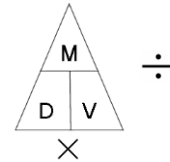


THE 50 WAYS TO PASS THE EARTH SCIENCE MIDTERM

1. Density is / how close or compact the molecules are
2. As temperature increases / density decreases (molecules spread out) and volume increases (that is why heat rises!)
3. The same objects have the / same density **NO MATTER WHAT SIZE**
4. Density triangle / cover up the variable you want to solve for:



5. Latitude lines are drawn / horizontal, but measure **north – south** of Equator (latitude = latitude)
6. Longitude lines are drawn / vertical, but measure **east – west** of Prime meridian
7. The altitude of Polaris equals / your latitude (be able to use NYS map to find altitude)
8. A set of circles inside circles indicates / a hill
9. To get the highest possible elevation / subtract one from the next possible contour line
10. Tick marks mean / depressions; the first tick marked line is the same elevation as the one next to it
11. Contour interval is the / amount between each contour line; Ocean is sea level 0'
12. Lines close together mean / steeper gradient
13. Water flows / downhill; opposite the bends (“V”) in contour lines (they point upstream)
14. The physical properties of minerals depends upon / the internal arrangement of atoms
15. Color is not a good way to ID a mineral because / some minerals come in lots of colors like quartz
16. Cleavage is / the flat sides on a mineral, mineral breaks along planes of weak bonding
17. The mineral and rock that react to acid are / calcite (rhombus-shaped) and limestone
18. The most abundant minerals in Earth’s crust are / oxygen and silicon (ESRT p.1)
19. Rocks are classified on the basis of / their origin (how they formed)
20. Sedimentary rocks form from / sediments by compaction & cementation, evaporation, and organic remains
 - Texture / clastic (pieces of other rocks)
 - / Fossils!!!
21. Igneous rocks form by / the crystallization of molten magma or lava (intergrown crystals)
 - Large crystals / slow cooling (Intrusive)
 - Small crystals / fast cooling (Extrusive)
 - Texture / glassy, fine, and coarse
22. Vesicular means / gas pockets (cooled fast, extrusive, volcanic)
23. Crystal size in igneous rocks depends on / the rate of cooling

24. Metamorphic rocks form from / other rocks by heat and pressure (recrystallization)
 Texture / foliated or banded
 Key words are / foliation and distorted structure
25. Weathering is the / breaking down of rocks into smaller pieces (sediments)
26. As particle size decreases / surface area increases and the rate of weathering increases
27. Frost action occurs as / water seeps in crack, freezes and expands
28. Rocks become smaller and rounder in a stream due to / abrasion (rock hitting against each other)
29. Chemical weathering / changes the chemical composition of the rock, best example is rust also cave formation and acid rain
30. Resistant layers of rock / stick out (forms cliffs)
31. Moist and warm climates favor / chemical weathering
32. Moist and cold climates favor / physical weathering (good for frost action)
33. Soils develop as a result of / weathering and biological activity
34. Erosion is the / movement of sediment
35. The primary **force** that drives the agents of erosion is / gravity
36. The primary **agent** of erosion is / water
37. Streams valleys are / V-shaped
38. Stream velocity depends on / gradient (steepness or slope) and volume (amount) of water
39. The outside of a meander bend is / fast and erodes (elbow)
40. The inside of a meander bend is / slow and deposits (dent)
41. As stream velocity increases, the size of the particles that can be transported / increases
42. Evidence of gravity erosion is / unsorted and angular (sharp) rocks at base of cliff.
43. Glacial landscapes show / U-shaped valleys, erratics (large boulders), kettle lakes, moraines & scratched bedrock
44. Glaciers advance from the / north, they formed Long Island, left sand and gravel (moraines)
45. Wind erosion creates / sand dunes, the windward side of a sand dune has a gentle slope
46. Deposition / is the dropping or stopping of sediments after erosion
47. Water and wind deposits are / sorted by size and layered
48. Gravity and glacial deposits are / unsorted and not layered
49. When a river enters the ocean / it slows down, deposits and is called a delta
50. The particles that settle out first are / larger, most dense, and roundest

Rocks and Minerals (ESRT pages are huge here, Rock pages on 6, 7, 16 and 1)

Weathering, Erosion, Deposition, (ESRT page 6 top right)

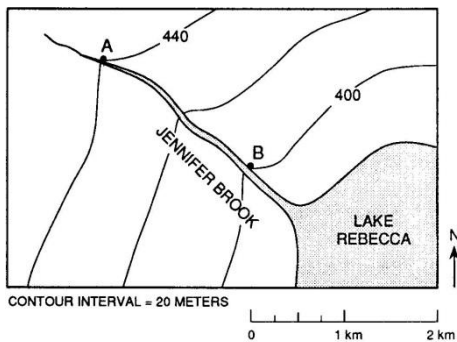
Latitude and Longitude (page 2)

Formula Questions

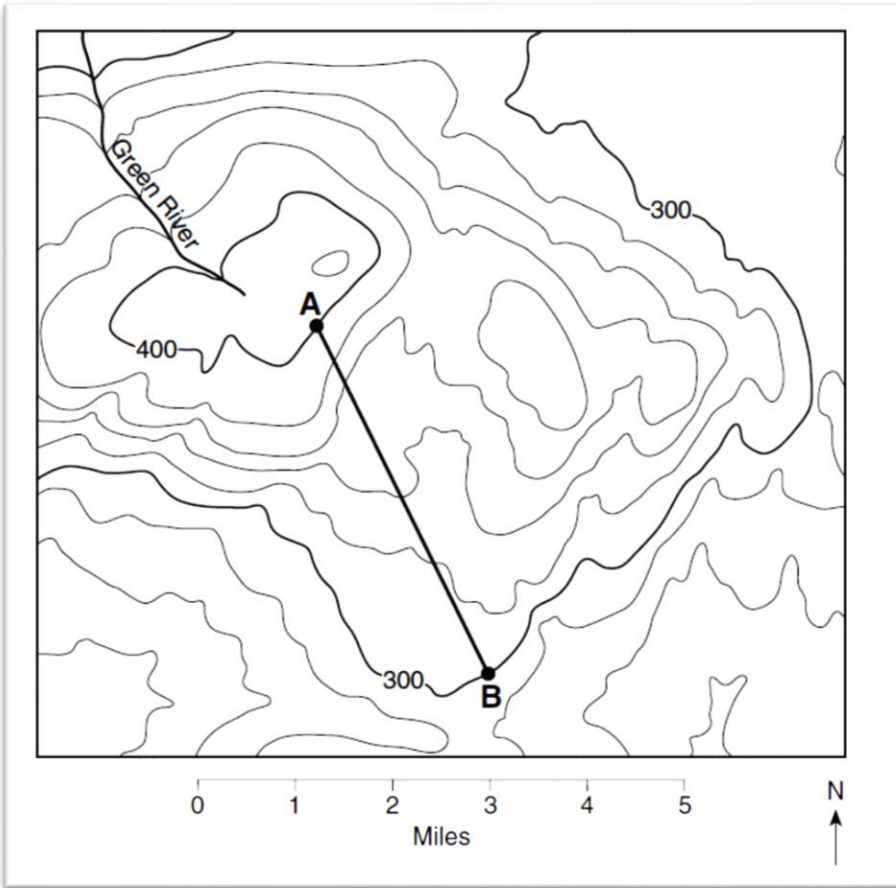
1. A cube is 3 cm on a side. Its mass is 67.5g, what is its density? (Show work) _____ g/cm³
2. A rectangle has a length of 3 cm, a width of 2 cm, and height of 1 cm. It has a mass of 120 grams. What is its density?
3. A rectangle has a volume of 40 cm³. It has a density of 3 gm/cc. Calculate it's mass.
4. A cube has a mass of 128 grams and a density of 2 gm/cc. Find the volume.
5. Between 6 A.M. and 11 A.M., the temperature inside a greenhouse rose from 13°C to 20°C. Calculate the rate of temperature change inside the greenhouse. (Show work)

6. On the contour map below, calculate the gradient of this stream from points A to B.

(Show work) _____ m/km



Gradients Questions



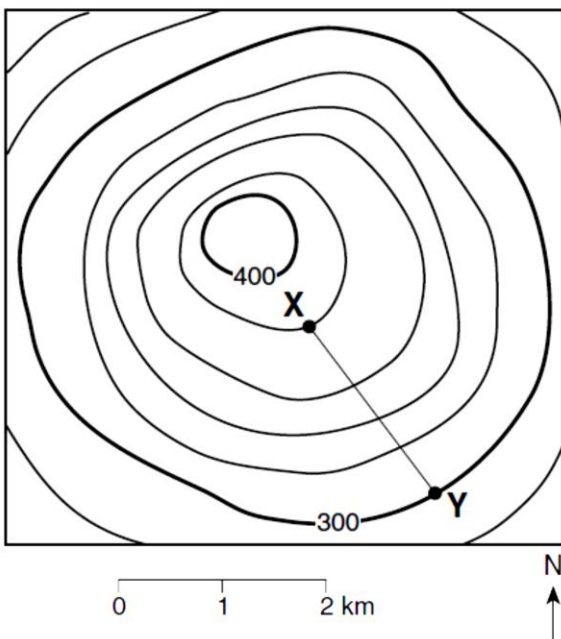
In the empty space below the diagram, calculate the gradient between points A and B. **Make sure you use and show the 3-step process.**

1. _____ What is the gradient along the straight line between points A and B?

- (1) 10 ft/mi (2) 20 ft/mi
 (3) 25 ft/mi (4) 35 ft/mi

2. What compass direction is the Green River flowing?

The topographic map below shows a hill. Points X and Y represent locations on the hill's surface. Elevations are shown in meters.

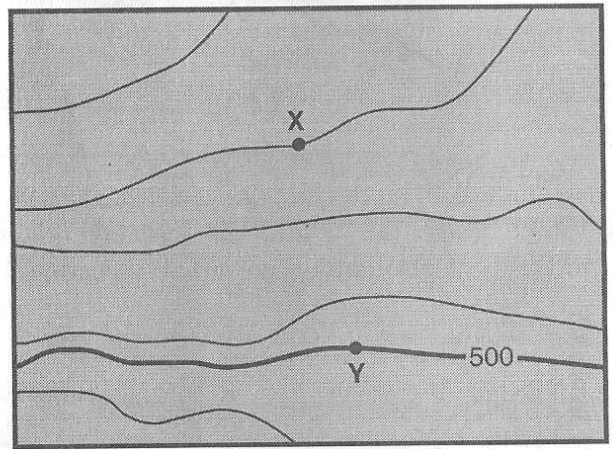


3. _____ What is the gradient between points X and Y?

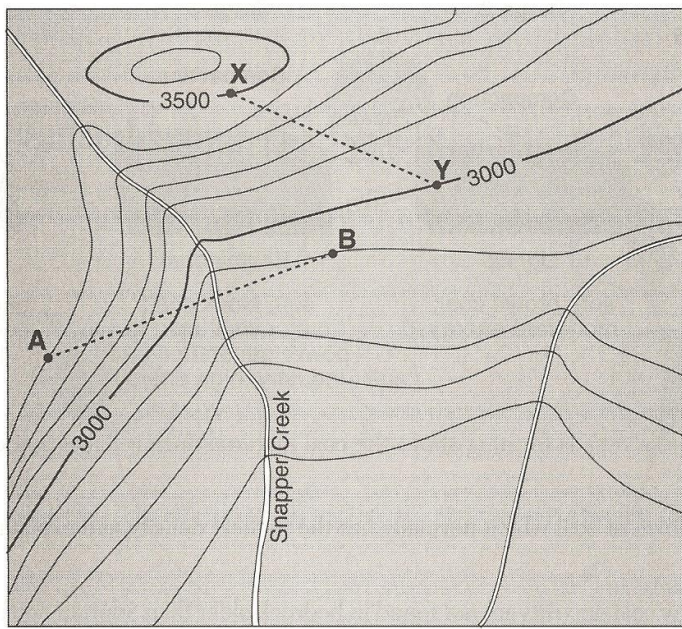
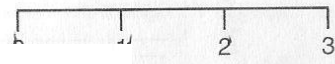
- (1) 40 m/km (2) 80 m/km (3) 100 m/km (4) 120m/km

4. _____ What is the approximate gradient between X and Y?

- (1) 15 ft/mi
- (2) 20 ft/mi
- (3) 30 ft/mi
- (4) 60 ft/mi



Scale of Miles Contour interval: 20 feet



0 1 2 3 miles Contour interval = 100 feet

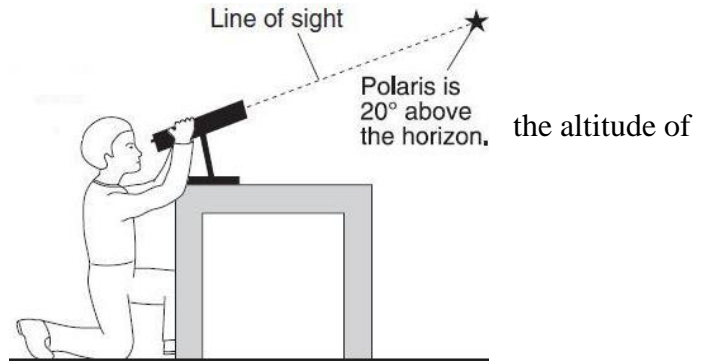


5. What is the gradient between points X and Y? **Show your work!**

6. What direction is Snapper Creek flowing?

Latitude and Longitude Questions

The diagram to the right shows an observer measuring Polaris.



1. _____ What is the latitude of the observer?

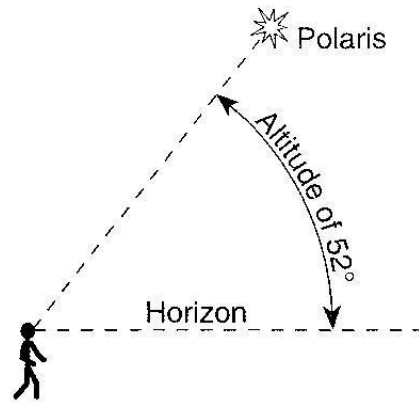
- (1) 20°N (2) 20°S (3) 70°N (4) 70°S

2. _____ What time is it in Greenwich, England (at 0° longitude) when it is noon in Massena, New York?

- (1) 7 a.m. (2) noon (3) 5 p.m. (4) 10 p.m.

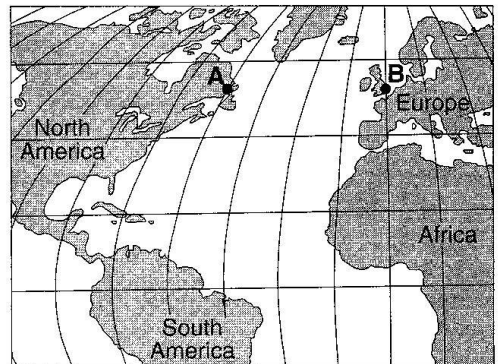
3. _____ The diagram to the right shows an observer on Earth viewing the star *Polaris*. What is this observer's latitude?

- (1) 38°N (3) 52°N
(2) 38°S (4) 52°S



4. On the map to the right, there is a four-hour solar time difference between locations A and B. What is the difference in longitude between these two locations?

- (1) 15° (3) 45°
(2) 23.5° (4) 60°



5. _____ What is the approximate location of the Canary Islands hot spot?

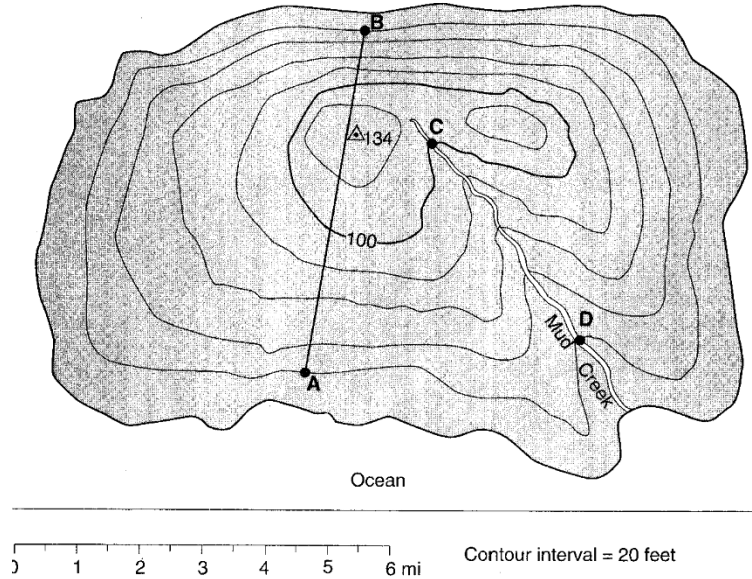
- (1) 32°S 18°W (2) 32°S 18°E (3) 32°N 18°W (4) 32°N 18°E

6. What is the longitude of Elmira? (to the nearest minute) _____

7. What is the latitude of Oswego? (to the nearest minute) _____

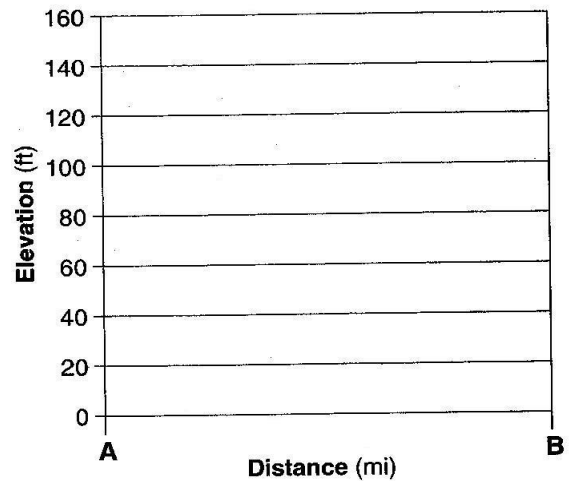
Topographic Map Questions

Base your answers to questions 1 through 4 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 triangle symbol represents an elevation on the hilltop. Elevations are measured in feet and distances are measured in miles.



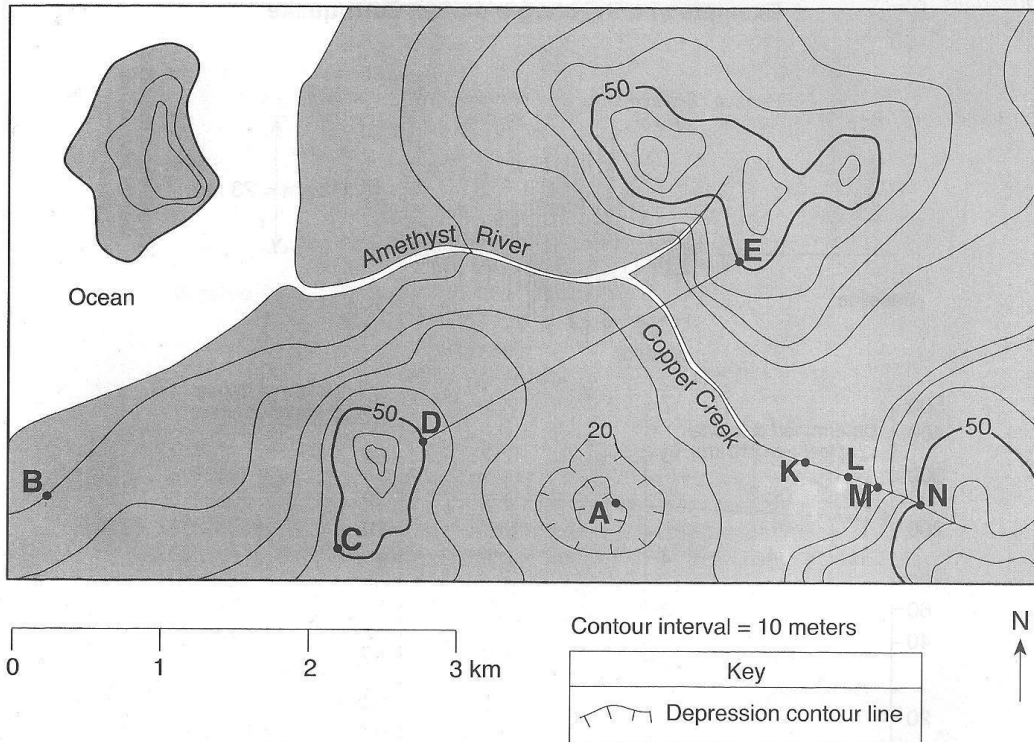
1. State the compass direction toward which Mud Creek flows.
2. Calculate the gradient of Mud creek between points C and D and label your answer with the correct units. Show all steps of the 3-step process and circle your answer.

3. On the grid to the right, 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.

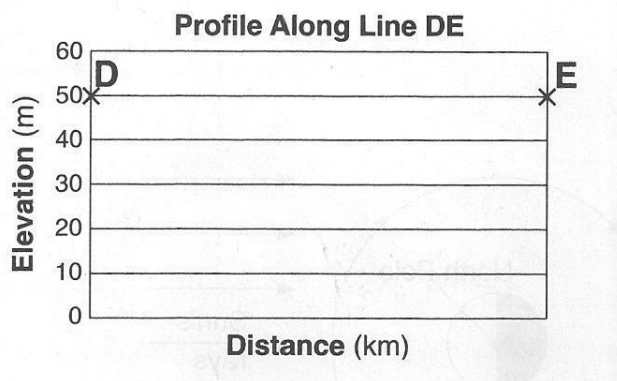


4. Explain how the contour lines on the map indicate that the north side of the island has the steepest slope.

Base your answers to questions 5 through 8 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.



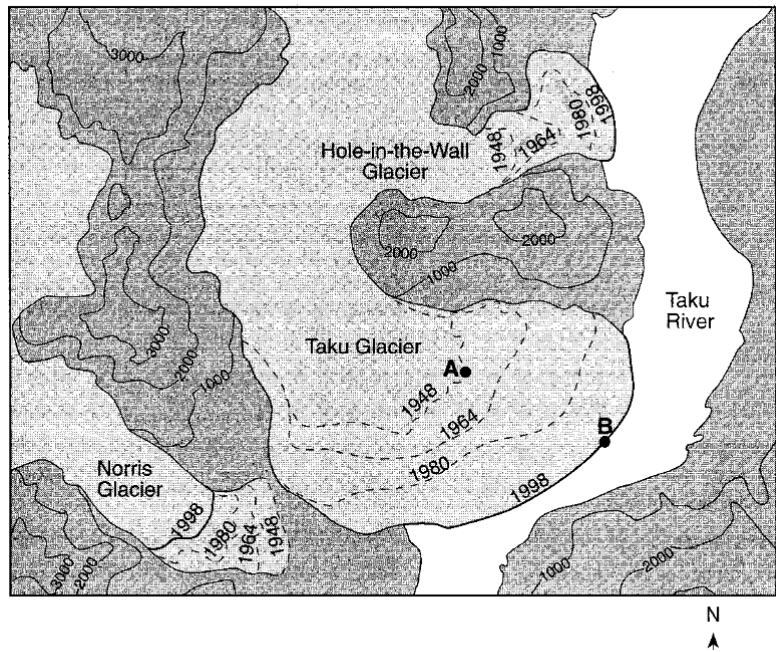
- What is the elevation of location A?
- Calculate the gradient between points B and C and label your answer with the correct units.
- On the grid to the right, construct a topographic profile along line DE by plotting an X for the elevation of each contour line that crosses line DE. Connect the X’s with a smooth, curved line to complete the profile.



- Explain how the map indicates that Copper Creek flows faster between points N and M than between points L and K.

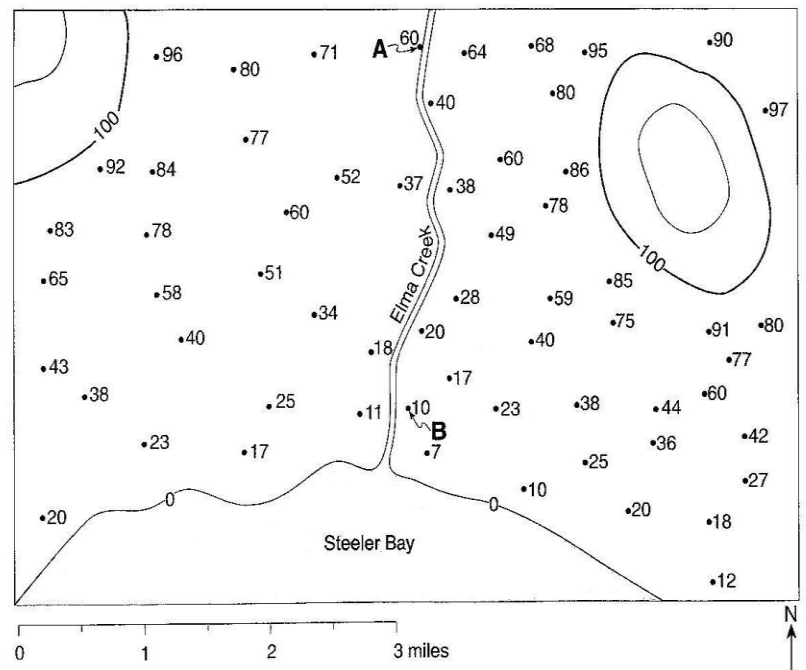
9. Using the map to the right, determine the rate, in miles per year, that the front edge of the Taku glacier moved between point A and point B.

10. What is the contour interval on this map?



Base your answers to questions 11 through 13 on the field map to the right. The map shows elevations, measured in feet, of a number of points in a certain geographic region. Contour lines have been drawn for the 100-foot and 120-foot elevations. Points A and B represent two spot elevations on the map.

11. On the map to the right, draw the 60-foot contour line. Make sure that the contour line extends to the edges of the map.
12. Toward which general compass direction does Elma Creek flow?
13. Calculate the gradient between points A and B. Label the answer with the correct units.



Rocks and Minerals Worksheet

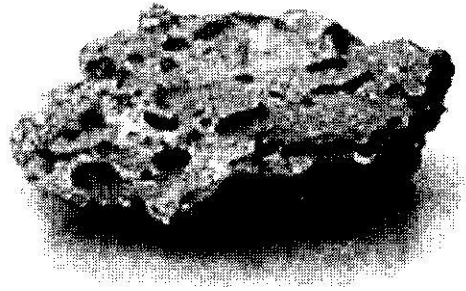
1. The chemical formula for the mineral chrysotile is $Mg_3Si_2O_5(OH)_4$. State the name of the mineral found on the Earth Science Reference Tables that is most similar in chemical composition.

2. _____ Which rock is sedimentary in origin and formed as a result of chemical processes?

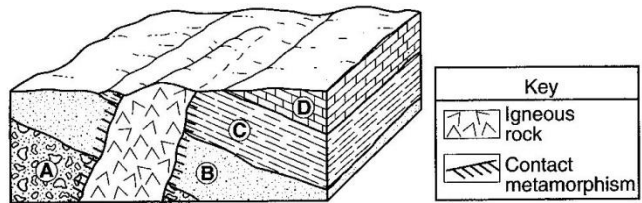
- (1) granite (2) shale (3) breccia (4) dolostone

3. _____ What is the rate and origin of the rock to the right?

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



Base your answers to questions 4 through 5 on the block diagram to the right, which shows a portion of Earth's crust. Letters A, B, C and D indicate sedimentary layers.



4. _____ 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

- (1) granite (2) pegmatite (3) gabbro (4) pumice

5. _____ Which processes produced rock layer B?

- (1) subduction and melting (3) heat and pressure
 (2) uplift and solidification (4) compaction and cementation

6. _____ Some of the bedrock in the Green Mountains of Vermont is actually green in color because of the presence of the mineral chlorite. Which other mineral can cause rocks to appear green?

- (1) sulfur (2) magnetite (3) olivine (4) halite

7. _____ Which state is best supported by the diagram?

- (1) A fingernail will scratch calcite, but not gypsum.
 (2) Calcite will be scratched by a copper penny.
 (3) The mineral apatite will scratch topaz.
 (4) A steel file has a hardness of about 7.5.

Index Minerals	Common Objects
Diamond	10
Corundum	9
Topaz	8
Quartz	7
Orthoclase	6
Apatite	5
Fluorite	4
Calcite	3
Gypsum	2
Talc	1

Steel file
 Glass
 Copper penny
 Fingernail

8. _____ What processes form granite?

- (1) compaction and cementation of sediments
- (2) cooling and solidification of magma
- (3) uplift and weathering of bedrock
- (4) application of heat and pressure to shale

9. _____ Which group of elements is listed in increasing order based on the percent by mass in Earth's crust?

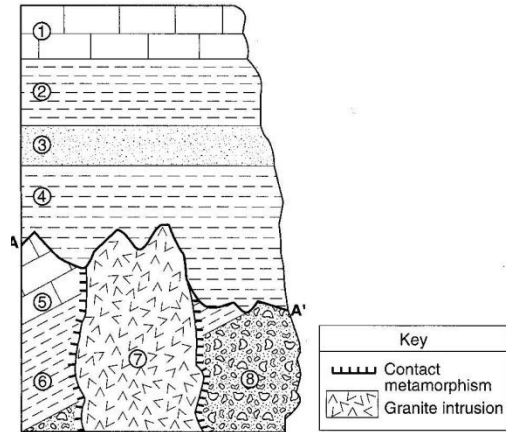
- (1) aluminum, iron, calcium (3) magnesium, iron, aluminum
- (2) aluminum, silicon, magnesium (4) magnesium, silicon, calcium

10. _____ Which characteristic of the granite intrusion provides the most direct evidence that it solidified deep underground?

- (1) very hard (3) light color
- (2) coarse texture (4) felsic composition

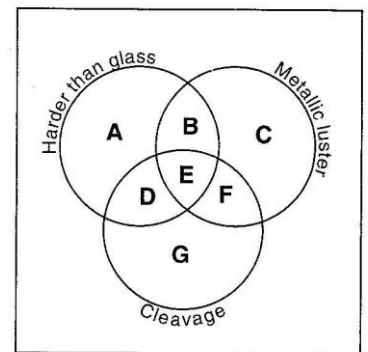
11. _____ Which rock most probably formed in the contact metamorphic zone with rock unit 6?

- (1) marble (3) quartzite
- (2) basalt (4) hornfels



12. Identify the sedimentary rock composed of halite and explain how this rock is usually formed.

Base your answers to questions 13 and 14 on the diagram to the right of a mineral classification scheme that shows the properties of certain minerals. Letters A through G represent mineral property zones. Zone E represents the presence of all three properties. For example, a mineral that is harder than glass, has a mineral luster, but does not have cleavage, would be placed in zone B. Assume that glass has a hardness of 5.5.



13. In which zone would the mineral potassium feldspar be placed?

14. State the name of one mineral listed on the *Properties of Common Mineral Table* that could *not* be placed in any one of the zones.

15. State the name of the dominant sediment particle that is compacted to form the rock shale.

16. _____ Which process led to the formation of thick salt deposits found in the bedrock at some locations in New York State?

- (1) melting (2) runoff (3) condensation (4) evaporation

17. _____ Oxygen is the most abundant element by volume in Earth's

- (1) inner core (2) troposphere (3) hydrosphere (4) crust

18. _____ In which type of rock would fossils of organisms most likely be found?

- (1) felsic igneous (2) vesicular igneous (3) clastic sedimentary (4) nonfoliated metamorphic

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

19. _____ Which table below correctly classifies each rock type?

Rock Type	Classification
1	sedimentary
2	metamorphic
3	igneous

(1)

Rock Type	Classification
1	metamorphic
2	igneous
3	sedimentary

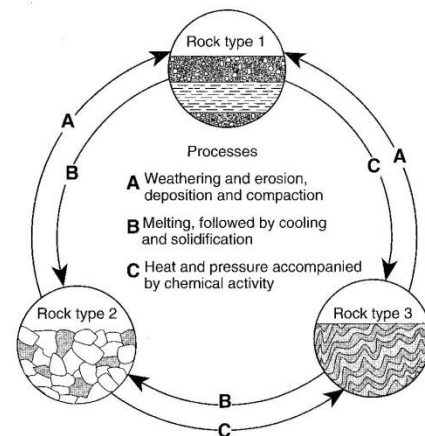
(3)

Rock Type	Classification
1	sedimentary
2	igneous
3	metamorphic

(2)

Rock Type	Classification
1	igneous
2	metamorphic
3	sedimentary

(4)



The table to the right shows some properties of four different minerals.

20. The minerals listed in the table to the right are varieties of which mineral?

- (1) garnet (2) magnetite (3) quartz (4) olivine

Mineral Variety	Color	Hardness	Luster	Composition
flint	black	7	nonmetallic	SiO ₂
chert	gray, brown, or yellow	7	nonmetallic	SiO ₂
jasper	red	7	nonmetallic	SiO ₂
chalcedony	white or light color	7	nonmetallic	SiO ₂

21. _____ What two minerals are most likely found in beach sand that was eroded from headlands composed of the rock diorite?

- (1) quartz and olivine (2) plagioclase feldspar and amphibole (3) potassium feldspar and biotite (4) pyroxene and calcite

22. What determines the physical properties of minerals, such as the long, stiff fibers of some varieties of asbestos?

23. _____ A human fingernail has a hardness of approximately 2.5. Which two minerals are *softer* than a human fingernail?

- (1) calcite and halite (2) sulfur and fluorite (3) graphite and talc (4) pyrite and magnetite

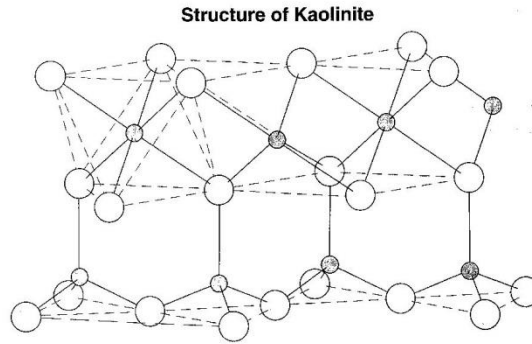
24. _____ Which physical characteristic best describes the rock phyllite?

- (1) glassy texture with gas pockets
- (2) clastic texture with angular fragments
- (3) bioclastic texture with cemented shell fragment
- (4) foliated texture with microscopic mica crystals

25. _____ Which home-building material is made mostly from the mineral gypsum?

- (1) plastic pipes
- (2) window glass
- (3) drywall panels
- (4) iron nails

The diagram to the right represents a part of structure of the mineral kaolinite.



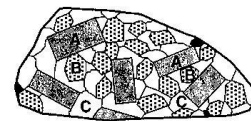
the crystal

the one

26. _____ An arrangement of atoms such as shown in the diagram represents a mineral's

- (1) age of formation
- (2) infiltration rate
- (3) physical properties
- (4) temperature of formation

Base your answers to questions 27 through 29 on the diagram and table to the right. The diagram represents a felsic igneous rock. Letters A, B and C represent three different minerals in the rock sample. The table describes the physical properties of minerals A, B and C found in the igneous rock sample.



(Actual size)

Mineral	Key	Physical Properties
A		pink, cleaves in two directions at 90°
B		white, cleaves in two directions, striations visible
C		colorless or clear with a glassy luster

27. State the texture of this igneous rock.

28. On the table provided to the right, state the names of minerals A, B and C.

Mineral	Name of Mineral
A	
B	
C	

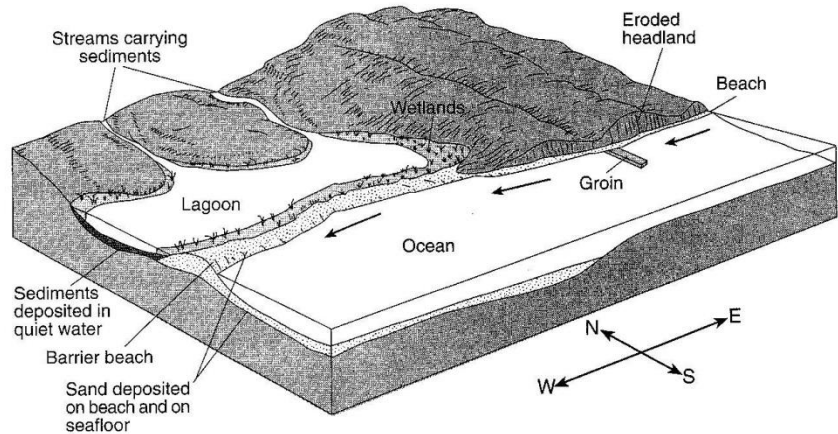
29. State two processes responsible for the formation of an igneous rock.

Erosion Weathering and Deposition Worksheet

1. _____ Which characteristic would most likely remain constant when a limestone cobble is subjected to extensive abrasion?

- (1) shape (2) mass (3) volume (4) composition

Base your answers to questions 2 through 4 on the diagram to the right. The arrows show the direction in which sediment is being transported along the shoreline. A barrier beach has formed, creating a lagoon. A groin has recently been constructed. Groins are wall-like structures built into the water perpendicular to the shoreline to trap beach sand.



2. _____ The groin structure will change the pattern of deposition along the shoreline, initially causing the beach to become

- (1) wider on the western side of the groin (3) narrower on both sides of the groin
(2) wider on the eastern side of the groin (4) wider on both sides of the groin

3. _____ The sediments that have been deposited by streams flowing into the lagoon are most likely

- (1) sorted and layered (3) unsorted and layered
(2) sorted and not layered (4) unsorted and not layered

4. _____ The entire area drained by a river and its tributaries is called a

- (1) delta (2) watershed (3) valley (4) floodplain

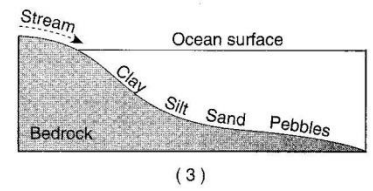
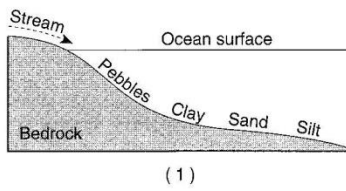
5. _____ Which event is an example of chemical weathering?

- (1) rocks falling off the face of a steep cliff
(2) feldspar in granite being crushed into clay-sized particles
(3) water freezing in cracks in a roadside outcrop
(4) acid rain reacting with limestone bedrock

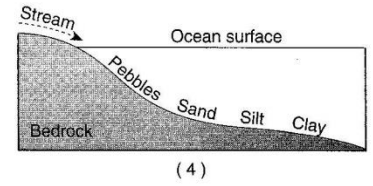
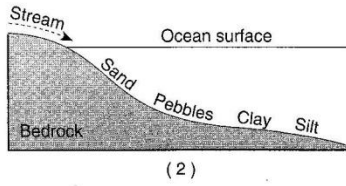
6. _____ Which natural agent of erosion is mainly responsible for the formation of the barrier islands along the southern coast of Long Island, New York?

- (1) mass movement (2) running water (3) prevailing winds (4) ocean waves

7. _____ Which profile best shows the general depositional pattern that occurs when water from a stream enters the ocean.

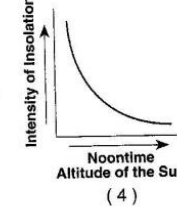
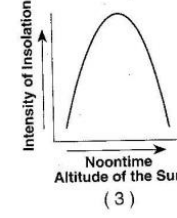
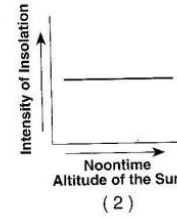
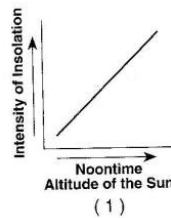


8. What characteristic of the stream changes to cause the deposition to occur?



9. If a glacier completely melted, what *two* pieces of evidence could a scientist find that a glacier had existed in this area?

10. _____ Which graph to the right best represents the relationship between the slope of a river and the particle size that can be transported by that river?

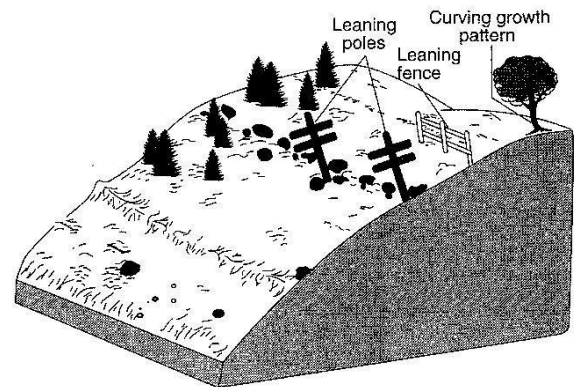


11. _____ Which agent of erosion was primarily responsible for forming the long, narrow, U-shaped valleys in the Finger Lakes region of New York State?

- (1) wind (2) landslides (3) meandering streams (4) continental glaciers

12. _____ Based on the diagram to the right, which erosional agent had the greatest effect on tree growth and the structures that humans have built on this landscape?

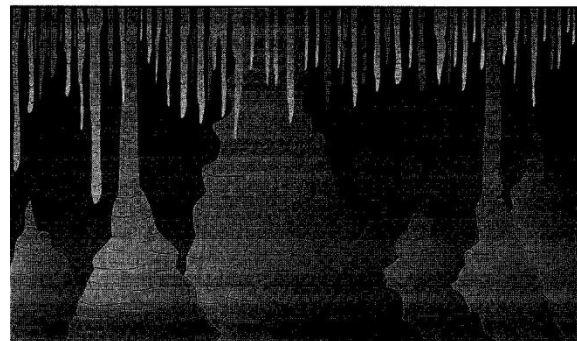
- (1) running water (3) prevailing wind
(2) moving ice (4) mass movement



The diagram to the right shows some features in a cave.

13. _____ What type of rock was chemically weathered by acidic groundwater to produce the cave and its features?

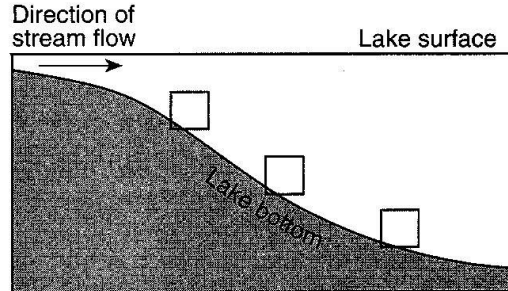
- (1) siltstone (2) basalt (3) quartzite (4) limestone



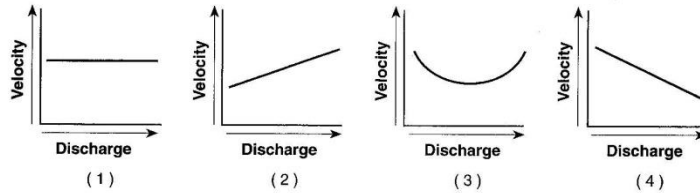
Base your answers to question 14 on the data table to the right, which shows the diameters of three particles A, B and C, made of the same uniform material. These particles were carried by a stream into a lake.

14. The cross-sectional diagram below shows the stream entering the lake. On the diagram, indicate the expected pattern of deposition of the three particles by placing the letters A, B, and C in the appropriate boxes along the lake bottom.

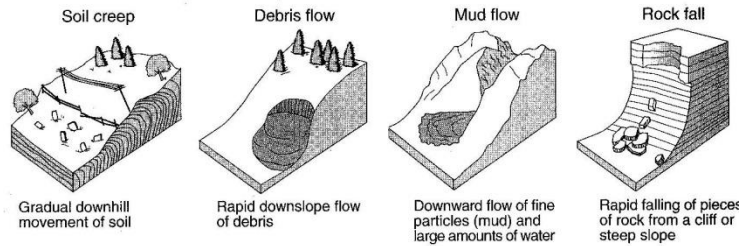
Data Table	
Particle	Particle Diameter (cm)
A	0.5
B	1.0
C	0.1



15. _____ Which graph below best represents the relationship between the discharge of a stream and the velocity of stream flow?



The diagrams to the right represent four different examples of one process that transports sediments.



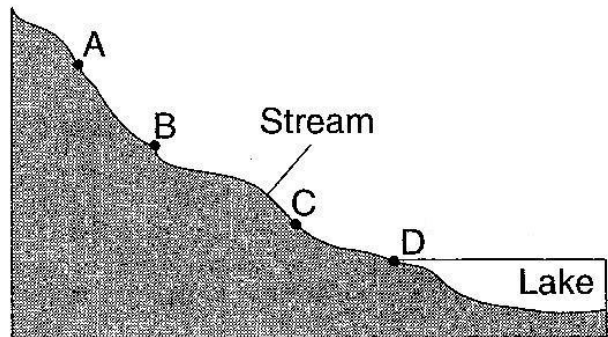
16. _____ Which process is shown in these diagrams

- (1) chemical weathering (2) wind action (3) mass movement (4) rock abrasion

The cross section to the right shows a stream flowing downhill. Points A through D are locations in the stream.

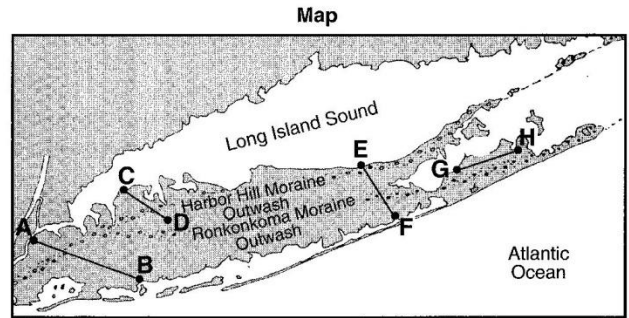
17. _____ At which point would most deposition occur?

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



Base your answers to questions 18 and 19 on the map of Long Island, New York. AB, CD, EF, and GH are reference lines on the map.

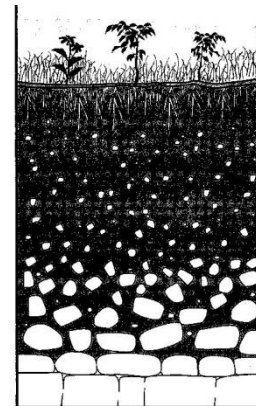
18. _____ Which agent of erosion transported the sediments that formed the moraines on the map?
 (1) water (2) wind (3) ice (4) mass movement



19. _____ A major difference between sediments in the outwash and sediments in the moraines is that the sediments deposited in the outwash are
 (1) larger (2) sorted (3) more angular (4) older

The cross section to the right shows a soil profile

20. _____ The soil was formed primarily by
 (1) erosion by glaciers (2) erosion by running water
 (3) capillarity and human activity (4) weathering and biological activity

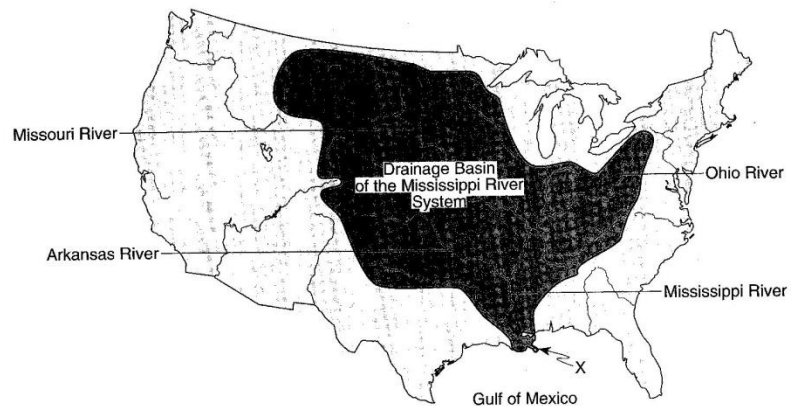


Base your answers to questions 21 through 23 on the map to the right, which shows the drainage basin of the Mississippi River system. Several rivers that flow into the Mississippi River are labeled. The arrow at location X shows where the Mississippi River enters the Gulf of Mexico.

21. _____ The entire land area drained by the Mississippi River is referred to as a
 (1) levee (2) watershed (3) meander belt (4) flood plain

22. _____ Sediments deposited at location X by the Mississippi River most likely have which characteristics?

- (1) angular fragments arranged as mixtures
 (2) rocks with parallel scratches and grooves
 (3) rock particles arranged in sorted beds
 (4) high density minerals with hexagonal crystals



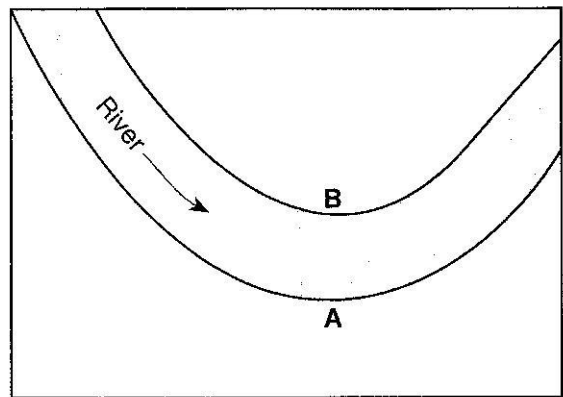
23. _____ The structure formed by the deposition of sediments at location X is best described as a
 (1) moraine (2) tributary (3) delta (4) drumlin

Streams Questions

1. _____ What is the largest sediment that can be transported by a stream that has a velocity of 125 cm/sec?
(1) cobbles (2) pebbles (3) sand (4) clay
2. _____ The largest sediment particles that can be transported by a stream traveling at a velocity of 200 centimeters per second are
(1) boulders (2) cobbles (3) pebbles (4) sand
3. _____ A stream with a velocity of 100 centimeters per second flows into a lake. Which sediment-size particles would the stream most likely deposit first as it enters the lake?
(1) boulders (2) cobbles (3) pebbles (4) sand

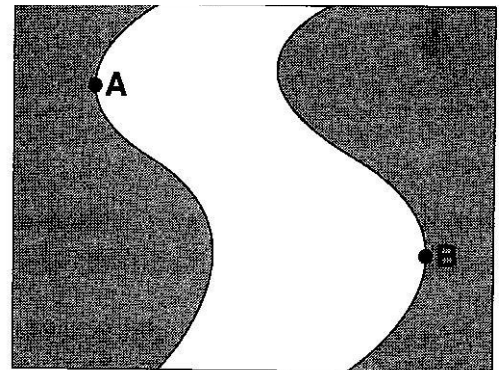
The map to the right shows the path of a river. The arrow shows the direction the river is flowing. Letters A and B identify the banks of the river.

4. _____ The water depth is greater near bank A than bank B because the water velocity near bank A is
(1) faster, causing deposition to occur
(2) faster, causing erosion to occur
(3) slower, causing deposition to occur
(4) slower, causing erosion to occur



The map to the right shows a meandering river. Points A and B are locations on the bank of the river.

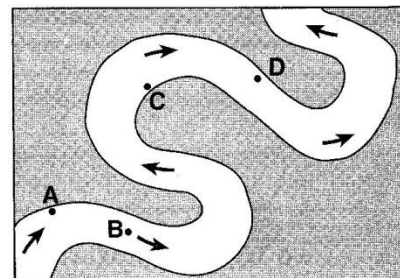
5. _____ What are the dominant processes occurring at locations A and B?
(1) deposition at location A; erosion at location B
(2) erosion at location A; deposition at location B
(3) deposition at both locations A and B
(4) erosion at both locations A and B
6. _____ Deposition within a meandering stream usually occurs on the inside of the curves because the
(1) water velocity decreases (3) water is deeper
(2) stream gradient decreases (4) stream is narrower



7. _____ A meandering stream deposits most of its sediments on the

- (1) inside of meanders where the stream flows faster
- (2) inside of meanders where the stream flows slower
- (3) outside of meanders where the stream flows faster
- (4) outside of meanders where the stream flows slower

The map to the right shows a meandering stream. Points A, B, C and D represent locations along the stream bottom.

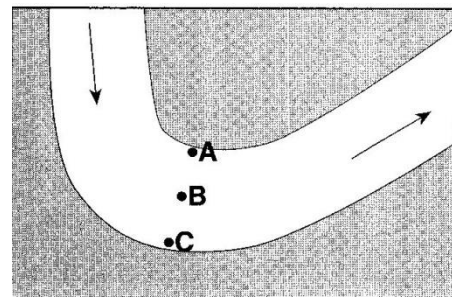


8. _____ At which location is the greatest amount of sediment most likely being deposited?

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

9. Describe *two* surface characteristics that will affect the rate of stream runoff into the ocean.

The map to the right shows the bend of a large meandering stream. The arrows show the direction of stream flow. Letters A, B and C are positions on the stream bed where erosion and deposition data were collected.



10. _____ Which table below best represents the locations where erosion and deposition are dominant and where an equilibrium exists between the two processes? (A check mark represents the dominant process for each lettered location.)

	Erosion	Equilibrium	Deposition
A		✓	
B			✓
C	✓		

(1)

	Erosion	Equilibrium	Deposition
A	✓		
B		✓	
C			✓

(3)

	Erosion	Equilibrium	Deposition
A			✓
B	✓		
C		✓	

(2)

	Erosion	Equilibrium	Deposition
A			✓
B		✓	
C	✓		

(4)