Earth Science Mid Term Part 1

Name _____

1. _____

Which property is most useful in mineral identification?

A. hardness
B. color
C. size
D. texture

2. _____

The recrystallization of unmelted material under high temperature and pressure results in

A. metamorphic rock
B. sedimentary rock
C. igneous rock
D. volcanic rock

p6

3. _____

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

~~A. granite~~
B. rhyolite
~~C. gabbro~~
D. basalt

p6

4. _____

Which relative concentrations of elements are found in felsic rock?

p6

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 concentrate of aluminum

No neg.!

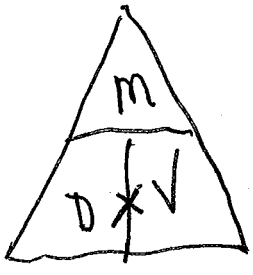
$\frac{0-9}{9} \times 100$

5. _____

Which rock was most likely formed from pebble-sized sediment deposited in shallow water at an ocean shoreline?

sed

A. shale S
B. basalt I
C. siltstone S
D. conglomerate S



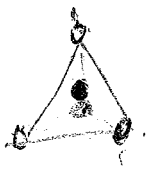
rate of change

LOOK UP!

Density
%Error
mass
vol.

6. _____ cleavage

The mineral mica breaks evenly along flat sheets mainly because of its



(A) atomic arrangement
B. chemical composition
C. hardness
D. density

Quartz SiO_4 Silicon tet.

7. _____

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

8. _____

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

A. olivine and quartz - light
(B) olivine and pyroxene
C. pyroxine and orthoclase
D. orthoclase and quartz - Ligh

9. _____

Which sedimentary rock is composed of fragmented skeletons and shells of sea organisms compacted and cemented together?

p7

A. shale - clastic
B. limestone - evape / Bioclastic
C. sandstone - clastic
D. gypsum evap

10. _____

The relative hardness of a mineral can best be tested by

(A) scratching the mineral across a glass plate
B. squeezing the mineral with calibrated pliers
C. determining the density of the mineral
D. breaking the mineral with a hammer

11. _____
Which is an accurate statement about rocks?

A. Rocks are located only in continental areas of the Earth.
B. Rocks seldom undergo change.
C. Most rocks contain fossils.
D. Most rocks have several minerals in common.

12. _____
The size of the mineral crystals found in an igneous rock is directly related to the

A. density of the minerals
B. color of the minerals
C. cooling time of the molten rock
D. amount of sediments cemented together

13. _____

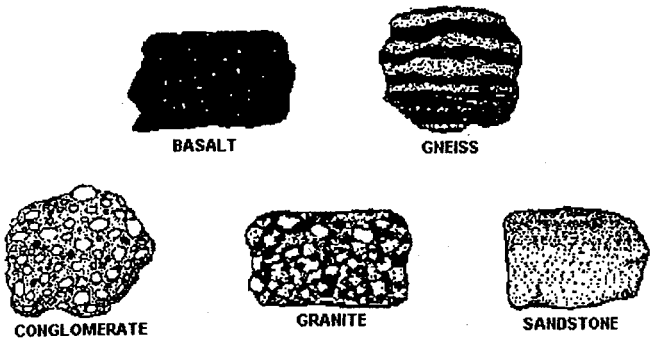


Diagram 1

The diagram 1 represents five rock samples. Which sample is composed of sediments 0.006 centimeter to 0.2 centimeter in size that were compacted and cemented together?

A. conglomerate
B. sandstone
C. gneiss
D. granite

14. _____
The diagram 1 represents five rock samples. If granite were subjected to intense heat and pressure, it would most likely change to

A. conglomerate
B. sandstone
C. gneiss
D. basalt

15. _____

Diagram 2

The diagram 2 represents five rock samples. The basalt was most likely formed by

A. heat and pressure
B. melting and solidification
C. compaction and cementation
D. erosion and deposition

16. _____

The diagram 2 represents five rock samples. Which sample would most likely contain fossils?

A. gneiss
B. granite
C. sandstone
D. basalt

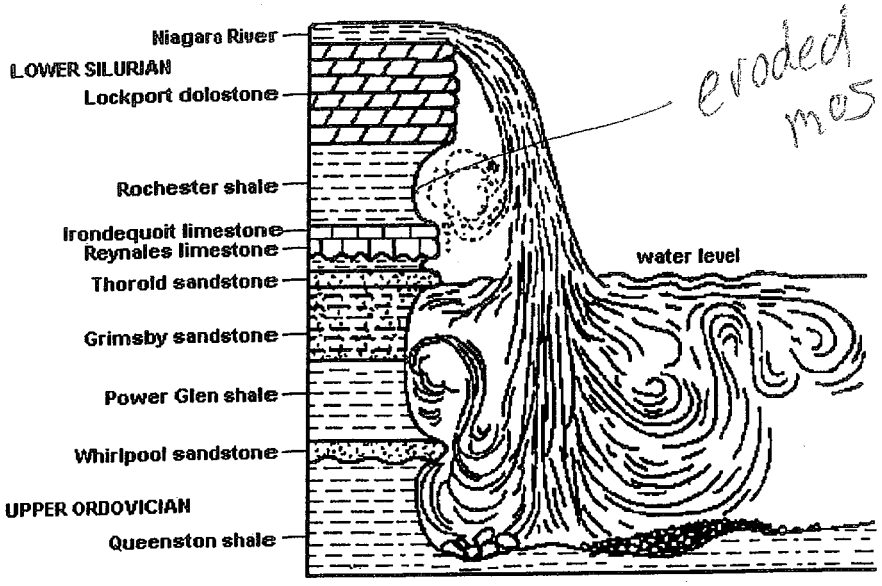
Sedimentary

17. _____

The diagram 2 represents five rock samples. Which sample is igneous and has a coarse texture?

A. sandstone
B. conglomerate
C. basalt
D. granite

18. _____



The diagram shows a cross section of bedrock where the Niagara River flows over Niagara Falls. Which rock unit was most likely formed from chemical precipitates?

A. Lockport dolostone
B. Whirlpool sandstone
C. Rochester shale
D. Thorold sandstone

19. _____

Which rock most likely formed as a result of biologic processes?

A. granite
B. basalt
C. sandstone
D. limestone

20. _____

Certain minerals usually break along flat surfaces, while other minerals break unevenly. This characteristic is due to the

A. luster of the mineral
B. age of the mineral
C. internal arrangement of the mineral's atoms
D. force with which the mineral is broken

21. _____

Some nonsedimentary rocks are formed as a result of

A. solidification of molten material
B. evaporation and precipitation
C. cementation of particles
D. deposition of particles

22. _____

Which is a coarse-grained, igneous rock composed mainly of pyroxene, plagioclase feldspar, and olivine?

A. granite
B. gabbro
C. rhyolite
D. basalt

23. _____

Hawaii is located near the middle of which tectonic plate?

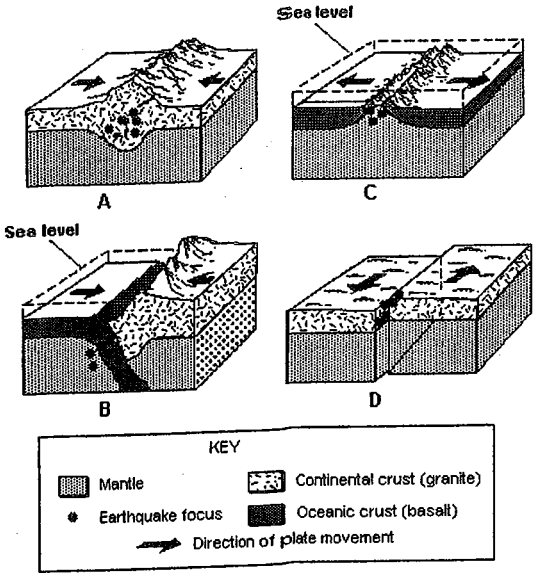
A. Philippine plate
B. Nazca plate
C. North American plate
D. Pacific plate

24. _____

According to the reference map of ***Tectonic Plates***, the border between the South Amercian plate and the African plate is best described as

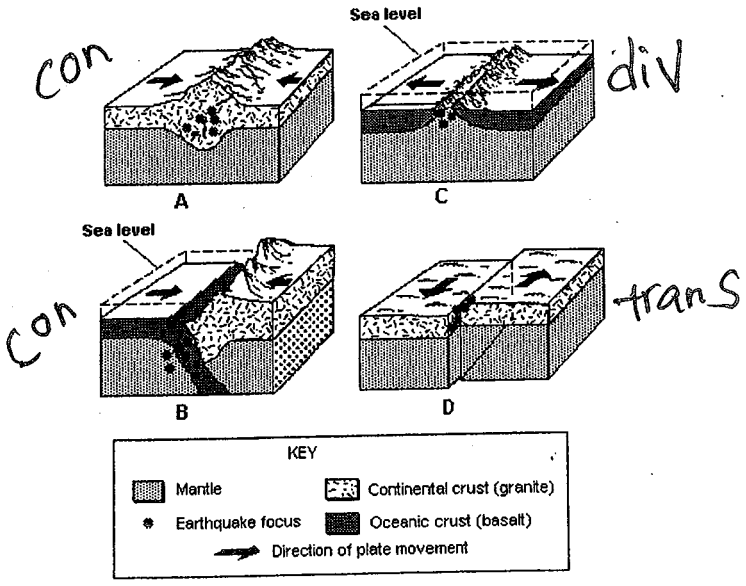
A. converging and located at an oceanic ridge
B. converging and located at an oceanic trench
C. diverging and located at an oceanic ridge
D. diverging and located at an oceanic trench

25. _____



The diagrams show geologic cross sections of the upper mantle and crust at four different Earth locations, *A, B, C,* and *D*. Movement of the crustal sections (plates) is indicated by arrows, and the locations of frequent earthquakes are indicated by an asterisk. Diagrams are not drawn to scale. Which location best represents the boundary between the African plate and the South American plate?

A. *A*
B. *B*
C. *C*
D. *D*



26. _____

Which diagram represents plate movement associated with transform faults such as those causing California earthquakes?

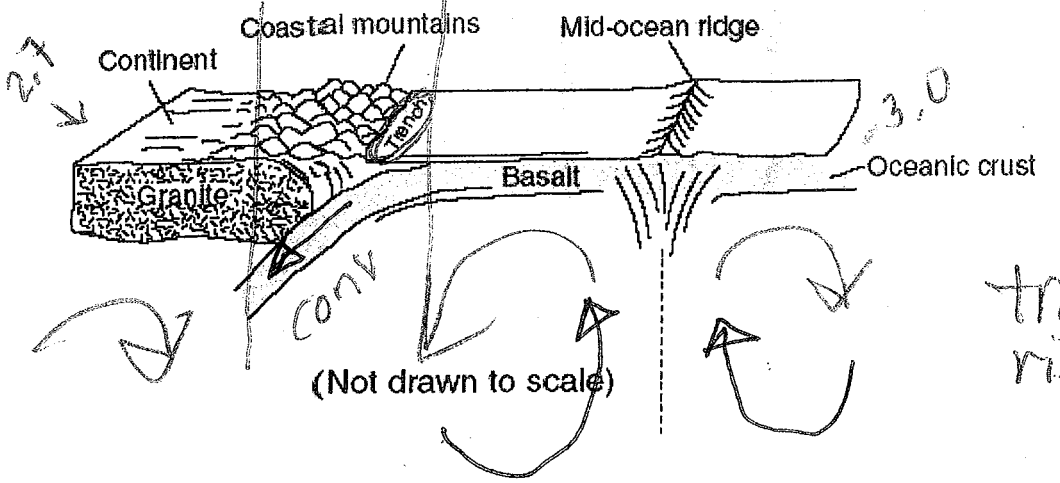
~~A. *A*~~
~~B. *B*~~
C. *C*
D. *D*

San Andres fault

P10

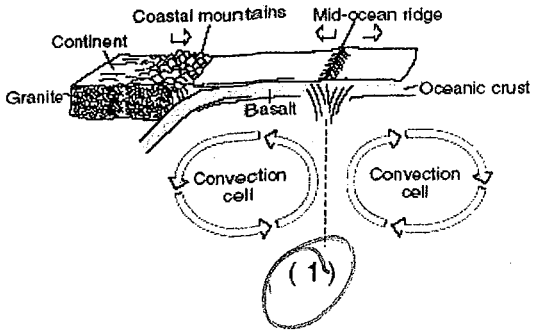
27. _____

The diagram below shows some features of Earth's crust and upper mantle.

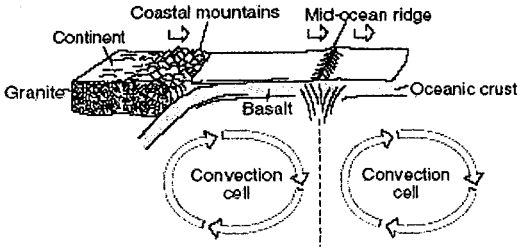


trench - convergent
rift/ridge - div

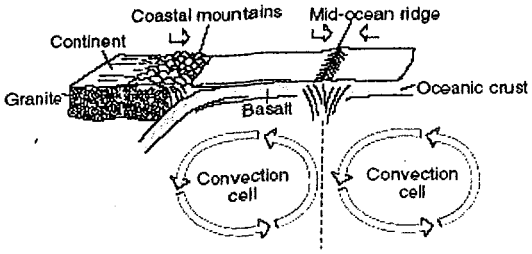
Which model most accurately shows the movements (arrows) associated with the surface features shown in the diagram?



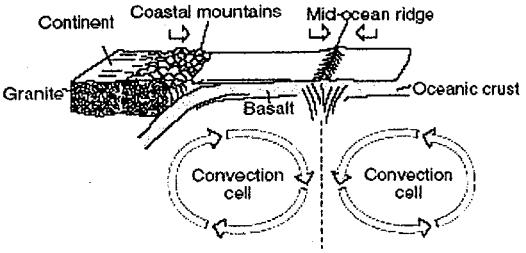
(1)



(3)

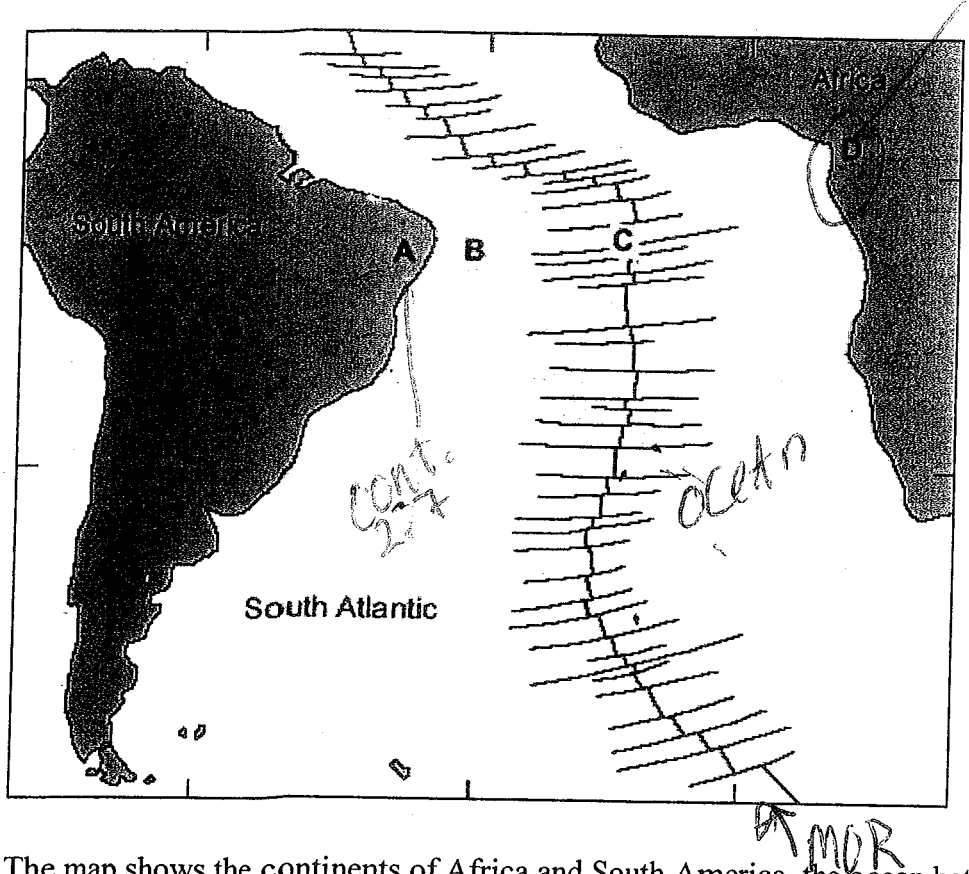


(2)



(4)

A. *1*
B. *2*
C. *3*
D. *4*



The map shows the continents of Africa and South America, the ocean between them, and the ocean ridge and transform faults. Locations A and D are on the continents. Locations B and C are on the ocean floor.

Which table best shows the relative densities of the crustal bedrock at locations *A, B, C,* and *D*?

Relative Densities of Crust

More Dense	Less Dense
A, B	C, D

(1)

Relative Densities of Crust

More Dense	Less Dense
C, D	A, B

(3)

Relative Densities of Crust

More Dense	Less Dense
B, C	A, D

(2)

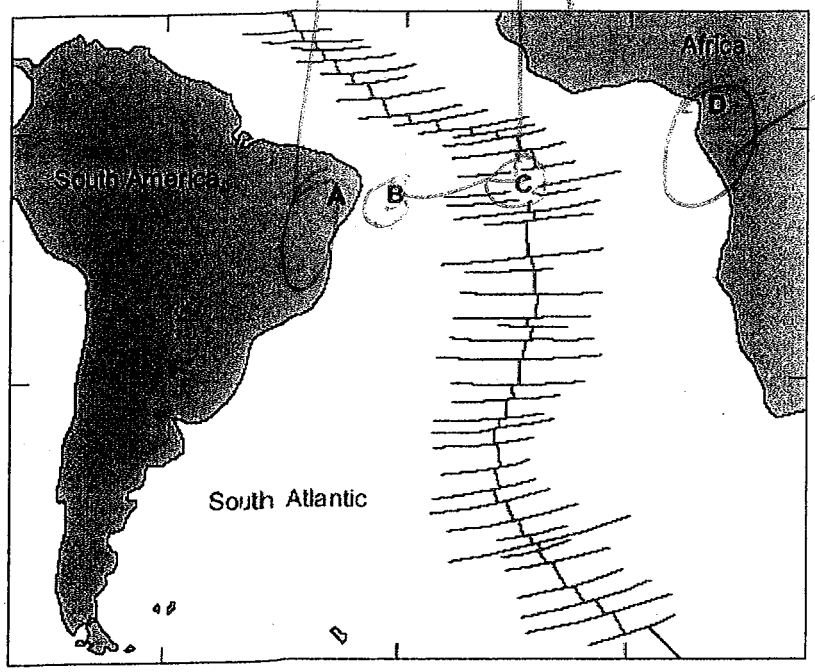
Relative Densities of Crust

More Dense	Less Dense
A, D	B, C

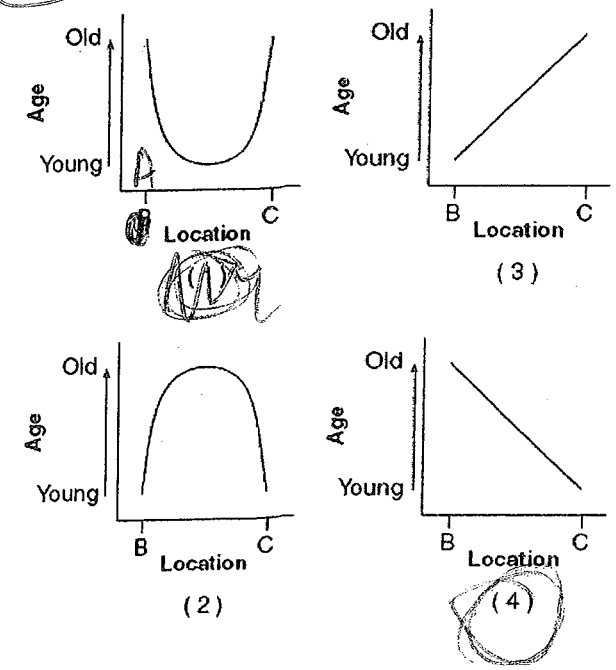
(4)

A. *1*
B. *2*
C. *3*
D. *4*

29. _____



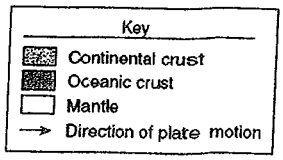
Which graph best shows the relative age of the ocean-floor bedrock from location *B* to location *C*?

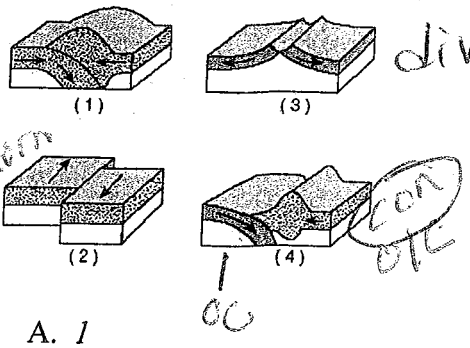


A. *1*
B. *2*
C. *3*
D. *4*

30. _____

Which cross section below best represents the crustal plate motion that is the primary cause of the volcanoes and deep rift valleys found at mid-ocean ridges?





A. *1*
B. *2*
C. *3*
D. *4*

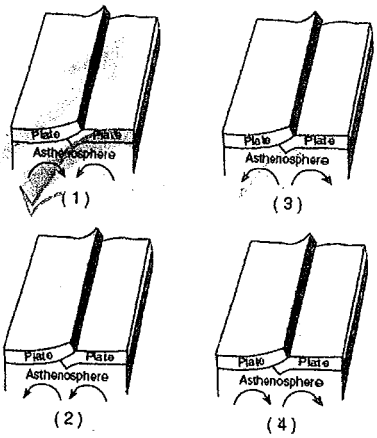
31. _____

According to plate tectonic theory, during which geologic time interval did the continents of North America and Africa separate, resulting in the initial opening of the Atlantic Ocean? Page 8-9 of ESRT

A. Mesozoic Era
B. Paleozoic Era
C. Proterozoic Eon
D. Archean Eon

32. _____

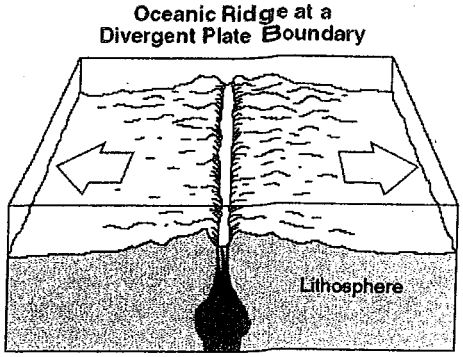
Which diagram correctly shows how mantle currents are most likely moving beneath colliding plates?



A. *1*
B. *2*
C. *3*
D. *4*

33. _____

The diagram below shows a tectonic plate boundary.



Div. Ridge o/o
Rift c/c

Which mantle hot spot is at a plate boundary like the one shown in this diagram?

~~A.~~ Hawaii Hot Spot
~~B.~~ Yellowstone Hot Spot
(C) Galapagos Hot Spot
D. Canary Hot Spot

p 5

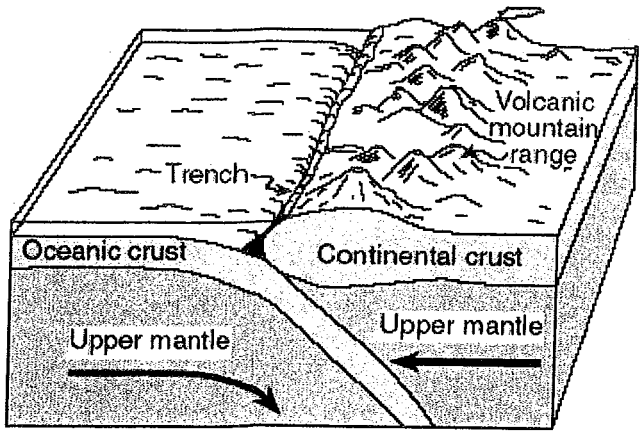
34. _____

Which mountain range resulted from the collision of North America and Africa, as parts of Pangea joined together in the late Pennsylvanian Period?

A. Appalachian Mountains
B. Acadian Mountains
C. Taconic Mountains
D. Grenville Mountains

35. _____

The diagram below shows the interaction of two tectonic plates.



(Not drawn to scale)

convergent
ocean _ continental

The type of plate boundary represented in the diagram most likely exists between the

A. Antarctic Plate and the African Plate o/o
B. Antarctic Plate and the Indian-Australian Plate o/o div.
C. South American Plate and the Nazca Plate c/o con.
D. South American Plate and the African Plate div o/o

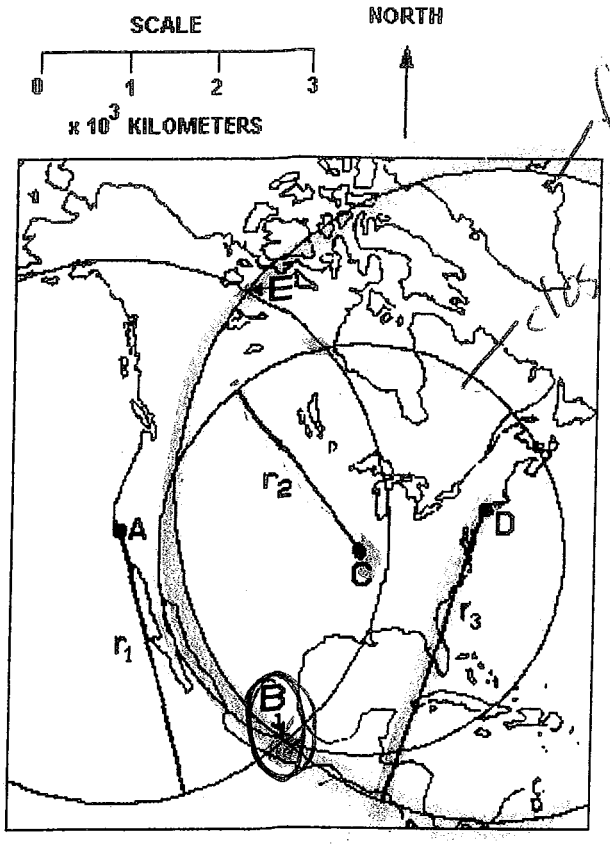
36. _____

Earthquakes generate compressional waves (*P*-waves) and shear waves (*S*-waves). Compared to the speed of shear waves in a given earth material, the speed of compressional waves is

A. always slower
B. always faster
C. always the same
D. sometimes faster and sometimes slower

P

37. _____



far

close

3

all Circle have to touch for Earthquake Epicenter

The map shows three circles used to locate an earthquake epicenter. Five lettered locations, *A*, *B*, *C*, *D*, and *E*, are shown as reference points. Epicenter distances from three locations are represented. At which location was the difference in time of arrival of *P*-waves and *S*-waves the greatest?

P & S - close closest Small ⊙
- far farthest Large ⊙

A. *A*
B. *B*
C. *C* close
D. *D* Far

38. _____

The map above shows three circles used to locate an earthquake epicenter. Five lettered locations, *A*, *B*, *C*, *D*, and *E*, are shown as reference points. Epicenter distances from three locations are represented. The earthquake epicenter is located at point

A. *A*
B. *B*
C. *C*
D. *E*

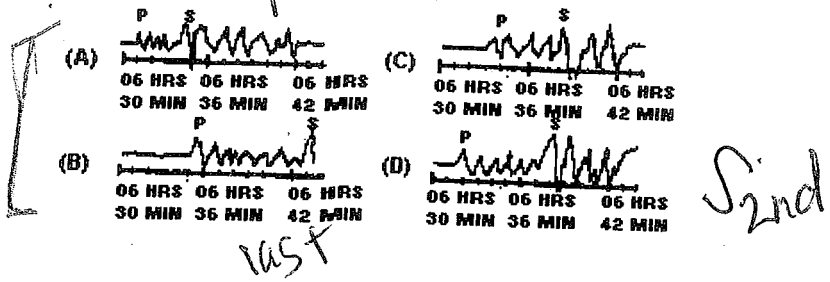
A 1 3 ⊙'s meet

39. _____

According to the graph of ***Earthquake P-wave and S-wave Travel Time*** in the reference information, what is the approximate total distance traveled by an earthquake's *P*-wave in its first 9 minutes?

A. 2,600 km
B. 5,600 km
C. 7,600 km
D. 12,100 km

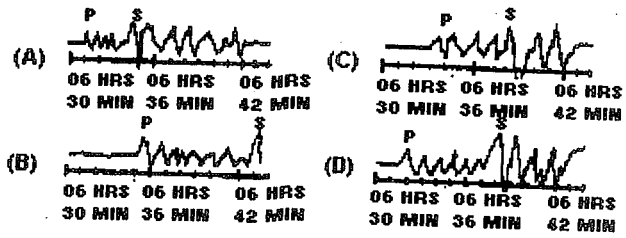
40. _____



The diagram shows seismograms recording the same earthquake at four different locations, *A*, *B*, *C*, and *D*. The arrival of *P*- and *S*-waves are indicated on each seismogram. How far will a *P*-wave travel in seven (7) minutes?

A. 10,500 km
B. 2,000 km
C. 5,500 km
D. 4,000 km

41. _____



What information about the earthquake could be determined by using the ***Earthquake P-wave and S-wave Travel Time*** graph in the reference information and only one of the seismograms?

A. the distance to the epicenter
B. the depth of the focus
C. the location of the epicenter
D. the direction to the epicenter

42. _____
In which type of climate does chemical weathering usually occur most rapidly?

A. hot and dry
B. hot and wet
C. cold and dry
D. cold and wet

43. _____
As a particle of sediment in the soil breaks into several smaller pieces, the rate of weathering of the sediment will

A. decrease due to a decrease in surface area
B. decrease due to an increase in surface area
C. increase due to a decrease in surface area
D. increase due to an increase in surface area

44. _____
On earth, the predominate agent of erosion is

A. wave action
B. moving ice
C. running water
D. moving air

45. _____
Which activity demonstrates chemical weathering?

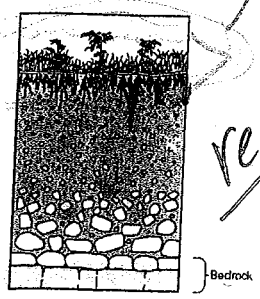
A. freezing of water in the cracks of a sandstone sidewalk
B. abrasion of a streambed by tumbling rocks
C. grinding of talc into a powder
D. dissolving of limestone by acid rain

46. _____
Which factors most directly control the development of soils?

A. soil particle sizes and method of deposition
B. bedrock composition and climate characteristics
C. direction of prevailing winds and storm tracks
D. earthquake intensity and volcanic activity

47. _____

The cross section shows a soil profile.



This soil was formed primarily by

A. erosion by glaciers
B. erosion by running water
C. capillarity and human activity
D. weathering and biological activity

48. _____

Which two New York State landscape regions are formed mostly of surface bedrock that is approximately the same geologic age? Page 3 of ESRT

A. Manhattan Prong and Atlantic Coastal Plain
B. Erie-Ontario Lowlands and Adirondack Mountains
C. Adirondack Mountains and Allegheny Plateau
D. Tug Hill Plateau and St. Lawrence Lowlands

49. _____

In which New York State landscape region is most of the surface bedrock composed of metamorphic rock?

A. Adirondacks
B. Catskills
C. Erie-Ontario Lowlands
D. Newark Lowlands

50. _____

Which sequence shows the order in which landscape regions are crossed as an airplane flies in a straight course from Albany, New York, to Massena, New York?

A. plateau → plain → mountain
B. plateau → mountain → plain
C. plain → mountain → plain
D. mountain → plain → plateau

Name _____

51.

A seismic station in Massena, New York, recorded the arrival of the first P-wave at 1:30:00 (1 hour, 30 minutes, 00 seconds) and the first S-wave from the same earthquake at 1:34:30.

Determine the distance, in kilometers, from Massena to the epicenter of this earthquake.

S 1:34:30
-P 1:30:00
4:30

3000 km ±200 pll positive 4:30

52.

A seismic station in Massena, New York, recorded the arrival of the first P-wave at 1:30:00 (1 hour, 30 minutes, 00 seconds) and the first S-wave from the same earthquake at 1:34:30.

State what additional information is needed to determine the location of the epicenter of this earthquake.

2 Additional Sites

53.

Base your answer on the passage and map below and on your knowledge of Earth science. The passage provides some information about the sediments under Portland, Oregon, and the map shows where Portland is located.

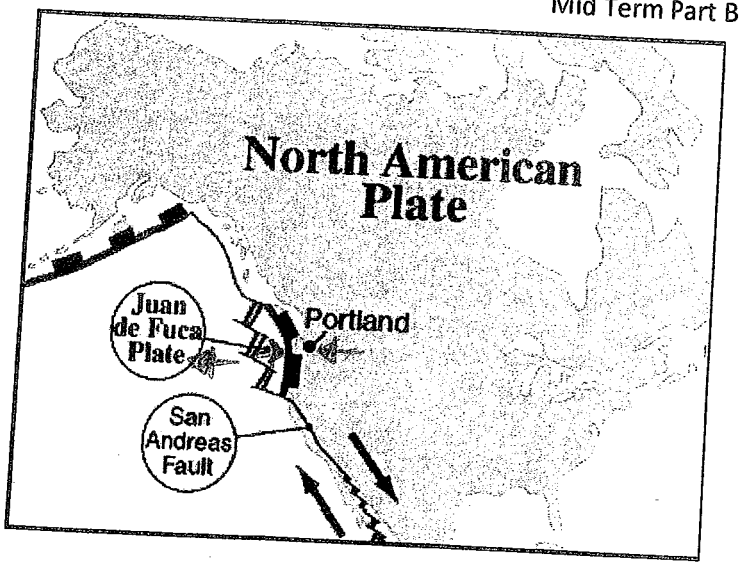
Bad seismic combination under Portland:
Earthquake faults and jiggly sediment

Using a technique called seismic profiling, researchers have found evidence of ancient earthquake faults under Portland, Oregon. The faults may still be active, a USGS [United States Geological Survey] seismologist will announce tomorrow.

The research also turned up a 250-foot deep layer of silt and mud, deep under the city, which may have been caused by a catastrophic ice dam break some 15,000 years ago.

The two findings could together mean bad news, as soft sediment is known to amplify ground shaking during strong earthquakes. In the 1989 San Francisco earthquake, much of the damage to buildings was caused by liquefaction, a shaking and sinking of sandy, water saturated soil along waterways. . . .

- Robert Roy Britt
excerpted from
"Bad sesimic combination under Portland:
Earthquake faults and jiggly sediment"
explorezone.com 05/03/99



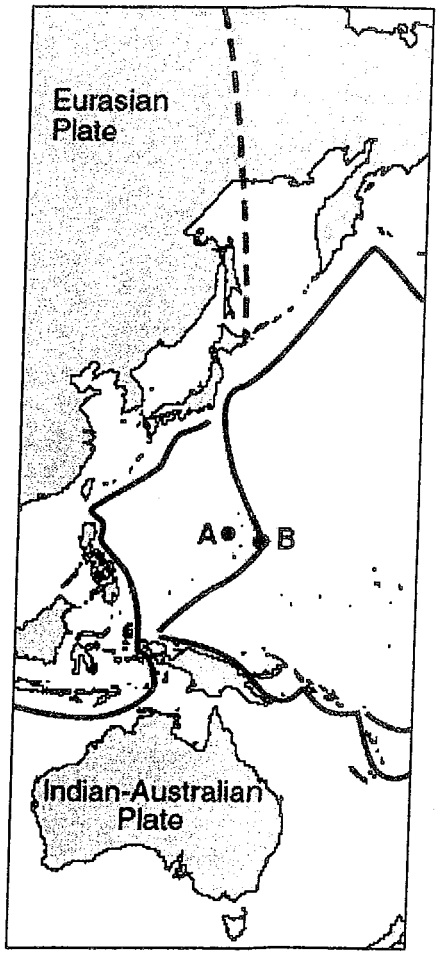
Explain why Portland is likely to experience a major earthquake.

on convergent plate boundry

54.

Base your answer to the question on the map and data table. The map shows some tectonic plates and the boundaries between them. Letters *A* and *B* are locations on Earth's surface. The data table shows the depth below Earth's surface of five earthquakes measured from location *A* toward location *B*.

Map



Data Table

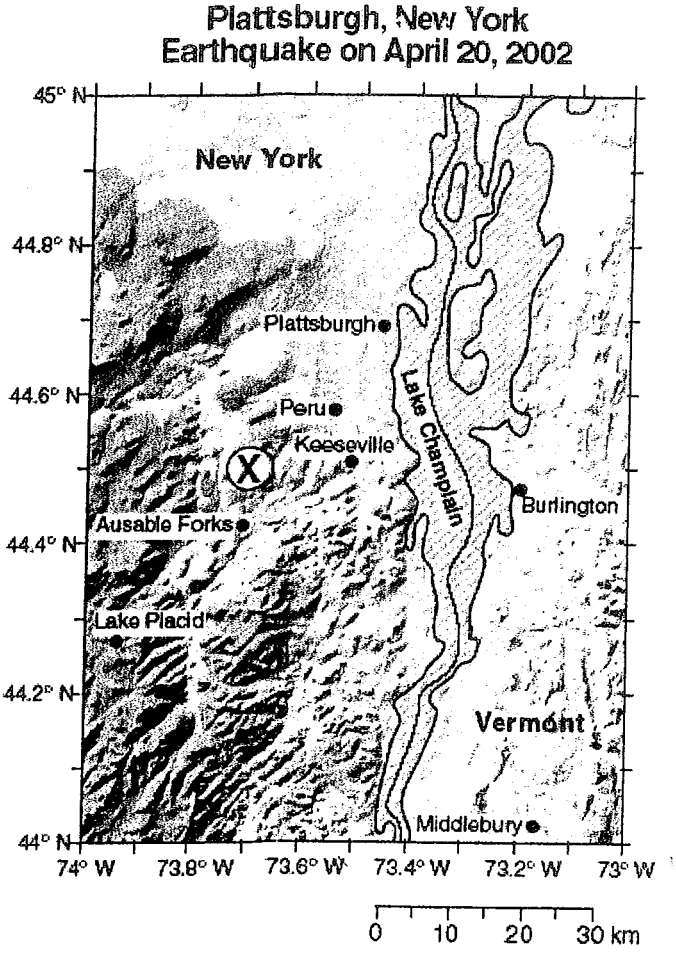
Earthquake	Distance from Location *A* Toward Location *B* (km)	Depth Below Earth's Surface (km)
1	100	600
2	200	400
3	250	300
4	300	250
5	400	60

Identify the type of plate boundary or geologic feature found at location *B*.

convergent or trench

55.

Base your answer to the question on the map and on your knowledge of Earth science. The map shows the location of the epicenter, Ⓧ, of an earthquake that occurred on April 20, 2002, about 29 kilometers southwest of Plattsburgh, New York.



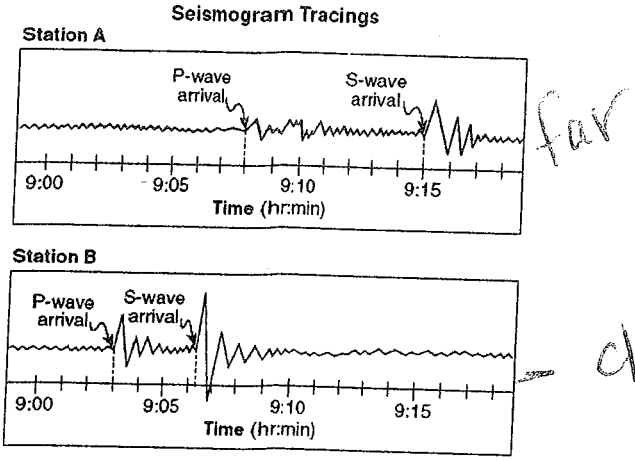
44.6°N 73.6°W
.30
lat Long

Explain why this earthquake was most likely felt with greater intensity by people in Peru, New York, than by people in Lake Placid, New York.

Peru is closer

56.

Base your answer to the question on the diagram below, which shows two seismogram tracings, at stations *A* and *B*, for the same earthquake. The arrival times of the *P*-waves and *S*-waves are indicated on each tracing.



far

closest

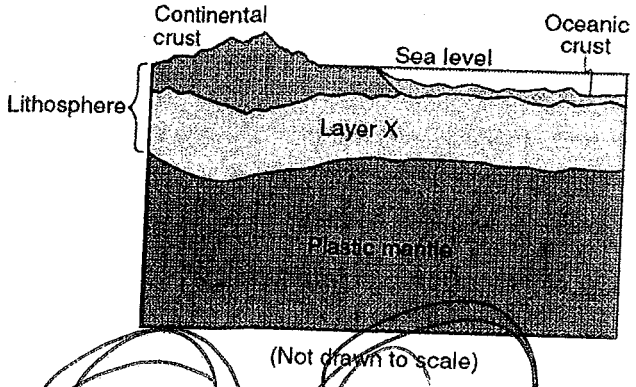
Explain how the seismic tracings recorded at station *A* and station *B* indicate that station *A* is farther from the earthquake epicenter than station *B*.

• Difference between P/S wave greater in station A

• P wave [illegible] station B

57.

Base your answer to the question on the cross section below and on your knowledge of Earth science. The cross section shows a portion of Earth's interior. Layer *X* is part of Earth's interior.



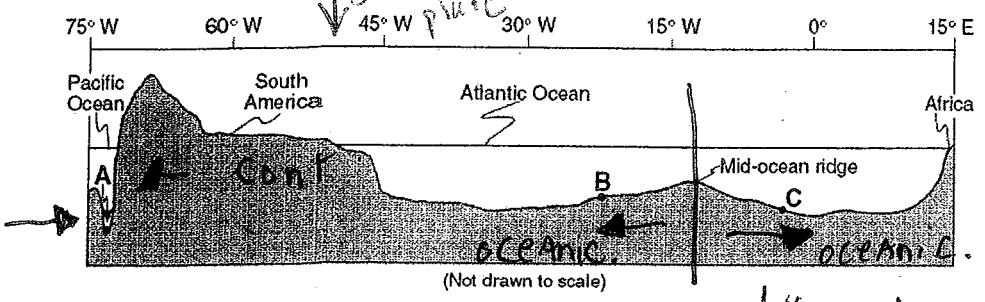
Identify the texture and relative density of the granitic bedrock of the continental crust.

granite density 2.7g/cm3 course

p10, p6 ESRT

58.

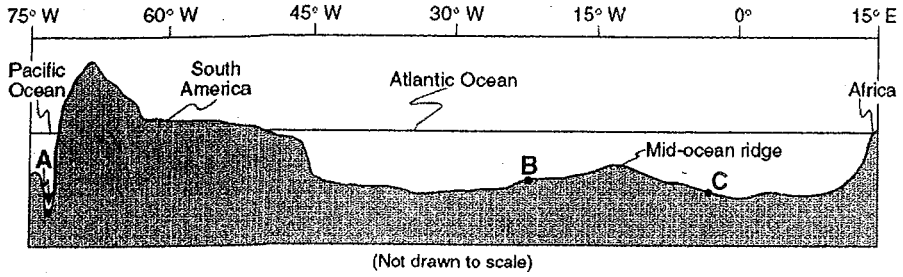
Base your answer to the question on the cross section below, which shows the major surface features of Earth along 25° S latitude between 75° W and 15° E longitude. Points *A*, *B*, and *C* represent locations on Earth's crust.



Identify the crustal feature located at point *A*. trench

59.

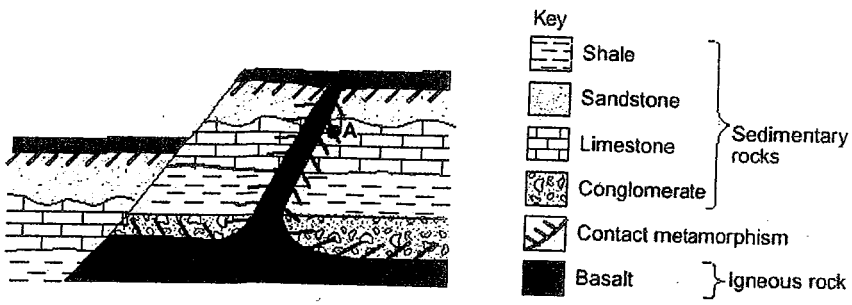
Base your answer to the question on the cross section below, which shows the major surface features of Earth along 25° S latitude between 75° W and 15° E longitude. Points *A*, *B*, and *C* represent locations on Earth's crust.



Identify the tectonic plate motion that is causing an increase in the distance between South America and Africa.

divergent plate boundry, seafloor spreading

60.



The diagram shows a cross section of a portion of Earth's crust that has undergone geological processes. Overturning of rock layers has not occurred. Point *A* represents one location of metamorphic rock.

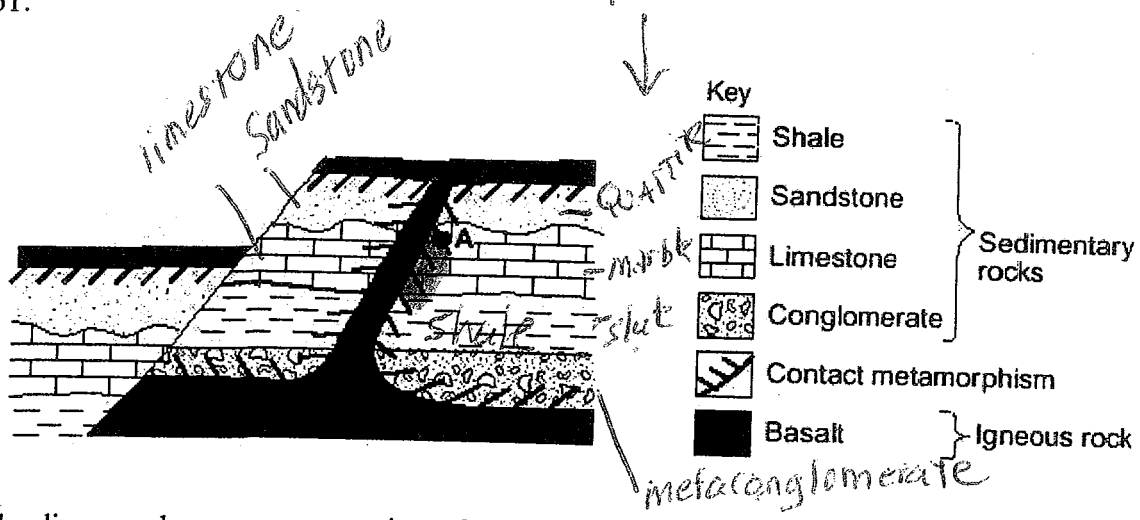
State the name of the inorganic sedimentary rock shown in the cross section that is composed of sediment with the greatest range in particle size.

P7

Conglomerate

met. rock

61.



The diagram shows a cross section of a portion of Earth's crust that has undergone geological processes. Overturning of rock layers has not occurred. Point *A* represents one location of metamorphic rock.

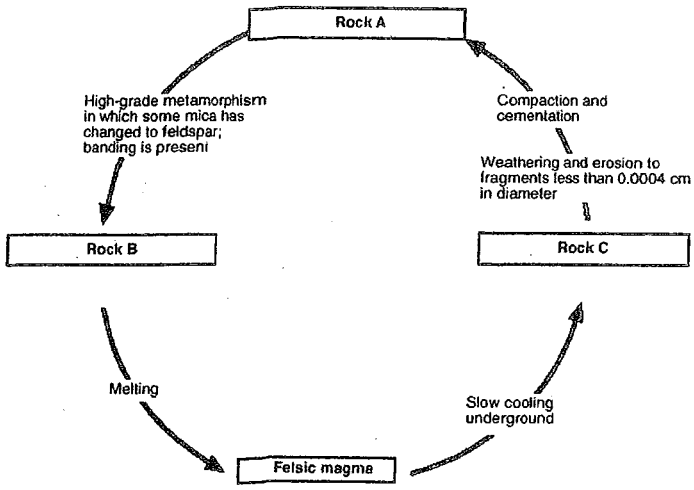
State the name of the rock, formed by contact metamorphism, located at *A* .

marble

limestone (Rock)

(mineral) calcite

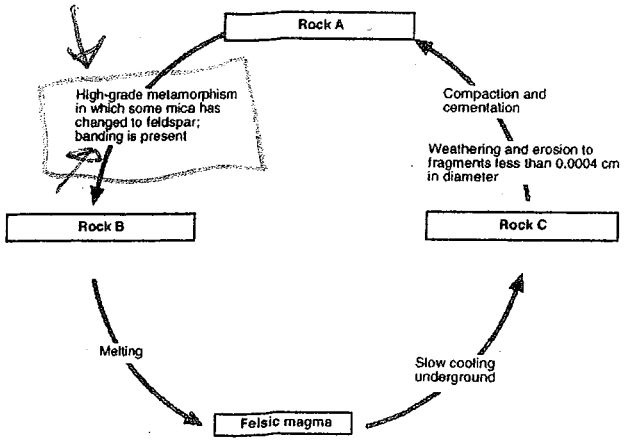
62.



State the specific name of rock *A* in the diagram. Do *not* write the terms "sedimentary," "igneous," and "metamorphic."

Rock A Shale

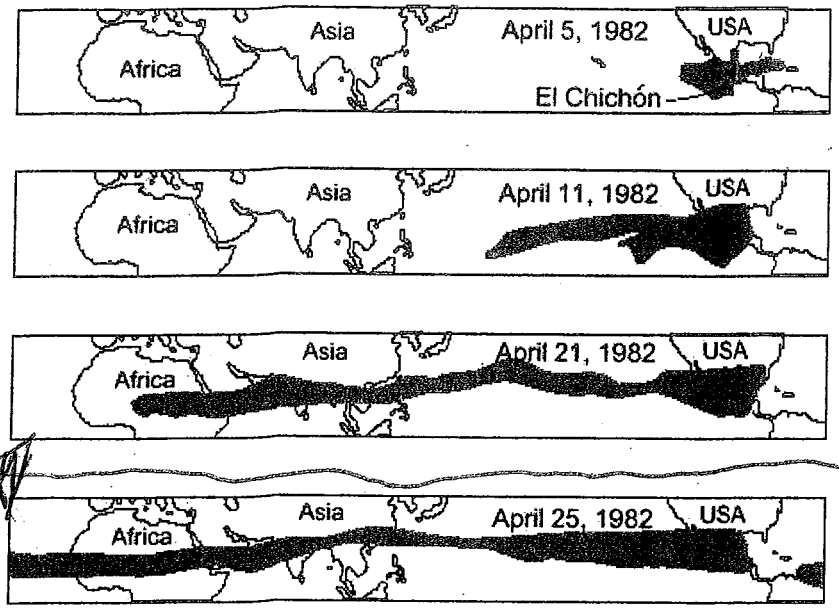
63.



State the specific names of rocks *B* in the diagram. Do *not* use the terms "sedimentary," "igneous," and "metamorphic."

Rock B gneiss

64.



Use map to answer 14-16

The maps show the spread of a volcanic ash cloud from the 1982 eruption of El Chichón in Mexico, as seen from weather satellites.

Identify the direction toward which the ash cloud spread from April 5 to April 25. West

65.

The maps show the spread of a volcanic ash cloud from the 1982 eruption of El Chichón in Mexico, as seen from weather satellites.

State what caused the main ash cloud to spread in the pattern shown on the map of April 25, 1982.

planetary winds

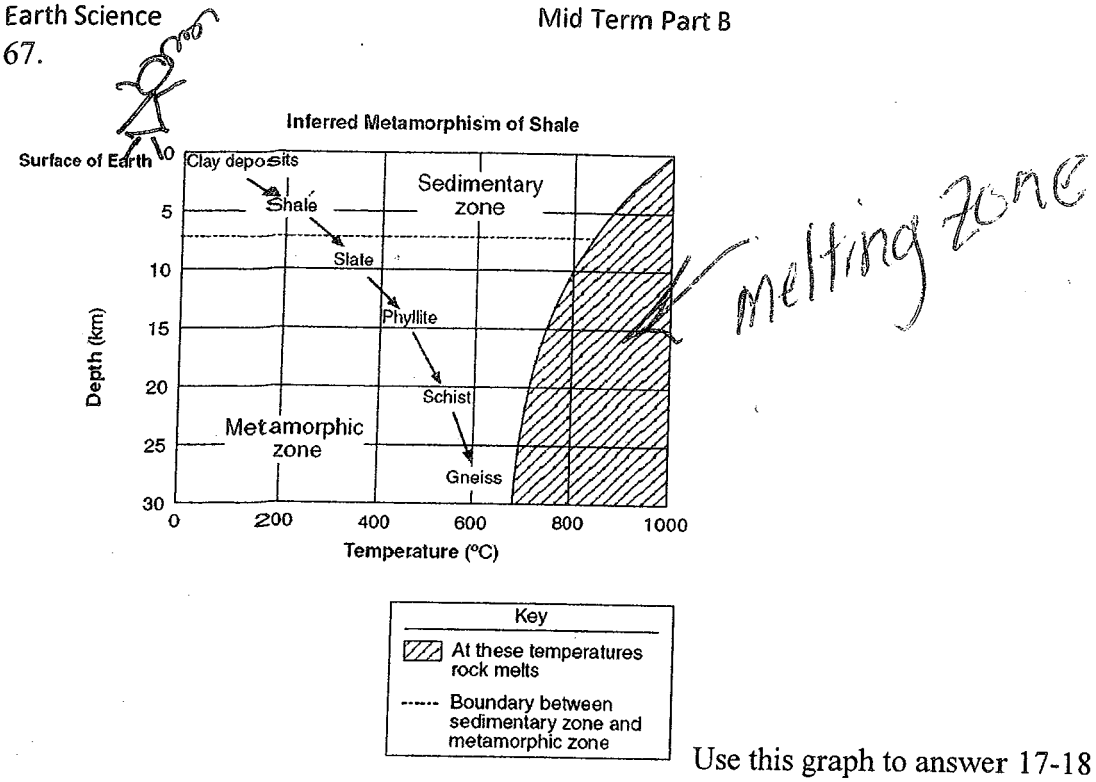
66.

The maps show the spread of a volcanic ash cloud from the 1982 eruption of El Chichón in Mexico, as seen from weather satellites.

State the most likely effect of the ash cloud on the temperature of areas under the cloud on April 25, 1982.

colder, more precip. More clouds

67.



Use this graph to answer 17-18

Base your answer on the graph, which shows a generalized sequence of rock types that form from original clay deposits at certain depths and temperature conditions within Earth's interior.

When clay materials are buried to a depth of 14 kilometers, which type of metamorphic rock is normally formed?

phyllite

phyllite

68.

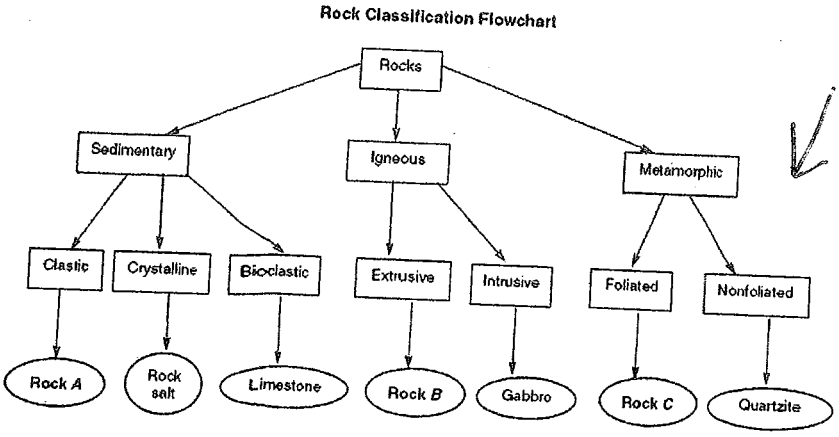
Base your answer on the graph, which shows a generalized sequence of rock types that form from original clay deposits at certain depths and temperature conditions within Earth's interior.

Explain why gneiss would *not* form at a depth of 27 kilometers and at a temperature of 800°C.

melt it

69.

Base your answer on the Rock Classification flowchart shown below. Letters *A*, *B*, and *C* represent specific rocks in this classification scheme.



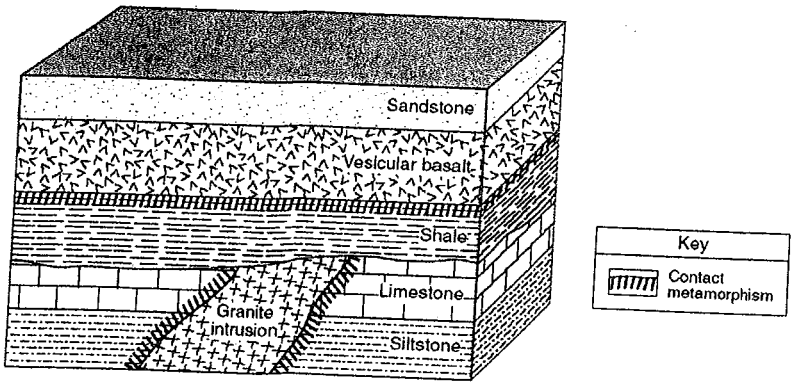
↙ Know how to read a Key

Granite could be placed in the same position in the flowchart above as gabbro.

Describe *two* differences between granite and gabbro.

granite, Light color, Low density, Felsic

70.



Base your answer to the question on the geologic cross section. Radioactive dating indicates that the granite intrusion is 279 million years old and the vesicular basalt is 260 million years old. The rock layers have not been overturned.

The granite intrusion caused part of the limestone layer to undergo metamorphism. What metamorphic rock would most likely be found in this zone of contact metamorphism?

marble

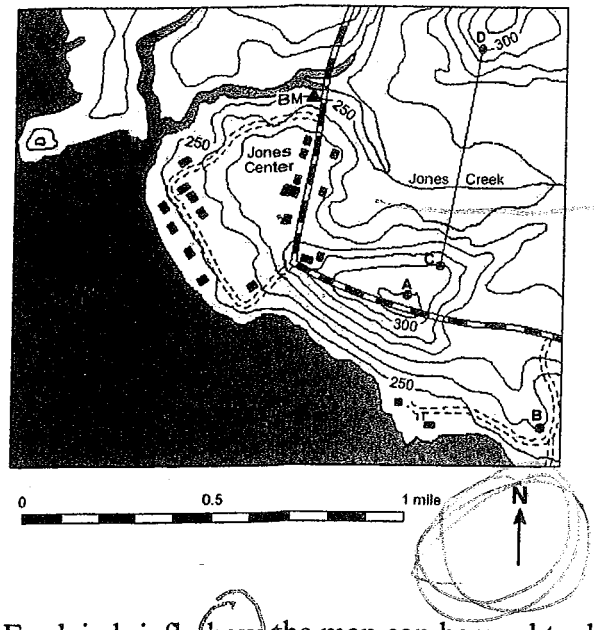
symbol

Mineral – calcite/dolomite

Earth Science Mid Term Part C

Name _____

71.



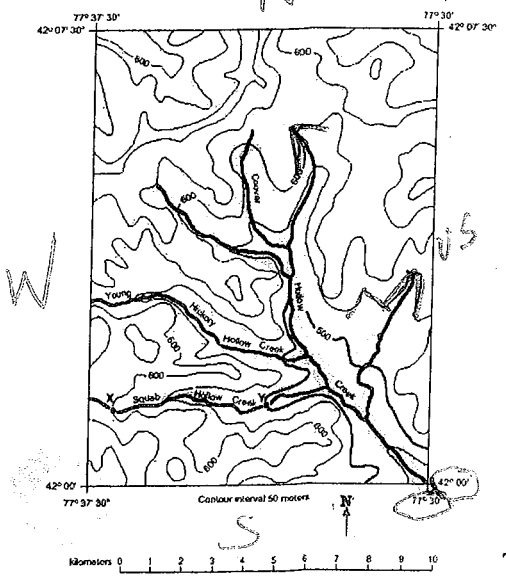
upstream is EAST

contour lines bend upstream

Explain briefly how the map can be used to determine that Jones Creek is flowing westward into Jones Lake.

water flows downhill, Water flows from the contour line V out from the Apex

72.



N

• contour lines bend upstream

E

W

S

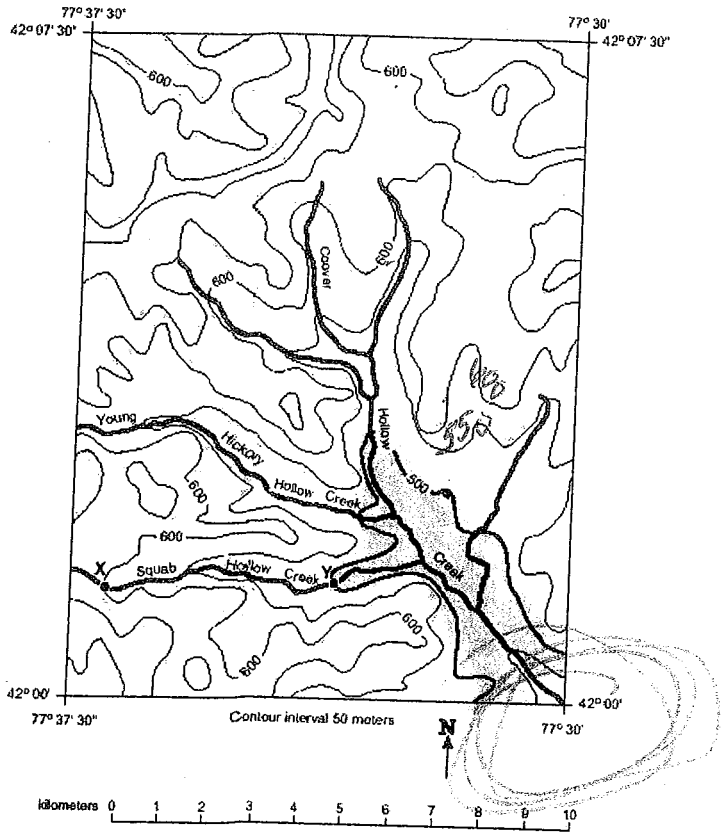
watershed

The topographic map is an area in New York State. Points *X* and *Y* are locations on Squab Hollow Creek.

Describe one way to determine the direction of flow of Coover Hollow Creek from information shown on the map.

flows downhill • C.L. bend upstream

73.



contour interval

P 3 ESRI

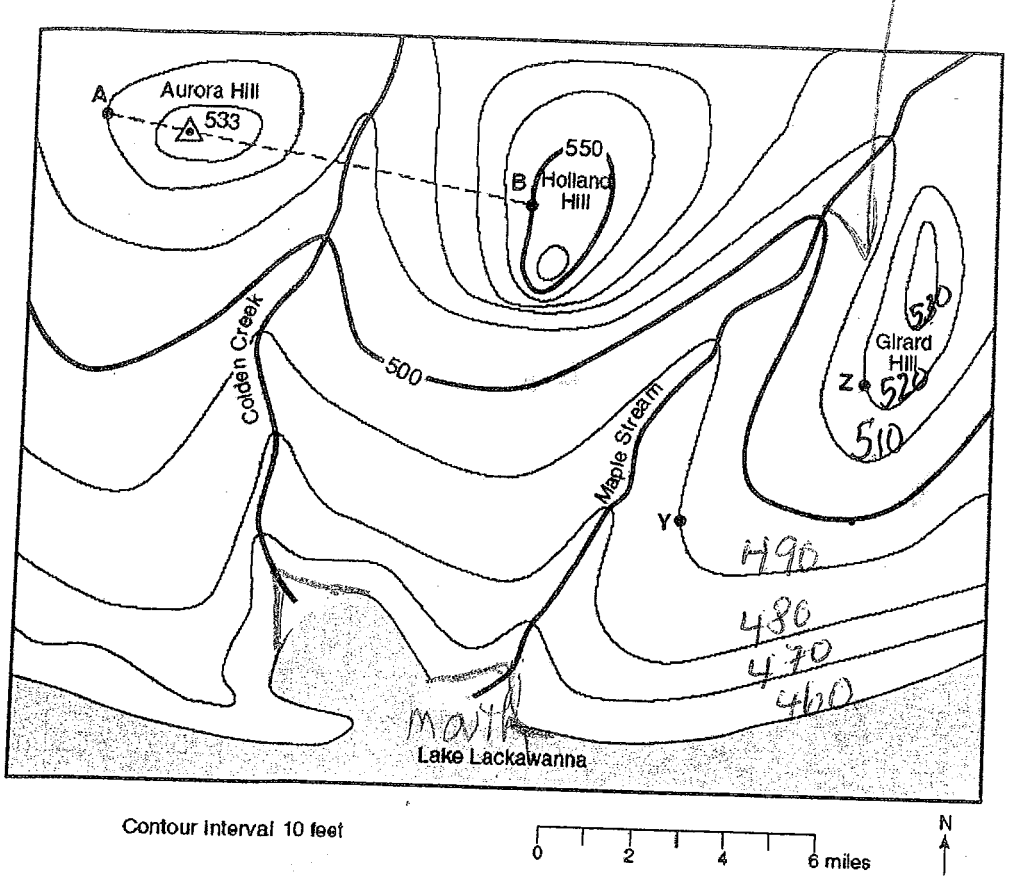
The topographic map is an area in New York State.
Points *X* and *Y* are locations on Squab Hollow Creek.

Based on the latitude and longitude coordinates given, identify the New York State landscape region in which this map region is located.

Allegheny Plateau

74.

steep head



530 + 10 = 540 − 1 = 539

ocean

Base your answer on the topographic map. Points *A*, *B*, *Y*, and *Z* are reference points on the topographic map. The symbol ▲533 represents the highest elevation on Aurora Hill.

Calculate the gradient between points *Y* and *Z* on the map, and label the answer with the correct units.

6 _____ ft/mile

$\frac{520 - 490 \text{ ft}}{5 \text{ miles}} = \frac{30}{5}$

unit

75.

Base your answer on the topographic map. Points *A*, *B*, *Y*, and *Z* are reference points on the topographic map. The symbol ▲533 represents the highest elevation on Aurora Hill.

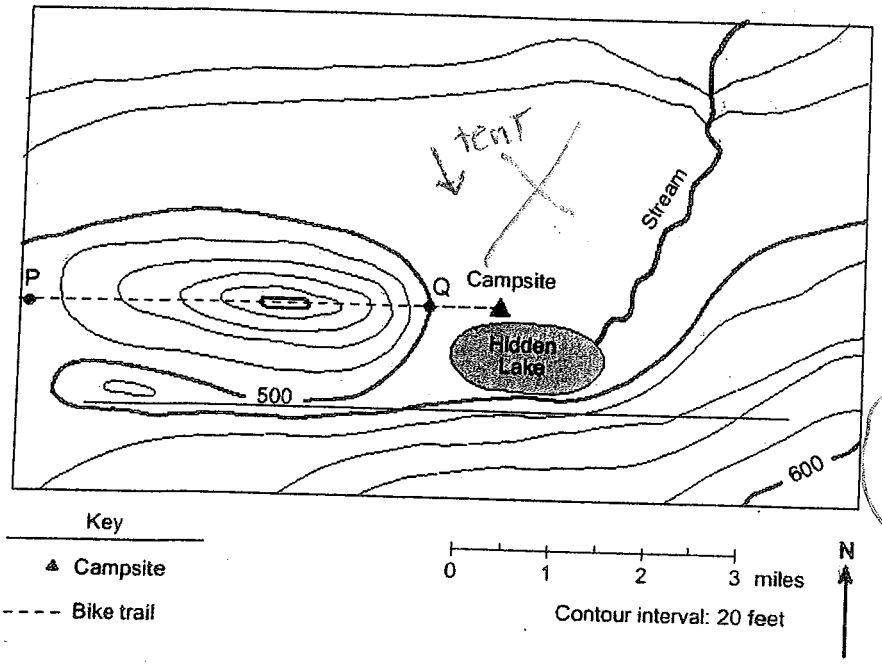
Describe the evidence shown on the map that indicates that the southern side of Holland Hill has the steepest slope.

lines closest together

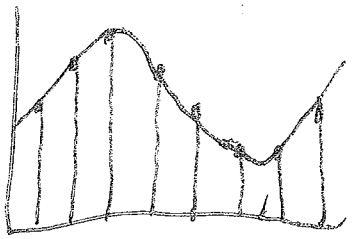
76.

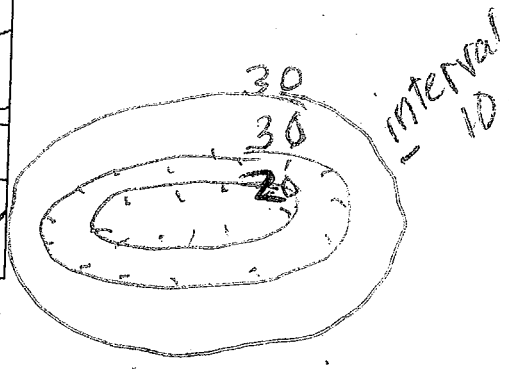
A group of Earth science students decided to take an adventurous camping trip, so they rode bicycles to a New York State park that was located in an isolated area. They traveled up a steep hill. When they reached the top, they looked at the landscape and noticed a lake at the bottom of the hill. They named it Hidden Lake. To the left of Hidden Lake was a large field with a small stream. They decided to set up their campsite in the field near Hidden Lake. To get to the field, they cycled down a very steep slope.

The map below shows the location of the bicycle trail and the students' campsite. Points *P* and *Q* are reference points on the map.



profile





depression

State the evidence shown on the map that indicates that the area directly north of Hidden Lake is relatively flat.

large space between isolines

77.

State the general compass direction in which the stream is flowing. N

78.

State how contour lines provide the evidence for determining this direction.

C.L. bend upstream

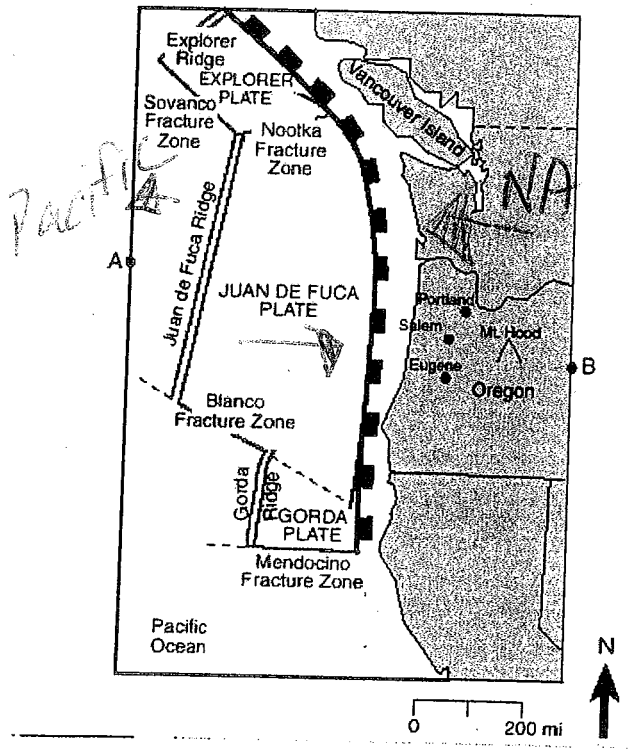
Huge Quake Possible in Oregon Valley

Scientists have warned for years that a magnitude 8 or 9 earthquake could strike about 30 miles off the Oregon coast, causing huge tsunamis (large ocean waves) and tremendous damage.

Now scientists say these earthquakes could be centered much farther inland and cause severe damage to a larger area, including cities in Oregon such as Portland, Salem, and Eugene.

Geologic evidence suggests that strong quakes in this area occur about every 400 years, plus or minus 200 years. The last one, believed to be a magnitude 9, occurred 300 years ago.

A magnitude 8 quake can cause tremendous damage. The San Francisco quake of 1906 has been estimated at 7.9. The Mexico City quake of 1985 that left thousands dead was measured at 8.1.



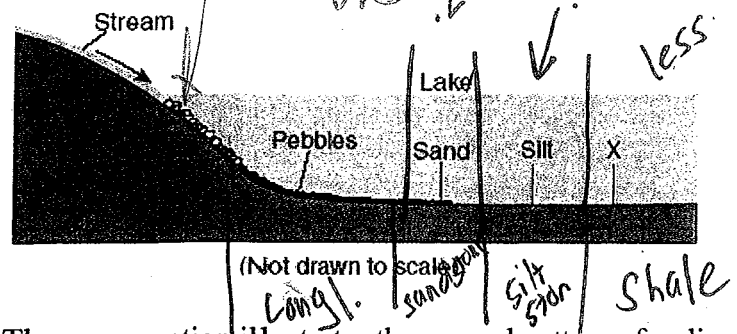
An emergency management specialist in Portland, Oregon, is developing a plan that would help save lives or prevent property damage in the event of a future earthquake.

Describe two actions or ideas that should be included in the plan. Not during!

prepared

Base your answer in part on the news article and map. Points A and B on the map are reference points.

80.



The cross section illustrates the normal pattern of sediments deposited where a stream enters a lake. Letter *X* represents a particular type of sediment.

Briefly explain why deposition of sediment usually occurs where a stream enters a lake.

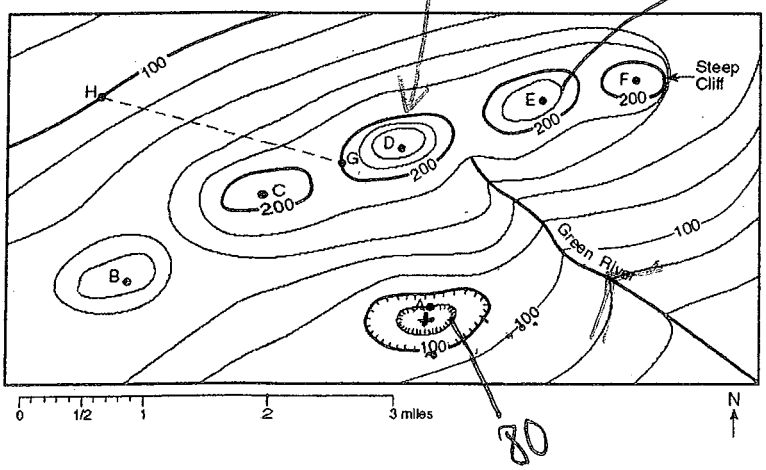
Stream velocity decreases

81.

The cross section illustrates the normal pattern of sediments deposited where a stream enters a lake. Letter *X* represents a particular type of sediment.

Name the type of sediment most likely represented by letter *X*. clay

82.



Base your answer on the contour map. Letters *A* through *H* represent locations in the area represented by the map. Contour lines are labeled in feet.

State how the shape of the contour lines crossing the Green River indicates that this river flows toward the southeast.