals in common.
- 2) Most rocks are composed of a single mineral.
- 3) All rocks contain fossils.
- 4) All rocks contain minerals formed by compression and cementation.

Base your answers to questions 7 and 8 on the table below which provides information about the crystal sizes and the mineral compositions of four igneous rocks, *A*, *B*, *C*, and *D*.

Mineral	Coarse Grained		Fine Grained	
	Rock A	Rock B	Rock C	Rock D
	Percent of Rock	Percent of Rock	Percent of Rock	Percent of Rock
Quartz	40	0	0	0
Pyroxene	0	25	0	70
Plagioclase feldspar	20	0	60	10
Potassium feldspar	20	0	0	0
Biotite	10	0	17	0
Hornblende	10	0	23	3
Olivine	0	75	0	17

7. Rock *B* most likely is

- 1) conglomerate
- 2) schist
- 3) obsidian
- 4) peridotite

8. Which characteristic of rock *B* could be caused by the minerals pyroxene and olivine?

- 1) green color
- 2) felsic composition
- 3) folded layers
- 4) metallic luster

10. The data table below gives characteristics of the gemstone peridot.

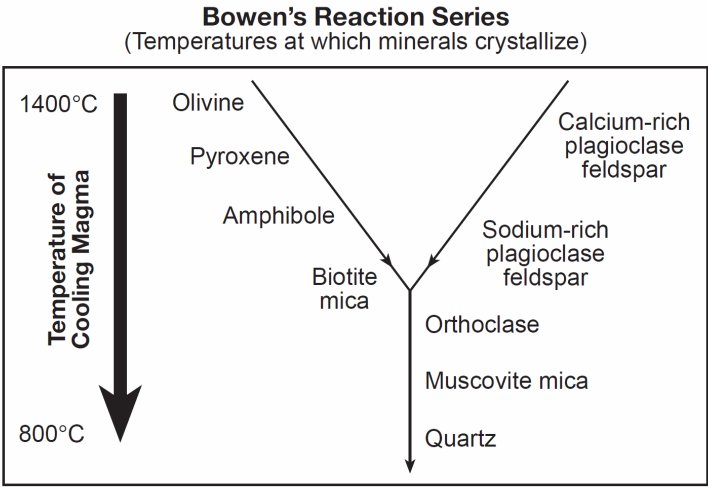
Characteristics of Peridot

Luster	nonmetallic
Hardness	6.5
Color	green
Composition	(Fe, Mg) <sub>2</sub> SiO <sub>4</sub>

Peridot is a form of the mineral

- 1) pyrite
- 2) pyroxene
- 3) olivine
- 4) garnet

11. The diagram of Bowen's Reaction Series below indicates the relative temperatures at which specific minerals crystallize as magma cools.



Which statement is best supported by Bowen's Reaction Series?

- 1) Most minerals crystallize at the same temperature.
- 2) Most felsic minerals usually crystallize before most mafic minerals.
- 3) Muscovite mica and quartz are the last minerals to crystallize as magma cools.
- 4) Biotite mica is the first mineral to crystallize as magma cools.

12. The photograph below shows an outcrop where a light-colored, igneous rock is cross cut by a dark-colored, igneous rock.



This fine-grained, dark-colored, igneous rock is most likely

- 1) rhyolite
- 2) diorite
- 3) basalt
- 4) gabbro

Base your answers to questions **13** and **14** on the data table below and on your knowledge of Earth science. The table provides information about four minerals, *A* through *D*.

**Data Table**

Mineral	Breakage	Hardness	Luster	Color
A	cleavage	2.5	metallic	silver
B	cleavage	2.5	nonmetallic	black
C	cleavage	3	nonmetallic	colorless
D	fracture	6.5	nonmetallic	green

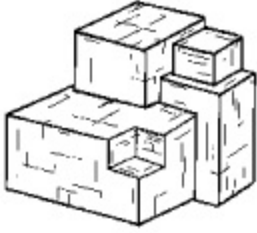
13. Which mineral can scratch *A*, *B*, and *C*, but can *not* scratch *D*?

- 1) talc
- 2) selenite gypsum
- 3) fluorite
- 4) quartz

|

## RR#7 - Multiple Choice

14. The diagram below represents a sample of mineral *A*.



Mineral *A* is most likely

- 1) garnet                      2) galena                      3) olivine                      4) halite

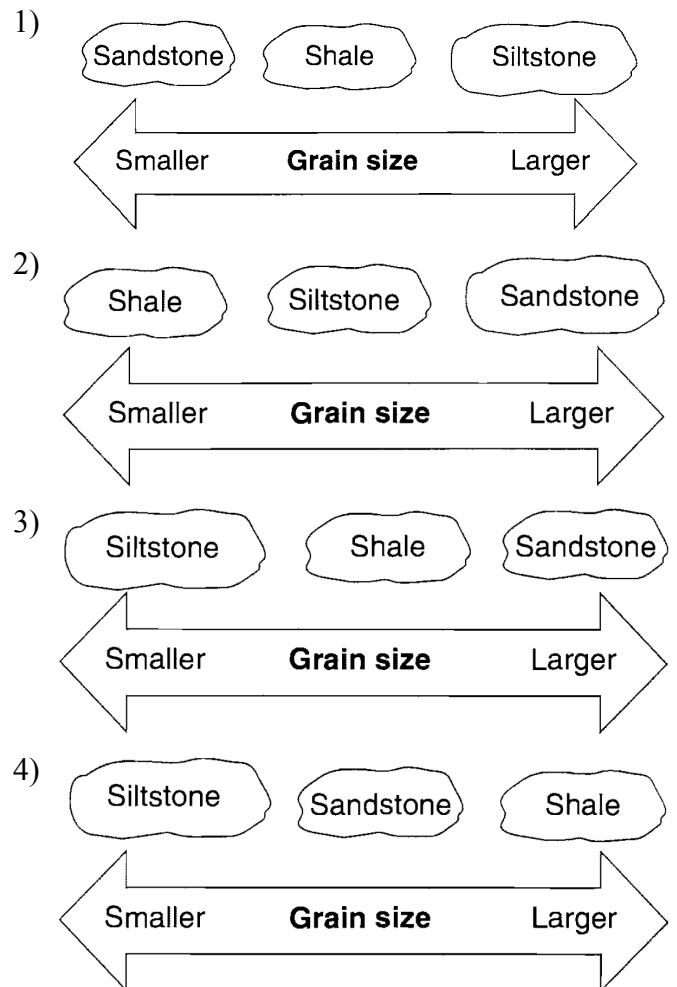
15. A nonvesicular rock is made entirely of green 2-millimeter-diameter crystals that have a hardness of 6.5 and show fracture, but **not** cleavage. The rock is most likely

- 1) shale                      2) phyllite  
3) dunite                      4) schist

16. Which mineral would most likely become rounded at the fastest rate when tumbled along

- 1) garnet  
2) pyroxene  
3) plagioclase feldspar  
4) selenite gypsum

17. Which diagram best shows the grain size of some common sedimentary rocks?



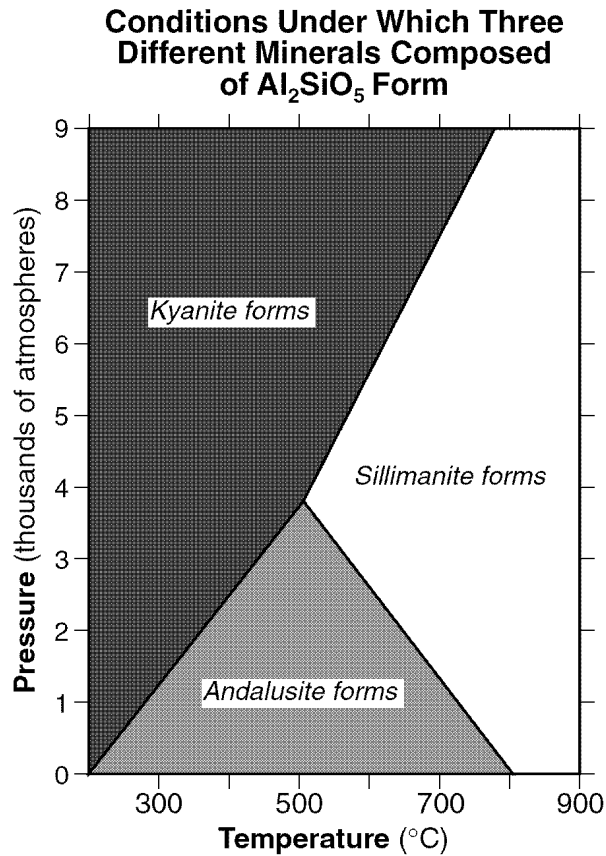
18. A student created the table below by classify six minerals into two groups, *A* and *B* , based on a single property.

Group A	Group B
olivine	pyrite
garnet	galena
calcite	graphite

Which property was used to classify' these minerals?

- 1) color
  - 2) luster
  - 3) chemical composition
  - 4) hardness
19. The internal atomic structure of a mineral most likely determines the mineral's
- 1) color, streak, and age
  - 2) origin, exposure, and fracture
  - 3) size, location, and luster
  - 4) hardness, cleavage, and crystal shape
20. Which statement about the minerals plagioclase feldspar, gypsum, biotite mica, and talc can best be inferred from the chart?
- 1) These minerals have the same chemical and physical properties.
  - 2) These minerals have different chemical properties, but they have similar physical properties.
  - 3) These minerals have different physical and chemical properties, but they have identical uses.
  - 4) The physical and chemical properties of these minerals determine how humans use them.
-

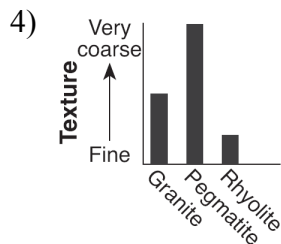
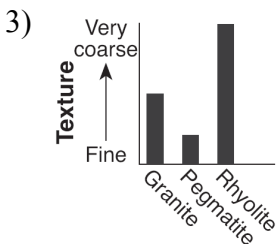
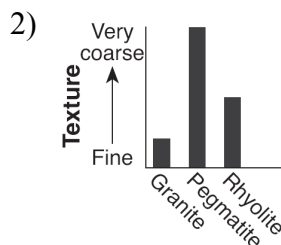
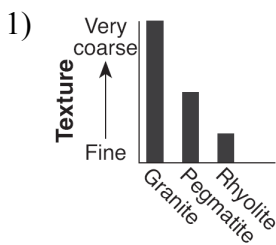
21. Base your answer to the following question on the graph below, which shows the crustal temperature and pressure conditions under which three different minerals with the same chemical composition ( $\text{Al}_2\text{SiO}_5$ ) crystallize.



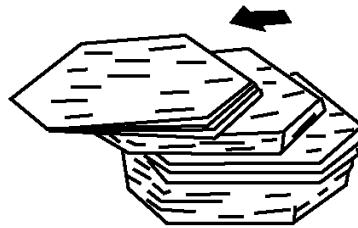
Which mineral has a chemical composition most similar to andalusite, sillimanite, and kyanite?

- 1) pyrite                                  2) gypsum  
3) dolomite                              4) potassium feldspar

22. Which graph best represents the textures of granite, pegmatite, and rhyolite?



23. The diagram below shows how a sample of the mineral mica breaks when hit with a rock hammer.



This mineral breaks in smooth, flat surfaces because it

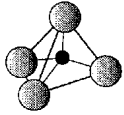
- 1) is very hard
- 2) is very dense
- 3) contains large amounts of iron
- 4) has a regular arrangement of atoms

## RR#7 - Multiple Choice

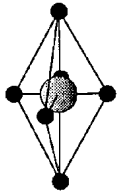
24. Which model best represents the silicon-oxygen tetrahedron?

KEY:  Oxygen Atom     Silicon Atom

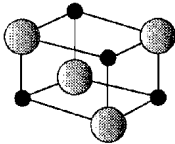
1)



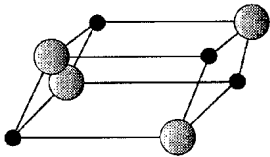
2)



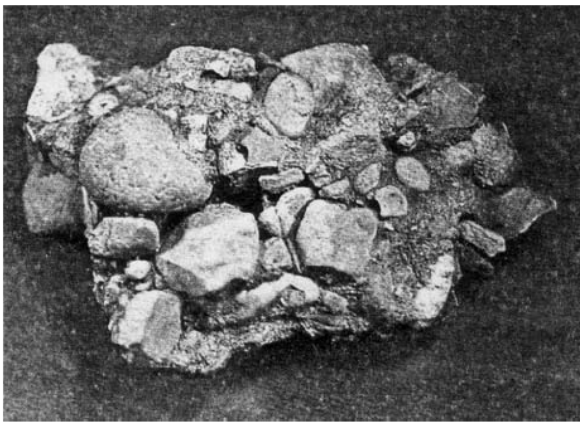
3)



4)



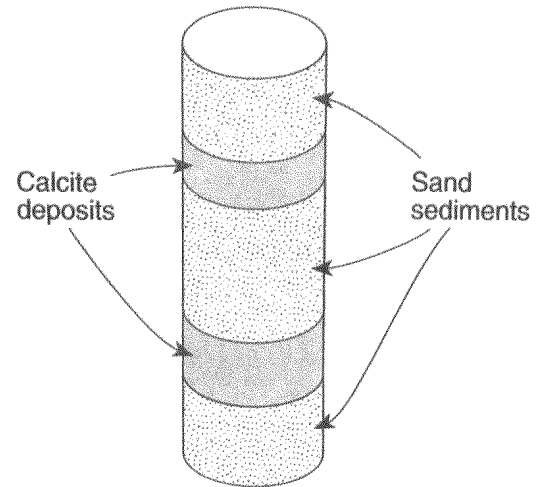
25. A student classified the rock below as sedimentary.



Which observation about the rock best supports this classification?

- 1) The rock is composed of several minerals.
- 2) The rock has a vesicular texture.
- 3) The rock contains fragments of other rocks.
- 4) The rock shows distorted and stretched pebbles.

26. The diagram below shows a drill core of sediment that was taken from the bottom of a lake.

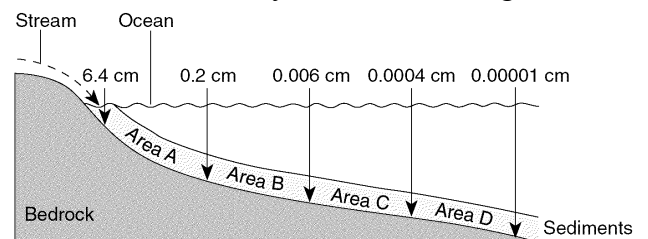


Which types of rock would most likely form from compaction and cementation of these sediments?

- 1) sandstone and limestone
  - 2) shale and coal
  - 3) breccia and rock salt
  - 4) conglomerate and siltstone
27. Which type of rock most likely contains fossils?

- 1) scoria
- 2) gabbro
- 3) schist
- 4) shale

28. The profile below shows the average diameter of sediment that was sorted and deposited in specific areas *A*, *B*, *C*, and *D* by a stream entering an ocean.



As compaction and cementation of these sediments eventually occur, which area will become siltstone?

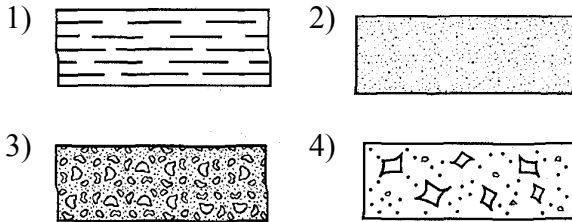
- 1) *A*
- 2) *B*
- 3) *C*
- 4) *D*



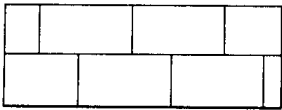
## RR#7 - Multiple Choice

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29. Which statement about the formation of a rock is best supported by geologic evidence?
- 1) Magma must be weathered before it can change to metamorphic rock.
  - 2) Sediment must be compacted and cemented before it can change to sedimentary rock.
  - 3) Sedimentary rock must melt before it can change to metamorphic rock.
  - 4) Metamorphic rock must melt before it can change to sedimentary rock.
30. Which symbol represents the sedimentary rock with the smallest grain size?

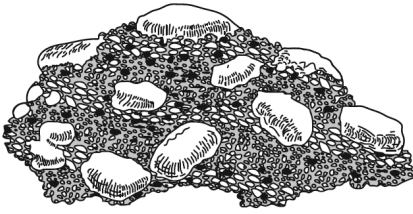


31. Brachiopod fossils were found in a layer of limestone rock. In which type of environment did the limestone layer form?
- 1) shallow marine
  - 2) tropical forest
  - 3) coastal plain
  - 4) interior grassland
32. Which type of rock is represented by the map symbol below?



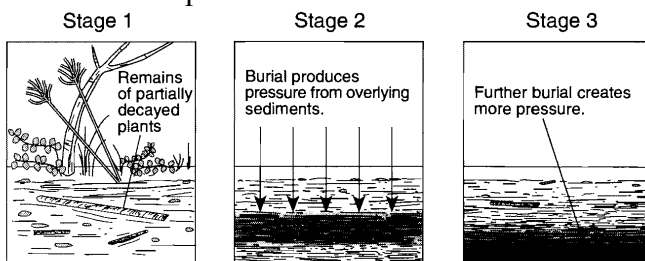
- 1) clastic sedimentary rock formed from organic substances
  - 2) chemically formed sedimentary rock that consists mainly of the mineral calcite
  - 3) regional metamorphic rock with block like foliation
  - 4) contact metamorphic rock that results from the alteration of limestone by contact with an igneous intrusion
-

33. Base your answer to the following question on the diagram below, which represents a rock composed of cemented pebbles and sand.



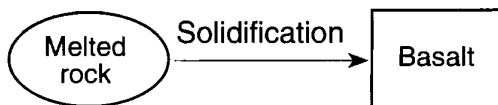
Which change would most likely occur if this rock became buried deep within Earth's crust and was subjected to intense heat and pressure, but did *not* melt?

- 1) The density of the pebbles and sand would decrease.
  - 2) The rock would become a plutonic rock composed mostly of quartz.
  - 3) The rock would become more felsic with a higher concentration of magnesium.
  - 4) The pebbles would become distorted and the sand would be recrystallized.
34. The diagram below shows three stages in the formation of a specific rock.



Which rock is formed as a result of these three stages?

- 1) limestone
  - 2) gneiss
  - 3) schist
  - 4) coal
35. The flowchart below illustrates the change from melted rock to basalt.

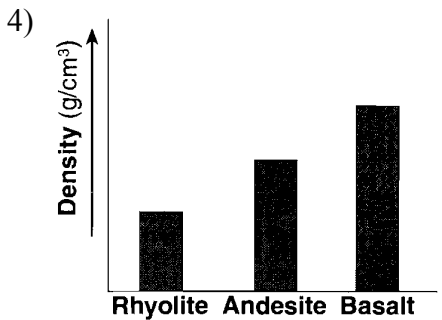
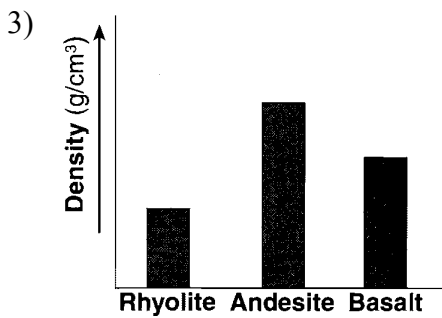
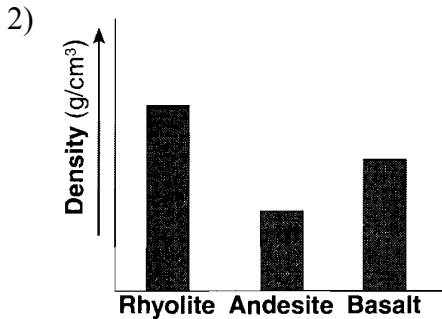
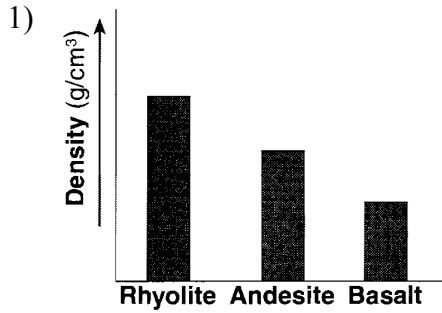


The solidification of the melted rock occurred

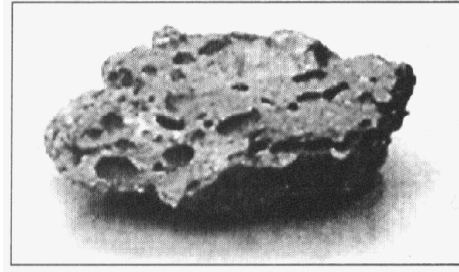
- 1) slowly, resulting in fine-grained minerals
- 2) slowly, resulting in coarse-grained minerals
- 3) rapidly, resulting in coarse-grained minerals
- 4) rapidly, resulting in fine-grained minerals

## RR#7 - Multiple Choice

36. Which graph best represents the relative densities of three different types of igneous rock?



37. The photograph below shows an igneous rock.



What is the origin and rate of formation of this rock?

- 1) plutonic with slow cooling
- 2) plutonic with rapid cooling
- 3) volcanic with slow cooling
- 4) volcanic with rapid cooling

38. Which intrusive igneous rock could be composed of approximately 60% pyroxene, 25% plagioclase feldspar, 10% olivine, and 5% amphibole?

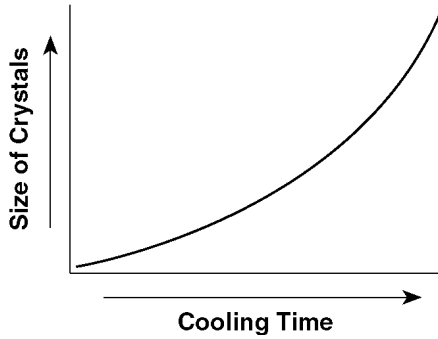
- 1) granite
- 2) rhyolite
- 3) gabbro
- 4) basalt

39. Biotite mica and muscovite mica have different chemical compositions. Compared to the magma from which biotite mica forms, the magma from which muscovite mica forms is usually

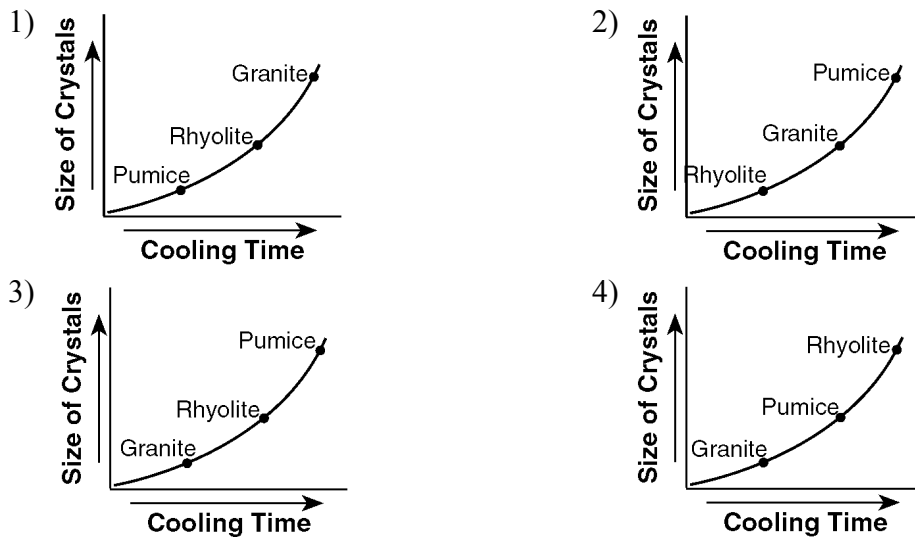
- 1) more mafic and less dense
- 2) more mafic and more dense
- 3) more felsic and less dense
- 4) more felsic and more dense

## RR#7 - Multiple Choice

40. The graph below shows the relationship between the cooling time of magma and the size of the crystals produced.



Which graph correctly shows the relative positions of the igneous rocks granite, rhyolite, and pumice?

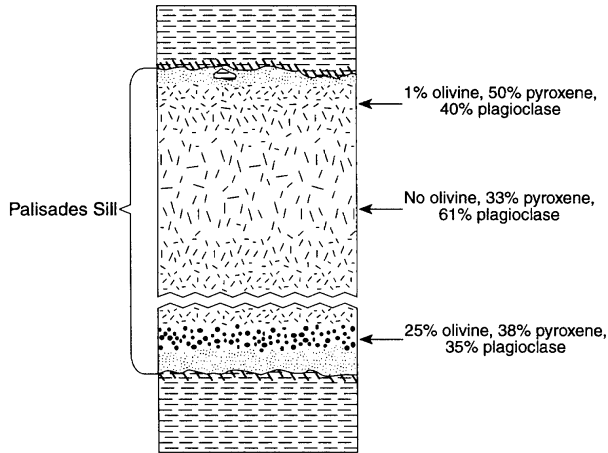


41. An extrusive igneous rock with a mineral composition of 35% quartz, 35% potassium feldspar, 15% plagioclase feldspar, 10% biotite, and 5% amphibole is called

- 1) rhyolite                      2) granite  
3) gabbro                      4) basaltic glass

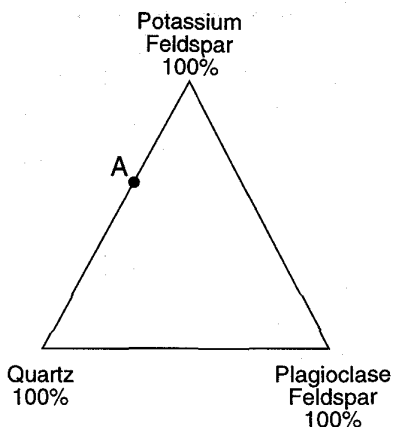
## RR#7 - Multiple Choice

42. The geologic cross section below shows variations of mineral composition that can be observed in the Palisades Sill. The Palisades Sill is an intrusive igneous rock called diabase.



Which other igneous rock is closest to diabase in mineral composition?

- 1) andesite
  - 2) granite
  - 3) rhyolite
  - 4) gabbro
43. In the diagram below, each angle of the triangle represents a 100 percent composition of the mineral named at that angle. The percentage of the mineral decreases toward 0 percent as either of the other angles of the triangle is approached. Letter *A* represents the mineral composition of an igneous rock.



Rock *A* is a coarse-grained igneous rock that can best be identified as

- 1) rhyolite
- 2) pumice
- 3) granite
- 4) gabbro

44. The photograph below shows a large outcrop of rock composed primarily of visible crystals of mica, quartz, and feldspar.



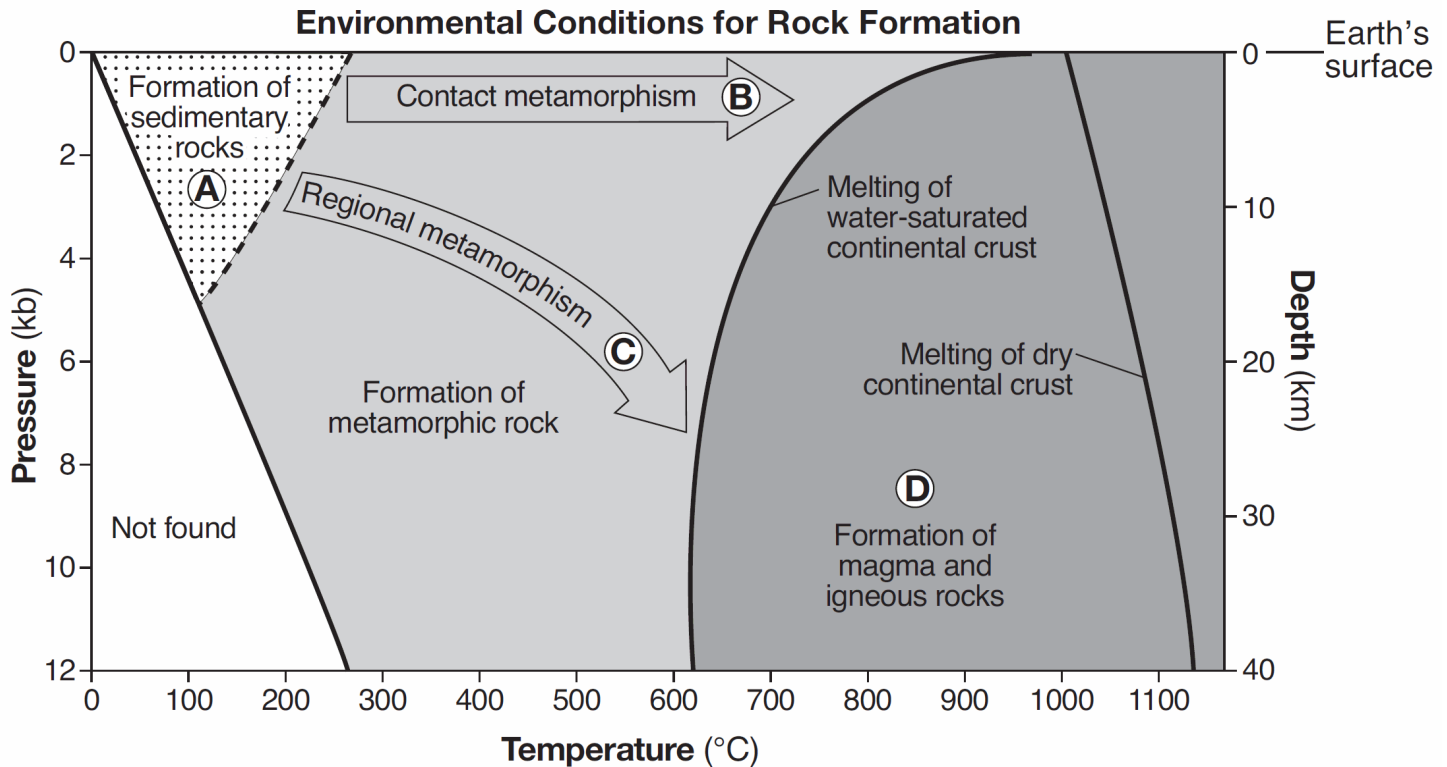
Based on the composition and foliated texture, this rock can best be identified as

- 1) marble
- 2) schist
- 3) slate
- 4) anthracite coal

## RR#7 - Multiple Choice

Base your answers to questions 45 through 47 on the graph below and on your knowledge of Earth science.

The graph shows the temperature, pressure, and depth environments for the formation of the three major rock types. Pressure is shown in kilobars (kb). Letters *A* through *D* identify different environmental conditions for rock formation.



45. Which rock is most likely to form directly from rock material at a depth of 30 km and a temperature of 1000°C?

- 1) quartzite      2) scoria      3) shale      4) granite

46. Which letter represents the environmental conditions necessary to form gneiss?

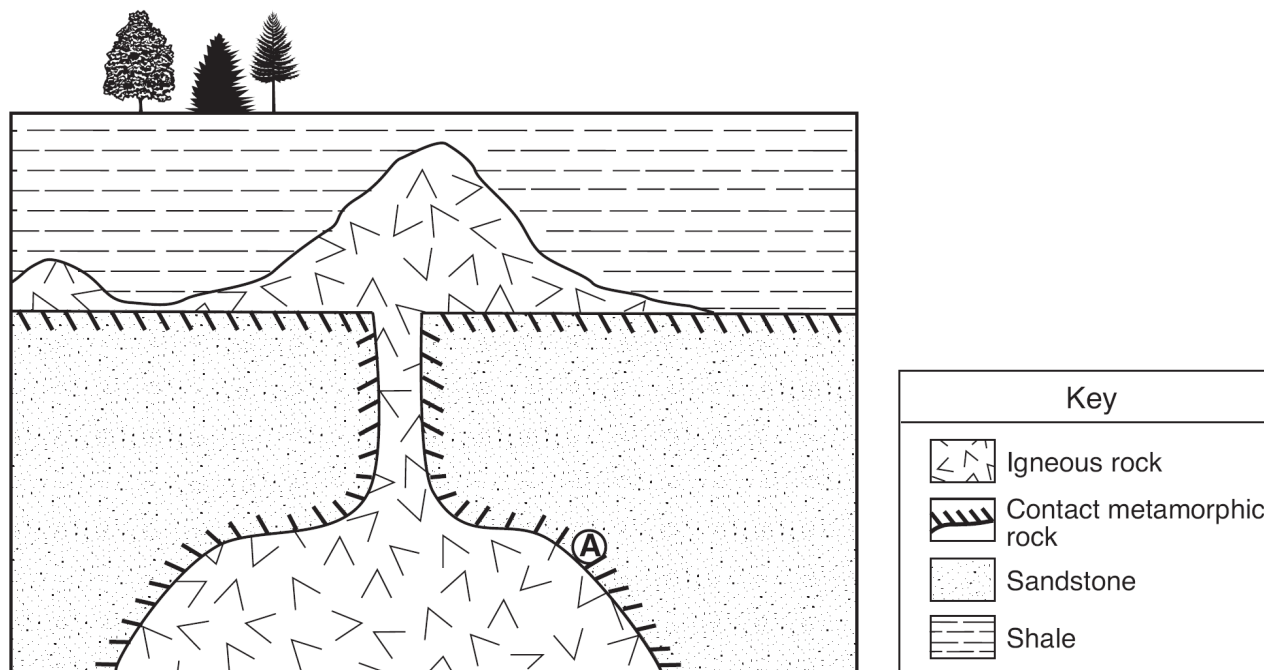
- 1) *A*      2) *B*      3) *C*      4) *D*

47. At what pressure and temperature is sand most likely to be compacted into sandstone?

- 1) 2 kb and 150°C      2) 6 kb and 200°C  
3) 10 kb and 400°C      4) 12 kb and 900°C

## RR#7 - Multiple Choice

48. Base your answer to the following question on the geologic cross section below. Location *A* is within the metamorphic rock.



The metamorphic rock at location *A* is most likely

- 1) marble      2) quartzite      3) phyllite      4) slate
49. During the intrusion of the Palisades Sill, contact metamorphism changed sandstone and shale into
- 1) diorite      2) marble  
3) limestone      4) hornfels
50. Which two kinds of adjoining bedrock would most likely have a zone of contact metamorphism between them?
- 1) shale and conglomerate  
2) shale and sandstone  
3) limestone and sandstone  
4) limestone and granite

51. The cartoon below presents a humorous look at history.

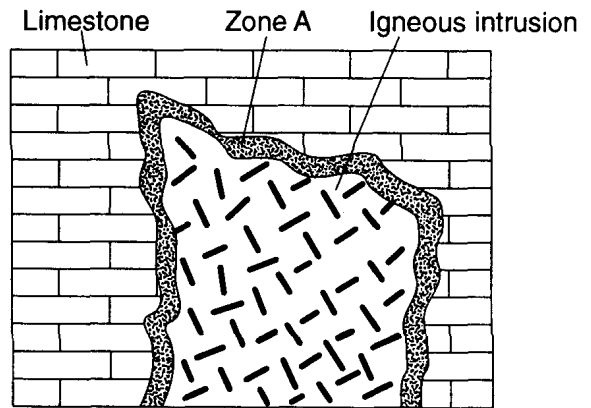


"You know, I like this hobby, too... But it seems like people from other communities have collected all the shiny mica rocks with foliated textures...There aren't any left for us!"

What kind of rocks does the complaining rock collector want?

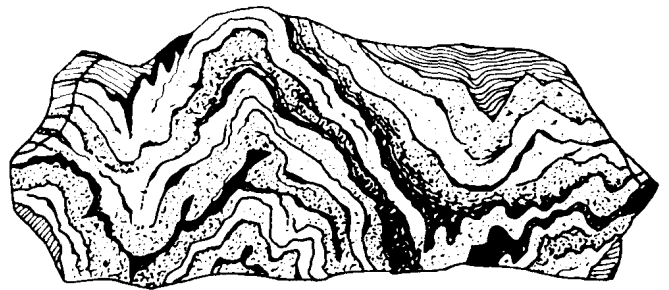
- 1) felsic volcanic rocks
- 2) clastic sedimentary rocks
- 3) inorganic sedimentary rocks
- 4) regionally metamorphosed rocks

52. The geologic cross section below shows limestone that was intruded. Part of the limestone (zone A) was heated intensely but was not melted.



Which type of rock most likely formed in zone A?

- 1) gneiss
  - 2) slate
  - 3) marble
  - 4) obsidian
53. Where is metamorphic rock frequently found?
- 1) on mountaintops that have horizontal layers containing marine fossils
  - 2) within large lava flows
  - 3) as a thin surface layer covering huge areas of the continents
  - 4) along the interface between igneous intrusions and sedimentary bedrock
54. The diagram below represents a rock with a distorted layer structure.



The distorted structure of this rock is most likely the result of

- 1) a long period of weathering
- 2) glacial activity
- 3) wind erosion
- 4) extreme pressure

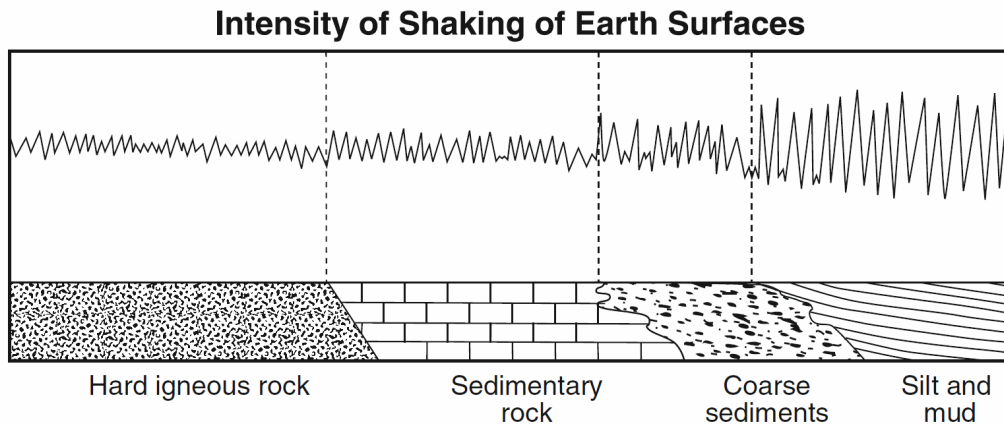


## RR#7 - Multiple Choice

55. Which rocks form relatively thin layers, compared to the thickness of the continent, over large areas of the continents?

- 1) granite and gabbro
- 2) sandstone and shale
- 3) metamorphic rocks
- 4) intrusive igneous rocks

56. The diagram below represents the intensity of the shaking that occurs on different Earth surfaces during the same earthquake.

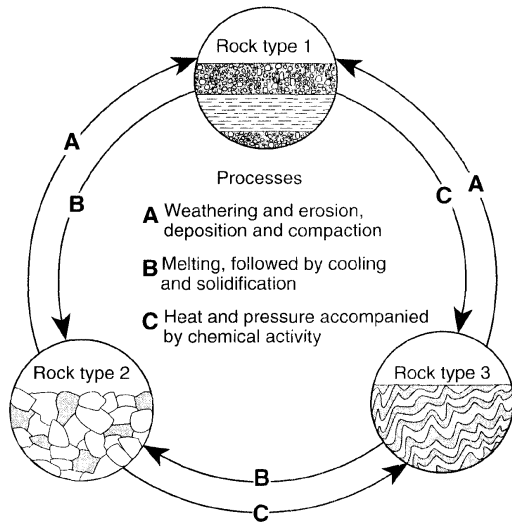


The greatest earthquake hazard to homes exists when they are built on

- |                      |                     |
|----------------------|---------------------|
| 1) hard igneous rock | 2) sedimentary rock |
| 3) coarse sediments  | 4) silt and mud     |

## RR#7 - Multiple Choice

57. The diagram below represents geological processes that act continuously on Earth to form different rock types.



Which table correctly classifies each rock type?

1)

Rock Type	Classification
1	sedimentary
2	metamorphic
3	igneous

2)

Rock Type	Classification
1	sedimentary
2	igneous
3	metamorphic

3)

Rock Type	Classification
1	metamorphic
2	igneous
3	sedimentary

4)

Rock Type	Classification
1	igneous
2	metamorphic
3	sedimentary

58. Which type(s) of rock can be the source of deposited sediments?

- 1) igneous and metamorphic rocks, only
- 2) metamorphic and sedimentary rocks, only
- 3) sedimentary rocks, only
- 4) igneous, metamorphic, and sedimentary rocks

59. Which igneous rock is dark colored, cooled rapidly on Earth's surface, and is composed mainly of plagioclase feldspar, olivine, and pyroxene?

- 1) obsidian
- 2) rhyolite
- 3) gabbro
- 4) scoria

60. Compared to felsic igneous rocks, mafic igneous rocks contain greater amounts of

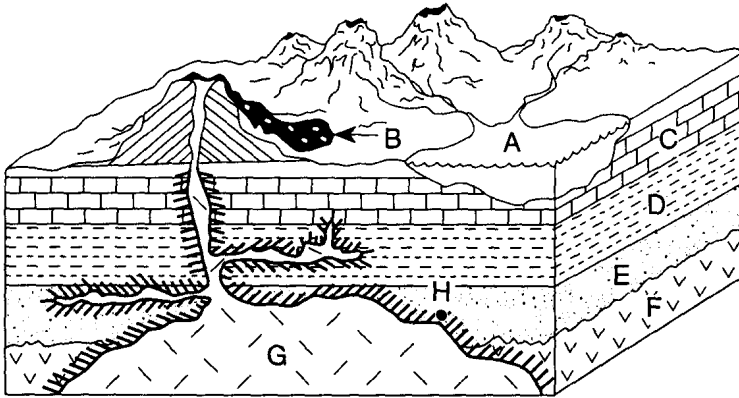
- 1) white quartz
- 2) aluminum
- 3) pink feldspar
- 4) iron

61. A fine-grained igneous rock composed mostly of plagioclase feldspar and hornblende and containing no quartz or pyroxene would be classified as

- 1) granite
- 2) andesite
- 3) peridotite
- 4) scoria

## RR#7 - Multiple Choice

Base your answers to questions 62 through 64 on the block diagram below which shows a cross section of Earth's crust. Letter *A* identifies a lake, and letters *B* through *G* represent different types of bedrock.



Key:

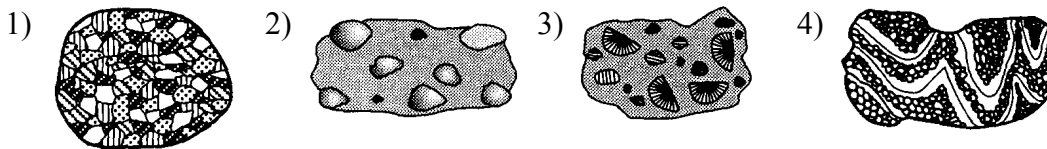
Limestone C	Intrusive igneous rock F
Shale D	Intrusive igneous rock G
Fine-grain sandstone E	Lava flow B
Contact metamorphism	

62. Rock *B* is a dark-colored crystalline rock that formed when a lava flow cooled and solidified quickly on the surface of Earth.

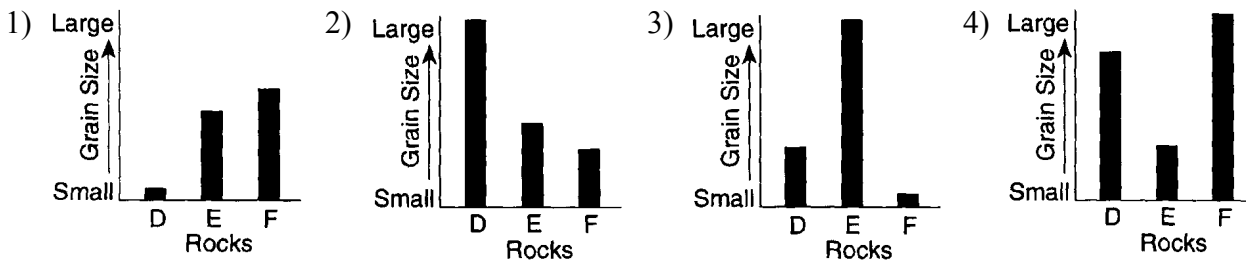
Rock *B* is classified as an

- 1) extrusive igneous rock with a coarse texture and felsic composition
- 2) extrusive igneous rock with a fine texture and a mafic composition
- 3) intrusive igneous rock with a coarse texture and a felsic composition
- 4) intrusive igneous rock with a fine texture and a mafic composition

63. Which diagram best represents a sample of rock *G*?



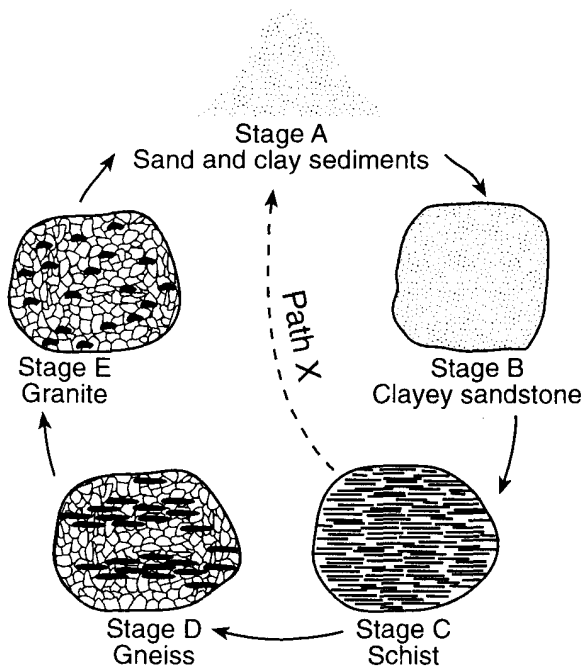
64. Which graph best represents a possible comparison of the average grain sizes for rocks *D*, *E*, and *F*?



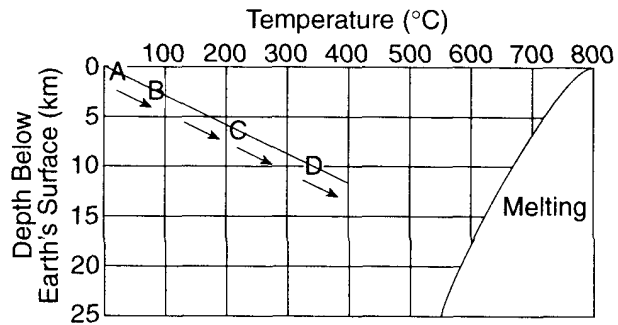
## RR#7 - Multiple Choice

Base your answers to questions **65** through **69** on the diagrams below which represents the same rock material at five stages of development. The graph below shows the temperature and depth of burial at which stages *A* through *D* develop Stage *E* has intentionally been omitted from the graph.

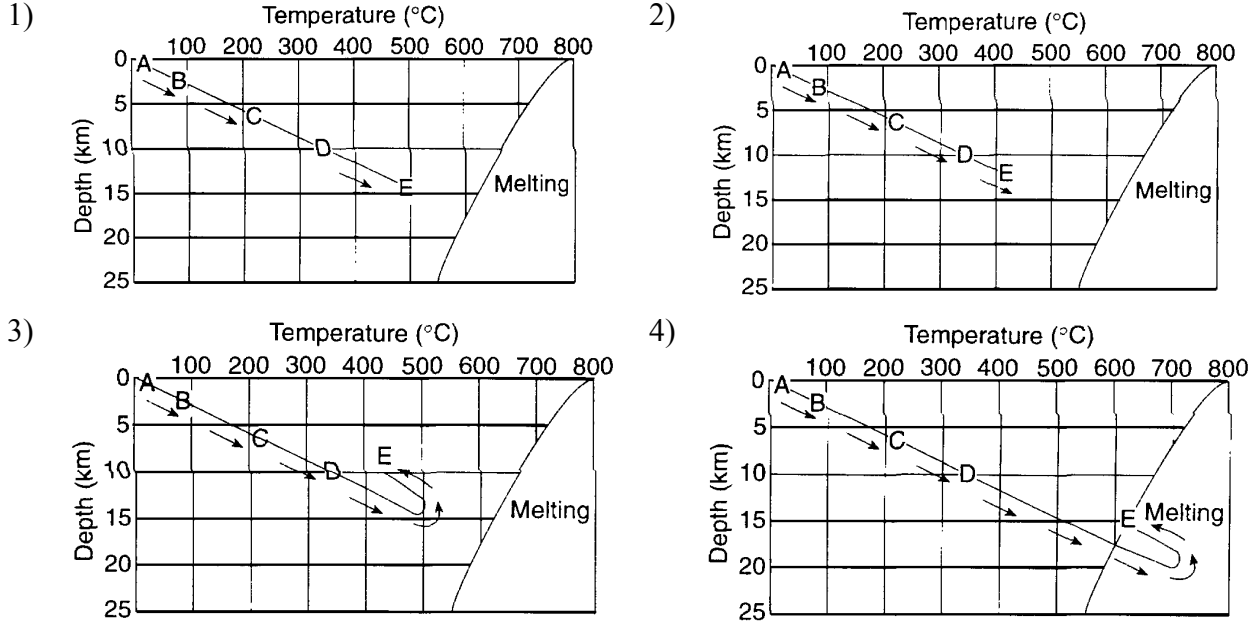
**A Simple Rock Cycle**



**Environment of Rock Stages**



65. Which graph correctly shows where magma would begin to crystallize into granite (stage *E*)?



66. According to the graph, gneiss is formed at a depth of approximately

- 1) 10 km      2) 7 km      3) 3 km      4) 0 km

## RR#7 - Multiple Choice

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67. Clayey sandstone will form gneiss if the

- 1) temperature and pressure both decrease
- 2) temperature and pressure both increase
- 3) temperature decreases and the pressure increases
- 4) temperature increases and the pressure decreases

68. The rocks in stages *C* and *D* are both

- 1) noncrystalline    2) foliated    3) clastic    4) glassy

69. In the simple rock-cycle diagram, which processes along path *X* would change the schist (stage *C*) directly into a pile of sediments (stage *A*)?

- 1) uplift, weathering, and erosion of the schist
- 2) cementing of sediment grains followed by compaction
- 3) melting of the schist followed by cooling
- 4) heat and/or pressure applied to the schist

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70. Rocks can be classified as sedimentary, igneous, or metamorphic based primarily upon differences in their

- 1) color                      2) density
  - 3) origin                     4) age
-