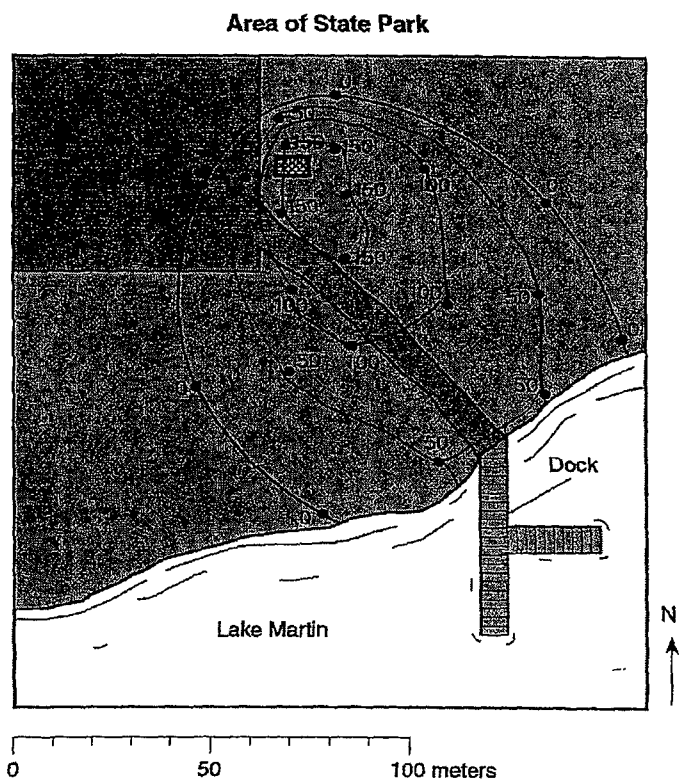
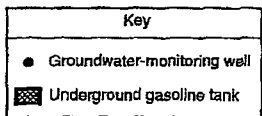


Name: Key

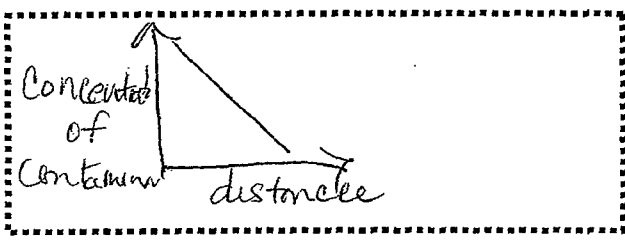
- 4 The best evidence that Earth spins on its axis is the motion of
 - tectonic plates
 - Polaris*
 - a wind vane
 - a Foucault pendulum
- 1 Approximately how many degrees per day does Earth revolve in its orbit around the Sun?
 - 1°
 - 13°
 - 15°
 - 23.5°
- 1 The approximate latitude of Utica, New York, is
 - 43°05' N
 - 43°05' S
 - 75°15' E
 - 75°15' W
- 4 Which ocean current brings warm water to the western coast of Africa?
 - Agulhas Current
 - North Equatorial Current
 - Canaries Current
 - Guinea Current
- 1 What is Earth's inferred interior pressure, in millions of atmospheres, at a depth of 3500 kilometers?
 - 1.9
 - 2.8
 - 5500
 - 6500

Base your answers to questions 6 through 8 on the field map below, which shows an area of a state park where an underground gasoline tank leaked and contaminated the groundwater. Groundwater monitoring wells were installed to determine the extent of the contamination. The concentration of contaminants in parts per million (ppm) in each of the wells is indicated on the map.

- On the field map to the right, draw the 50-ppm, 100-ppm, and 150-ppm isolines. The 0-ppm isoline has been drawn for you.



- State the relationship between the distance from the gasoline tank and the concentration of contaminants in the groundwater.



- Park officials do not want to see another incident of groundwater contamination from gasoline tanks. State *one* action that park officials could take to prevent gasoline from contaminating the groundwater in the future.

move it, insulate it

Name: _____

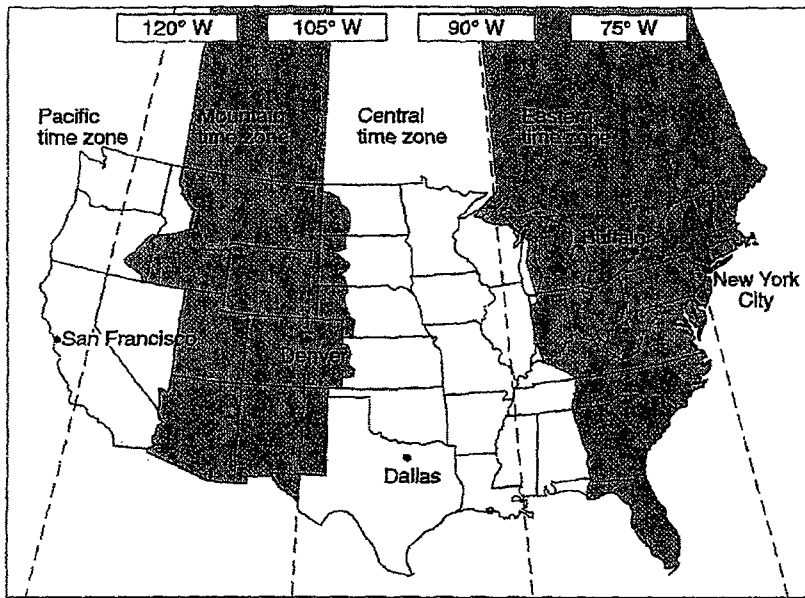
9. 2 What causes the Coriolis effect?

- (1) Earth's tilt on its axis
- (2) the spin of Earth on its axis
- (3) the orbital motion of the Moon around Earth
- (4) the orbital motion of Earth around the Sun

Base your answers to questions 10 and 11 on the passage and time zones map shown below.

Time Zones

In 1883, Earth was divided into 24 time zones. The United States (excluding Alaska and Hawaii) has four time zones, which are indicated by different shadings on the map. Each zone is roughly centered on lines of longitude that are 15° apart. These lines are shown as dashed lines on the map. Most locations within a time zone have the same time. This time is called standard time. As you move to the west, the time in each zone is one hour earlier than the previous time zone.



10. When it is 1 a.m. in New York City, what time is it in Denver?

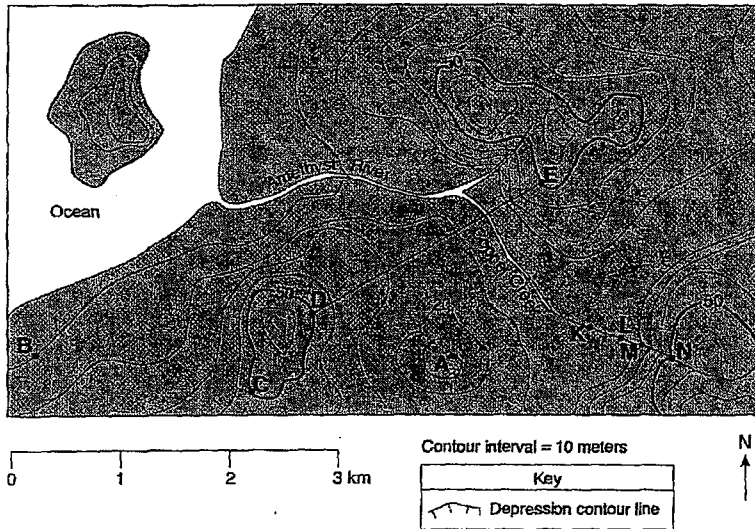
11 p.m.

11. Explain, in terms of Earth's rotation, why the time zones are 15° of longitude apart.

Earth rotates 15°/hr.

Name: _____

Base your answers to questions 1 through 4 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.

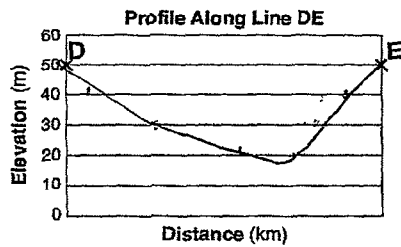


1. What is the elevation of location A? 10 meters
2. Calculate the gradient between points B and C and label your answer with the correct units.

$$\text{gradient} = \frac{\Delta \text{field value}}{\text{distance}}$$

$$= \frac{50 \text{ m} - 10 \text{ m}}{2 \text{ km}} = \frac{40 \text{ m}}{2 \text{ km}} = 20 \text{ m/km}$$

3. 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 Xs with a smooth, curved line to complete the profile.



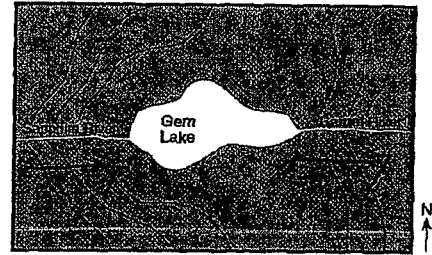
4. Explain how the map indicates that Copper Creek flows faster between points N and M than between points L and K.

Closer contour lines = steeper gradient

Name: _____

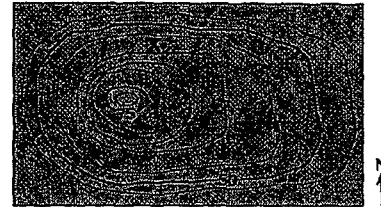
The topographic map below shows a lake and two rivers.

5. 1 In which direction does each of the rivers flow?
- (1) The Sapphire River and the Garnet River both flow east.
 - (2) The Sapphire River and the Garnet River both flow west.
 - (3) The Sapphire River flows east and the Garnet River flows west.
 - (4) The Sapphire River flows west and the Garnet River flows east.

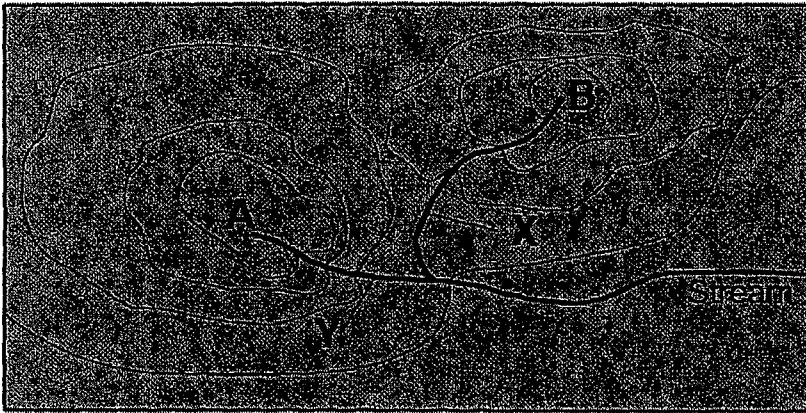


6. 2 Point X is a location on the topographic map below. Elevations are measured in meters. What is a possible elevation, in meters, of point X?
- (1) 55 (2) 57 (3) 68 (4) 70

C.I. = 5 meters.



The topographic map below shows two hills labeled A and B. The tributary streams labeled X and Y have the same volume of water.



7. 4 Which statement is best supported by the map?
- (1) Hill A is higher than hill B.
 - (2) Hill B is higher than hill A.
 - (3) Stream X flows faster than stream Y.
 - (4) Stream Y flows faster than stream X.

Same.

KEY

Name: _____

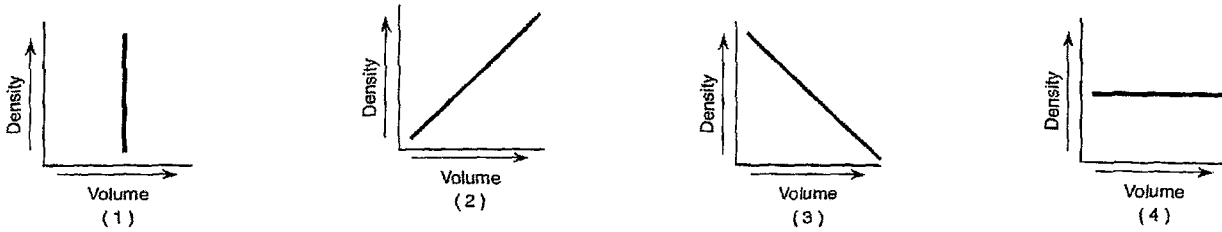
- 1 The two elements that make up the largest percentage by mass of Earth's crust are oxygen and
 - silicon
 - potassium
 - hydrogen
 - nitrogen
- 4 Which two minerals have cleavage planes at right angles?
 - biotite mica and muscovite mica
 - sulfur and amphibole
 - quartz and calcite
 - halite and pyroxene
- 2 What is the origin of fine-grained igneous rock?
 - lava that cooled slowly on Earth's surface
 - lava that cooled quickly on Earth's surface
 - silt that settled slowly in ocean water
 - silt that settled quickly in ocean water

The data table below shows the mass and volume of three samples of the same mineral. [The density column is provided for student use.]

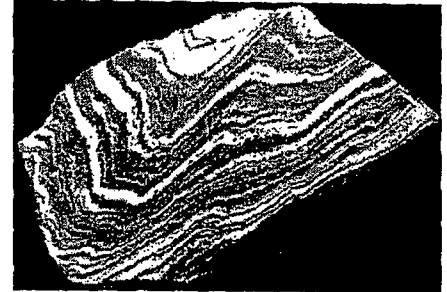
Data Table

Sample	Mass (g)	Volume (cm ³)	Density (g/cm ³)
A	50	25	
B	100	50	
C	150	75	

- 4 Which graph best represents the relationship between the density and the volume of these mineral samples?



Base your answers to questions 5 through 7 on the photograph of a sample of gneiss below.



- What observable characteristic could be used to identify this rock sample as gneiss?

banding

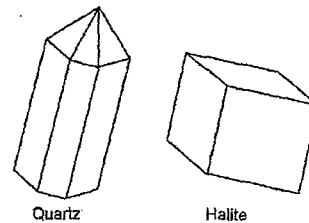
- Identify *two* minerals found in gneiss that contain iron and magnesium.

amphibole, pyroxene, mica

- A dark-red mineral with a glassy luster was also observed in this gneiss sample. Identify the mineral and state *one* possible use for this mineral.

Quartz Fe ore

- 4 The diagrams below show the crystal shapes of two minerals. Quartz and halite have different crystal shapes primarily because



- light reflects from crystal surfaces
- energy is released during crystallization
- of impurities that produce surface variations
- of the internal arrangement of the atoms

- 2 A student created the table below by classifying six minerals into two groups, A and B, based on a single property. Which property was used to classify these minerals?

- color
- luster
- chemical composition
- hardness

Group A	Group B
olivine	pyrite
garnet	galena
calcite	graphite

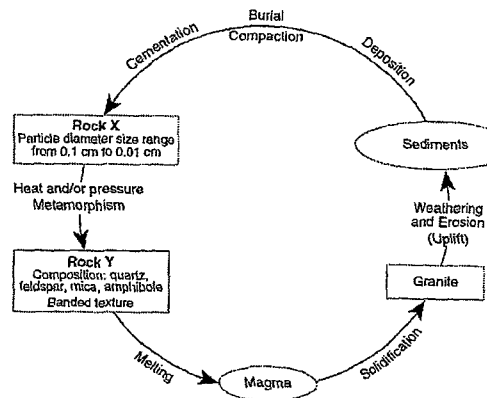
- 3 Which igneous rock has a vesicular texture and contains the minerals potassium feldspar and quartz?

- andesite
- pegmatite
- pumice
- scoria

Name: _____

11. 2 Dolostone is classified as which type of rock?
 (1) land-derived sedimentary rock (3) foliated metamorphic rock
 (2) chemically formed sedimentary rock (4) nonfoliated metamorphic rock

Base your answers to questions 12 through 14 on the diagram below, which represents a part of the rock cycle. The igneous rock, granite, and the characteristics of sedimentary rock X and metamorphic rock Y are shown.



12. Identify sedimentary rock X. Sandstone

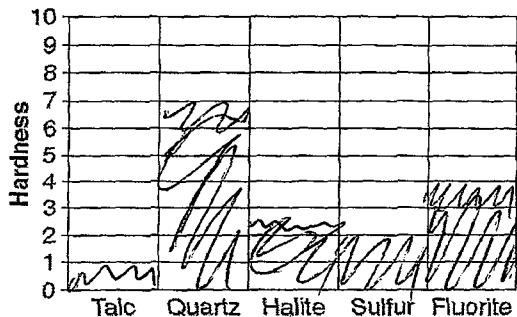
13. Identify metamorphic rock Y. gneiss

14. Complete the table below, with descriptions of the observable characteristics used to identify granite.

Characteristic of Granite	Description
Texture	<u>coarse</u>
Color	<u>felsic</u>
Density	<u>low</u>

Base your answers to questions 15 and 16 on the hardness of the minerals talc, quartz, halite, sulfur, and fluorite.

15. On the grid below, construct a bar graph to represent the hardness of these minerals.



16. Which mineral shown on the grid would be the best abrasive? State *one* reason for your choice.

Quartz, it's the hardest

17. 1 The data table below shows the density of four different mineral samples. A student accurately measured the mass of a sample of one of the four minerals to be 294.4 grams and its volume to be 73.6 cm³. Which mineral sample did the student measure?

- (1) corundum (3) hematite
 (2) galena (4) quartz

Data Table

Mineral	Density (g/cm ³)
corundum	4.0
galena	7.6
hematite	5.3
quartz	2.7

18. 2 Which mineral has a metallic luster, a black streak, and is an ore of iron?

- (1) galena
 (2) magnetite
 (3) pyroxene
 (4) graphite

19. 4 In which set are the rock drawings labeled with their correct rock types?

Name: _____

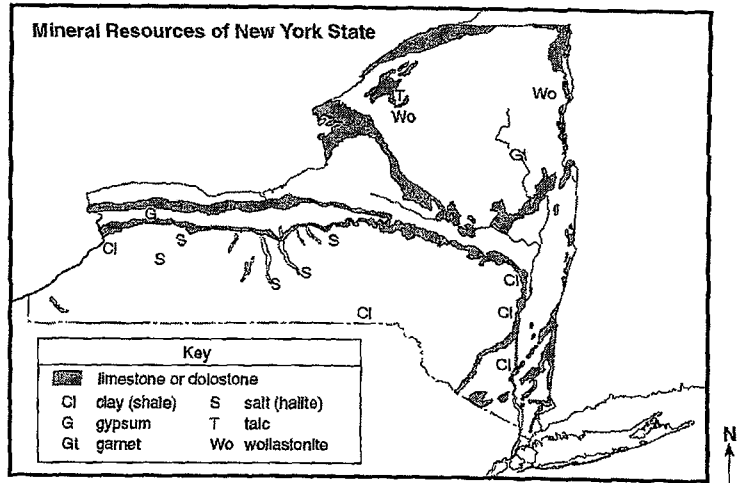
Base your answers to questions 20 through 23 on the map below, which shows areas where certain minerals were mined in significant amounts during 1989.

20. 2 In which New York State landscape region was most of the garnet mined?
 (1) Catskills
 (2) Adirondack Mountains
 (3) Tug Hill Plateau
 (4) Erie-Ontario Lowlands

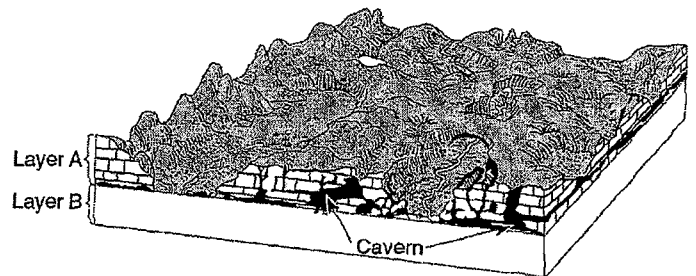
21. 4 What is a common use for the mineral that is mined at the southern end of the two largest Finger Lakes?
 (1) making talcum powder
 (2) vulcanizing rubber
 (3) polishing jewelry
 (4) melting ice

22. 3 The gypsum deposits in New York State were formed
 (1) as a result of volcanic eruptions
 (2) as a result of metamorphism
 (3) in a shallow ocean
 (4) in a glacial outwash plain

23. 1 The mineral wollastonite has a hardness of 4.5 to 5. Which New York State mineral could easily scratch wollastonite?
 (1) garnet (2) halite (3) talc (4) gypsum



Base your answers to questions 24 through 26 on the block diagram below, which shows the landscape features of an area of Earth's crust. Two sedimentary rock layers, A and B, are labeled in the diagram. The rock symbol for layer B has been omitted.



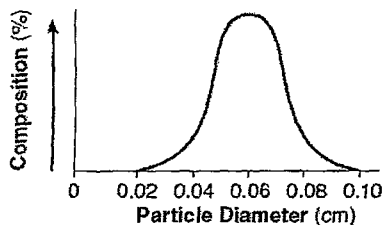
24. Identify the most abundant mineral in rock layer A.

Calcite / limestone

25. Describe how the caverns formed in rock layer A.

limestone dissolved by water

26. The graph below shows the particle sizes that compose the clastic sedimentary rock in layer B. In the box, draw the map symbol from the *Earth Science Reference Tables* that represents rock layer B.

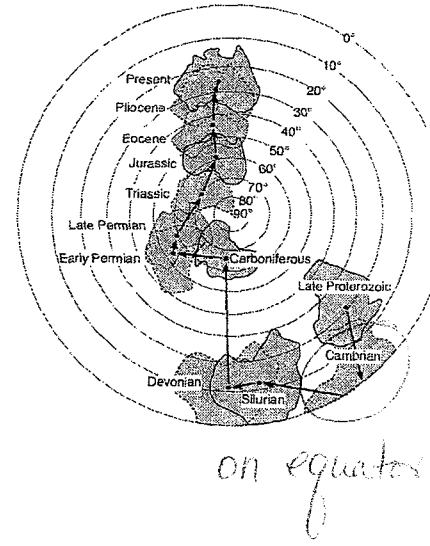


Siltstone

Name: Rey

1. Why does the oceanic crust sink beneath the continental crust at a subduction boundary?
- (1) The oceanic crust has a greater density.
 - (2) The oceanic crust is pulled downward by Earth's magnetic field.
 - (3) The continental crust has a more mafic composition.
 - (4) The continental crust is pulled upward by the Moon's gravity.

Base your answers to questions 2 and 3 on the map below, which shows Earth's Southern Hemisphere and the inferred tectonic movement of the continent of Australia over geologic time. The arrows between the dots show the relative movement of the center of the continent of Australia. The parallels of latitude from 0° to 90° south are labeled.



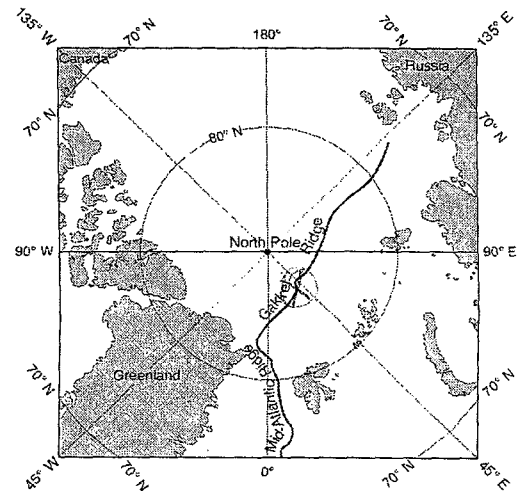
2. The geographic position of Australia on Earth's surface has been changing mainly because
- (1) the gravitational force of the Moon has been pulling on Earth's landmasses
 - (2) heat energy has been creating convection currents in Earth's interior
 - (3) Earth's rotation has spun Australia into different locations
 - (4) the tilt of Earth's axis has changed several times
3. During which geologic time interval did Australia most likely have a warm, tropical climate because of its location?
- | | |
|-------------------|------------------|
| (1) Cambrian | (3) Late Permian |
| (2) Carboniferous | (4) Eocene |

Base your answers to questions 7 through 8 on the passage below and on the map below. The passage describes the Gakkel Ridge found at the bottom of the Arctic Ocean. The map shows the location of the Gakkel Ridge.

The Gakkel Ridge

In the summer of 2001, scientists aboard the U.S. Coast Guard icebreaker *Healy* visited one of the least explored places on Earth. The scientists studied the 1800-kilometer-long Gakkel Ridge at the bottom of the Arctic Ocean near the North Pole. The Gakkel Ridge is a section of the Arctic Mid-Ocean Ridge and extends from the northern end of Greenland across the Arctic Ocean floor toward Russia. At a depth of about 5 kilometers below the ocean surface, the Gakkel Ridge is one of the deepest mid-ocean ridges in the world. The ridge is believed to extend down to Earth's mantle, and the new seafloor being formed at the ridge is most likely composed of huge slabs of mantle rock. Bedrock samples taken from the seafloor at the ridge were determined to be the igneous rock peridotite. The Gakkel Ridge is also the slowest moving mid-ocean ridge. Some ridge systems, like the East Pacific Ridge, are rifting at a rate of about 20 centimeters per year. The Gakkel Ridge is rifting at an average rate of less than 1 centimeter per year. This slow rate of movement means that there is less volcanic activity along the Gakkel Ridge than along other ridge systems. However, heat from the underground magma slowly seeps up through cracks in the rocks of the ridge at structures scientists call hydrothermal (hot water) vents. During the 2001 cruise, a major hydrothermal vent was discovered at 87° N latitude 45° E longitude.

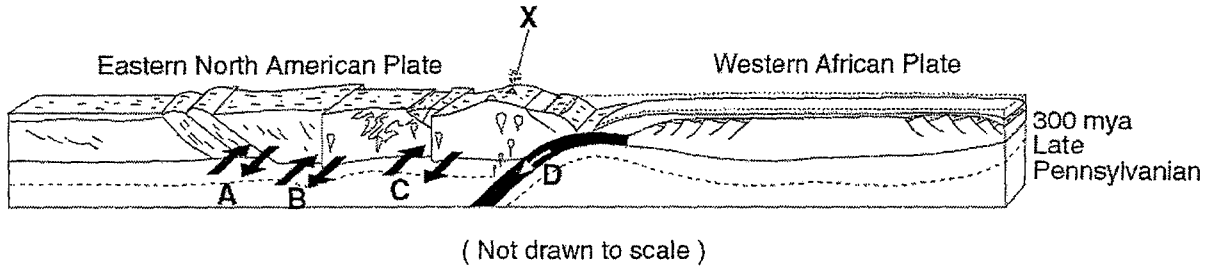
4. On the map to the right, place an X on the location of the major hydrothermal vent described in the passage.
5. Describe the relative motion of the two tectonic plates on either side of the Gakkel Ridge.



- divergent - Spreading apart
6. The Gakkel Ridge is a boundary between which two tectonic plates?
- N. American EURASIAN
7. Identify one feature, other than hydrothermal vents, often found at mid-ocean ridges like the Gakkel Ridge that indicates heat from Earth's interior is escaping.
- Magma/lava, volcanoes
8. State the two minerals that were most likely found in the igneous bedrock samples collected at the Gakkel Ridge.
- Pyroxene olivine

9. 3 The movement of tectonic plates is inferred by many scientists to be driven by
- (1) tidal motions in the hydrosphere
 - (2) density differences in the troposphere
 - (3) convection currents in the asthenosphere
 - (4) solidification in the lithosphere
10. 4 Which two tectonic plates are separated by a mid-ocean ridge?
- (1) Indian-Australian and Eurasian
 - (2) Indian-Australian and Pacific
 - (3) North American and South American
 - (4) North American and Eurasian

Base your answers to questions 11 and 12 on the block diagram below. The diagram shows the tectonic plate boundary between Africa and North America 300 million years ago, as these two continents united into a single landmass. The arrows at letters A, B, C, and D represent relative crustal movements. Letter X shows the eruption of a volcano at that time.



11. Identify the type of tectonic plate motion represented by the arrow shown at D.

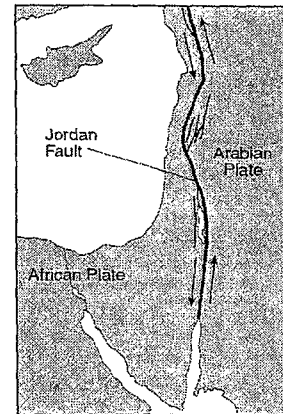
subduction - convergent

12. Identify the type of tectonic motion represented by the arrows shown at A, B, and C.

transform

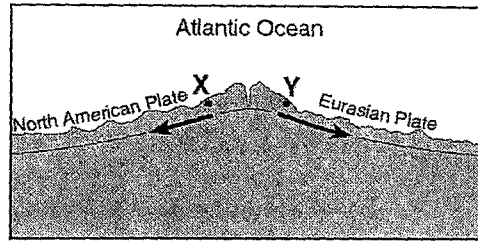
13. 3 The edges of most lithospheric plates are characterized by
- (1) reversed magnetic orientation
 - (2) unusually rapid radioactive decay
 - (3) frequent volcanic activity
 - (4) low P-wave and high S-wave velocity
14. 1 Compared to Earth's continental crust, Earth's oceanic crust is
- (1) thinner and more dense
 - (2) thinner and less dense
 - (3) thicker and more dense
 - (4) thicker and less dense

The map to the right shows the northern section of the boundary between the Arabian Plate and the African Plate. Arrows show the relative direction of plate motion.



15. 4 Which type of plate boundary is located at the Jordan Fault?
- (1) divergent
 - (2) subduction
 - (3) convergent
 - (4) transform
16. 1 Which temperature is inferred to exist in Earth's plastic mantle?
- (1) 2000°C
 - (2) 3000°C
 - (3) 5000°C
 - (4) 6000°C

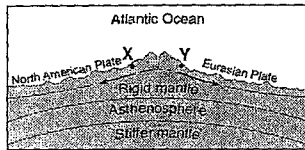
Base your answers to questions 17 and 19 on the cross section below, which shows an underwater mountain range in the Atlantic Ocean. The oceanic bedrock is composed mainly of basalt. Points X and Y are locations in the bedrock that have been diverging at the same rate. The movement of the North American Plate and Eurasian Plate is shown by the two arrows.



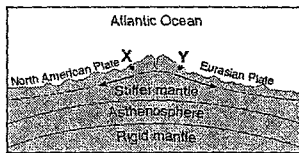
(Not drawn to scale)

17. 2 Which statements best describe the age and magnetic orientation of the basalts found at locations X and Y?
- (1) The basalt at location X is younger than the basalt at location Y. Both locations have the same magnetic orientation.
 - (2) The basalts at locations X and Y are the same age. Both locations have the same magnetic orientation.
 - (3) The basalts at locations X and Y are the same age. Location X has normal magnetic orientation and location Y has reversed magnetic orientation.
 - (4) The basalt at location X is older than the basalt at location Y. Location X has reversed magnetic orientation and location Y has normal magnetic orientation.

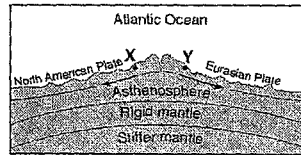
18. 1 Which cross section best represents the relative locations of Earth's asthenosphere, rigid mantle, and stiffer mantle? (The cross sections are not drawn to scale.)



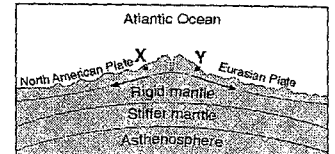
(1)



(2)



(3)



(4)

19. Identify the process in Earth's asthenosphere that is inferred to be the cause of tectonic plate motion.

Convection

Key

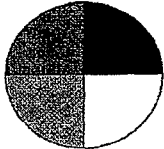



Name: _____

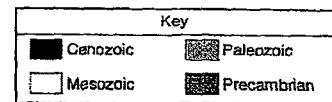
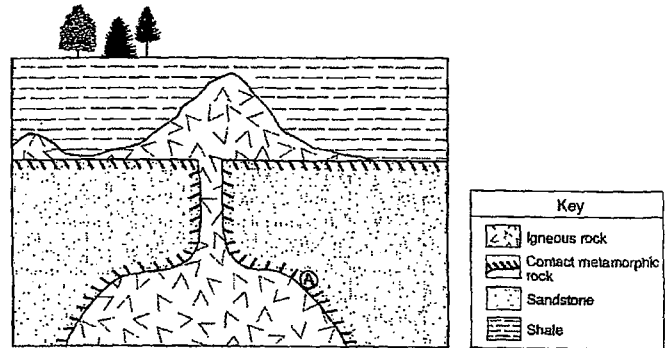
- 2 Based on fossil evidence, most scientists infer that
 - life has not changed significantly throughout Earth's history
 - life has evolved from complex to simple forms
 - many organisms that lived on Earth have become extinct
 - mammals developed early in the Precambrian time period
- 1 The presence of which index fossil in the surface bedrock most likely indicates that a forest environment once existed in the region?
 - Aneurophyton*
 - Cystiphyllum*
 - Centroceras*
 - Bothriolepis*
- 4 Which two types of rock are most commonly found as outcrops in New York State's Newark Lowlands landscape region?
 - rock salt and gypsum
 - limestone and granite
 - gneiss and quartzite
 - conglomerate and sandstone

Late triassic

Base your answers to questions 4 and 5 on the geologic cross section to the right. Location A is within the metamorphic rock.

- 2 The metamorphic rock at location A is most likely
 - marble
 - quartzite
 - phyllite
 - slate
- 1 Which rock is the youngest?
 - shale
 - sandstone
 - igneous rock
 - rock at location A
- 3 Which pie graph best represents the percentage of total time for the four major divisions of geologic time?



Base your answers to questions 7 through 10 on the diagrams below, which represent two bedrock outcrops, I and II, found several kilometers apart in New York State. Rock layers are lettered A through F. Drawings represent specific index fossils.

- During which geologic time period was rock layer C deposited?

Elliptocephala (A) Cambrian

- Identify two processes that produced the unconformity in outcrop I.

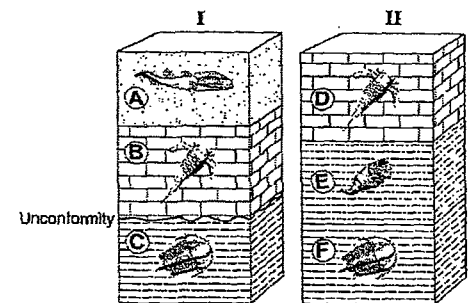
submergence, deposition - w/e, uplift

- Describe one characteristic a fossil must have in order to be considered a good index fossil.

① widespread geographically ② short lifespan

- Explain why carbon-14 can not be used to find the geologic age of these index fossils.

too old - C14 - less than 1 million year

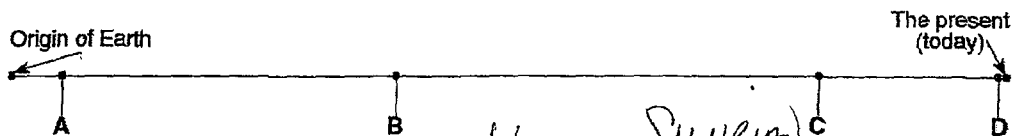


Name: _____

11. 4 The presence of brachiopod, nautiloid, and coral fossils in the surface bedrock of a certain area indicates the area was once covered by
 (1) tropical vegetation (2) glacial deposits (3) volcanic ash (4) ocean water

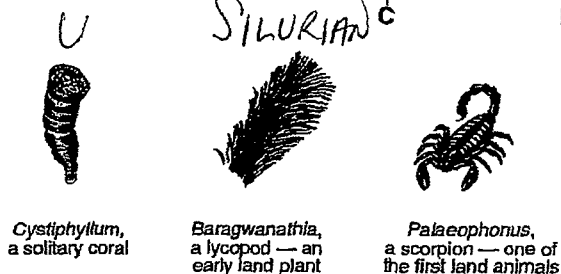
12. 4 The time line below represents the entire geologic history of Earth.

Which letter best represents the first appearance of humans on Earth?
 (1) A (2) B (3) C (4) D



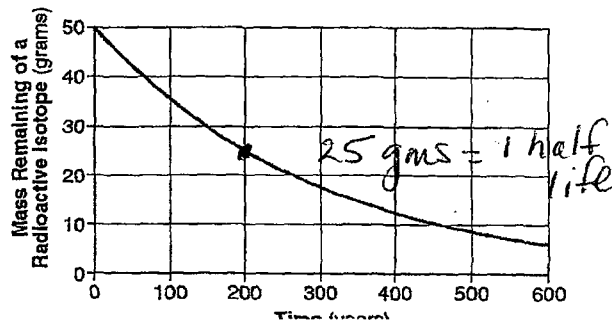
13. 4 Three extinct organisms are shown in the diagrams below. Which other life-form reached its peak development during the same period in geologic history that these three life-forms first appeared on Earth?

- (1) dinosaurs (2) stromatolites (3) mastodonts (4) eurypterids



14. 3 The graph to the right shows the radioactive decay of a 50-gram sample of a radioactive isotope. According to the graph, what is the half-life of this isotope?

- (1) 100 years (2) 150 years (3) 200 years (4) 300 years



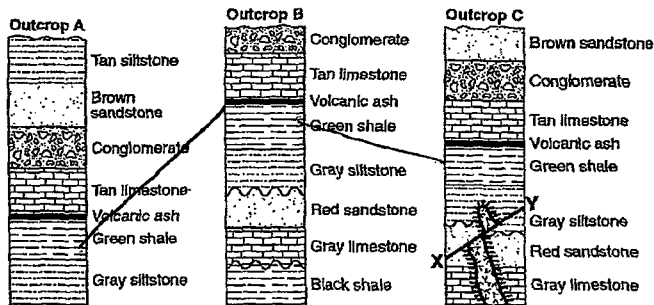
Base your answers to questions 15 through 18 on the cross sections of three rock outcrops, A, B, and C. Line XY represents a fault. Overturning has not occurred in the rock outcrops.

15. 4 The volcanic ash layer is considered a good time marker for correlating rocks because the volcanic ash layer

- (1) has a dark color (2) can be dated using carbon-14 (3) lacks fossils (4) was rapidly deposited over a wide area

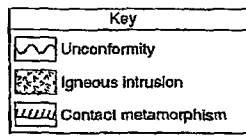
16. 3 Which sedimentary rock shown in the outcrops is the youngest?

- (1) black shale (2) conglomerate (3) tan siltstone (4) brown sandstone



17. 1 What is the youngest geologic feature in the three bottom layers of outcrop C?

- (1) fault (2) igneous intrusion (3) unconformity (4) zone of contact metamorphism



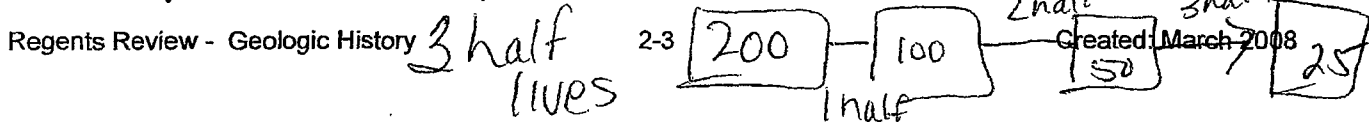
18. 3 Which processes were primarily responsible for the formation of most of the rock in outcrop A?

- (1) melting and solidification (2) heating and compression (3) compaction and cementation (4) weathering and erosion

19. 4 What is the geologic age sequence of the surface bedrock from Ithaca, New York, to Watertown, New York?

- (1) Ordovician, Taconic, Cambrian (2) Ordovician, Tertiary, Pleistocene (3) Devonian, Silurian, Cambrian (4) Devonian, Silurian, Ordovician

20. 3 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?

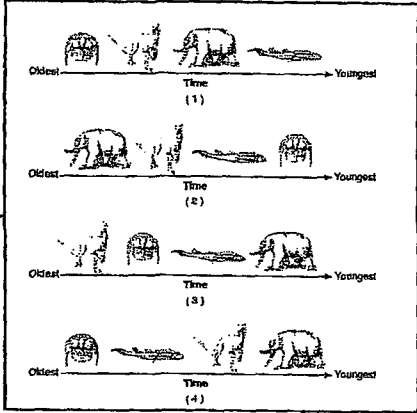


Name: _____

21. 3 (1) 1 (2) 2 (3) 3 (4) 4
 Which geologic event occurred during the same geologic period as the first appearance of modern corals in Earth's oceans?
 (1) Grenville Orogeny (2) Acadian Orogeny (3) intrusion of the Palisades Sill (4) formation of the Catskill Delta

late Triassic - Geologic Events

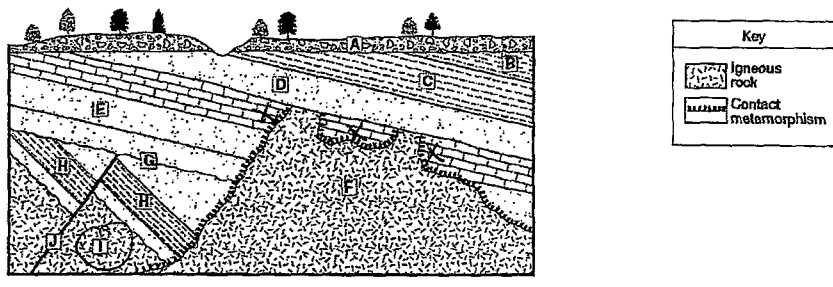
22. 4 The presence of eurypterid fossils in New York State bedrock indicates that
 (1) eurypterids lived in land environments
 (2) eurypterids first appeared on Earth during the Devonian Period
 (3) most of New York State was once a mountainous region
 (4) areas of New York State were once covered with shallow seas



23. 4 Which sequence of New York State index fossils shows the order in which the organisms appeared on Earth?

Base your answers to questions 24 through 27 on the cross section below which shows a portion of Earth's crust. Letters A through J represent rock units or geologic structures. The rock units have not been overturned.

24. On the cross section below, draw a circle around the letter of the oldest rock unit shown.
 25. On the same cross section, place an X to indicate a location where the rock, marble, was formed.



26. Describe *one* piece of evidence shown in the cross section that suggests rock unit D is younger than rock unit F.

No Contact metamorphism of Rx unit D - so it had to be deposited later.

27. Explain why rock unit H is *not* one continuous layer.

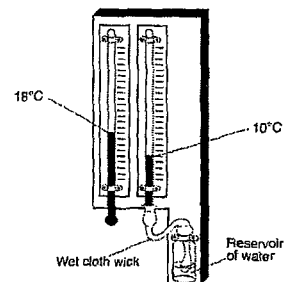
Cut By a Fault

28. 2 Which processes most likely formed the shale bedrock found near Ithaca, New York?
 (1) uplift and solidification (2) burial and compaction (3) heat and pressure (4) melting and recrystallization

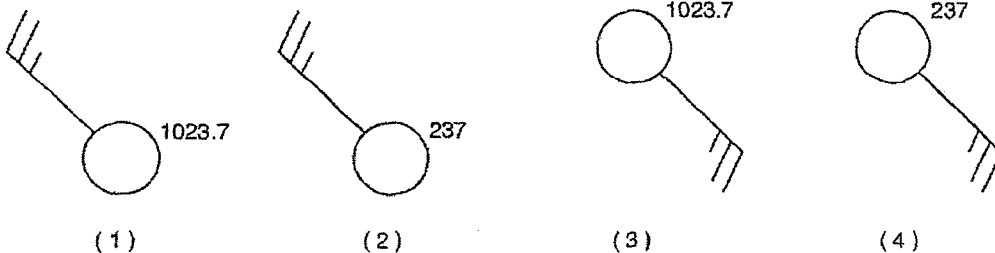
Name: KEY

- 4 Which temperature zone of Earth's atmosphere contains the most water vapor?
(1) mesosphere (2) stratosphere (3) thermosphere (4) troposphere
- 3 Which weather condition most directly determines wind speeds at Earth's surface?
(1) visibility changes (3) air-pressure gradient
(2) amount of cloud cover (4) dewpoint differences
- 2 Which statement best explains why an increase in the relative humidity of a parcel of air generally increases the chance of precipitation?
(1) The dewpoint is farther from the condensation point, causing rain.
(2) The air temperature is closer to the dewpoint, making cloud formation more likely.
(3) The amount of moisture in the air is greater, making the air heavier.
(4) The specific heat of the moist air is greater than the drier air, releasing energy.

- 3 The weather instrument below can be used to determine relative humidity. Based on the temperatures shown, the relative humidity is
(1) 19% (2) 2% (3) 33% (4) 40%

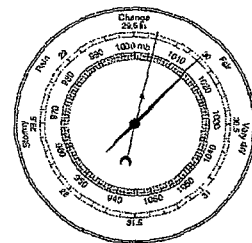


- 2 Which station model shows the correct form for indicating a northwest wind at 25 knots and an air pressure of 1023.7 mb?



- 1 The Coriolis effect causes winds in New York State to generally curve
(1) to the right of the direction of travel (3) upward away from Earth's surface
(2) to the left of the direction of travel (4) downward toward Earth's surface

- 4 A weather instrument is shown below. Which weather variable is measured by this instrument?
(1) wind speed (2) precipitation (3) cloud cover (4) air pressure



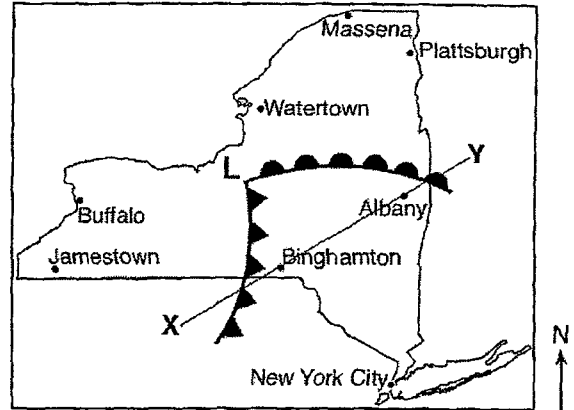
- 2 In the United States, most tornadoes are classified as intense
(1) low-pressure funnel clouds that spin clockwise
(2) low-pressure funnel clouds that spin counterclockwise
(3) high-pressure funnel clouds that spin clockwise
(4) high-pressure funnel clouds that spin counterclockwise

- 2 Which type of air mass is associated with warm, dry atmospheric conditions?
(1) cP (2) cT (3) mP (4) mT

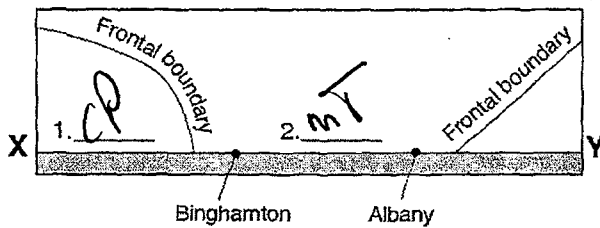
- 3 What is the relative humidity if the dry-bulb temperature is 22°C and the wet-bulb temperature is 17°C?
(1) 5% (2) 14% (3) 60% (4) 68%

Name: _____

Base your answers to questions 51 through 53 on the weather map below. The weather map shows a low pressure system in New York State during July. The L represents the center of the low-pressure system. Two fronts extend from the center of the low. Line XY on the map is a reference line.



11. The cross section below shows a side view of the area along line XY on the map. On lines 1 and 2 in the cross section, place the appropriate two-letter air-mass symbols to identify the most likely type of air mass at each of these locations.



12. The forecast for one city located on the map is given below: "In the next hour, skies will become cloud covered. Heavy rains are expected with possible lightning and thunder. Temperatures will become much cooler." State the name of the city for which this forecast was given.

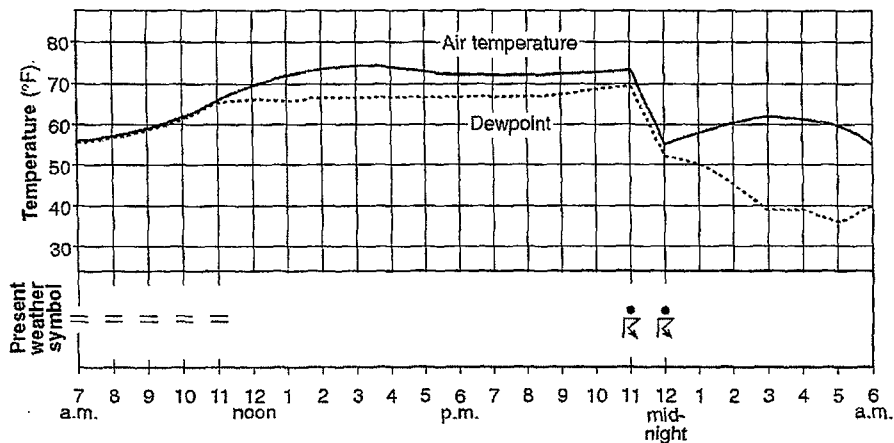
Binghamton

13. Identify *one* action that people should take to protect themselves from lightning.

Seek shelter, stay away from baths & showers, electronics & tall objects.

14. 2 Earth's surface winds generally blow from regions of higher
 (1) air temperature toward regions of lower air temperature (3) latitudes toward regions of lower latitudes
 (2) air pressure toward regions of lower air pressure (4) elevations toward regions of lower elevations

Base your answers to questions 15 and 16 on the graph below, which shows air temperature, dewpoint, and present weather conditions for a 23-hour period at Dallas, Texas.

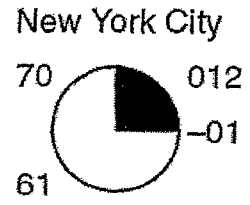
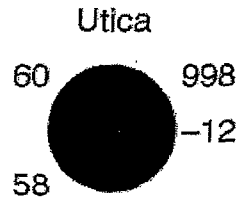
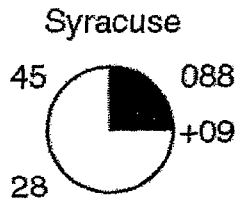
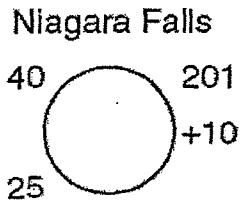


15. 2 The thunderstorm that occurred between 11 p.m. and 12 midnight was most likely the result of
 (1) the arrival of a warm front (3) an increase in the difference between air temperature and dewpoint
 (2) the arrival of a cold front (4) an increase in both air temperature and dewpoint

Name: _____

16. Which weather condition was reported at Dallas when the air temperature was equal to the dewpoint?
 (1) fog (2) rain (3) thunderstorm (4) drizzle

Base your answers to questions 17 through 19 on the information on the four station models shown below. The weather data were collected at Niagara Falls, Syracuse, Utica, and New York City at the same time.



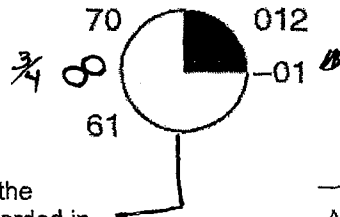
17. What was the air pressure in Niagara Falls? 1020.1 mb

18. Explain how the weather conditions shown on the station models suggest that Utica had the greatest chance of precipitation.

Air temp & dew point temp close together.

19. New York City was experiencing a wind blowing from the south at 10 knots with hazy conditions limiting visibility to $\frac{3}{4}$ of a mile. On the station model for New York City below, place, in the proper location and format, the information below.

- wind direction
- wind speed
- present weather
- visibility



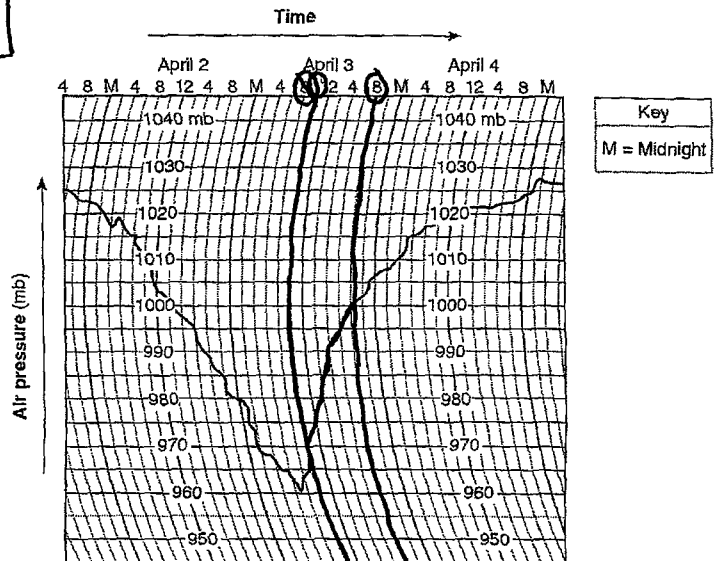
Base your answers to questions 20 and 21 on the barogram below, which shows air pressure recorded in millibars at Green Bay, Wisconsin, from April 2 through April 4, 1982.

20. Calculate the rate of change in air pressure from 10 a.m. to 8 p.m. on April 3. Label your answer with the correct units.

$$ROC = \frac{\text{change in F.V.}}{\text{time}}$$

$$F.V. = 1000 - 970 = \frac{30 \text{ mb}}{10 \text{ hrs}}$$

$$3 \text{ mb/hr.}$$



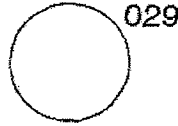
21. What most likely caused the changes in air pressure for the period of time shown on the graph?

Cold front

Name: _____

22. 1 Which weather instrument is used to measure wind speed?
 (1) anemometer (2) wind vane (3) psychrometer (4) thermometer

23. 3 A weather station model is shown to the right.
 What is the barometric pressure indicated by this station model?
 (1) 0.029 mb (2) 902.9 mb (3) 1002.9 mb (4) 1029.0 mb

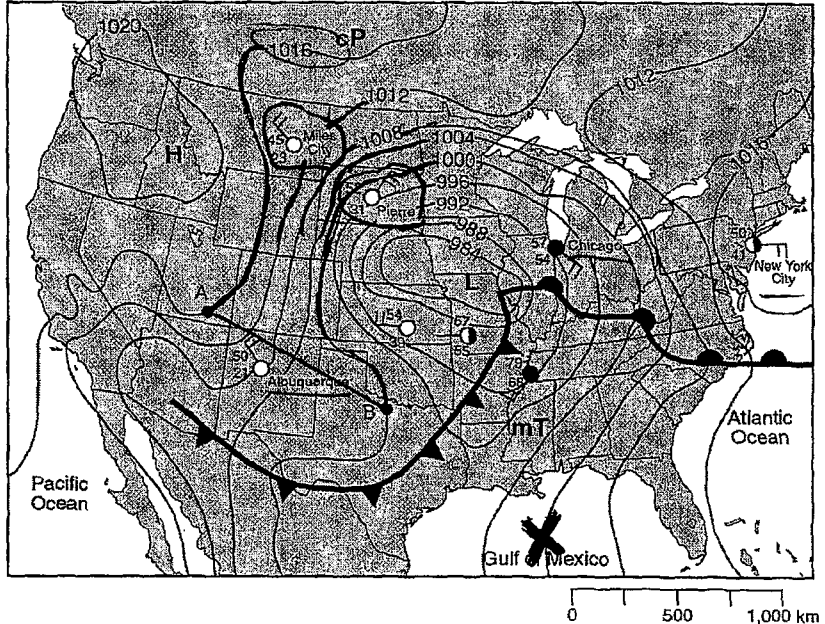


24. 2 What is the relative humidity when the dry-bulb temperature is 16°C and the wet-bulb temperature is 14°C?
 (1) 90% (2) 80% (3) 14% (4) 13%

Base your answers to questions 25 through 29 on the weather map below. The isobars show air pressures, in millibars. Points A and B indicate locations on the map.

25. On the weather map to the right, place an X centered on the geographic region that was most likely the source of the mT air mass.

26. Calculate the pressure gradient along a straight line between point A and point B on the map. Label your answer with the correct units.



$$G = \frac{\text{change in P.V.}}{\text{distance}}$$

$$1016 \text{ mb} - 1000 \text{ mb} = 16 \text{ mb}$$

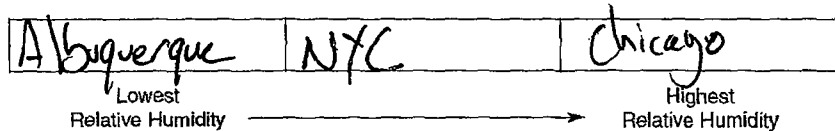
$$\frac{16 \text{ mb}}{1000 \text{ km}} =$$

27. Describe the evidence shown on the map that indicates strong winds were blowing between Miles City and Pierre.

Isobars are close together.

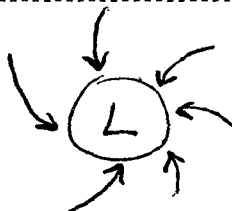
28. In the table below, write the names of the cities listed below in sequence from lowest relative humidity to highest relative humidity.

Albuquerque
 Chicago
 New York City



29. Describe the pattern of the surface winds around the center of the low-pressure system (L).

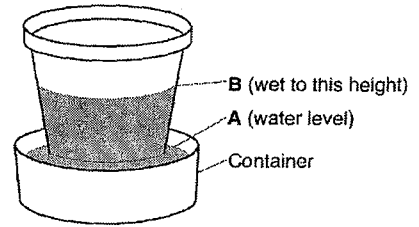
They flow inward and counter-clockwise, rising air, foul weather.



KEY

Name: _____

1. 3 The diagram below shows the result of leaving an empty, dry clay flowerpot in a full container of water for a period of time. The water level in the container dropped to level A. The top of the wet area moved to level B.



- (1) is less dense than the clay pot
 (2) is more dense than the clay pot
 (3) traveled upward in the clay pot by capillary action
 (4) traveled downward in the clay pot by capillary action

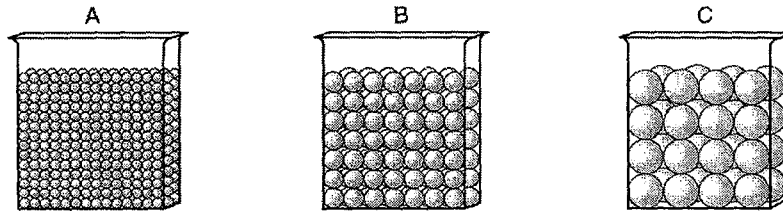
2. 2 Under which atmospheric conditions will water most likely evaporate at the fastest rate?

- (1) hot, humid, and calm (3) cold, humid, and windy
 (2) hot, dry, and windy (4) cold, dry, and calm

X How many calories are required to evaporate 1 gram of boiling water?

- (1) 1 (2) 80 (3) 540 (4) 620

The diagrams below represent three containers, A, B, and C, which were filled with equal volumes of uniformly sorted plastic beads. Water was poured into each container to determine porosity and infiltration time.



(Not drawn to scale)

4. 1 Which data table best represents the porosity and infiltration time of the beads in the three containers?

Beaker	Porosity (%)	Infiltration Time (sec)
A	40	5.2
B	40	2.8
C	40	0.4

(1)

Beaker	Porosity (%)	Infiltration Time (sec)
A	20	5.2
B	30	2.8
C	40	0.4

(3)

Beaker	Porosity (%)	Infiltration Time (sec)
A	40	0.4
B	40	2.8
C	40	5.2

(2)

Beaker	Porosity (%)	Infiltration Time (sec)
A	20	0.4
B	30	2.8
C	40	5.2

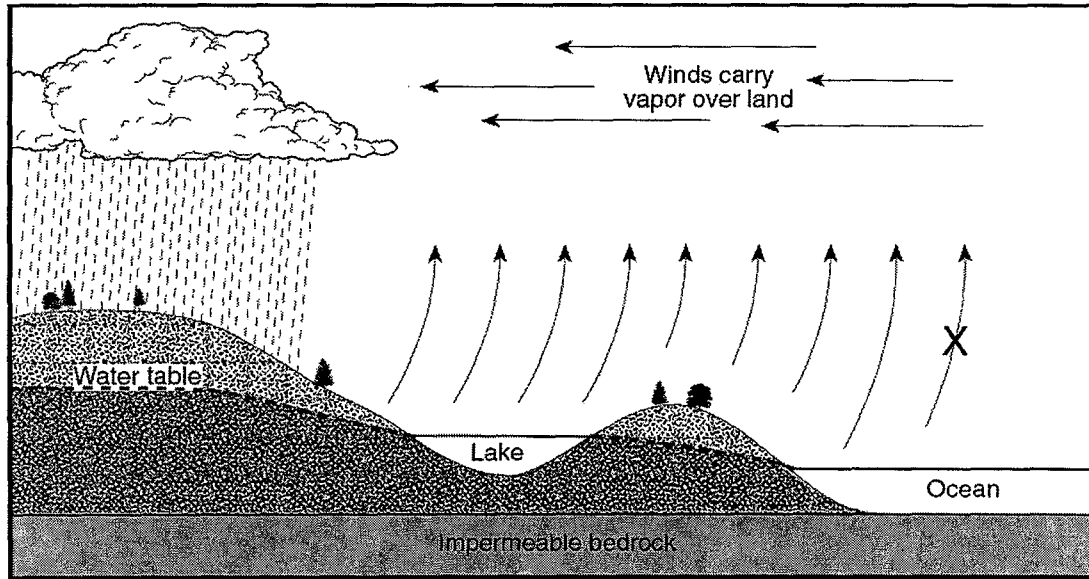
(4)

5. 3 The water table usually rises when there is

- (1) a decrease in the amount of infiltration
 (2) a decrease in the amount of surface area covered by vegetation
 (3) an increase in the amount of precipitation
 (4) an increase in the slope of the land

Name: _____

Base your answers to questions 6 through 10 on the cross section below, which shows the general pattern of water movement in the water cycle. Letter X represents a water-cycle process.



6. What process of the water cycle is represented by X?

evaporation

7. Describe the process of condensation.

water changes phase, gas \rightarrow liquid

8. Describe one surface condition that would allow runoff to occur.

steep slope, impermeable, saturated

9. Explain one role of plants in the water cycle.

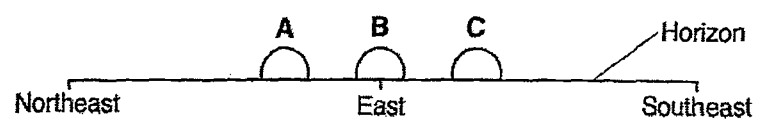
transpiration

X As the lake surface freezes in the winter, how many calories of heat are released by each gram of water?

Name: Key

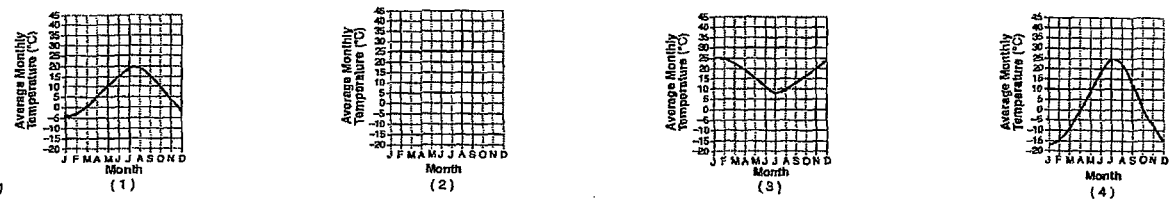
1. 1 The average temperature at Earth's equator is higher than the average temperature at Earth's South Pole because the South Pole
 (1) receives less intense insolation (3) has less land area
 (2) receives more infrared radiation (4) has more cloud cover

2. 2 A student in New York State looked toward the eastern horizon to observe sunrise at three different times during the year. The student drew the following diagram that shows the positions of sunrise, A, B, and C, during this one-year period. Which list correctly pairs the location of sunrise to the time of the year?



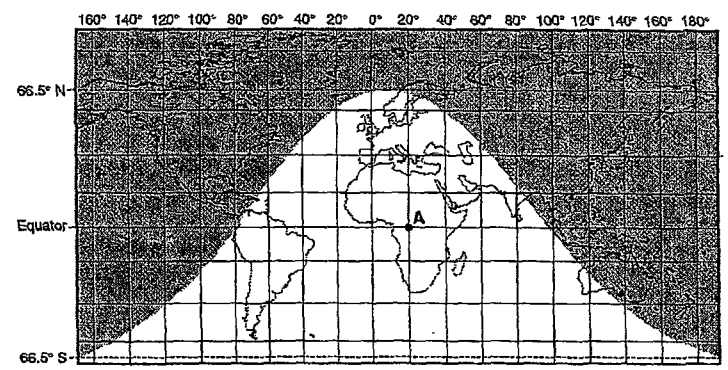
- (1) A—June 21 B—March 21 C—December 21
 (2) A—December 21 B—March 21 C—June 21
 (3) A—March 21 B—June 21 C—December 21
 (4) A—June 21 B—December 21 C—March 21

3. 3 Which graph best represents the average monthly temperatures for one year at a location in the Southern Hemisphere?



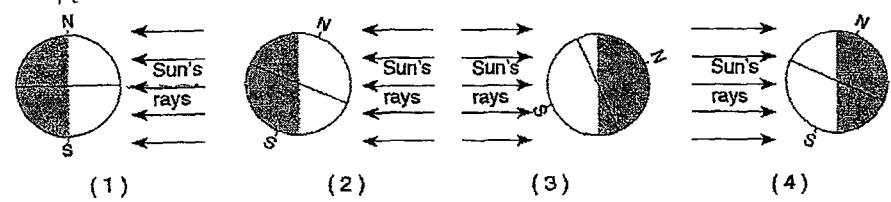
4. 3 Most of the solar radiation absorbed by Earth's surface is later radiated back into space as which type of electromagnetic radiation?
 (1) x ray (2) ultraviolet (3) infrared (4) radio wave

Base your answers to questions 5 through 7 on the world map to the right. The shaded portion of the map indicates areas of night, and the unshaded portion indicates areas of daylight on a certain day of the year. Dashed latitude lines represent the Arctic Circle (66.5° N) and the Antarctic Circle (66.5° S). Point A is a location on Earth's surface.



5. 3 Approximately how many hours of daylight would occur at position A on this day?
 (1) 6 (2) 9 (3) 12 (4) 15

6. 4 Which diagram shows the position of Earth relative to the Sun's rays on this day?



Winter Solstice

7. 1 On this day, the duration of daylight from the equator to the Arctic Circle
 (1) decreases, only (2) increases, only
 (3) decreases, then increases (4) increases, then decreases

Name: _____

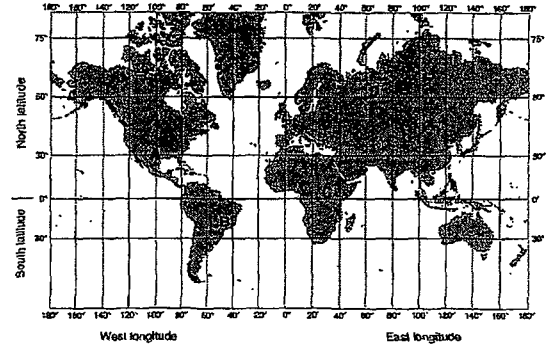
8. _____ The diagram below shows four surfaces of equal area that absorb insolation.



9. D Which letter represents the surface that most likely absorbs the greatest amount of insolation?

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

Base your answers to questions 10 through 12 on the world map below. Letters A through D represent locations on Earth's surface.



10. 2 At which location could an observer *not* see Polaris in the night sky at any time during the year?

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

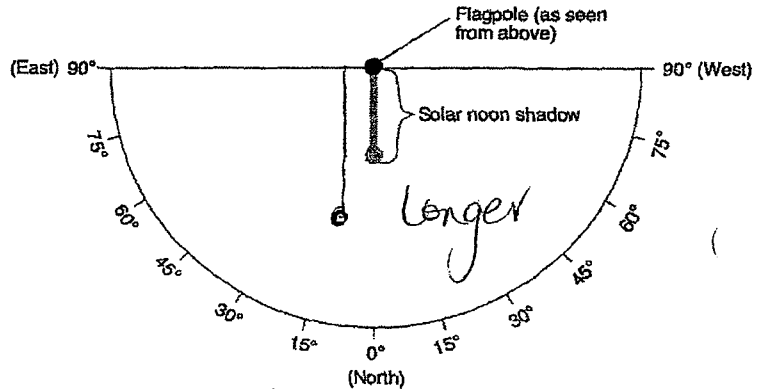
3 11. Which location receives 12 hours of daylight and 12 hours of darkness on June 21?

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

12. 1 At which location on December 21 is the Sun directly overhead at solar noon?

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

The diagram to the right is a view of the ground from directly above a flagpole in New York State at solar noon on a particular day of the year. The flagpole's shadow at solar noon is shown. Draw the position and relative length of the shadow that would be cast by this flagpole three hours later.



Base your answers to questions 13 through 15 on the graph below, which shows the average monthly temperatures for a year for city X and city Y. Both cities are located at the same latitude.

13. What was the range in the average monthly temperatures for city Y during the year?

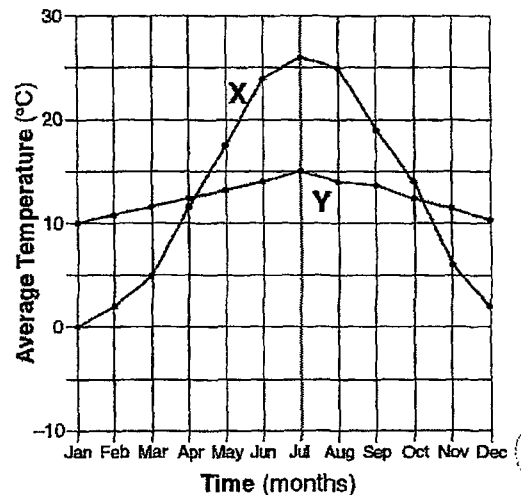
$15^{\circ}\text{C} - 10^{\circ}\text{C} = 5^{\circ}\text{C}$

14. Explain why city X has a greater difference between summer and winter temperatures than city Y.

Continental - inland location
greater T range

15. What evidence shown on the graph indicates that both cities, X and Y, are located in the Northern Hemisphere?

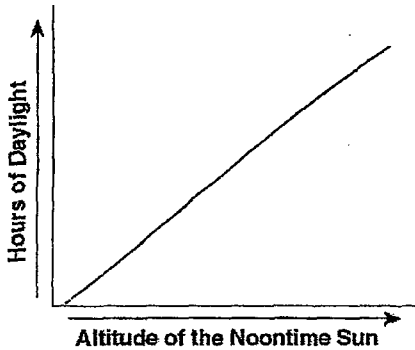
Hottest months are June, July, Aug.



Name: _____

Base your answers to questions 16 through 18 on the data table below. A student recorded the hours of daylight and the altitude of the Sun at noon on the twenty-first day of every month for one year in Buffalo, New York.

16. On the graph below draw a line to represent the general relationship between the altitude of the Sun at noon and the number of hours of daylight throughout the year at Buffalo.

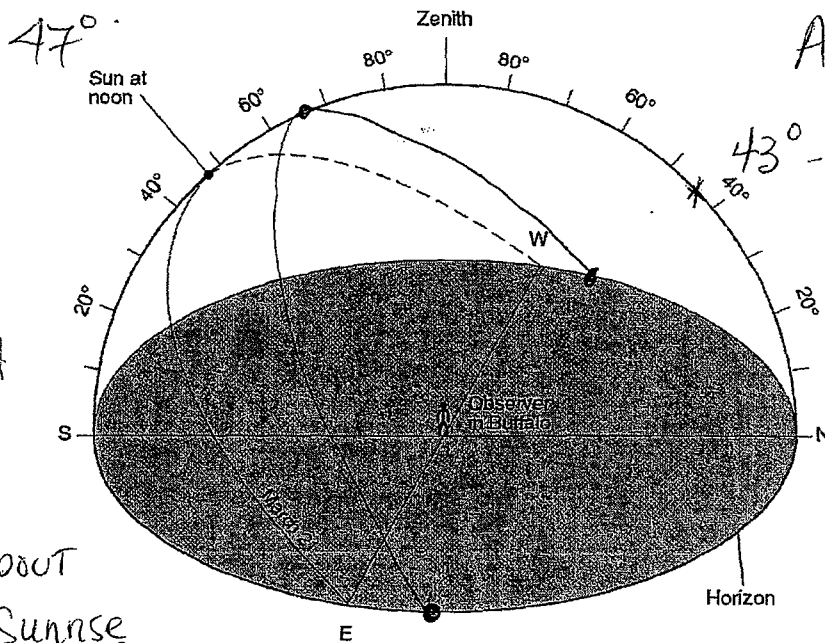


Data Table

Date	Hours of Daylight	Altitude of the Sun at Noon (°)
January 21	9.5	32.3
February 21	10.8	40.1
March 21	12.0	47.3
April 21	13.7	55.1
May 21	14.8	62.5
June 21	15.3	70.4
July 21	14.8	63.3
August 21	13.7	55.5
September 21	12.1	47.7
October 21	10.8	39.9
November 21	9.5	32.1
December 21	9.0	24.4

17. The sky model diagram below shows the apparent path of the Sun on March 21 for an observer in Buffalo, New York. Draw a line to represent the apparent path of the Sun from sunrise to sunset at Buffalo on May 21. Be sure your path indicates the correct altitude of the noon Sun and begins and ends at the correct positions on the horizon.

18. On the same sky model diagram below place an asterisk (☆) at the apparent position of the North Star as seen from Buffalo.

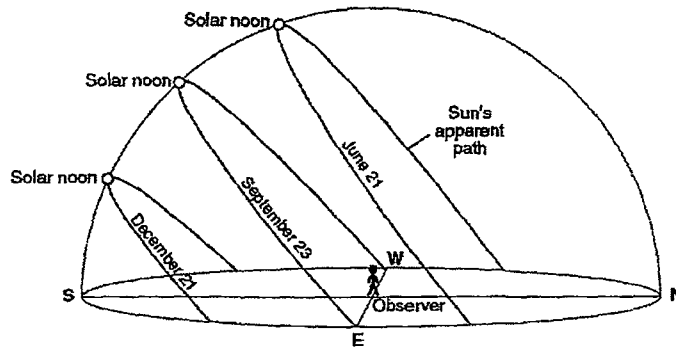


47°
 $+ 23.5^\circ$
 \hline
 70.5° would
 be June 21st
 So MAY 21st
 has to be about
 7° less. at Sunrise
 North of east

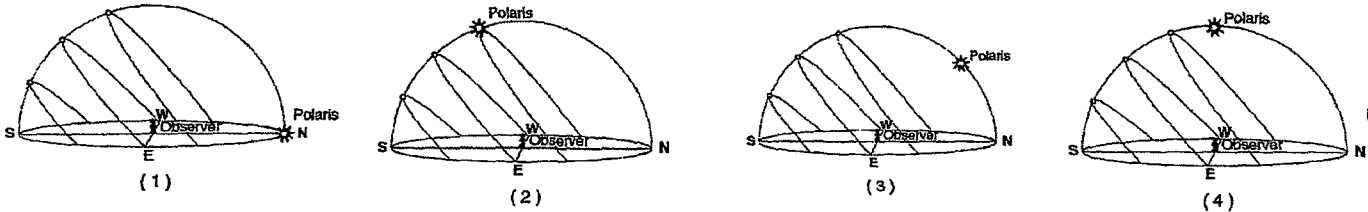
19. 4 Which type of surface absorbs the greatest amount of electromagnetic energy from the Sun?
 (1) smooth, shiny, and light colored
 (2) smooth, shiny, and dark colored
 (3) rough, dull, and light colored
 (4) rough, dull, and dark colored

Name: _____

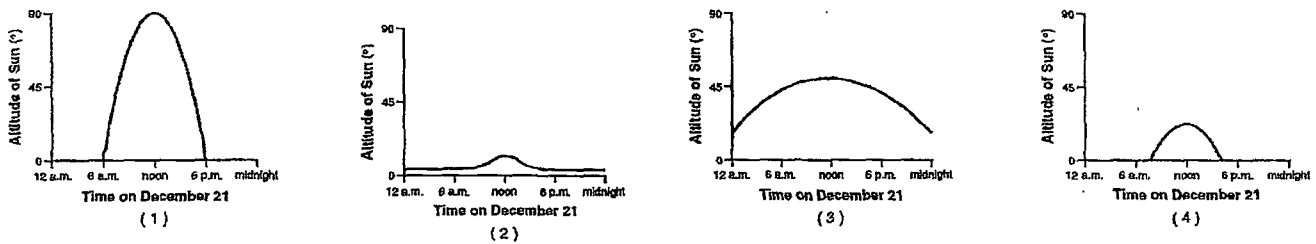
Base your answers to questions 20 through 23 on the diagram below, which represents the Sun's apparent paths and the solar noon positions for an observer at 42° N latitude on December 21, September 23, and June 21.



20. 2 In which direction will sunrise occur on June 21?
 (1) north of due west (3) south of due west
 (2) north of due east (4) south of due east
21. 3 How many hours occurred between sunrise and solar noon on September 23?
 (1) 6 (2) 8 (3) 12 (4) 24
22. 3 Which diagram best shows the location of *Polaris* relative to the observer?




23. 4 Which graph best shows the altitude of the Sun, as measured by the observer located at 42° N, at various times on December 21?



Name: Keyz

Base your answers to questions 1 through 5 on the data table below, which shows the percentage of the lighted side of the Moon visible from Earth for the first fourteen days of July 2003.

Date	Percentage of Lighted Side of the Moon Visible From Earth (%)
July 1	1
July 2	5
July 3	10
July 4	17
July 5	26
July 6	37
July 7	48
July 8	59
July 9	70
July 10	80
July 11	89
July 12	95
July 13	98
July 14	100

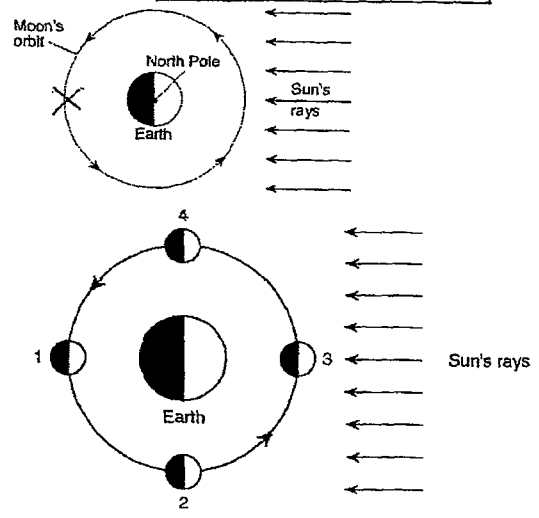
- On what July date listed in the table did the Moon appear as shown to the right?

July 7
- What motion of the Moon causes the percentage of the lighted side of the Moon visible from Earth to change from July 1 to July 14?
Revolution
- A full Moon phase was observed on July 14. On what day in August was the next full Moon phase observed?
Aug 10, 11
- The diagram to the right shows the orbit of the Moon around Earth. Place an X on the orbit to show where the Moon was in its orbit on July 14, 2003.
- Why are the phases of the Moon considered to be cyclic?

FIRST quarter

repeatable - every month.

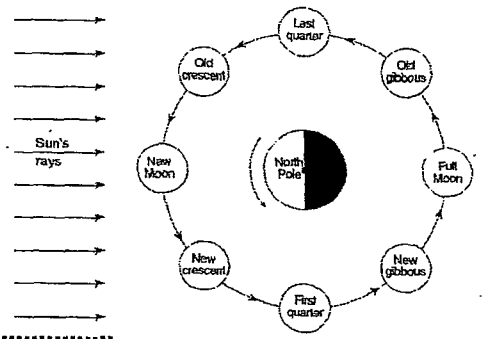
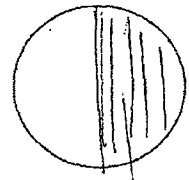
The diagram to the right represents the Sun's rays striking Earth and the Moon. Numbers 1 through 4 represent positions of the Moon in its orbit around Earth.

- The highest tides on Earth occur when the Moon is in positions
 (1) 1 and 3 (3) 3 and 2
 (2) 2 and 4 (4) 4 and 1



Base your answers to questions 7 through 10 on the diagram below, which shows Earth as viewed from above the North Pole. The nighttime side of Earth has been shaded. The Moon is shown at eight positions in its orbit around Earth. The name of each Moon phase is indicated at each Moon position. The dark portion of each Moon position has not been shaded.

- On the diagram to the right, shade the portion of the Moon that is in darkness to show the last quarter phase as viewed from New York State.



(Not drawn to scale)

- Explain what causes the Moon's phases when viewed from Earth.

Moon's Revolution

- Which Moon phase occurs approximately one week after the New Moon phase?

1st quarter

- Explain why the same side of the Moon always faces Earth.

Rotation of Moon = Revolution of Moon
27.3 day = 27 day 8 hrs

Name: KEY

1. 3 When viewed from Earth, the light from very distant galaxies shows a red shift. This is evidence that these distant galaxies are
- (1) revolving around the Sun
 (2) revolving around the Milky Way
 (3) moving away from Earth
 (4) moving toward Earth

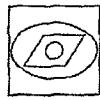
The symbols below are used to represent different regions of space.

Universe = □ Earth = ○ Galaxy = ▱ Solar system = ○

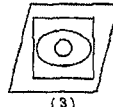
2. 1 Which diagram shows the correct relationship between these four regions? [If one symbol is within another symbol, that means it is part of, or included in, that symbol.]



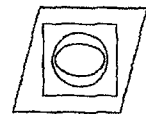
(1)



(2)



(3)



(4)

Base your answers to questions 3 through 6 on the table below, which shows eight inferred stages describing the formation of the universe from its beginning to the present time.

Data Table

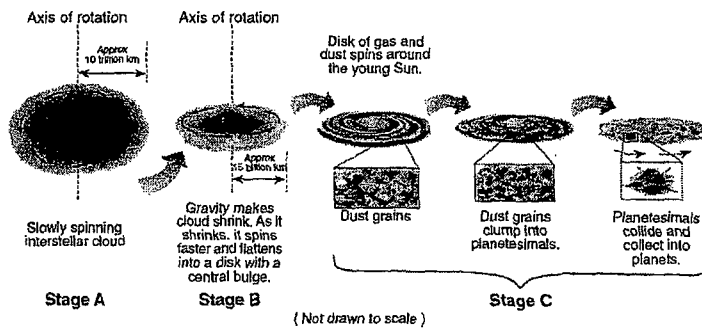
Stage	Description of the Universe	Average Temperature of the Universe (°C)	Time From the Beginning of Universe
1	the size of an atom	?	0 second
2	the size of a grapefruit	?	10^{-43} second
3	"hot soup" of electrons	10^{27}	10^{-32} second
4	Cooling allows protons and neutrons to form.	10^{13}	10^{-6} second
5	still too hot to allow the forming of atoms	10^8	3 minutes
6	Electrons combine with protons and neutrons, forming hydrogen and helium atoms. Light emission begins.	10,000	300,000 years
7	Hydrogen and helium form giant clouds (nebulae) that will become galaxies. First stars form.	-200	1 billion years
8	Galaxy clusters form and first stars die. Heavy elements are thrown into space, forming new stars and planets.	-270	13.7 billion years

3. 3 How soon did protons and neutrons form after the beginning of the universe?
- (1) 10^{-43} second
 (2) 10^{-32} second
 (3) 10^{-6} second
 (4) 13.7 billion years
4. 1 What is the most appropriate title for this table?
- (1) The Big Bang Theory
 (2) The Theory of Plate Tectonics
 (3) The Law of Superposition
 (4) The Laws of Planetary Motion
5. 1 According to this table, the average temperature of the universe since stage 3 has
- (1) decreased, only
 (2) increased, only
 (3) remained the same
 (4) increased, then decreased
6. 4 Between which two stages did our solar system form?
- (1) 1 and 3
 (2) 3 and 5
 (3) 6 and 7
 (4) 7 and 8
7. 1 Scientists can plan to photograph a solar eclipse because most astronomical events are
- (1) cyclic and predictable
 (2) cyclic and unpredictable
 (3) random and predictable
 (4) random and unpredictable

Name: _____

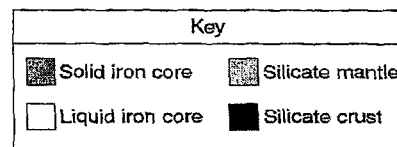
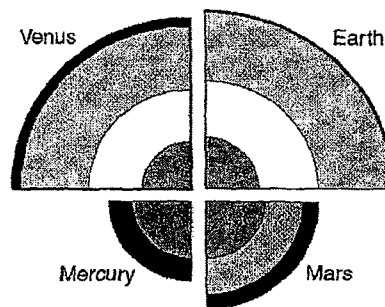
8. 2 In New York State, the constellation Pisces can be seen in the night sky between the middle of summer and the middle of winter. The constellation Scorpio can be seen in the night sky between early spring and early fall. The reason these two constellations can be viewed only at these times is a direct result of Earth's
- (1) spin on its axis (2) movement around the Sun (3) axis having a 23.5° tilt (4) distance from the Sun
9. 4 Compared with our Sun, the star *Betelgeuse* is
- (1) smaller, hotter, and less luminous (2) smaller, cooler, and more luminous (3) larger, hotter, and less luminous (4) larger, cooler, and more luminous
10. 4 Astronomers viewing light from distant galaxies observe a shift of spectral lines toward the red end of the visible spectrum. This shift provides evidence that
- (1) orbital velocities of stars are decreasing (2) Earth's atmosphere is warming (3) the Sun is cooling (4) the universe is expanding

Base your answers to questions 11 and 12 on the diagram to the right, which shows an inferred sequence in which our solar system formed from a giant interstellar cloud of gas and debris. Stage A shows the collapse of the gas cloud, stage B shows its flattening, and stage C shows the sequence that led to the formation of planets.



11. 1 From stage B to stage C, the young Sun was created
- (1) when gravity caused the center of the cloud to contract (2) when gravity caused heavy dust particles to split apart (3) by outgassing from the spinning interstellar cloud (4) by outgassing from Earth's interior
12. 4 After the young Sun formed, the disk of gas and dust
- (1) became spherical in shape (2) formed a central bulge (3) became larger in diameter (4) eventually formed into planets

Base your answers to questions 13 through 15 on the diagram to the right, which shows the inferred internal structure of the four terrestrial planets, drawn to scale.



13. How are the crusts of Mars, Mercury, Venus, and Earth similar in composition?

Silicate material SiO₂

14. Identify the *two* planets that would allow an S-wave from a crustal quake to be transmitted through the core to the opposite side of the planet.

Mars Mercury

15. Explain why the densities of these terrestrial planets are greater than the densities of the Jovian planets.

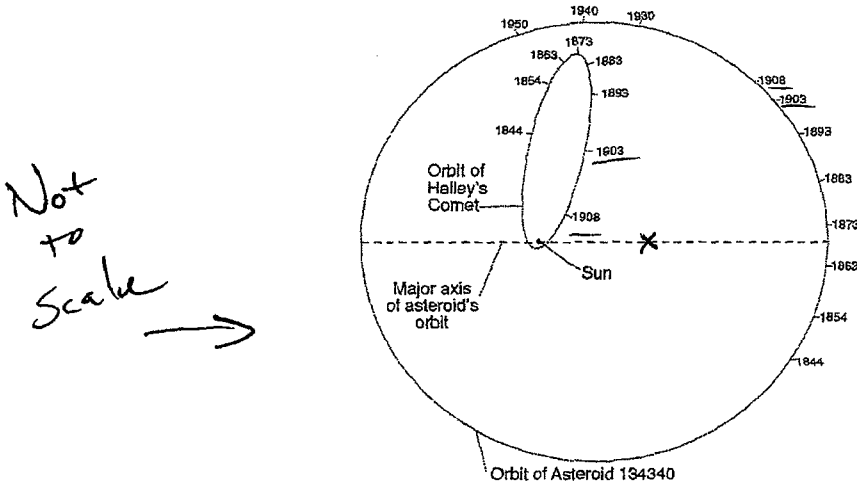
They are smaller & made of rocks not gases

16. 2 One factor responsible for the strength of gravitational attraction between a planet and the Sun is the
- (1) degree of tilt of the planet's axis (2) distance between the planet and the Sun (3) planet's period of rotation (4) amount of insolation given off by the Sun
17. 3 Which planet is located approximately ten times farther from the Sun than Earth is from the Sun?
- (1) Mars (2) Jupiter (3) Saturn (4) Uranus

Name: _____

Base your answers to questions 18 through 20 on the diagram below. The diagram shows the positions of Halley's Comet and Asteroid 134340 at various times in their orbits. Specific orbital positions are shown for certain years.

18. The eccentricity of the asteroid's orbit is 0.250. On the orbital diagram below, mark the position of the second focus of the asteroid's orbit by placing an X on the major axis at the proper location.



19. Determine which was traveling faster, Halley's Comet or the asteroid, between the years 1903 and 1908. State one reason for your choice.

Halley's Comet, covers more space in smaller time

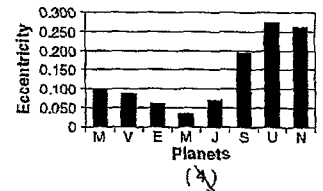
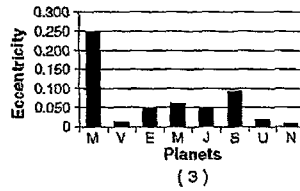
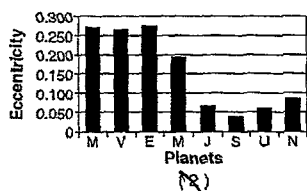
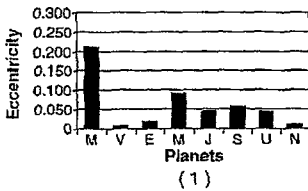
20. Explain why Halley's Comet is considered to be part of our solar system.

One of its foci is our Sun. It orbits our Sun.

21. 4 Large craters found on Earth support the hypothesis that impact events have caused
 (1) a decrease in the number of earthquakes and an increase in sea level
 (2) an increase in solar radiation and a decrease in Earth radiation
 (3) the red shift of light from distant stars and the blue shift of light from nearby stars
 (4) mass extinctions of life-forms and global climate changes

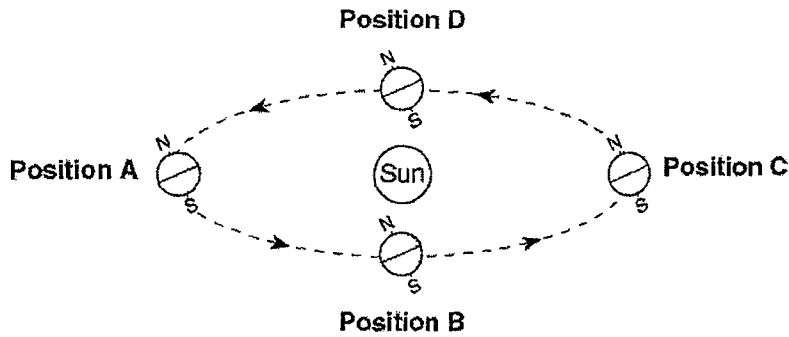
22. 3 What is the inferred age of our solar system, in millions of years?
 (1) 544 (2) 1300 (3) 4600 (4) 10,000

23. 1 Which bar graph correctly shows the orbital eccentricity of the planets in our solar system?



Name: _____

The diagram below shows Earth in its orbit around the Sun. Positions A, B, C, and D represent Earth at the beginning of each season.



(Not drawn to scale)

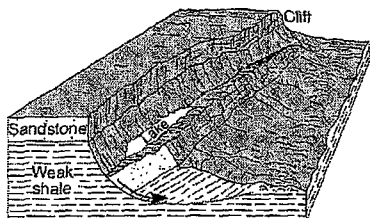
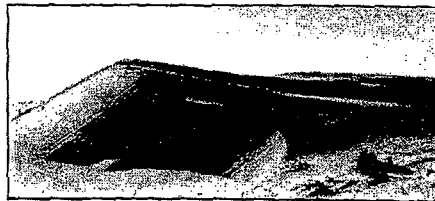
24. 3 At which lettered position of Earth does New York State experience the first day of summer?
 (1) A (2) B (3) C (4) D

25. Complete the table *in your answer booklet* by identifying the color and classification of the star *Procyon B*. The data for the Sun have been completed as an example.

Star	Color	Classification
Sun	yellow	main sequence
<i>Procyon B</i>	<i>White / yellow</i>	<i>White Dwarf</i>

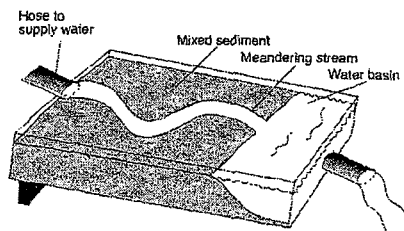
Name: KEY

- 2 Which property would best distinguish sediment deposited by a river from sediment deposited by a glacier?
 (1) mineral composition of the sediment (3) thickness of sediment layers
 (2) amount of sediment sorting (4) age of fossils found in the sediment
- 2 Salt deposits are found in the surface bedrock near which New York State location?
 (1) Oswego (2) Syracuse (3) Old Forge (4) Albany
- 4 The photograph below shows a sand dune that formed in a coastal area. This sand dune was most likely formed by
 (1) water flowing from the left (3) wind blowing from the left
 (2) water flowing from the right (4) wind blowing from the right

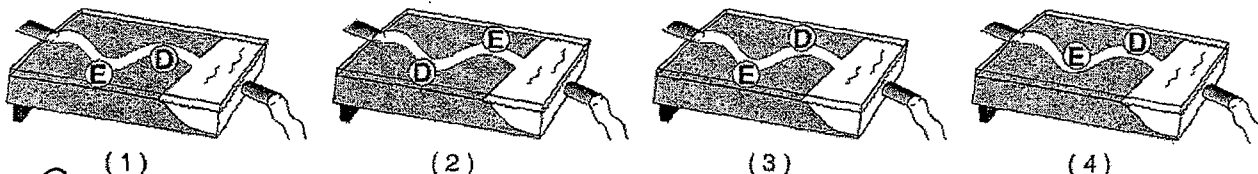


- 3 The block diagram below shows a displacement of rock layers. Which process describes the downward sliding of the rock material?
 (1) tidal changes (3) mass movement
 (2) glacial erosion (4) lava flow

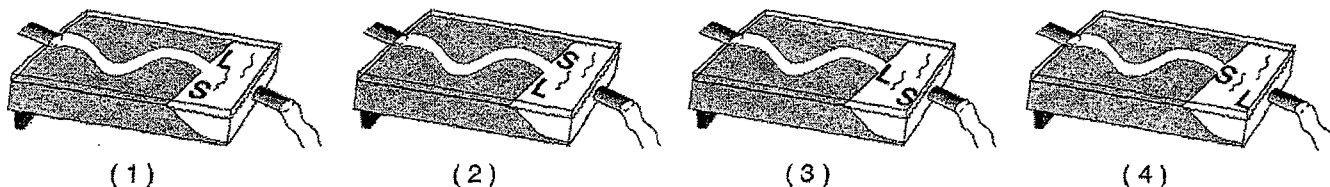
Base your answers to questions 5 through 7 on the diagram below, which shows a model used to investigate the erosional-depositional system of a stream. The model was tilted to create a gentle slope, and a hose supplied water to form the meandering stream shown.



- 1 Which diagram best represents where erosion, E, and deposition, D, are most likely occurring along the curves of the meandering stream?

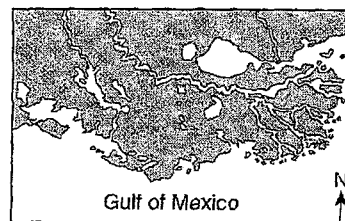


- 3 Which diagram best represents the arrangement of large, L, and small, S, sediment deposited as the stream enters the water basin?



- 4 How can the model be changed to increase the amount of sediment transported by the stream?
 (1) decrease the temperature of the sediment (3) increase the size of the sediment
 (2) decrease the slope (4) increase the rate of the water flow

- 3 The map below shows the large delta that formed as the Mississippi River emptied into the Gulf of Mexico. Which process was primarily responsible for the formation of the delta?
 (1) glacial erosion (3) deposition of sediment
 (2) cementation of sediment (4) mass movement

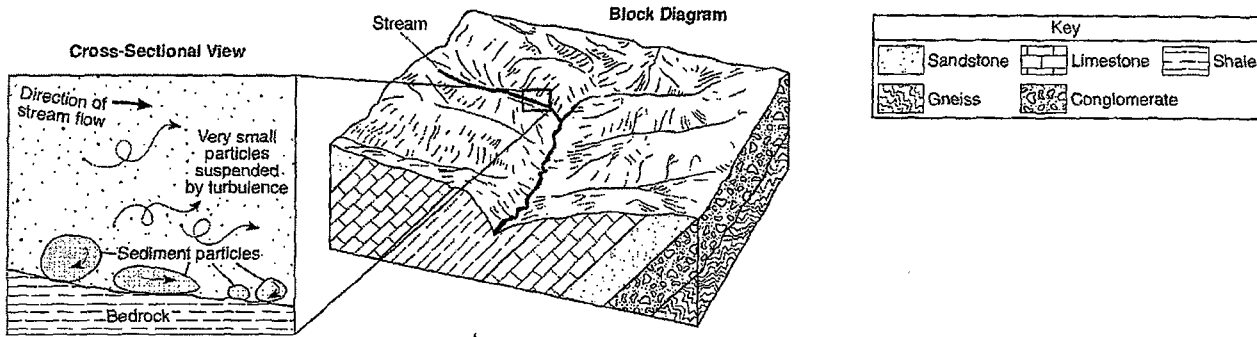


Base your answers to questions 9 through 12 on the cross section and block
 Regents Review – Weathering and Erosion 1-4

Created: March 2008

Name: _____

diagram below. The cross section shows an enlarged view of the stream shown in the block diagram. The sediments in the cross section are drawn to actual size. Arrows show the movement of particles in the stream. The block diagram represents a region of Earth's surface and the bedrock beneath the region.



9. After measuring the actual size, identify the name of the largest particle shown on the stream bottom in the cross section.

Pebble

10. What process is responsible for producing the rounded shape of the particles shown on the stream bottom in the cross section?

Weathering

11. Identify the type of rock shown in the block diagram that appears to be the most easily eroded.

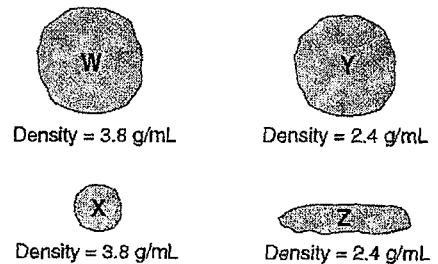
Shale

12. How does the shape of a valley eroded by a glacier differ from the shape of the valley shown in the block diagram?

U-shaped

13. 1 A stream is transporting the particles W, X, Y, and Z, shown to the right. Which particle will most likely settle to the bottom first as the velocity of this stream decreases?

- (1) W (2) X (3) Y (4) Z



14. 2 New York State's Catskills are classified as which type of landscape region?

- (1) mountain (2) plateau (3) lowland (4) plain

15. 1 Which diagram represents a landscape where fine-grained igneous bedrock is most likely to be found?



16. 2 The largest particles that a stream deposits as it enters a pond are 8 centimeters in diameter. The minimum velocity of the stream is approximately

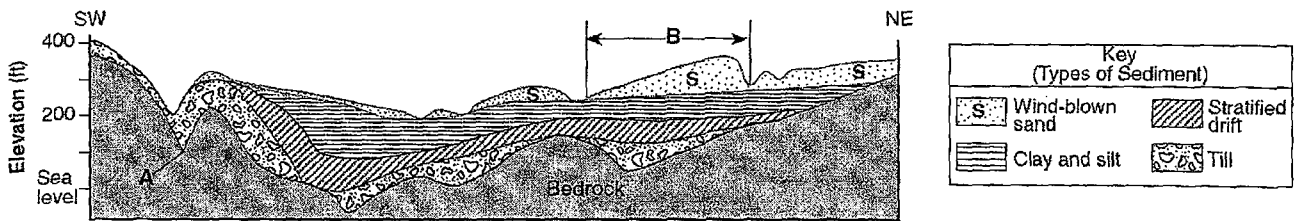
- (1) 100 cm/sec (2) 200 cm/sec (3) 300 cm/sec (4) 400 cm/sec

Name: _____

Base your answers to questions 17 through 21 on the passage and the cross section below. The passage describes the geologic history of the Pine Bush region near Albany, New York. The cross section shows the bedrock and overlying sediment along a southwest to northeast diagonal line through a portion of this area. Location A shows an ancient buried stream channel and location B shows a large sand dune.

The Pine Bush Region

The Pine Bush region, just northwest of Albany, New York, is a 40-square mile area of sand dunes and wetlands covered by pitch pine trees and scrub oak bushes. During the Ordovician Period, this area was covered by a large sea. Layers of mud and sand deposited in this sea were compressed into shale and sandstone bedrock. During most of the Cenozoic Era, running water eroded stream channels into the bedrock. One of these buried channels is shown at location A in the cross section. Over the last one million years of the Cenozoic Era, this area was affected by glaciation. During the last major advance of glacial ice, soil and bedrock were eroded and later deposited as till (a mixture of boulders, pebbles, sand, and clay). About 20,000 years ago, the last glacier in New York State began to melt. The meltwater deposited pebbles and sand, forming the stratified drift. During the 5000 years it took to melt this glacier, the entire Pine Bush area became submerged under a large 350-foot-deep glacial lake called Lake Albany. Delta deposits of cobbles, pebbles, and sand formed along the lake shorelines, and beds of silt and clay were deposited farther into the lake. Lake Albany drained about 12,000 years ago, exposing the lake bottom. Wind erosion created the sand dunes that cover much of the Pine Bush area today.



17. According to the passage, how old is the bedrock shown in the cross section?

Ordovician

18. What evidence shown at location A suggests that the channel in the bedrock was eroded by running water?

V-shaped valley

19. List, from oldest to youngest, the four types of sediment shown above the bedrock in the cross section.

Oldest

1. till
2. stratified drift
3. clay/silt
4. wind-blown sand



Youngest

20. Explain why the till layer is composed of unsorted sediment.

Glaciers picked up and transported a wide variety of sediment sizes

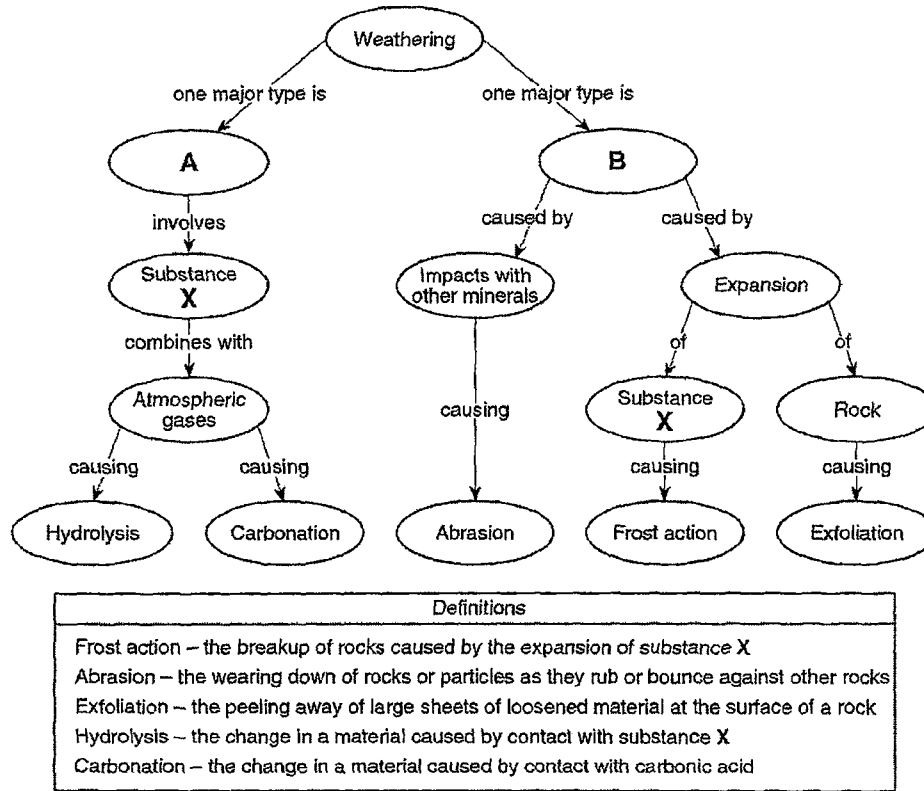
21. How does the shape of the sand dune at location B provide evidence that the prevailing winds that formed this dune were blowing from the southwest?

windward

22. The generalized landscape regions of New York State are classified according to
 (1) bedrock structure and elevation (3) latitude and longitude
 (2) bedrock type and index fossils (4) climate and topography

Name: _____

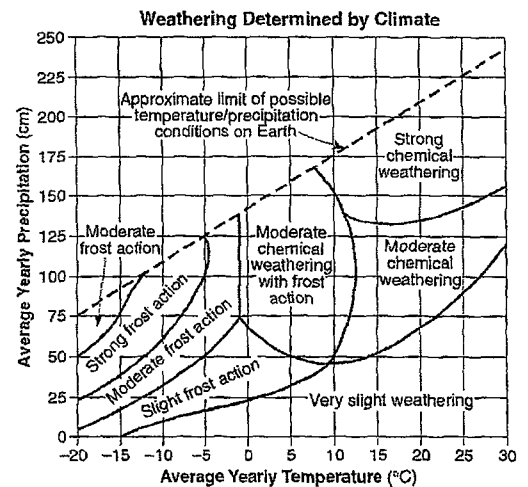
Base your answers to questions 23 through 25 on the flowchart below, which shows a general overview of the processes and substances involved in the weathering of rocks at Earth's surface. Letter X represents an important substance involved in both major types of weathering, labeled A and B on the flowchart. Some weathering processes are defined below the flowchart.



23. 3 Which term best identifies the type of weathering represented by A?
 (1) physical (2) biological (3) chemical (4) glacial
24. 4 Which substance is represented by X on both sides of the flowchart?
 (1) potassium feldspar (2) air (3) hydrochloric acid (4) water
25. 1 Which weathering process is most common in a hot, dry environment?
 (1) abrasion (2) carbonation (3) frost action (4) hydrolysis

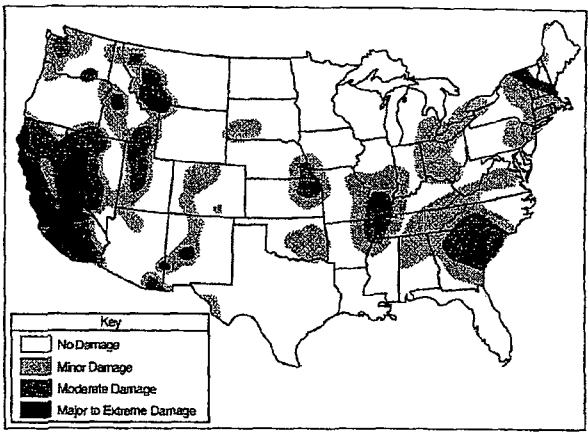
Base your answers to questions 26 and 27 on the graph below, which shows the effect that average yearly precipitation and temperature have on the type of weathering that will occur in a particular region.

26. 4 Which type of weathering is most common where the average yearly temperature is 5°C and the average yearly precipitation is 45 cm?
 (1) moderate chemical weathering
 (2) very slight weathering
 (3) moderate chemical weathering with frost action
 (4) slight frost action
27. 4 The amount of chemical weathering will increase if
 (1) air temperature decreases and precipitation decreases
 (2) air temperature decreases and precipitation increases
 (3) air temperature increases and precipitation decreases
 (4) air temperature increases and precipitation increases



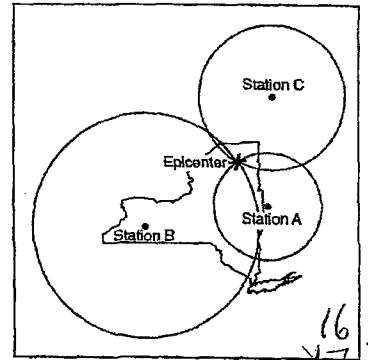
Name: Key

Base your answers to questions 1 and 2 on the map to the right, which shows the risk of damage from seismic activity in the United States.



- 4 In the United States, most of the major damage expected from a future earthquake is predicted to occur near a
 - (1) divergent plate boundary, only
 - (2) convergent plate boundary, only
 - (3) mid-ocean ridge and a divergent plate boundary
 - (4) transform plate boundary and a hot spot
- 3 Which New York State location has the greatest risk of earthquake damage?
 - (1) Binghamton
 - (2) Buffalo
 - (3) Plattsburgh
 - (4) Elmira

The map to the right shows the location of an earthquake epicenter in New York State. Seismic stations A, B, and C received the data used to locate the earthquake epicenter.



- 2 The seismogram recorded at station A would show the
 - (1) arrival of P-waves, only
 - (2) earliest arrival time of P-waves
 - (3) greatest difference in the arrival times of P-waves and S-waves
 - (4) arrival of S-waves before the arrival of P-waves
- 2 An earthquake's first P-wave arrives at a seismic station at 12:00:00. This P-wave has traveled 6000 kilometers from the epicenter. At what time will the first S-wave from the same earthquake arrive at the seismic station?

(1) 11:52:20 (3) 12:09:20
 (2) 12:07:40 (4) 12:17:00

$12:00:00$
 $+ 07:40$
 $\underline{\hspace{1cm}}$

P waves takes 9:20
 S wave takes 17:00
 $16:60$
 $\underline{\hspace{1cm}}$
 $7:40$
- 2 A seismograph station recorded the arrival of the first P-wave at 7:32 p.m. from an earthquake that occurred 4000 kilometers away. What time was it at the station when the earthquake occurred?

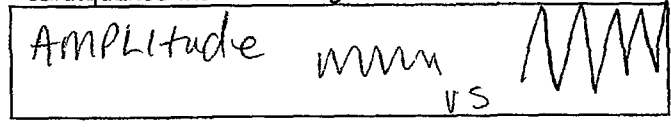
(1) 7:20 p.m. (3) 7:32 p.m.
 (2) 7:25 p.m. (4) 7:39 p.m.

Arrival time 7:32
 $-$ P wave travel time $- 07$
 $\underline{\hspace{1cm}}$
 origin time 7:25

Base your answers to questions 6 and 7 on the table to the right, which lists the location of some earthquakes, their Richter magnitude, and their year of occurrence.

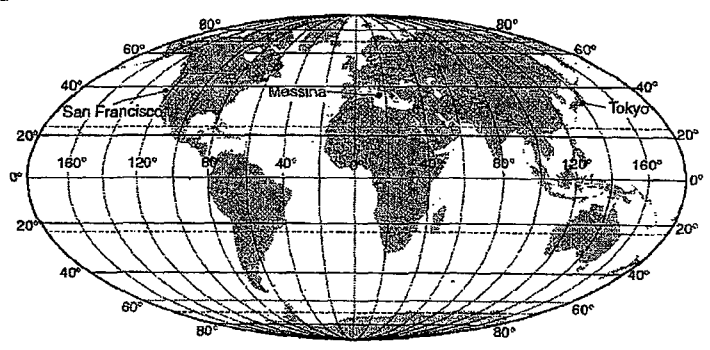
Location	Richter Magnitude	Year
San Francisco, United States	7.8	1906
Messina, Italy	7.5	1908
Tokyo, Japan	8.3	1923
San Francisco, United States	7.1	1989

6. What data do scientists use to determine the magnitude of earthquakes without visiting the actual sites?



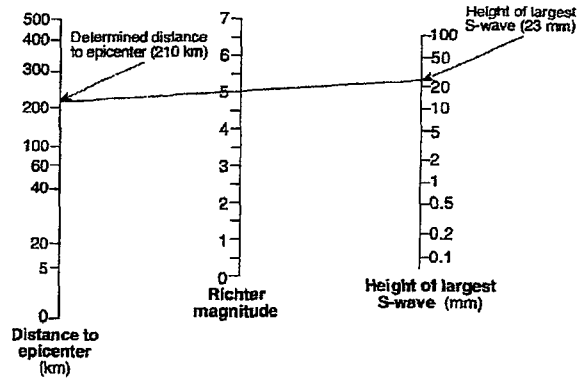
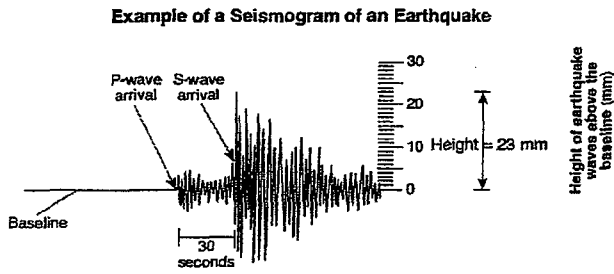
7. The locations of the earthquakes listed in the table are shown on the map below. Explain how the locations of these earthquakes are related to tectonic plates.

Plate Boundaries



Name: _____

Base your answers to questions 8 through 10 on the example of a seismogram and set of instructions for determining the Richter magnitude of an earthquake below. The example shows the Richter magnitude of an earthquake 210 kilometers from a seismic station.

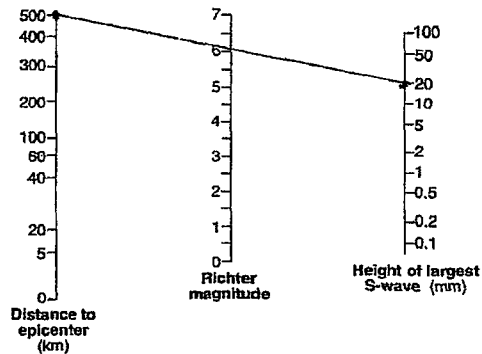
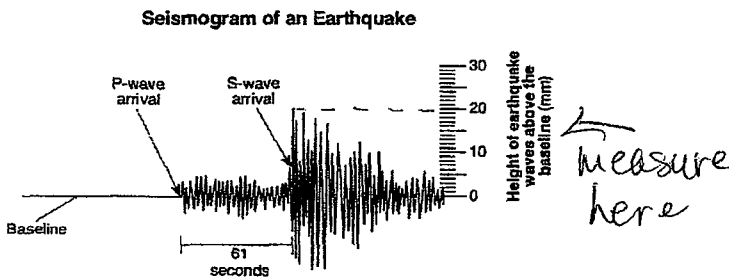


Instructions for determining Richter magnitude:

- Determine the distance to the epicenter of the earthquake. (The distance in the example is 210 kilometers.)
- Measure the maximum wave height of the S-wave recorded on the seismogram. (The height in the example is 23 millimeters.)
- Place a straightedge between the distance to the epicenter (210 kilometers) and the height of the largest S-wave (23 millimeters) on the appropriate scales. Draw a line connecting these two points. The magnitude of the earthquake is determined by where the line intersects the Richter magnitude scale. (The magnitude of this example is 5.0.)

8. Using the set of instructions above and the seismogram and scales below, determine the Richter magnitude of an earthquake that was located 500 kilometers from this seismic station. Record your answer below.

6.0 to 6.2.



9. Identify the information shown on the seismogram that was used to determine that the distance to the epicenter was 500 kilometers.

difference between P and S wave arrival times

10. How long did it take the first S-wave to travel 500 kilometers to reach this seismic station?

:02:00 to :02:20

11. 1 Which statement correctly compares seismic P-waves with seismic S-waves?
- (1) P-waves travel faster than S-waves and pass through Earth's liquid zones.
 - (2) P-waves travel faster than S-waves and do not pass through Earth's liquid zones.
 - (3) P-waves travel slower than S-waves and pass through Earth's liquid zones.
 - (4) P-waves travel slower than S-waves and do not pass through Earth's liquid zones.