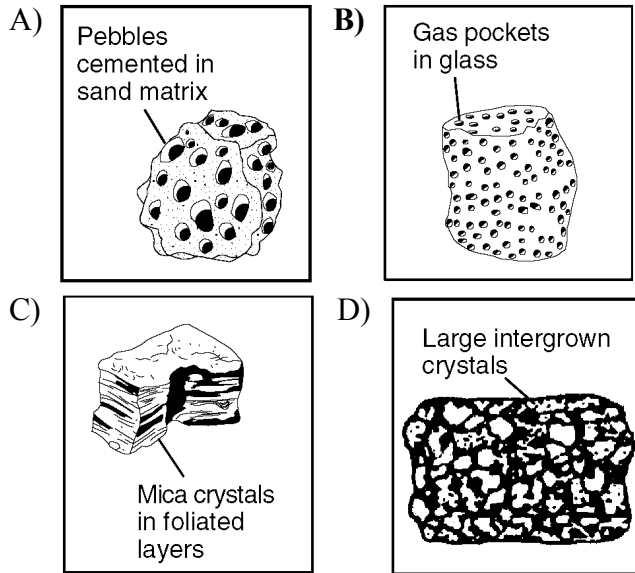


1. Which rock most probably formed directly from lava cooling quickly at Earth's surface?



2. Rhyolite is an example of a

- A) monomineralic igneous rock
- B) polymineralic igneous rock**
- C) monomineralic sedimentary rock
- D) polymineralic sedimentary rock

Base your answers to questions 3 and 4 on

the two tables below and on your knowledge of Earth science. Table 1 shows the composition, hardness, and average density of four minerals often used as gemstones. Table 2 lists the minerals in Moh's Scale of Hardness from 1 (softest) to 10 (hardest).

Table 1

Gemstone Mineral	Composition	Hardness	Average Density (g/cm ³)
emerald	Be ₃ Al ₂ (Si ₆ O ₁₈)	7.5–8	2.7
sapphire	Al ₂ O ₃	9	4.0
spinel	MgAl ₂ O ₄	8	3.8
zircon	ZrSiO ₄	7.5	4.7

Table 2

Moh's Scale of Hardness
1 talc
2 gypsum
3 calcite
4 fluorite
5 apatite
6 feldspar
7 quartz
8 topaz
9 corundum
10 diamond

KEY

Al = aluminum	O = oxygen
Be = beryllium	Si = silicon
Mg = magnesium	Zr = zirconium

3. Part of a gemstone's value is based on the way the gemstone shines in reflected light. The way a mineral reflects light is described as the mineral's

- A) fracture
- B) hardness
- C) luster**
- D) streak

4. Sapphire is a gemstone variety of which mineral on Moh's scale of hardness?

- A) corundum B) diamond C) fluorite D) topaz

5. Analysis of a granite pebble would probably show that the pebble consists mostly of the

- A) **minerals quartz and feldspar**
B) minerals calcite and gypsum
C) elements iron and magnesium
D) elements carbon and hydrogen

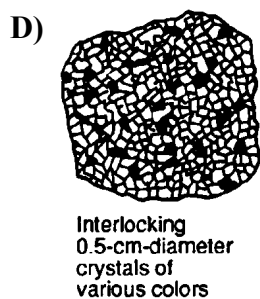
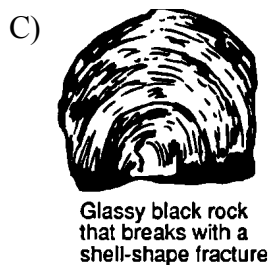
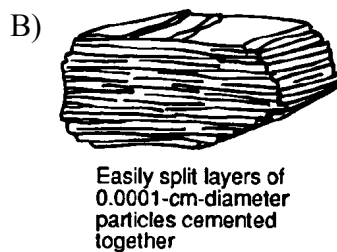
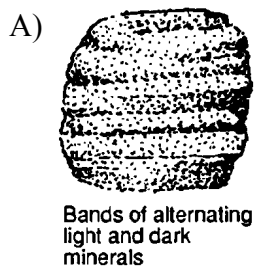
6. Which relative concentrations of elements are found in a felsic rock?

- A) **a high concentration of aluminum and a low concentration of iron**
B) a high concentration of iron and a low concentration of aluminum
C) a high concentration of magnesium and a low concentration of iron
D) a high concentration of magnesium and a low concentration of aluminum

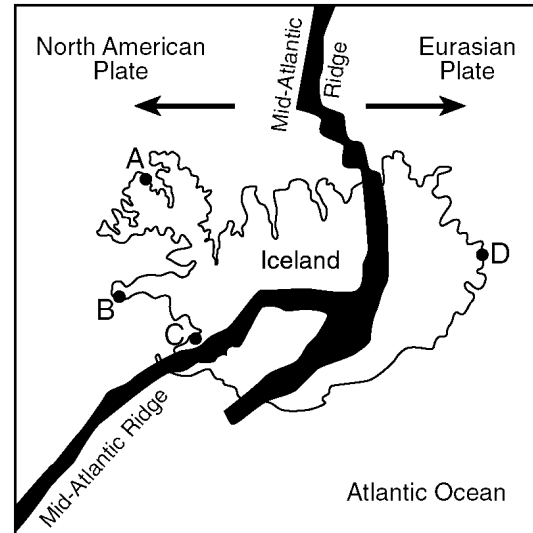
7. Which property would be most useful for identifying igneous rocks?

- A) kind of cement
B) **mineral composition**
C) number of minerals present
D) types of fossils present

8. The diagrams below represent four rock samples. Which rock took the longest time to solidify from magma deep within the Earth?



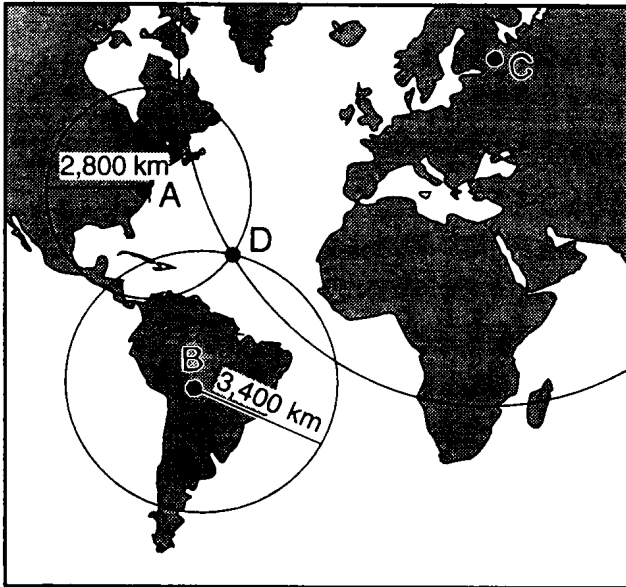
9. Base your answer to the following question on the map below of Iceland, a country located on the Mid-Atlantic Ridge. Four locations are represented by the letters A through D.



The fine-grained texture of most of the igneous rock formed on the surface of Iceland is due to

- A) **rapid cooling of the molten rock**
B) high density of the molten rock
C) numerous faults in the island's bedrock
D) high pressure under the island

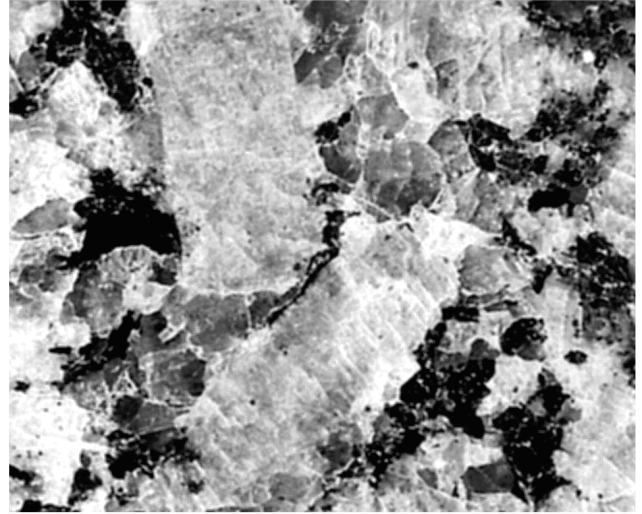
10. Base your answer to the following question on the map below, which shows seismograph recording stations at locations *A*, *B*, and *C*. Location *D* is an earthquake epicenter. The distances from locations *A* and *B* to this epicenter are given in kilometers.



Which statement best describes the igneous crustal bedrock below locations *A*, *B*, *C*, and *D*?

- A) **The bedrock below *D* is mostly basalt; below *A*, *B*, and *C*, the bedrock is mostly granite.**
 B) The bedrock below *D* is mostly granite; below *A*, *B*, and *C*, the bedrock is mostly basalt.
 C) The bedrock below *A*, *B*, *C*, and *D* is mostly basalt.
 D) The bedrock below *A*, *B*, *C*, and *D* is mostly granite.

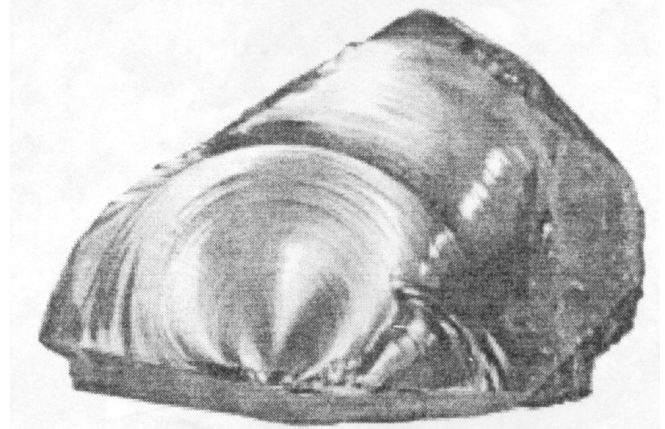
11. The photograph below shows the intergrown crystals of a pegmatite rock.



(Actual size)

Which characteristic provides the best evidence that this pegmatite solidified deep underground?

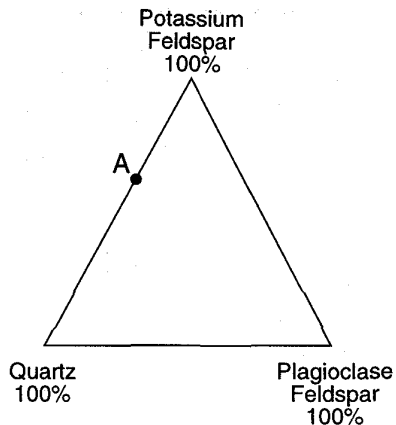
- A) low density
 B) light color
 C) felsic composition
 D) **very coarse texture**
12. The picture below shows the igneous rock obsidian.



The obsidian's glassy texture indicates that it formed from a magma that cooled

- A) slowly, deep below Earth's surface
 B) slowly, on Earth's surface
 C) quickly, deep below Earth's surface
 D) **quickly, on Earth's surface**
13. Which rock is of felsic composition, low in density, light in color, and coarse grained?
- A) rhyolite B) basalt
 C) **granite** D) gabbro

14. 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

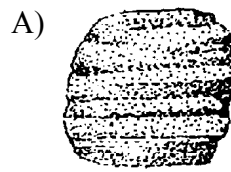
- A) rhyolite B) pumice
 C) **granite** D) gabbro
15. The table below provides information about the mineral composition of a sample of beach sand from Hawaii.

Mineral	Composition (%)
Pyroxene	50
Plagioclase feldspar	40
Olivine	3
Amphibole	5
Unidentified minerals	2

If the sand deposited on this beach recently weathered from only one type of igneous rock, the rock was most likely

- A) granite B) peridotite
 C) diorite D) **basalt**

16. The diagrams below represent four rock samples. Which rock was formed by rapid cooling in a volcanic lava flow? [The diagrams are not to scale.]



Bands of alternating light and dark minerals



Easily split layers of 0.0001-cm-diameter particles cemented together



Glassy black rock that breaks with a shell-shaped fracture



Interlocking 0.5-cm-diameter crystals of various colors

17. Which property is common to most dark-colored igneous rocks?

- A) **high density**
 B) intrusive formation
 C) abundant felsic minerals
 D) coarse-grained texture

18. Compared to basalt, granite is

- A) **lighter in color**
 B) greater in density
 C) more mafic in composition
 D) more fine grained in texture

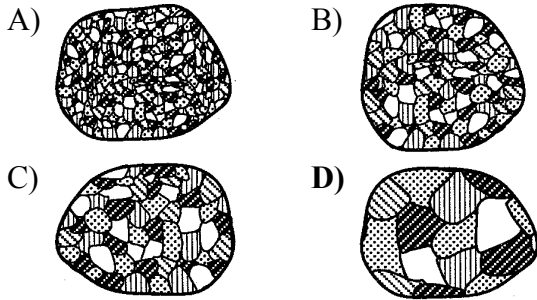
19. The four igneous rocks below are classified into two groups.

Group A	Group B
Granite	Rhyolite
Gabbro	Basalt

What is the basis for this classification?

- A) density B) color
 C) **crystal grain size** D) mineral content

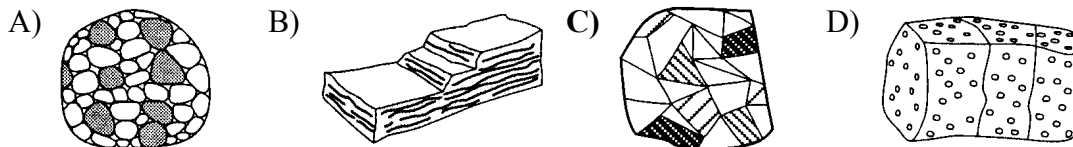
20. Which granite sample most likely formed from magma that cooled and solidified at the slowest rate?



21. Base your answer to the following question on the table below which provides information about the crystal sizes and the mineral compositions of four igneous rocks, *A*, *B*, *C*, and *D*.

	Coarse Grained		Fine Grained	
	Rock A	Rock B	Rock C	Rock D
Mineral	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

Which diagram best represents the texture, composition, and intergrown crystals of rock *A*?



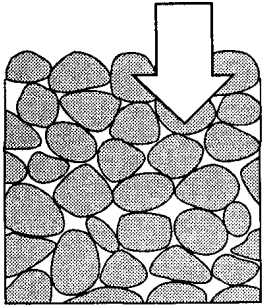
22. Which processes lead directly to the formation of igneous rock?

- A) weathering and erosion
- B) compaction and cementation
- C) heat and pressure
- D) melting and solidification**

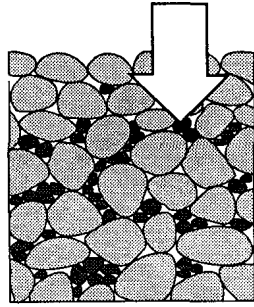
23. Which two igneous rocks could have the same mineral composition?

- A) rhyolite and diorite
- B) pumice and scoria
- C) peridotite and andesite
- D) gabbro and basalt**

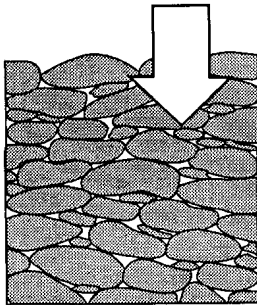
24. Base your answer to the following question on the diagram below, which represents samples of soil and bedrock at Earth's surface. The arrows represent possible infiltration of rainwater.



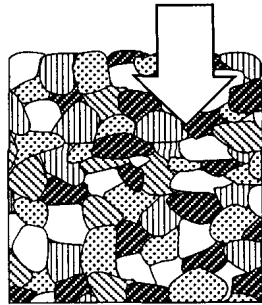
Pebble soil



Pebble-and-sand soil



Conglomerate bedrock



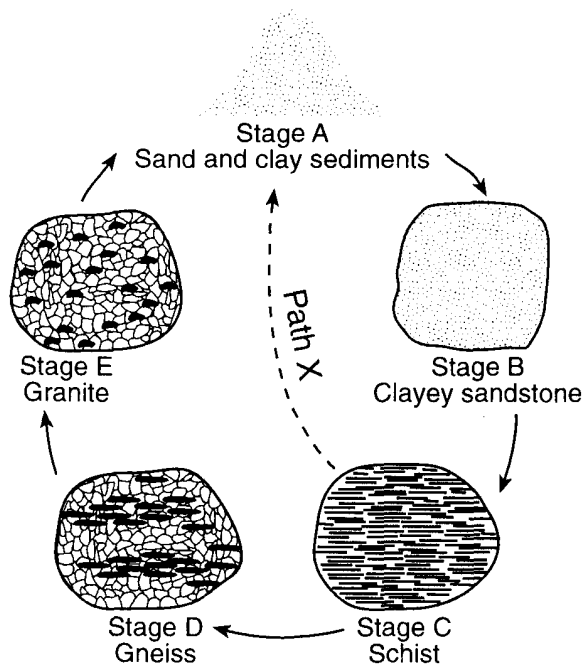
Granite bedrock

Which three minerals are usually found in granite?

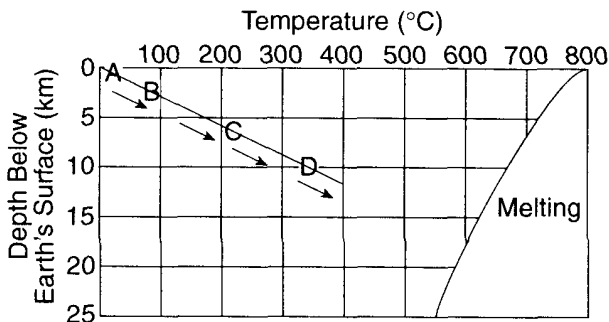
- A) biotite, olivine, and hornblende
 - B) quartz, pyroxene, and olivine
 - C) potassium feldspar, quartz, and hornblende**
 - D) plagioclase feldspar, biotite, and pyroxene
25. Which three minerals are most commonly found in the igneous rock granite?
- A) amphibole, calcite, and hematite
 - B) amphibole, biotite mica, and gypsum
 - C) plagioclase feldspar, pyroxene, and olivine
 - D) plagioclase feldspar, potassium feldspar, and quartz**

26. Base your answer to the following question 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.

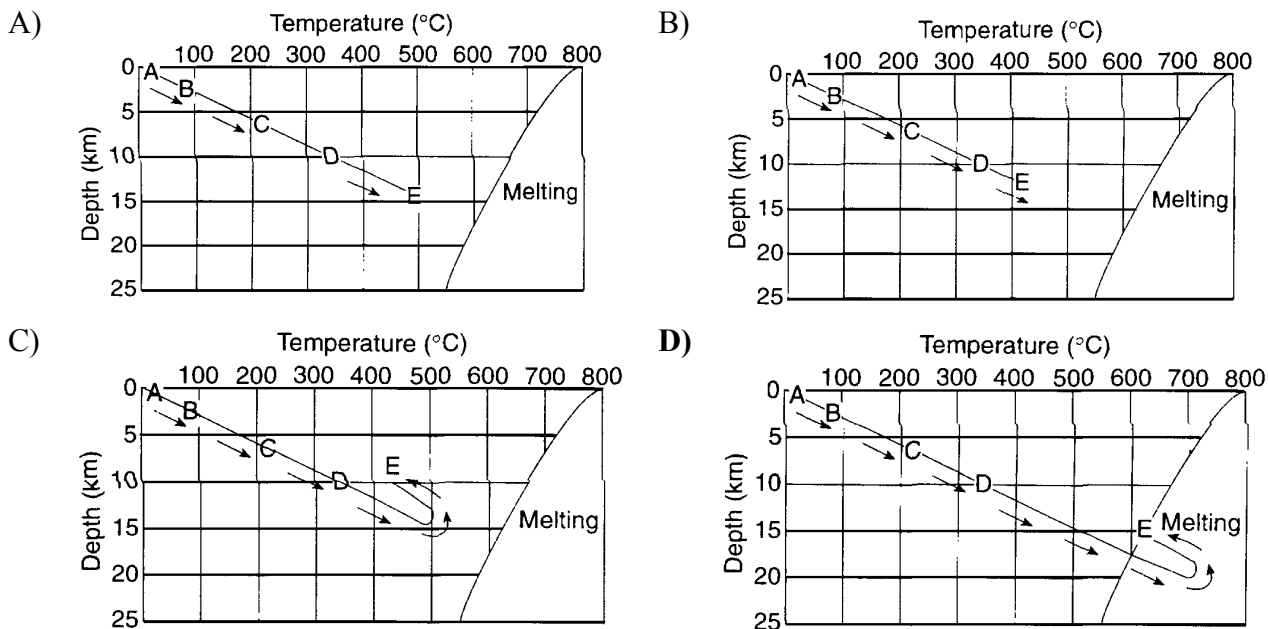
A Simple Rock Cycle



Environment of Rock Stages



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



27. Gabbro is composed mainly of

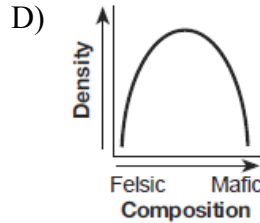
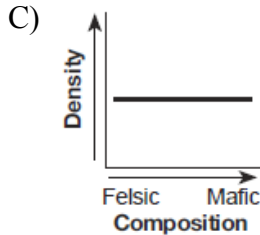
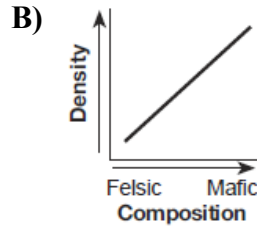
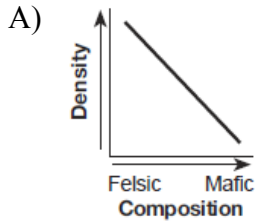
- A) plagioclase feldspars and pyroxene
- B) hornblende and quartz
- C) biotite and olivine
- D) potassium feldspar and quartz

28. For an igneous rock to be classified as rhyolite, it must be light colored, be fine grained, and contain

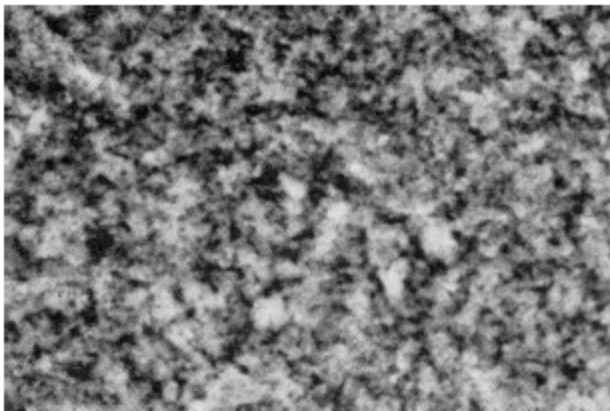
- A) quartz
- B) calcite
- C) pyroxene
- D) olivine

-
29. Which relative concentration of elements is found in a mafic rock?
- A) a high concentration of silicon and a low concentration of iron
 - B) a high concentration of iron and a low concentration of aluminum**
 - C) a high concentration of aluminum and a low concentration of iron
 - D) a high concentration of aluminum and a low concentration of magnesium
30. Olivine and pyroxene are commonly found in igneous rocks that are
- A) felsic, with low density
 - B) felsic, with high density
 - C) mafic, with low density
 - D) mafic, with high density**
31. A fine-grained igneous rock composed mostly of plagioclase feldspar and hornblende and containing no quartz or pyroxene would be classified as
- A) granite
 - B) andesite**
 - C) peridotite
 - D) scoria
32. Which statement best describes the percentage of plagioclase feldspars in a sample of gabbro?
- A) The percentage of plagioclase feldspars in gabbro can vary.**
 - B) Gabbro always contains less plagioclase than pyroxene.
 - C) Plagioclase feldspars always make up 25% of a gabbro sample.
 - D) Gabbro contains no plagioclase feldspars.
33. Large crystals in an igneous rock most likely form as a result of the
- A) mineral composition of the magma
 - B) cooling rate of the magma**
 - C) fossil content of the rock
 - D) color of the rock
-

34. Which graph best shows the relationship between the compositions of different igneous rocks and their densities?



35. The photograph below shows actual crystal sizes in a light-colored igneous rock that contains several minerals, including potassium feldspar, quartz, and biotite mica.



(Shown to actual size)

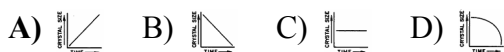
The rock should be identified as

- A) **granite** B) gabbro
C) basalt D) rhyolite

36. Which process could lead directly to the formation of pumice rock?

- A) precipitation of minerals from evaporating seawater
B) metamorphism of unmelted rock material
C) deposition of quartz sand
D) **explosive eruption of lava from a volcano**

37. Which graph best shows the relationship between the size of the crystals in an igneous rock and the length of time it has taken the rock to solidify?



38. Which substances could be found in the same igneous rock?

- A) pebbles and cobbles
B) sandstone and limestone
C) **plagioclase feldspar and pyroxene**
D) quartz and olivine

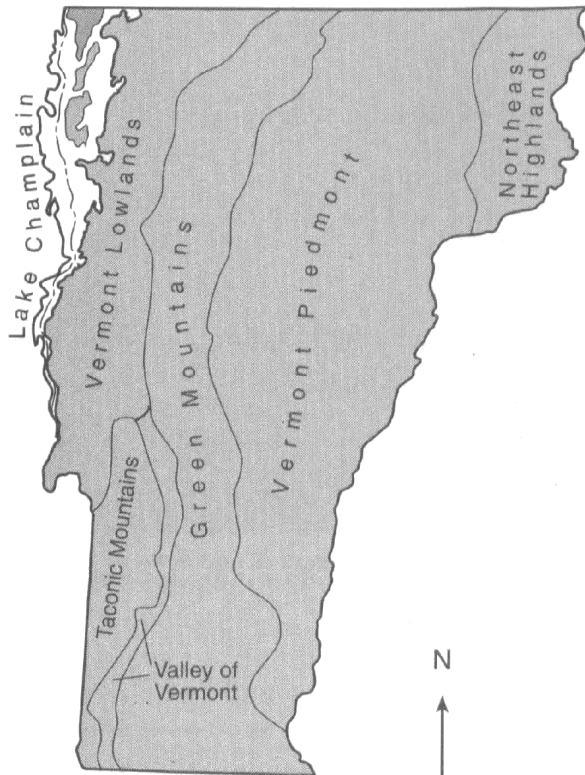
-
39. Base your answer to the following question on the passage and map below. The map shows the generalized landscape regions of Vermont.

Landscape Regions of Vermont

Most of Vermont's landscape regions consist of ancient, weathered mountains that were covered by several ice sheets during the last ice age. When the ice melted, sand, cobbles, and boulders were deposited throughout the state, Vermont is divided into six landscape regions.

- (1) The Vermont Lowlands region has a mild climate, with Lake Champlain moderating its temperature.
 - (2) The Green Mountains run the length of Vermont and were formed over 400 million years ago. Most of the bedrock is metamorphic and the region is known for its deposits of talc and asbestos.
 - (3) The Taconic Mountains extend into New York State. Slate and marble are commonly mined in this region.
 - (4) The Valley of Vermont is a narrow valley between two mountain ranges. Most of the bedrock in the region is limestone and marble.
 - (5) The Vermont Piedmont covers the largest area of the state. This region consists of rolling hills and valleys. Granite mining is an important industry.
 - (6) The Northeast Highlands is a mountainous region composed of granite bedrock.
-

Generalized Landscape Regions of Vermont



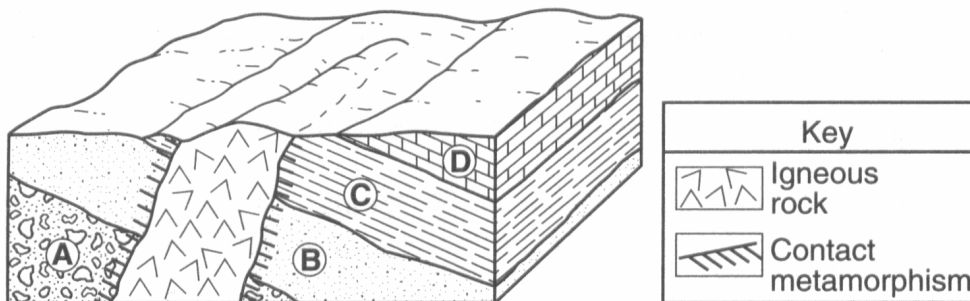
Which processes formed the granite that is mined in Vermont?

- A) compaction and cementation of sediments
- B) cooling and solidification of magma**
- C) uplift and weathering of bedrock
- D) application of heat and pressure to shale

40. A fossil is not likely to be found in

- A) limestone
- B) sandstone
- C) basalt**
- D) shale

41. Base your answer to the following question on the block diagram below, which shows a portion of Earth's crust. Letters *A*, *B*, *C*, and *D* indicate sedimentary layers.

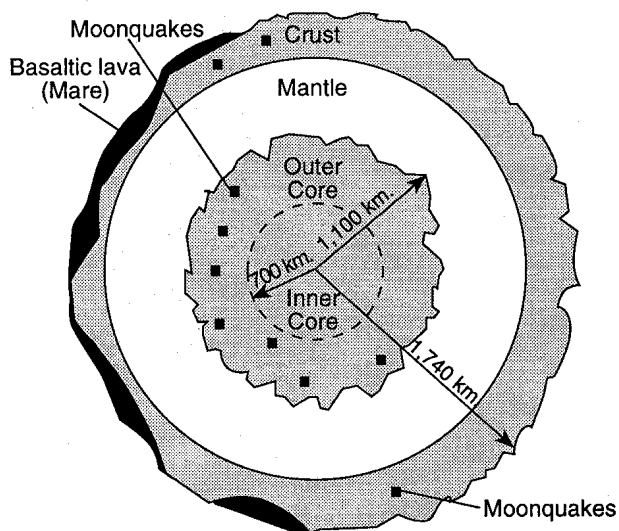


The igneous rock is mostly composed of potassium feldspar and quartz crystals that have an average grain size of 3 millimeters. The igneous rock is most likely

- A) granite**
- B) pegmatite
- C) gabbro
- D) pumice

42. Base your answer to the following question on the information and the cross section below. The cross section represents a possible model of the Moon's interior.

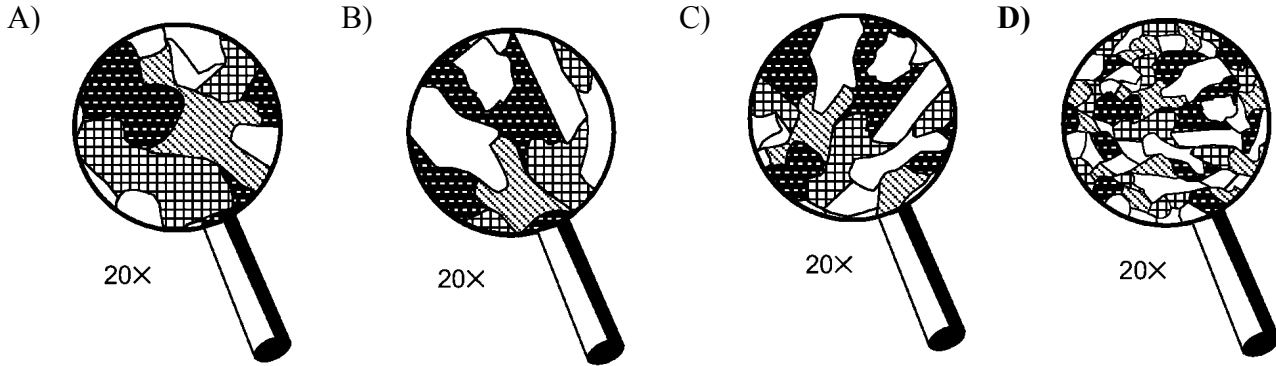
Seismographs left on the Moon by astronauts have provided enough data to develop a model of the Moon's interior. Scientists believe that the Moon has a layered interior and that its crustal thickness varies greatly from one side of the Moon to the other.



According to the cross section, which kind of surface bedrock is found in large amounts on the Moon?

- A) fossil limestone
 - B) volcanic rock**
 - C) sedimentary conglomerate
 - D) nonclastic evaporite
43. The best evidence for determining the cooling rate of an igneous rock during its solidification is provided by
- A) index fossils
 - B) faults in the rock
 - C) the crystal size of its minerals**
 - D) the disintegration of radioactive substances
44. A mafic igneous rock is most likely to be relatively
- A) high in density and dark in color**
 - B) high in density and light in color
 - C) low in density and dark in color
 - D) low in density and light in color

45. The diagrams below show the crystals of four different rocks viewed through the same hand lens. Which crystals most likely formed from molten material that cooled and solidified most rapidly?



46. The diagrams below represent magnifications of rocks. Which is most likely a diagram of a non-sedimentary rock?

KEY

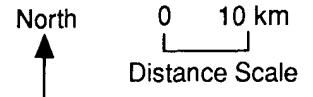
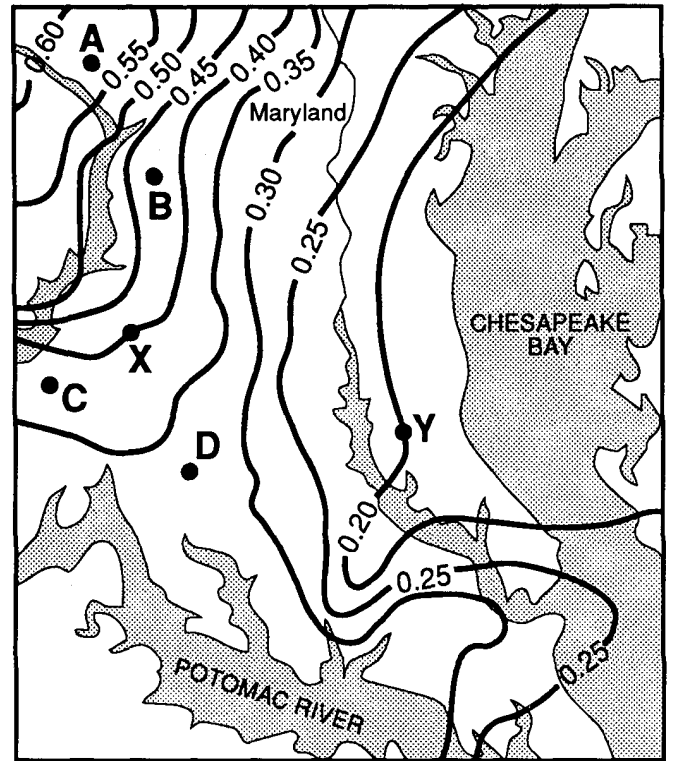


- A) [stippled] B) [diagonal lines] C) [dotted] D) [diagonal lines]

47. A fine-grained igneous rock was probably formed by

- A) weathering and erosion
- B) great heat and pressure that did not produce melting
- C) **rapid cooling of molten material**
- D) burial and cementation of sediment

48. Base your answer to the following question on the field map below, which shows the average size of particles deposited by streams that drained an area of Maryland during the Pleistocene Epoch. The field values represent particle diameters in centimeters.



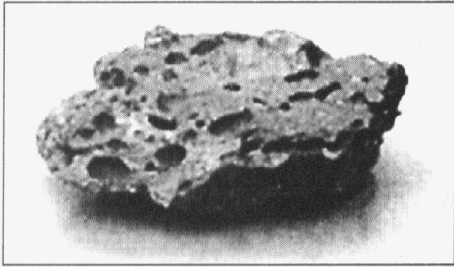
Particles of sediment collected at location Y contain intergrown crystals of quartz, potassium feldspar, and hornblende. From which rock did these sediments most likely weather?

- A) **granite**
- B) gabbro
- C) sandstone
- D) limestone

49. Which characteristic provides the best evidence that obsidian rock formed in an extrusive environment?

- A) layers of rounded fragments
- B) distorted bands of large mineral crystals
- C) noncrystalline glassy texture**
- D) mineral cement between grains

50. The photograph below shows an igneous rock.



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

- A) plutonic with slow cooling
- B) plutonic with rapid cooling
- C) volcanic with slow cooling
- D) volcanic with rapid cooling**

51. Most igneous rocks form by which processes?

- A) melting and solidification**
- B) heat and pressure
- C) erosion and deposition
- D) compaction and cementation

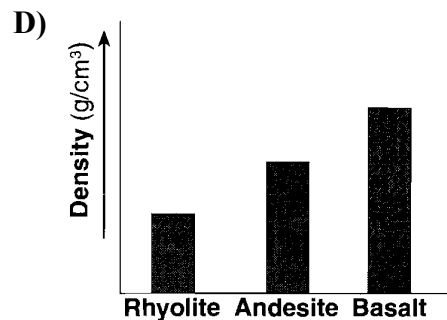
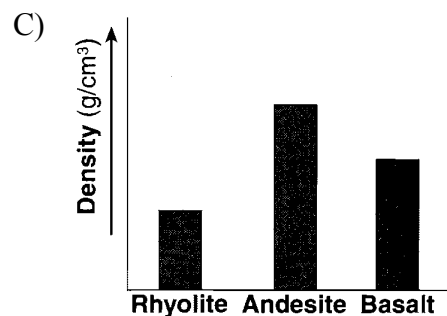
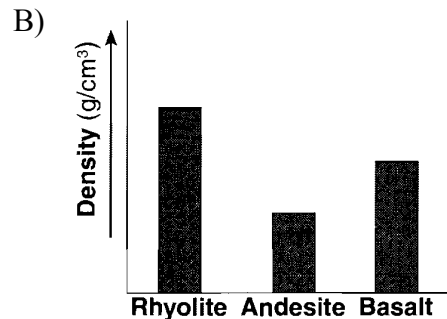
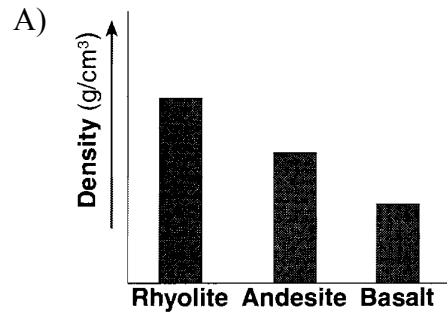
52. Rock *X* and rock *Y* are igneous rocks with identical mineral composition. Rock *X* has no visible crystals and rock *Y* has large, visible crystals. What can be inferred about rock *Y*?

- A) It cooled at the Earth's surface, more slowly than rock *X*.
- B) It cooled beneath the Earth's surface, more slowly than rock *X*.**
- C) It cooled at the Earth's surface, more quickly than rock *X*.
- D) It cooled beneath the Earth's surface, more quickly than rock *X*.

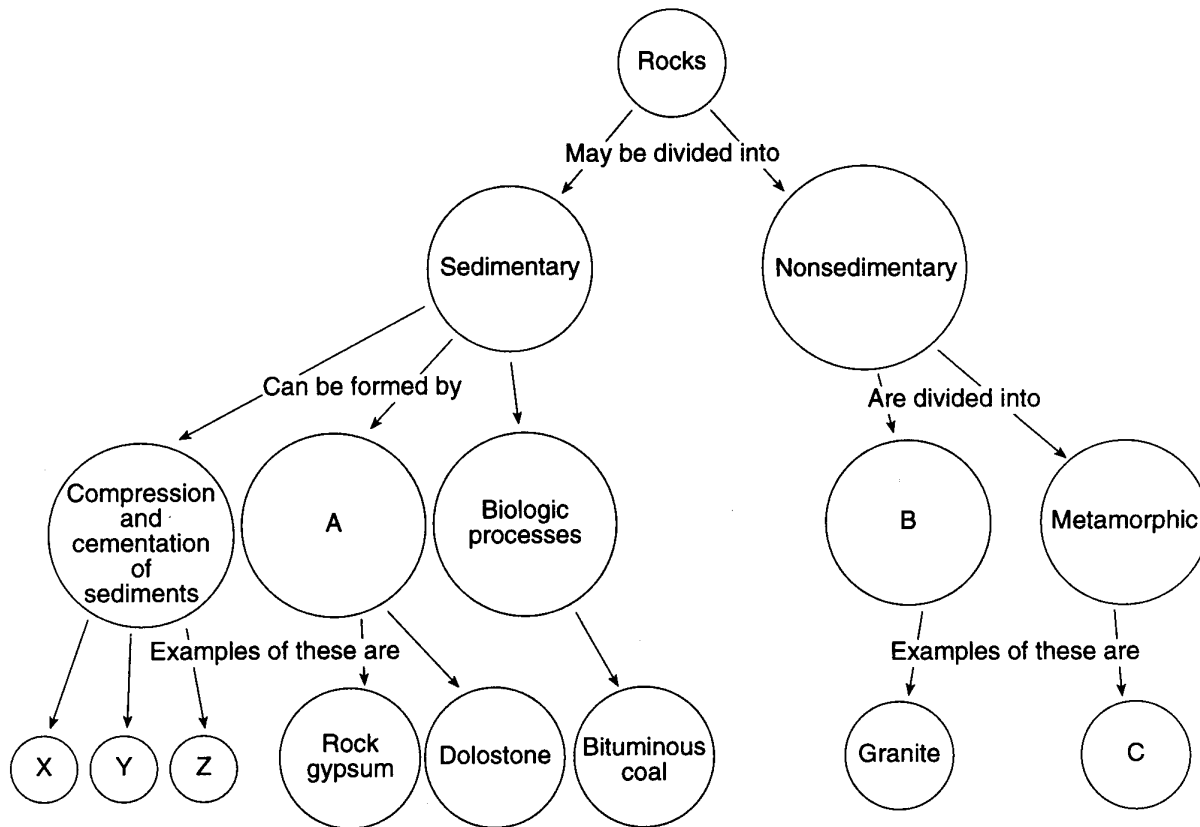
53. Which texture best describes an igneous rock that formed deep underground?

- A) glassy
- B) vesicular
- C) fine grained
- D) coarse grained**

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



55. Base your answer to the following question on the diagram below, which represents a scheme for classifying rocks. The letters *A*, *B*, *C* and *X*, *Y*, *Z* represent missing labels.



Which processes would form the type of rock that is represented by circle *B*?

- A) deposition and compaction
 B) weathering and erosion
 C) **melting and solidification**
 D) faulting and folding

56. 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

- A) more mafic and less dense
 B) more mafic and more dense
 C) **more felsic and less dense**
 D) more felsic and more dense

57. When granite melts and then solidifies, it becomes

- A) a sedimentary rock
 B) **an igneous rock**
 C) a metamorphic rock
 D) sediments

58. Which is the best description of the properties of basalt?

- A) **fine-grained and mafic**
 B) fine-grained and felsic
 C) coarse-grained and mafic
 D) coarse-grained and felsic

59. What is the origin of fine-grained igneous rock?

- A) lava that cooled slowly on Earth's surface
 B) **lava that cooled quickly on Earth's surface**
 C) silt that settled slowly in ocean water
 D) silt that settled quickly in ocean water

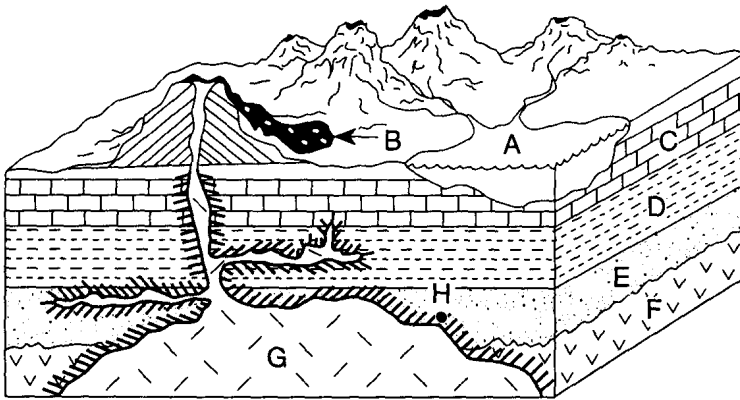
60. Which igneous rock, when weathered, could produce sediment composed of the minerals potassium feldspar, quartz, and amphibole?

- A) gabbro
 B) **granite**
 C) andesite
 D) basalt

61. The end product of the weathering of gabbro or basalt rocks is a solution of dissolved material that most likely would contain high amounts of

- A) iron and magnesium
- B) magnesium and potassium
- C) aluminum and iron
- D) aluminum and potassium

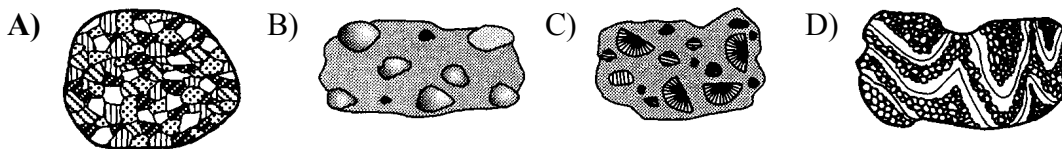
Base your answers to questions 62 through 64 on the block diagram below which shows a cross section of Earth's crust. Letter *A* identifies a lake, and letters *B* through *G* represent different types of bedrock.



Key:

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

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

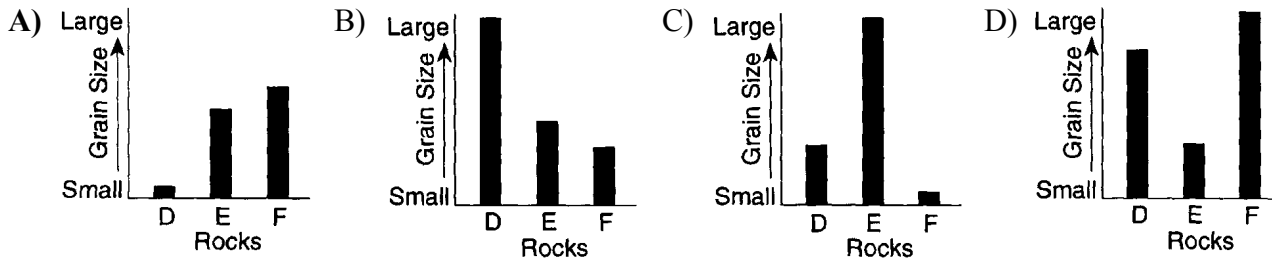


63. Rock *B* is a dark-colored crystalline rock that formed when a lava flow cooled and solidified quickly on the surface of Earth.

Rock *B* is classified as an

- A) extrusive igneous rock with a coarse texture and felsic composition
- B) extrusive igneous rock with a fine texture and a mafic composition**
- C) intrusive igneous rock with a coarse texture and a felsic composition
- D) intrusive igneous rock with a fine texture and a mafic composition

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



65. Mineral crystals of quartz, biotite mica, and amphibole are produced primarily by the

- A) chemical reaction of elements in seawater
- B) cooling and solidification of magma**
- C) deposition of sediments by a glacier
- D) metamorphism of bituminous coal

66. Which common rock is formed from the solidification of molten material?

- A) rock gypsum
- B) slate
- C) rhyolite**
- D) coal

67. The bedrock of the flat areas on the Moon is mostly basalt. This fine-grained igneous rock was most likely formed by the

- A) cementing and compacting of sediments
- B) changes caused by heat and pressure on preexisting rocks
- C) slow cooling of magma deep under the surface
- D) rapid cooling of molten rock in lava flows**

68. Base your answer to the following question on on the data table below, which shows information about the four largest asteroids found in our solar system.

Data Table

Name	Average Diameter (kilometers)	Period of Revolution (years)
Ceres	848.4	4.60
Pallas	498.1	4.61
Juno	247.0	4.36
Vesta	468.3	3.63

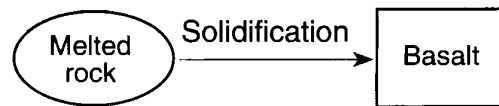
The surface rocks of Vesta contain significant amounts of the mineral pyroxene. If rocks on Vesta are similar to rocks on Earth, which two igneous rocks would most likely be found on the surface of Vesta?

- A) **basalt and scoria**
- B) dunite and granite
- C) peridotite and pumice
- D) rhyolite and pegmatite

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

- A) granite
- B) rhyolite
- C) gabbro**
- D) basalt

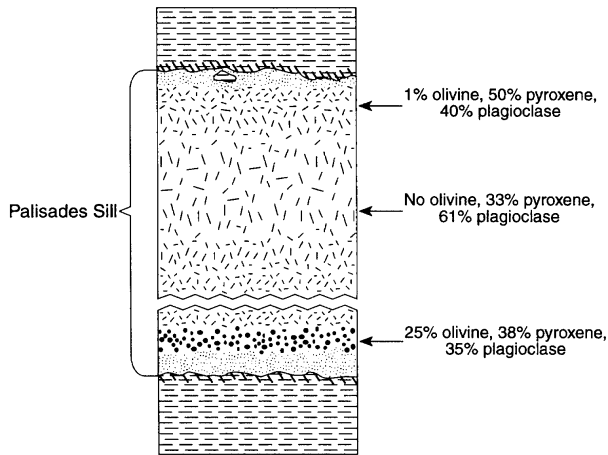
70. The flowchart below illustrates the change from melted rock to basalt.



The solidification of the melted rock occurred

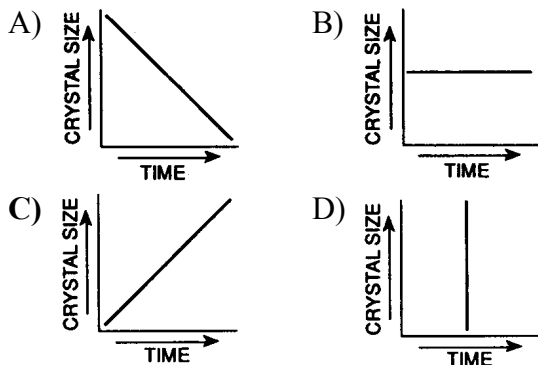
- A) slowly, resulting in fine-grained minerals
- B) slowly, resulting in coarse-grained minerals
- C) rapidly, resulting in coarse-grained minerals
- D) rapidly, resulting in fine-grained minerals**

71. 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?

- A) andesite B) granite
 C) rhyolite D) **gabbro**
72. Which two mineral grains would most likely be found in soil formed from granite?
- A) olivine and pyroxene
B) potassium feldspar and quartz
 C) plagioclase and pyroxene
 D) olivine and nepheline
73. Which graph best represents the relationship between the length of time molten magma takes to cool and the size of the crystals in the rock formed by the magma?



74. A coarse-grained rock contains 50% plagioclase, 45% pyroxene, and 5% hornblende. This rock should be identified as
- A) basalt B) granite
 C) rhyolite D) **gabbro**

75. A fine-grained igneous rock contains 11% plagioclase, 72% pyroxene, 15% olivine, and 2% amphibole. This rock would most likely be classified as

- A) granite B) rhyolite
 C) gabbro D) **basalt**

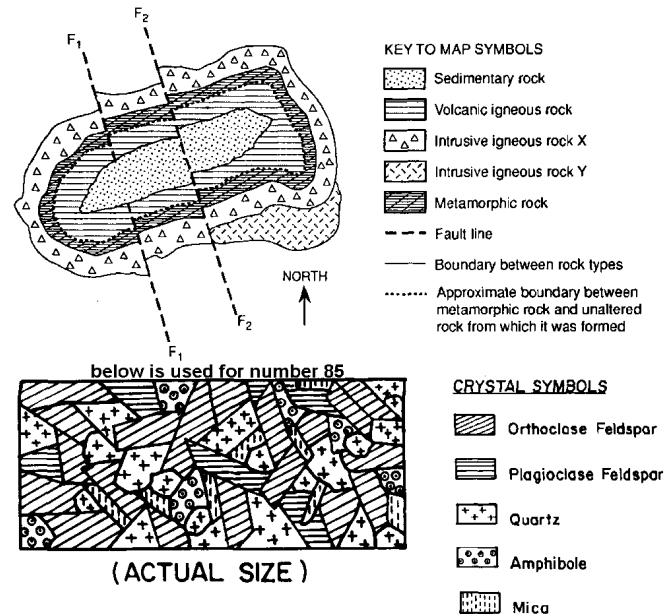
76. Rhyolite and granite are alike in that they both are

- A) fine-grained B) dark-colored
 C) mafic D) **felsic**

77. Which igneous rock has a vesicular texture and contains the minerals potassium feldspar and quartz?

- A) andesite B) pegmatite
C) pumice D) scoria

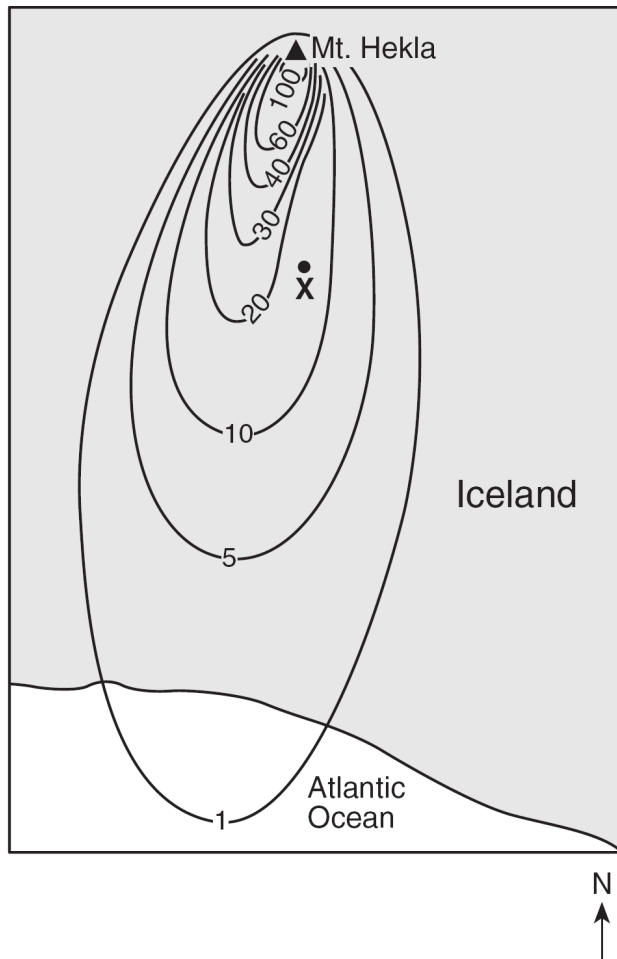
78. Base your answer to the following question on the diagram below which shows a top view of the bedrock geology of a portion of the Earth's surface. Two faults (F_1 and F_2) and three periods of igneous activity have occurred in this area.



Based on the diagram of a sample of igneous rock Y, its mineral composition and crystal size, what is igneous rock Y?

- A) rhyolite B) basalt
 C) conglomerate D) **granite**

79. Base your answer to the following question on the map below. The black triangle represents Mt. Hekla, a volcano in Iceland. The isolines represent the thickness of ash, in centimeters, that settled on Earth's surface after a volcanic eruption of Mt. Hekla on March 29, 1947. Point X is a location on the surface of the ash.



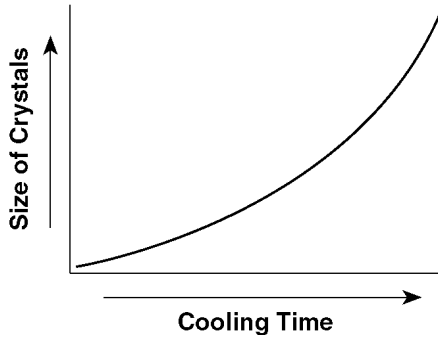
In addition to the ash, solid rock formed on Mt. Hekla from the lava extruded during this eruption. This rock is most likely

- A) light-colored metamorphic
 - B) dark-colored metamorphic
 - C) fine-grained igneous**
 - D) coarse-grained igneous
80. An extrusive igneous rock with a mineral composition of 35% quartz, 35% potassium feldspar, 15% plagioclase feldspar, 10% biotite, and 5% amphibole is called
- A) rhyolite**
 - B) granite
 - C) gabbro
 - D) basaltic glass

81. Which is usually a characteristic of igneous rocks with a high density?

- A) They are light in color.
- B) They are felsic.
- C) They have a high aluminum content.
- D) They contain iron.**

82. 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?



83. A coarse-grained igneous rock contains plagioclase feldspars and pyroxenes, but no quartz. This rock is most likely

- A) basalt B) rhyolite
C) granite D) **gabbro**

84. Which process is necessary for the formation of igneous rocks?

- A) erosion B) deposition
C) **solidification** D) metamorphism

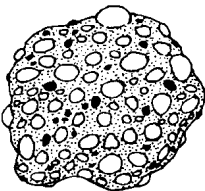
Base your answers to questions 85 and 86 on the diagrams below of five rock samples.



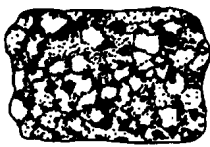
BASALT



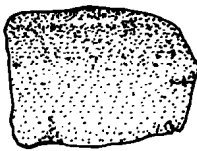
GNEISS
(METAMORPHIC)



CONGLOMERATE



GRANITE



SANDSTONE

85. The basalt was most likely formed by

- A) heat and pressure
B) **melting and solidification**
C) compaction and cementation
D) erosion and deposition

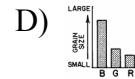
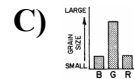
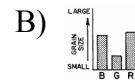
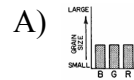
86. Which sample is igneous and has a coarse texture?

- A) sandstone B) conglomerate
C) basalt D) **granite**

87. Which graph best represents the comparison of the average grain sizes in basalt, granite, and rhyolite?

Key to Graph Abbreviations

- B** – Basalt
G – Granite
R – Rhyolite



88. Which two processes result in the formation of igneous rocks?

- A) solidification and evaporation
B) **melting and solidification**
C) crystallization and cementation
D) compression and precipitation

89. Base your answer to the following question on on the photographs and news article below.

Old Man's Loss Felt in New Hampshire

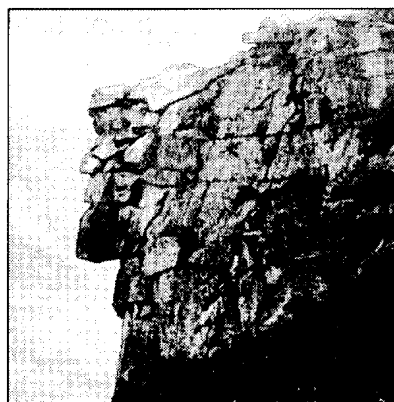
FRANCONIA, N.H. — Crowds of visitors were drawn to Franconia Notch on Sunday to mourn the loss of New Hampshire's well-known symbol — the Old Man of the Mountain granite profile.

The 700-ton natural formation was just a pile of rocks after breaking loose from its 1,200-foot-high mountainside perch. It was unclear when the outcropping fell because clouds had obscured the area Thursday and Friday; a state park trail crew discovered the collapse Saturday morning.

The famous mountain's history dates millions of years. Over time, nature carved out a 40-foot-tall profile resembling an old man's face, and it eventually became New Hampshire's most recognizable symbol.

The Buffalo News, May 5,

2003



Associated Press

Granite profile of the Old Man of the Mountain is shown before the collapse, and after

The granite bedrock formed when

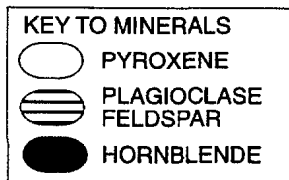
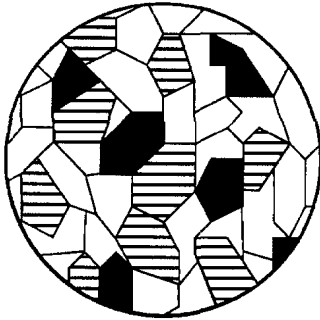
- A) sediments were buried
- B) a volcano erupted
- C) **magma cooled underground**
- D) limestone recrystallized

90. What is the color and type of rock that forms oceanic crust at mid-ocean ridges?
- A) light colored and igneous
 - B) light colored and sedimentary
 - C) **dark colored and igneous**
 - D) dark colored and sedimentary
91. Which is a fine-grained igneous rock made up primarily of pyroxene and plagioclase feldspar?
- A) gabbro
 - B) **basalt**
 - C) granite
 - D) rhyolite
92. Compared to felsic igneous rocks, mafic igneous rocks contain greater amounts of
- A) white quartz
 - B) aluminum
 - C) pink feldspar
 - D) **iron**
93. Which minerals are present in granite but are never present in gabbro?
- A) quartz and plagioclase feldspar
 - B) **potassium feldspar (orthoclase) and quartz**
 - C) plagioclase feldspar and potassium feldspar (orthoclase)
 - D) biotite mica and hornblende amphibole
94. The igneous rock gabbro most likely formed from molten material that cooled
- A) rapidly at Earth's surface
 - B) slowly at Earth's surface
 - C) rapidly, deep underground
 - D) **slowly, deep underground**

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

- A) obsidian B) rhyolite
C) gabbro D) **scoria**

96. The diagram below shows the mineral composition of an igneous rock drawn actual size.



This igneous rock is

- A) **gabbro** B) granite
C) basalt D) rhyolite

97. Some Moon rock samples have coarse intergrown crystals composed of plagioclase feldspar, hornblende, and olivine. These Moon rock samples are most similar to Earth rock samples of

- A) **gabbro** B) marble
C) breccia D) pumice

98. Obsidian's glassy texture indicates that it formed

- A) slowly, deep below Earth's surface
B) slowly, on Earth's surface
C) quickly, deep below Earth's surface
D) **quickly, on Earth's surface**

99. Which minerals are found in the igneous rocks gabbro and basalt?

- A) olivine and quartz
B) **olivine and pyroxene**
C) pyroxene and orthoclase
D) orthoclase and quartz

100. Which extrusive igneous rock is composed of approximately 40% quartz, 20% potassium feldspar, 20% plagioclase feldspar, 10% biotite mica, and 10% hornblende?

- A) **rhyolite** B) gabbro
C) granite D) basalt