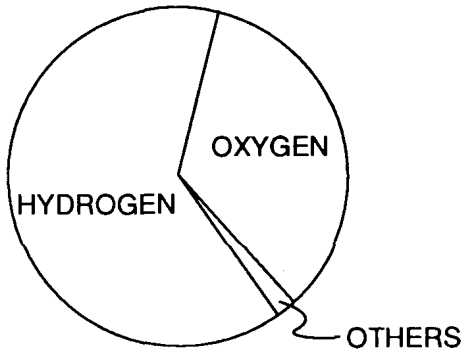


## Midterm review

1. Which element is most abundant in Earth's lithosphere?

- A) oxygen                      C) hydrogen  
B) silicon                      D) nitrogen

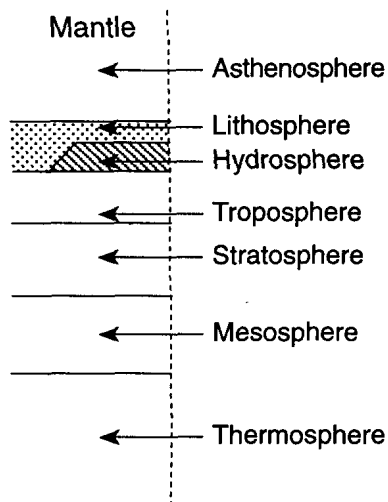
2. Base your answer to the following question on The graph below represents percentage of elements by volume.



This graph best represents the elements of the Earth's

- A) lithosphere                  C) troposphere  
B) hydrosphere                D) stratosphere

3. The diagram below shows spheres associated with Earth.

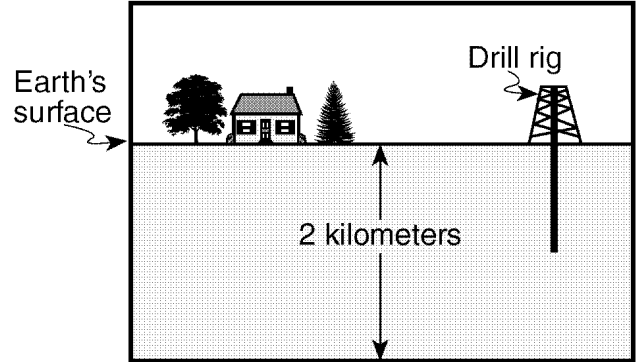


(Not drawn to scale)

Which spheres are zones of Earth's atmosphere?

- A) lithosphere, hydrosphere, and troposphere  
B) stratosphere, mesosphere, and thermosphere  
C) asthenosphere, lithosphere, and hydrosphere  
D) hydrosphere, troposphere, and stratosphere

4. Base your answer to the following question on The cross section below shows a drill rig used to collect rock samples from below Earth's surface.



(Not drawn to scale)

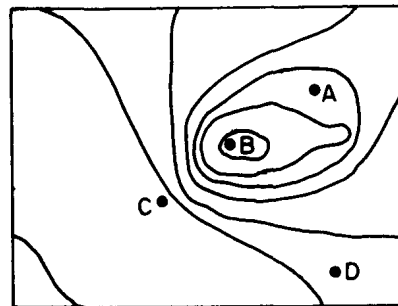
The rock samples collected from the bottom of the drill hole came from which Earth layer?

- A) lithosphere                  C) asthenosphere  
B) hydrosphere                 D) stiffer mantle

5. In which group are the spheres of the Earth listed in order of increasing density?

- A) atmosphere, hydrosphere, lithosphere  
B) hydrosphere, lithosphere, atmosphere  
C) lithosphere, hydrosphere, atmosphere  
D) lithosphere, atmosphere, hydrosphere

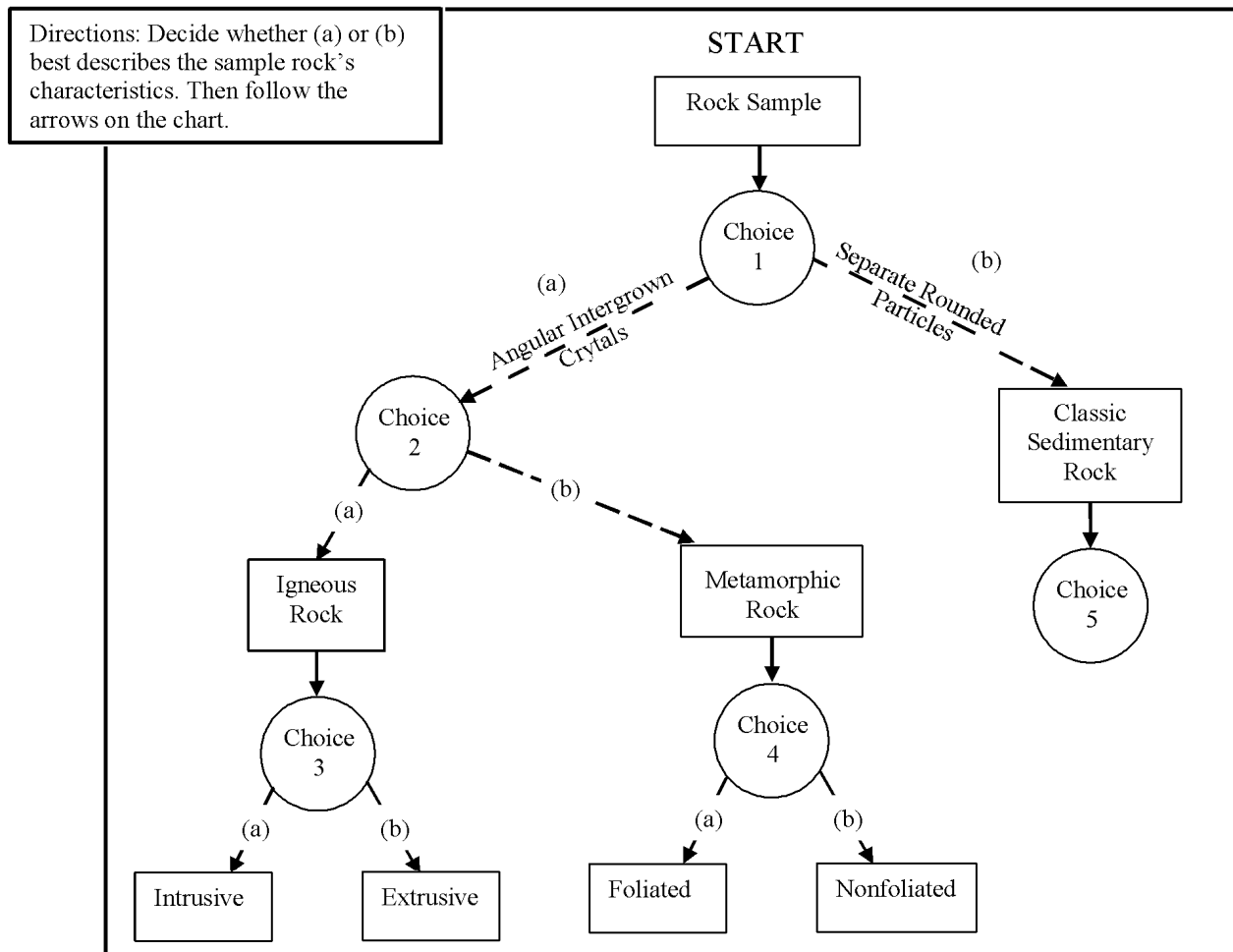
6. The diagram below is a contour map. Between which two points is the slope of the hill steepest?



- A) A and B                      C) C and D  
B) B and C                      D) A and D

Base your answers to questions 7 through 10 on the diagram below which shows the structure of a student-developed chart for identifying some rock samples. The circles labeled choice 1 through choice 4 represent decision-making steps leading either to path (a) or path (b). Choice 5 has not been completed.

### Student Chart



7. Before the student can select either path (a) or path (b) at choice 1, the student must make a decision about
 

A) mineral composition	C) the temperature at which rocks form
B) crystal size	D) the appearance of the rock grains
8. Which rock specimen should lead the student to choice 4, path (a)?
 

A) peridotite	B) quartzite	C) gneiss	D) dolostone
---------------	--------------	-----------	--------------
9. At choice 2, the student should generally select path (a) if the student observes
 

A) a random arrangement of mineral crystals	B) distorted structure and crystal alignment
C) bands of mineral crystals	D) layers of same-sized crystals
10. Which characteristic should be used at choice 5 to further identify the types of clastic sedimentary rocks?
 

A) grain size	C) mineral color
B) mineral cement	D) horizontal layering

11. Which property is used to classify the land-derived sedimentary rocks listed in the *Earth Science Reference Tables*?

- A) particle size
- B) mineral composition
- C) fossil content
- D) color

12. Which metamorphic rock will have visible mica crystals and a foliated texture?

- A) marble
- B) quartzite
- C) schist
- D) slate

13. Which two rocks are primarily composed of a mineral that bubbles with acid?

- A) limestone and marble
- B) granite and dolostone
- C) sandstone and quartzite
- D) slate and conglomerate

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

<b>Group A</b>	<b>Group B</b>
Granite	Rhyolite
Gabbro	Basalt

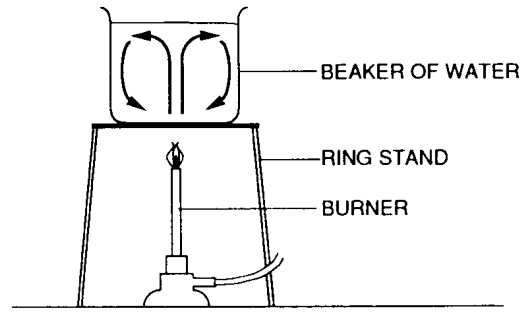
What is the basis for this classification?

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

15. What is the relationship between density, temperature, and pressure inside the Earth?

- A) As depth increases, density, temperature, and pressure decrease.
- B) As depth increases, density and temperature increase, but pressure decreases.
- C) As depth increases, density increases, but temperature and pressure decrease.
- D) As depth increases, density, temperature, and pressure increase.

16. The diagram below shows a container of water that is being heated.



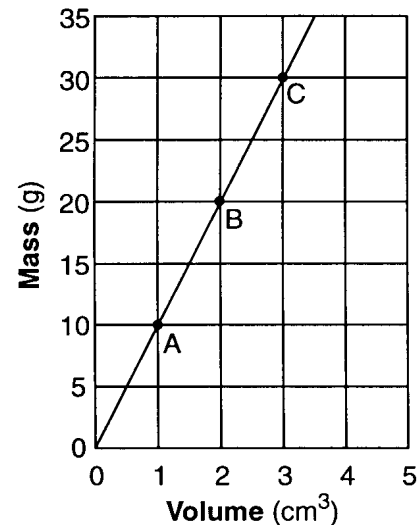
The movement of water shown by the arrows is most likely caused by

- A) density differences
- B) insolation
- C) the Coriolis effect
- D) the Earth's rotation

17. The basaltic bedrock of the oceanic crust is classified as

- A) felsic, with a density of 2.7 g/cm<sup>3</sup>
- B) felsic, with a density of 3.0 g/cm<sup>3</sup>
- C) mafic, with a density of 2.7 g/cm<sup>3</sup>
- D) mafic, with a density of 3.0 g/cm<sup>3</sup>

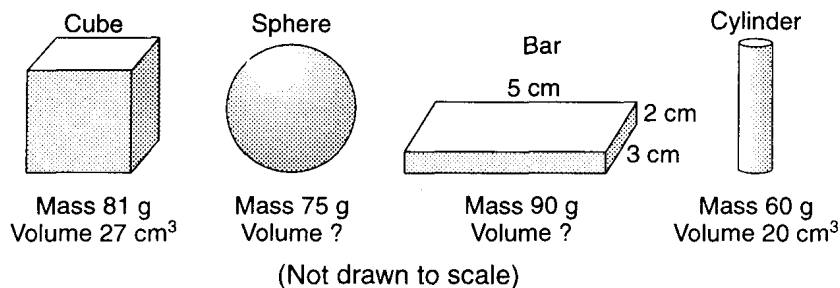
18. Base your answer to the following question on The graph below shows the relationship between mass and volume for three samples, A, B, and C, of a given material.



What is the density of this material?

- A) 1.0 g/cm<sup>3</sup>
- B) 5.0 g/cm<sup>3</sup>
- C) 10.0 g/cm<sup>3</sup>
- D) 20.0 g/cm<sup>3</sup>

Base your answers to questions 19 through 21 on the diagrams below which represent four solid objects made of the same uniform material. The volumes of the sphere and the bar are not given.



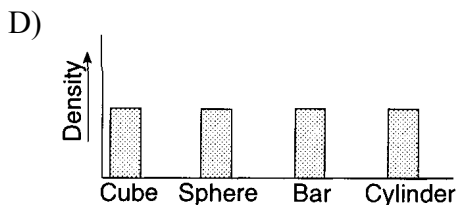
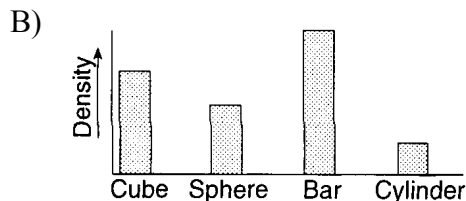
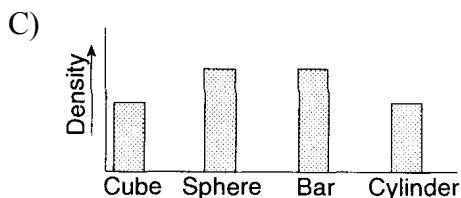
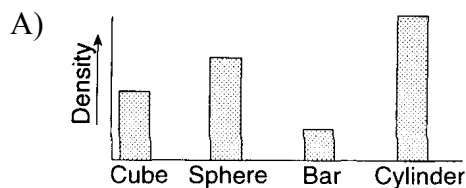
19. What is the density of the bar?

- A)  $9.0 \text{ g/cm}^3$     B)  $30.0 \text{ g/cm}^3$     C)  $3.0 \text{ g/cm}^3$     D)  $90.0 \text{ g/cm}^3$

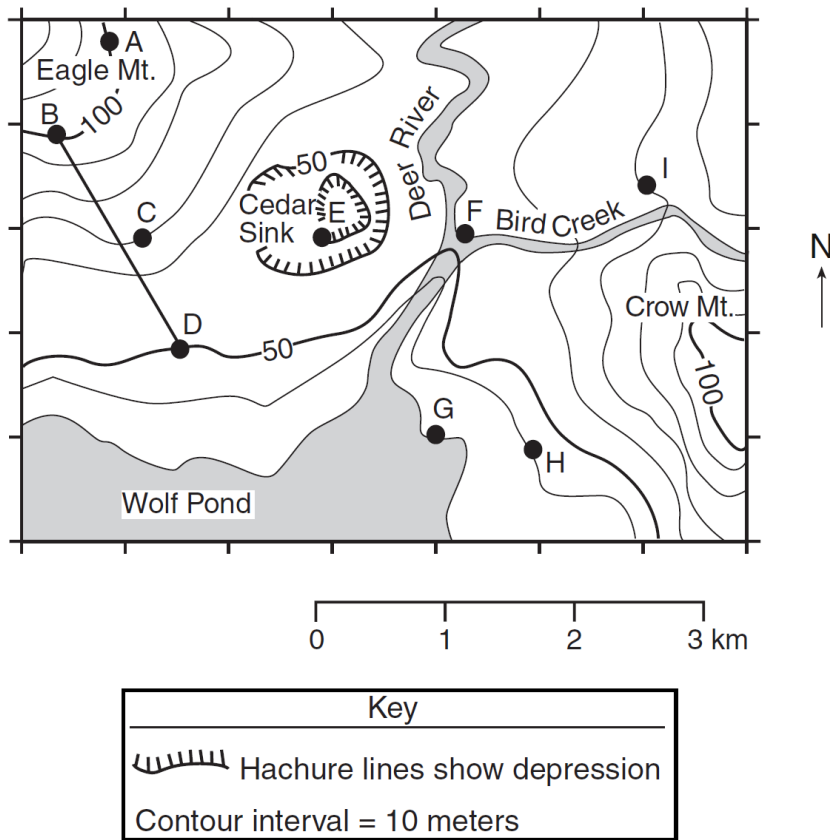
20. What will occur when the sphere is heated?

- A) Its mass will increase and its volume will remain the same.  
 B) Its mass will decrease and its volume will remain the same.  
 C) Its mass will remain the same and its volume will increase.  
 D) Its mass will remain the same and its volume will decrease.

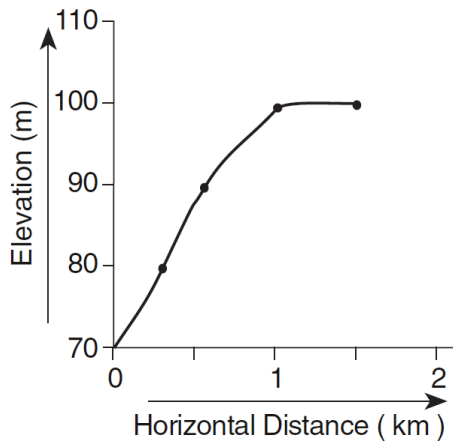
21. Which graph best represents the relative densities of the objects?



Base your answers to questions 22 through 29 on the topographic map below. Points *A* through *I* are locations on the map. Elevations are shown in meters.



22. The profile below represents certain locations on the map.



The profile represents a cross section of the landscape between points

- A) *A* and *D*      B) *B* and *C*      C) *C* and *A*      D) *I* and *H*

23. What is the approximate gradient along line *BD*?

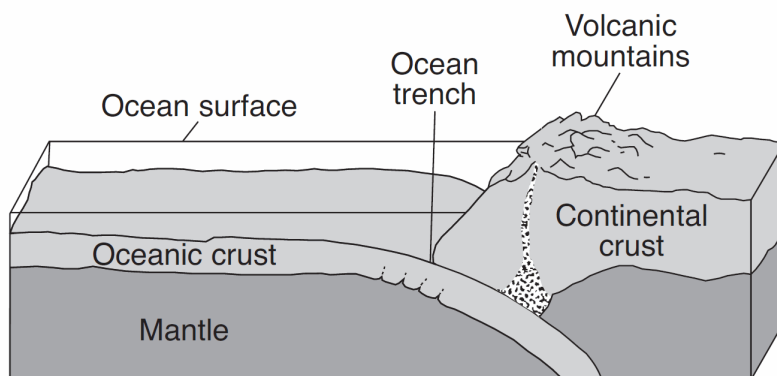
- A) 25 m/km      B) 50 m/km      C) 100 m/km      D) 150 m/km

24. In which section of the map is the highest elevation located?

- A) northeast      B) northwest      C) southeast      D) southwest

25. Which locations have the same elevation?  
 A) *A* and *C*      B) *B* and *E*      C) *C* and *I*      D) *F* and *G*
26. The contour lines crossing Deer River show that the river flows  
 A) northward out of Wolf Pond      C) southward out of Wolf Pond  
 B) northward into Wolf Pond      D) southward into Wolf Pond
27. What is the elevation of Point E?  
 A) 20 m      B) 30 m      C) 40 m      D) 50 m
28. What is the elevation of point I?  
 A) 60 m      B) 70 m      C) 80 m      D) 90 m
29. What is the distance from *A* to *G*?  
 A) 3 km      B) 4km      C) 5km      D) 6km

30. Base your answer to the following question on The block diagram below shows the boundary between two tectonic plates.

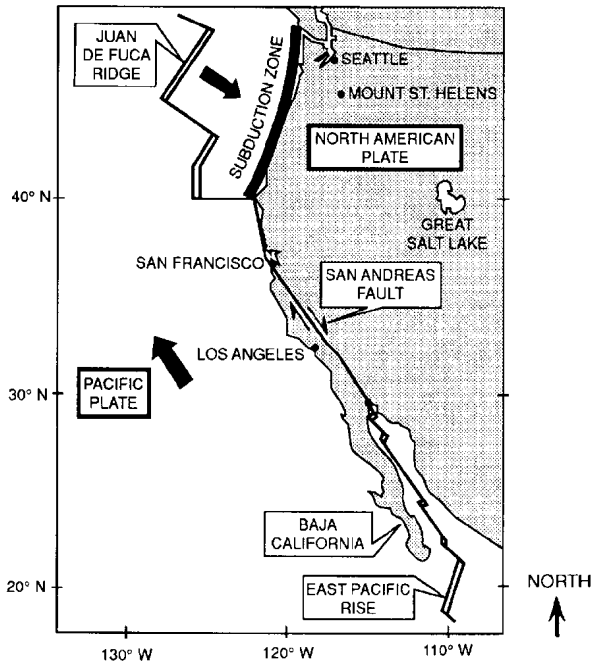


(Not drawn to scale)

Which type of plate boundary is shown?

- A) divergent      B) convergent      C) transform      D) complex
- 
31. Alternating parallel bands of normal and reversed magnetic polarity are found in the basaltic bedrock on either side of the  
 A) Mid-Atlantic Ridge  
 B) Yellowstone Hot Spot  
 C) San Andreas Fault  
 D) Peru-Chile Trench

Base your answers to questions 32 through 39 on the map below, which shows crustal plate boundaries located along the Pacific coastline of the United States. The arrows show the general directions in which some of the plates appear to be moving slowly.



32. Which feature is located at 20° North latitude and 109° West longitude?

- A) San Andreas fault
- B) East Pacific rise
- C) Baja California
- D) Juan de Fuca Ridge

33. Geologic studies of the San Andreas fault indicate that

- A) many earthquakes occur along the San Andreas fault
- B) the North American plate and the Pacific plate are locked in dynamic equilibrium
- C) the subduction zone is the boundary at which the crustal plates are drifting apart
- D) the age of the bedrock increases as distance from the fault increases

34. Which features are most often found at crustal plate boundaries like those shown on the map?

- A) meandering rivers and warm-water lakes
- B) plains and plateaus
- C) geysers and glaciers
- D) faulted bedrock and volcanoes

35. What would a study of the East Pacific rise (a mid-ocean ridge) indicate about the age of the basaltic bedrock in this area?

- A) The bedrock is youngest at the ridge.
- B) The bedrock is oldest at the ridge.
- C) The bedrock at the ridge is the same age as the bedrock next to the continent.
- D) The bedrock at the ridge is the same age as the bedrock at the San Andreas fault.

36. The best way to find the direction of crustal movement along the San Andreas fault is to

- A) study the Earth's present magnetic field
- B) observe erosion along the continental coastline
- C) measure gravitational strength on opposite sides of the fault
- D) match displaced rock types from opposite sides of the fault

37. Which feature is located at 40° North latitude and 120° West longitude?

- A) San Andreas fault
- B) East Pacific rise
- C) Baja California
- D) Juan de Fuca Ridge

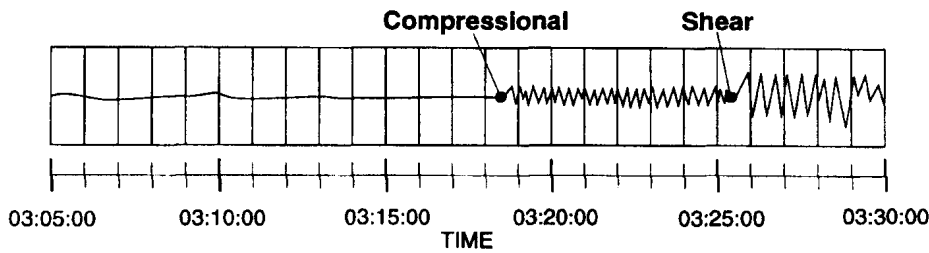
38. Which feature is located at 20° North latitude and 150° East longitude?

- A) Hawaii Hot Spot
- B) Mariana Trench
- C) Indian-Australian Plate
- D) Peru-Chili Trench

39. Geologic studies of the San Andreas fault indicate that

- A) many earthquakes occur along the San Andreas fault
- B) the North American plate and the Pacific plate are locked in dynamic equilibrium (both plates not moving)
- C) the subduction zone is the boundary at which the crustal plates are drifting apart
- D) the age of the bedrock increases as distance from the fault increases

40. A seismogram recorded at a seismic station is shown below.

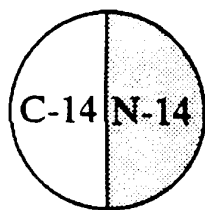


Which information can be determined by using this seismogram?

- A) the depth of the earthquake's focus      C) the location of the earthquake's epicenter  
B) the direction to the earthquake's focus      D) the distance to the earthquake's epicenter
41. Which statement about earthquake waves best supports the inference that the Earth's outer core is liquid
- A) The velocity of earthquake waves increases as the distance from an epicenter increases.  
B) The difference in arrival times for compressional and shear waves increases as the distance from an epicenter increases.  
C) Compressional waves travel faster than shear waves.  
D) Shear waves travel only through solids.
42. The *P*-waves (compressional waves) from an earthquake travel through the Earth's
- A) crust, only  
B) crust and mantle, only  
C) crust, mantle, and inner core, only  
D) crust, mantle, outer core, and inner core
43. In 8 minutes, an earthquake *P*-wave travels a total distance of
- A) 2,100 km      C) 6,600 km  
B) 4,700 km      D) 11,300 km
44. An earthquake's *P*-wave arrived at a seismograph station at 02 hours 40 minutes 00 seconds. The earthquake's *S*-wave arrived at the same station 2 minutes later. What is the approximate distance from the seismograph station to the epicenter of the earthquake?
- A) 1,100 km      C) 3,100 km  
B) 2,400 km      D) 4,000 km
45. A large earthquake occurred at 45° N 75° W on September 5, 1994. Which location in New York State was closest to the epicenter of the earthquake?
- A) Buffalo      C) Albany  
B) Massena      D) New York City
46. Which statement best describes the relationship between the travel rates and travel times of earthquake *P*-waves and *S*-waves from the focus of an earthquake to a seismograph station?
- A) *P*-waves travel at a slower rate and take less time.  
B) *P*-waves travel at a faster rate and take less time.  
C) *S*-waves travel at a slower rate and take less time.  
D) *S*-waves travel at a faster rate and take less time.
47. Which radioactive element has a half-life of  $4.5 \times 10^9$  years?
- A) carbon-14      C) uranium-238  
B) rubidium-87      D) potassium-40
48. Which gases in the Earth's atmosphere are the best absorbers of infrared radiation?
- A) carbon dioxide and water vapor  
B) carbon dioxide and oxygen  
C) nitrogen and oxygen  
D) nitrogen and water vapor
49. Which radioactive element would be used to determine the age of late Pleistocene mastodont bones found in western Connecticut?
- A) carbon-14      C) uranium-238  
B) potassium-40      D) rubidium-87



50. Geologists have subdivided geologic time into periods that are based on
- A) carbon dating      C) fossil evidence  
B) rock types          D) landscape regions
51. A whalebone that originally contained 200 grams of radioactive carbon-14 now contains 25 grams of carbon-14. How many carbon-14 half-lives have passed since this whale was alive?
- A) 1    B) 2    C) 3    D) 4
52. The diagram below shows the relative proportions of carbon-14 (C-14) to nitrogen-14 (N-14) in a rock.



What is the most likely age of the rock?

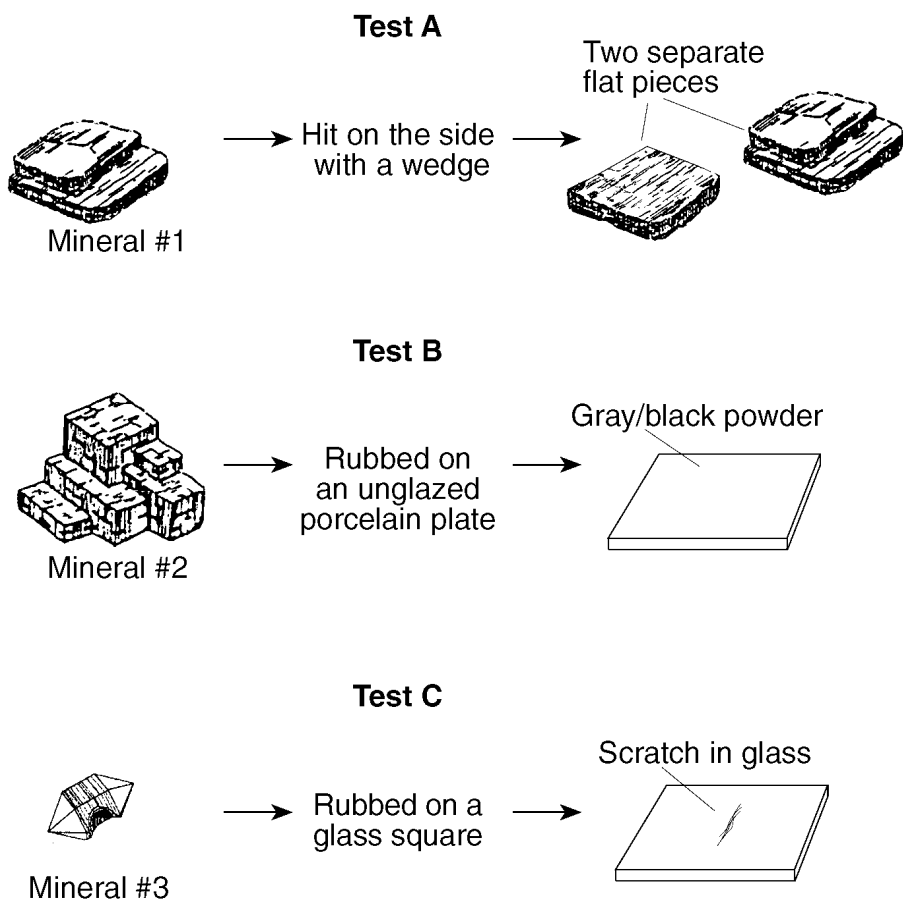
- A)  $2.85 \times 10^3$       C)  $1.3 \times 10^9$   
B)  $5.7 \times 10^3$       D)  $4.5 \times 10^9$
53. The table below gives information about the radioactive decay of carbon-14. [Part of the table has been left blank for student use.]

Half-life	Mass of Original C-14 Remaining (grams)	Number of Years
0	1	0
1	$\frac{1}{2}$	5,700
2	$\frac{1}{4}$	11,400
3	$\frac{1}{8}$	17,100
4		
5		
6		

What is the amount of the original carbon-14 remaining after 34,200 years?

- A)  $\frac{1}{8}g$     B)  $\frac{1}{16}g$     C)  $\frac{1}{32}g$     D)  $\frac{1}{64}g$

Base your answers to questions 54 and 55 on the diagram below, which shows three minerals with three different physical tests, *A*, *B*, and *C*, being performed on them.



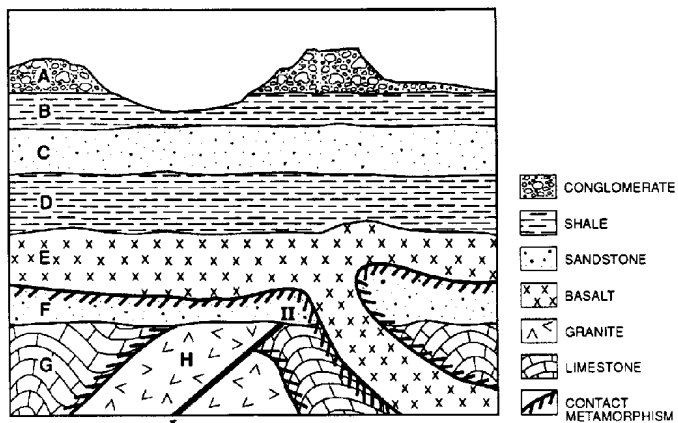
54. Which sequence correctly matches each test, *A*, *B*, and *C*, with the mineral property tested?

- A) *A*—cleavage; *B*—streak; *C*—hardness    C) *A*—streak; *B*—cleavage; *C*—hardness  
B) *A*—cleavage; *B*—hardness; *C*—streak    D) *A*—streak; *B*—hardness; *C*—cleavage

55. The results of all three physical tests shown are most useful for determining the

- A) rate of weathering of the minerals  
B) identity of the minerals  
C) environment where the minerals formed  
D) geologic period when the minerals formed

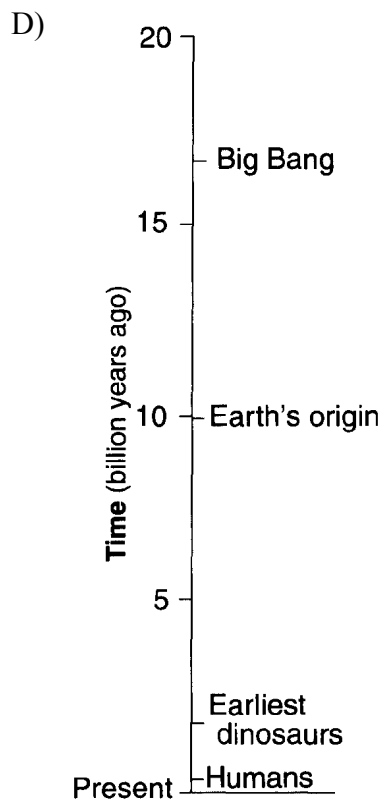
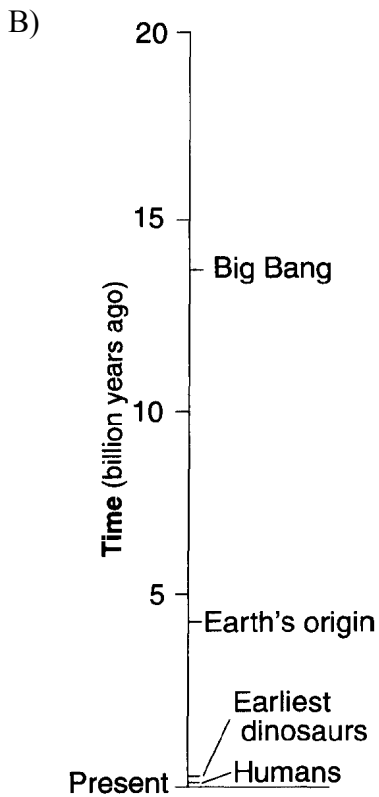
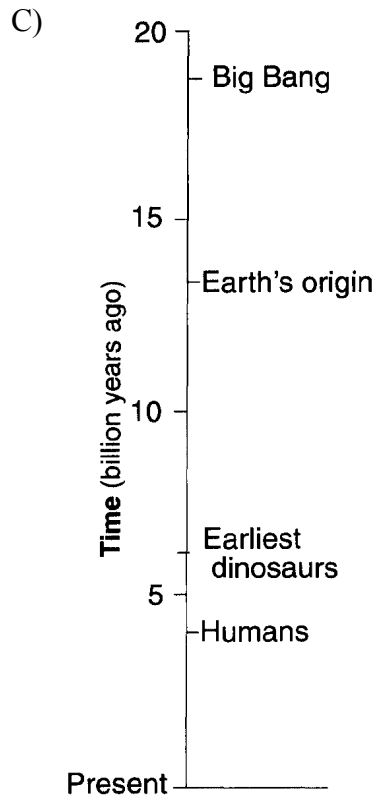
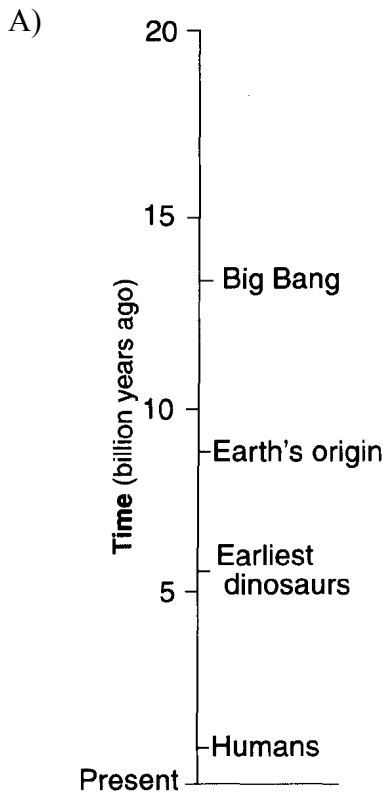
56. Base your answer to the following question on the *Earth Science Reference Tables* and the diagram below. The diagram is a geologic cross section of a portion of the Earth's crust consisting of various sedimentary and non-sedimentary rock units, represented by letters *A* through *H*, which have not been overturned. Line I-II represents a fault.



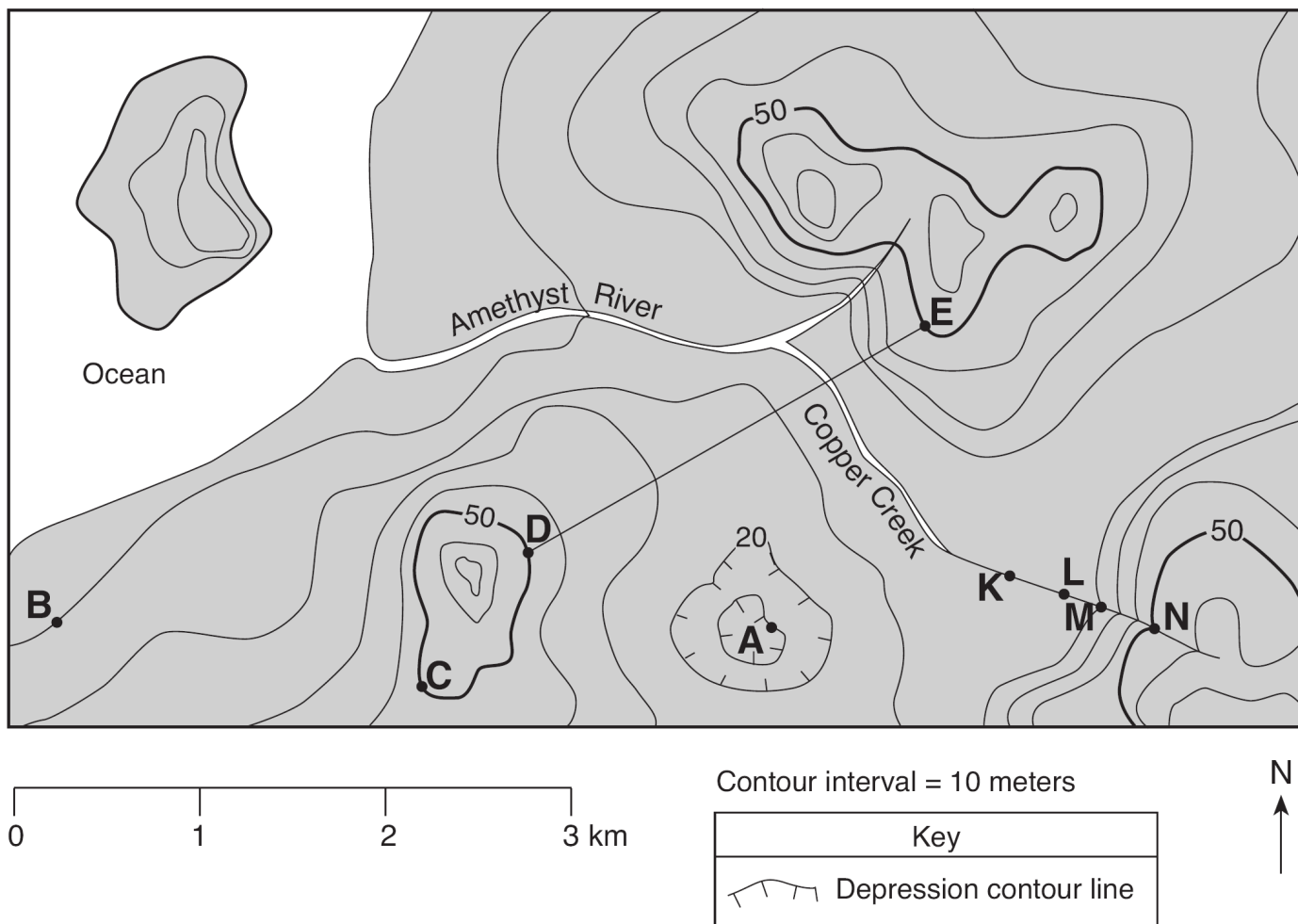
What is the age sequence of the rock units, from oldest to youngest?

- A) *E, F, G, H*                      C) *G, H, F, E*  
 B) *H, G, E, F*                      D) *F, E, G, H*
57. According to fossil evidence, which sequence shows the order in which these four life-forms first appeared on Earth?
- A) reptiles → **amphibians** → **insects** → **fish**  
 B) insects → fish → reptiles → **amphibians**  
 C) amphibians → reptiles → fish → insects  
 D) fish → insects → amphibians → **reptiles**

58. Which time line most accurately indicates when this sequence of events in earth's history occurred?

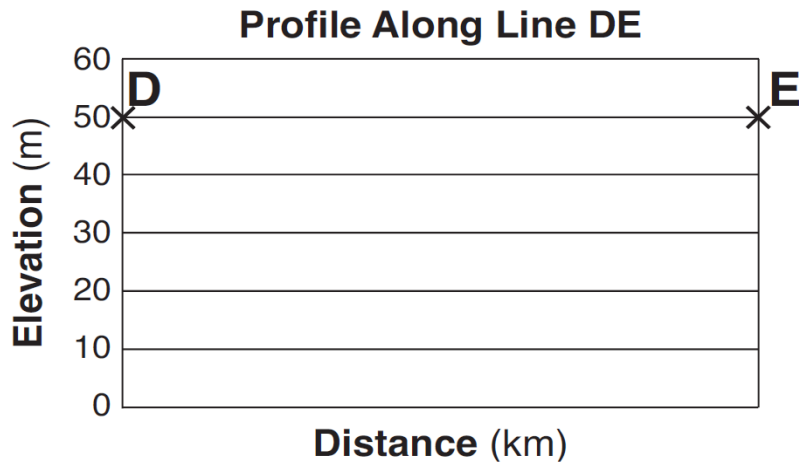


Base your answers to questions **59** through **65** on the topographic map shown below. Letters *A*, *B*, *C*, *D*, and *E* represent locations on Earth's surface. Letters *K*, *L*, *M*, and *N* are locations along Copper Creek. Elevations are measured in meters.



59. What is the elevation of location *A*?

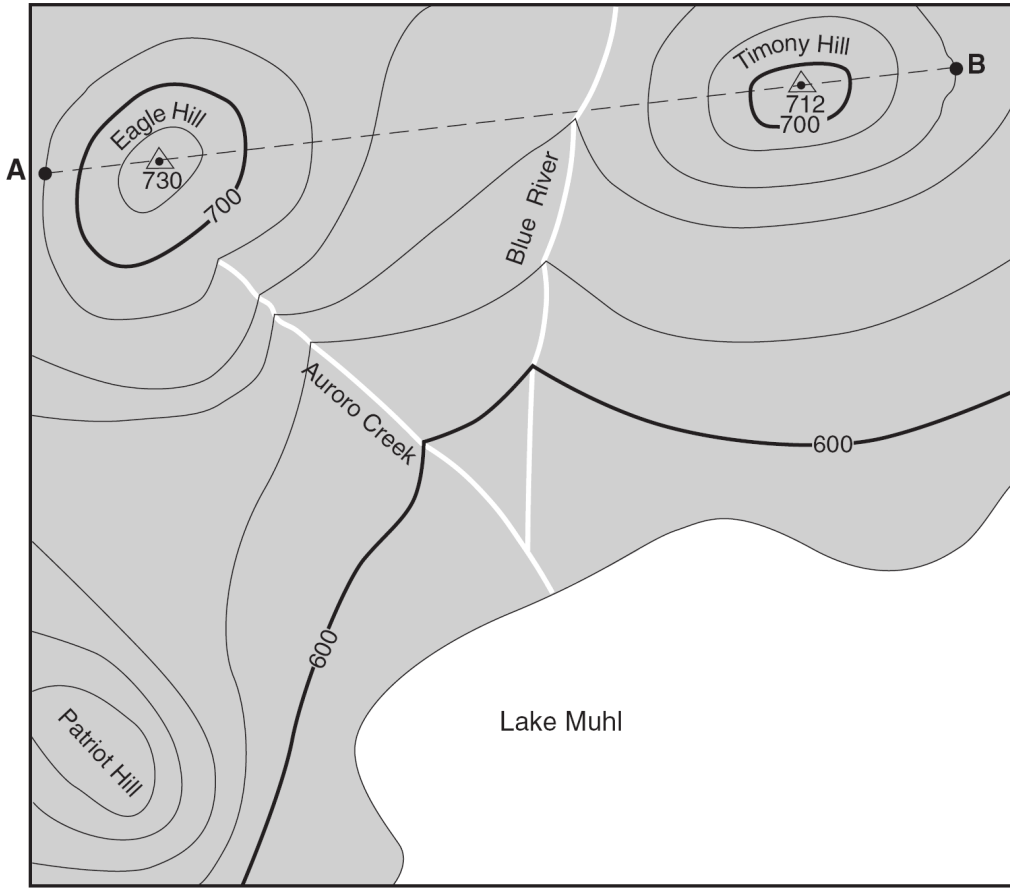
60. On the grid below, construct a topographic profile along line *DE* by plotting an **X** for the elevation of each contour line that crosses line *DE*. Connect the **X**s with a smooth, curved line to complete the profile.



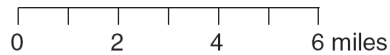
61. Explain how the map indicates that Copper Creek flows faster between points *N* and *M* than between points *L* and *K*.
62. What is the elevation range for point *F*?
63. What is the elevation of location *A*?
64. Which side of Diamond Island has the steepest slope and how can you tell?
65. What general direction is Amethyst River flowing and how can you tell?

66. Base your answer to the following question on the topographic map below. Points *A* and *B* are reference points on the map. The  $\Delta$  symbols show the highest elevations on Eagle Hill and Timony Hill. Elevations are shown in feet.

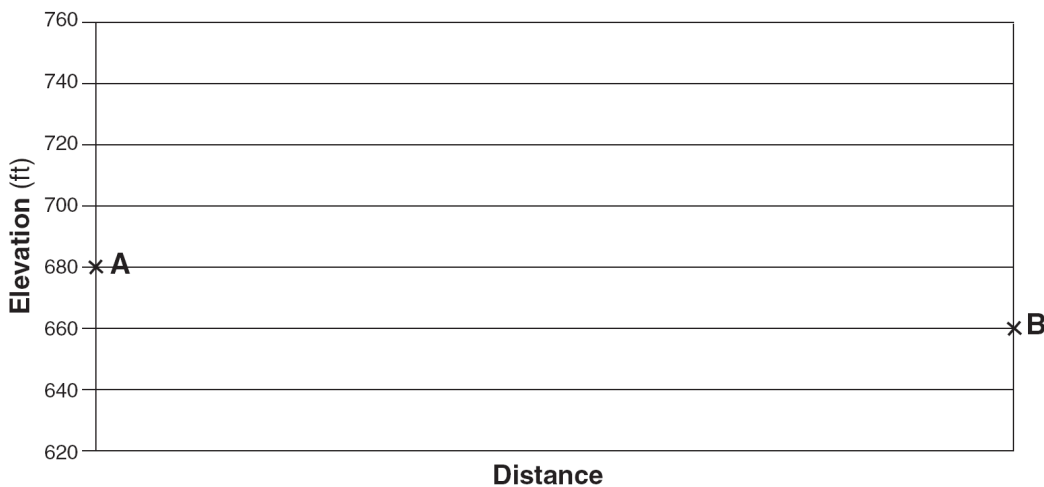
Topographic Map



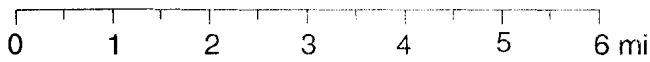
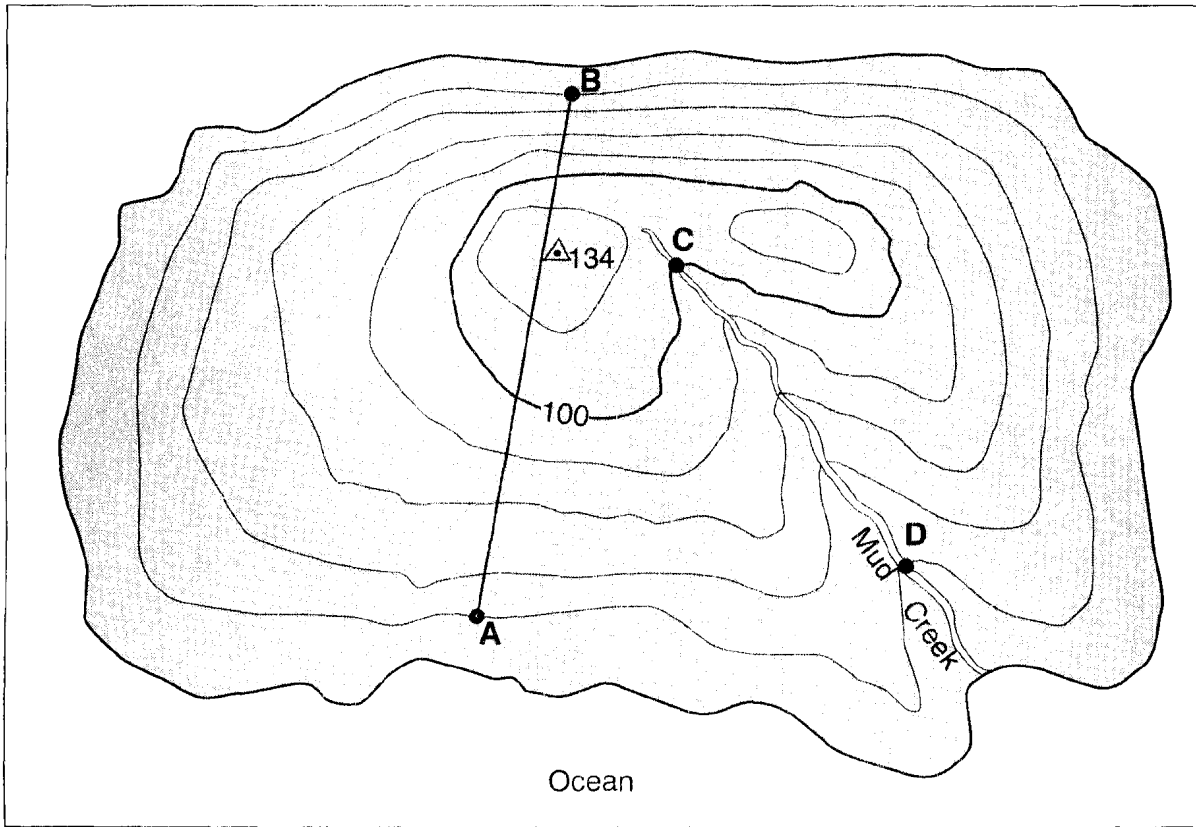
Contour interval = 20 feet



On the grid below, construct a topographic profile along line *AB* by plotting an **X** for the elevation of each contour line that crosses line *AB*. Connect the plotted **X**s with a smooth, curved line to complete the profile. Points *A* and *B* have been plotted.

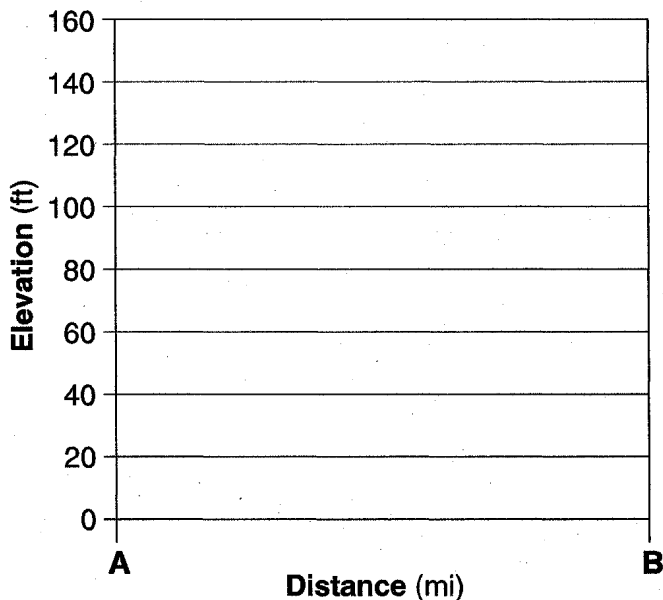


67. Base your answer to the following question on the topographic map below, which shows a small island in an ocean. Points *A*, *B*, *C*, and *D* represent surface locations on the island. The symbol  $\triangle 134$  represents an elevation on the hilltop. Elevations are measured in feet and distances are measured in miles.



Contour interval = 20 feet

On the grid below, construct a profile along line *AB* by plotting an **X** for the elevation of *each* contour line that crosses line *AB*. Connect the **X**s with a smooth, curved line to complete the profile.





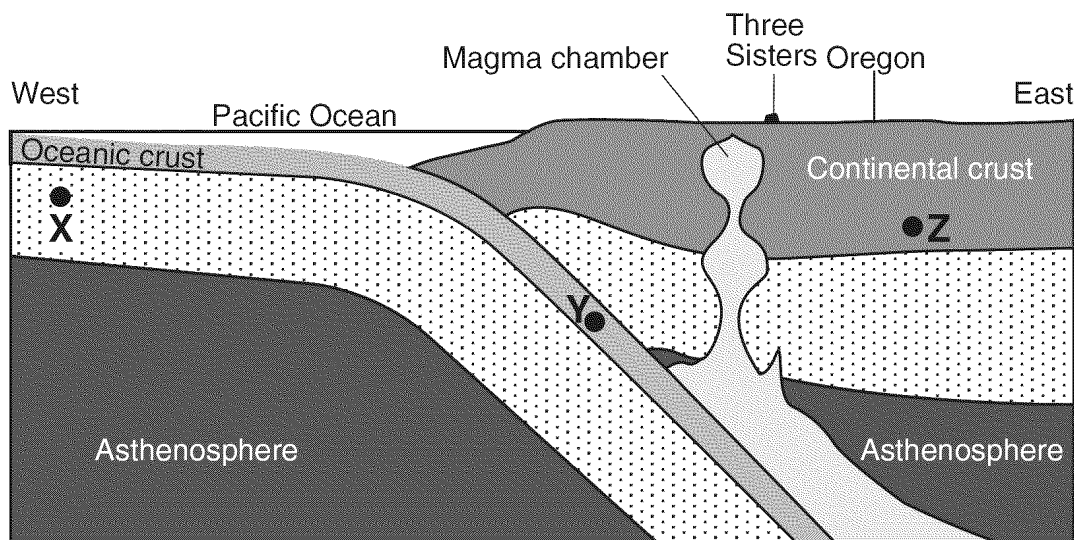
68. Base your answer to the following question on the passage below and on your knowledge of Earth science.

### A New Oregon Volcano?

The Three Sisters are 10,000-foot volcanic mountain peaks in Oregon. Volcanic eruptions began building the Three Sisters from andesitic lava and cinders 700,000 years ago. The last major eruption occurred 2000 years ago.

West of the Three Sisters peaks, geologists have recently discovered that Earth's surface is bulging upwards in a bull's-eye pattern 10 miles wide. There is a 4-inch rise at its center, which geologists believe could be the beginning of another volcano. The uplift was found by comparing satellite images. This uplift in Oregon may allow the tracking of a volcanic eruption from its beginning, long before the smoke and explosions begin.

This uplift is most likely caused by an upflow of molten rock from more than four miles below the surface. Rock melts within Earth's interior and then moves upward in cracks in Earth's crust, where it forms large underground pools called magma chambers. Magma upswelling often produces signs that help scientists predict eruptions and protect humans. When the pressure of rising magma becomes forceful enough to crack bedrock, swarms of small earthquakes occur. Rising magma releases carbon dioxide and other gases that can be detected at the surface.



(Not drawn to scale)

Identify *one* of the minerals found in the andesite rock of the Three Sisters volcanoes.