VIRGINIA
STANDARDS OF LEARNING ASSESSMENTS

Spring 2001 Released Test

END OF COURSE
EARTH SCIENCE

Property of the Virginia Department of Education

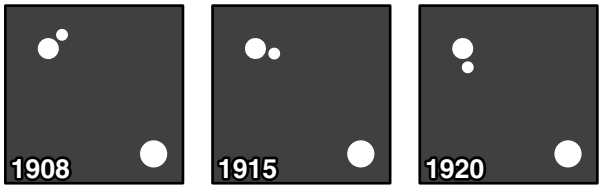
DIRECTIONS
Read each question carefully and choose the best answer. Then mark the space on the answer sheet for the answer you have chosen.

SAMPLE

Which of these can be used to measure atmospheric pressure?

A An anemometer
B A barometer
C A thermometer
D A seismometer

1



The pictures show the same stars at different times. Which hypothesis is best supported by these data?

A The stars are moving toward one another.
B The three stars are moving very fast.
C One star is moving around another star.
D The biggest star is closest to the Earth.

2 All of the following are sources of energy derived from the ocean *except* —

F coal
G thermal
H tides
J waves

3 A star might be much brighter than it appears to be. This is called the star's absolute magnitude. The difference in apparent magnitude and absolute magnitude is due primarily to the star's —

A surface temperature
B motion through the universe
C diameter
D distance from the Earth

GO ON

4

Mineral Classification				
Mineral	**Crystal System**	**Density**	**Streak**	**Chemical Formula**
Bauxite	Amorphous	2.0-2.5	White-brown	Al_2O_3
Hematite	Hexagonal	5.2-5.3	Cherry-red	Fe_2O_3
Pyrolusite	Tetragonal	4.7-5.0	Blue-black	MnO_2
Uraninite	Isometric	7.5-9.7	Metallic black	UO_2

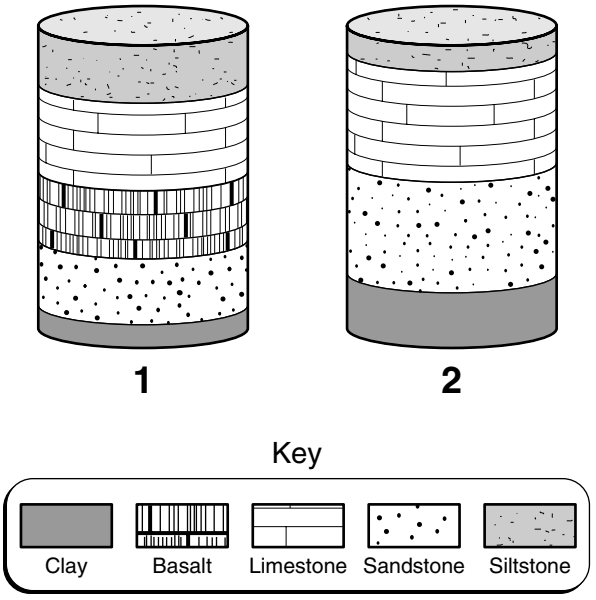
These minerals may be grouped together because they all have —

F the same crystal systems
G constant density values
H shiny streaks
J the oxygen ion

5 Water vapor is lighter than many atmospheric gases such as oxygen, nitrogen, and carbon dioxide. Why then doesn't water vapor rise above these other gases to a higher level of the atmosphere?

A Water vapor contains other elements that give it weight.
B The cool atmosphere condenses the rising water vapor and causes it to fall back to Earth.
C The water molecules are attracted to molecules of heavier gases and remain in the lower regions of the atmosphere.
D There is an attraction among the water vapor molecules to hold them together close to the Earth.

6

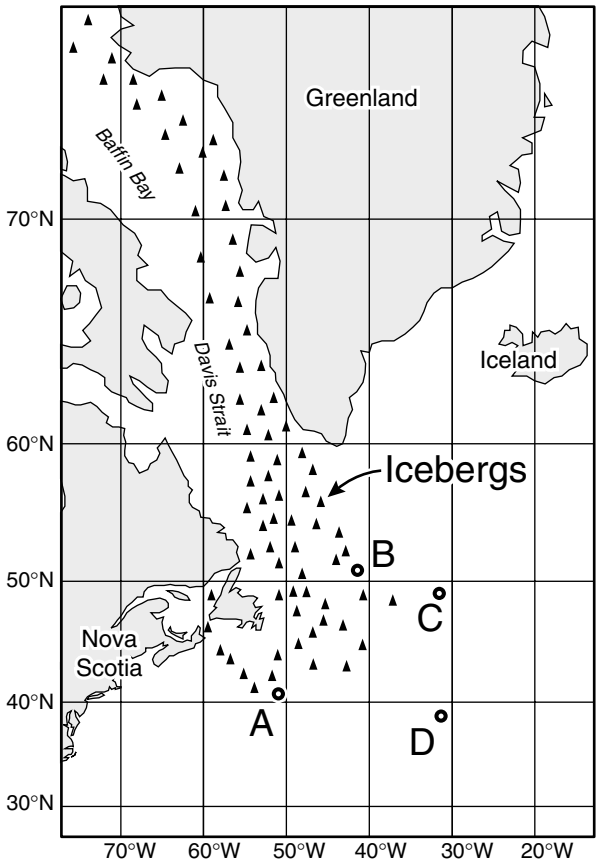


Scientists use drill core samples to study the underlying rock structure. These two core samples were obtained from the ocean floor from locations separated by 10 km. Which layer in core sample one does not have a matching layer in core sample two?

F Basalt
G Clay
H Limestone
J Sandstone

GO ON

7



The wireless operator aboard the *Titanic* signaled for help and gave the ship's location as 41°45′N and 50°14′W. Which area shown on the map is most likely where the *Titanic* struck the iceberg?

A A
B B
C C
D D

8

Worldwide CO_2 Release

Country	Tons/Year (per capita)
United States	5.9
Canada	5.2
Germany	3.1
United Kingdom	2.9
Japan	2.3
France	2.0
Italy	2.0
World Average	1.2

The countries shown here released much more CO_2 than the rest of the world because these countries have the largest —

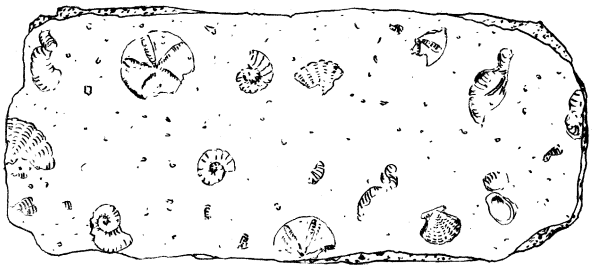
F number of people
G amount of rainfall
H number of heavy industries
J amount of land per person

9 The presence of many metamorphic rocks in Virginia is an indication that the area has been subjected to —

A intense heat and pressure
B limited volcanic activity
C deep ocean venting
D massive solar bombardment

GO ON

10



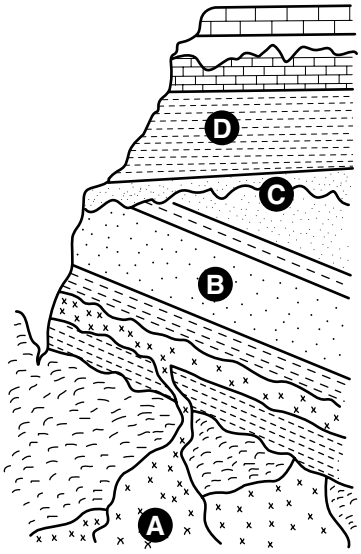
The picture shows a limestone building block. Which observation best shows that the limestone was formed from ocean sediments?

F The thickness of the rock layers
G The number of fossils
H The type of fossils
J The size of the fossils

11 About how long does it take the Earth to make one complete rotation on its axis?

A One day
B One week
C One month
D One year

12



What appears to have occurred at the area labeled B?

F Sediment was deposited on sloped ground.
G Sediment was deposited on sloped ground that later became level.
H Sediment was deposited on level ground that later tilted.
J Sediment was deposited on level ground that stayed level.

13 Which of these energy sources produces the *least* harmful environmental effects?

A Nuclear
B Fossil fuels
C Solar
D Hydroelectric

14 All of the following support the theory of continental drift *except* that —

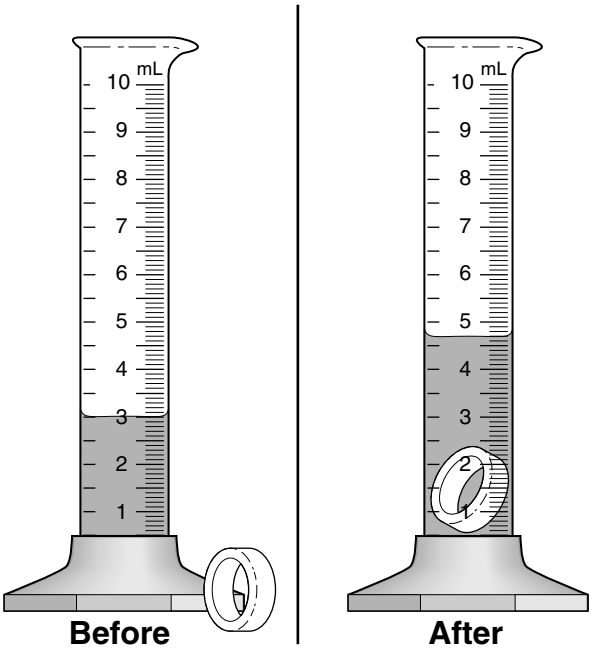
F the continents seem to fit together like pieces of a puzzle

G there are similar fossils on different continents

H mountain ranges in South America and Africa line up

J the North Pole and Antarctica are covered with ice

15



One step in determining the metal content of a ring is to find the volume of the ring. What is the volume of this ring?

A 1.7 mL

B 3.0 mL

C 4.7 mL

D 7.1 mL

16 The Southern Hemisphere is warmer in January than in July because —

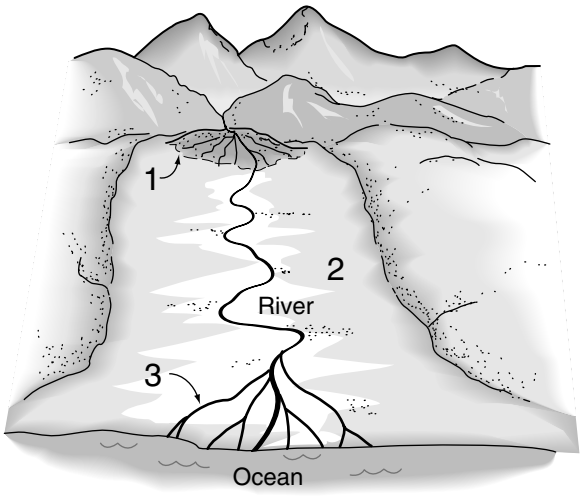
F it is experiencing summer

G the cold winds are concentrated in the Northern Hemisphere

H the sun puts out more energy

J the hole in the ozone layer allows more heat into the atmosphere

17



Which answer below matches the number in the drawing with the correct name of a sedimentary formation?

A 1-delta, 2-continental rise, 3-flood plain

B 1-alluvial fan, 2-flood plain, 3-delta

C 1-barrier island, 2-continental shelf, 3-alluvial fan

D 1-continental shelf, 2-continental rise, 3-barrier island

18 Only 3% of the Earth's water is fresh water. The world's oceans contain the rest of the Earth's water. Of that 3%, three-fourths is tied up in glaciers, ice caps, and snow fields. Antarctic glaciers contain nearly 85% of all the ice in the world, and floating sea ice in the Arctic contains 10% of the ice. Sea ice freezes from ocean water, but the salt is excluded in the freezing process, resulting in mostly freshwater ice. Where is the remaining 5% of the world's permanent supply of ice and snow?

F High mountain peaks
G Permanent Arctic blizzards
H Floating icebergs
J Drifting Antarctic snow

19 Oil spills have a tremendous impact on the ocean environment, and the oil must be cleaned up after these spills. A new technique for cleaning oil from beaches is called bioremediation. This technique uses naturally occurring bacteria to break down the oil. How is this accomplished?

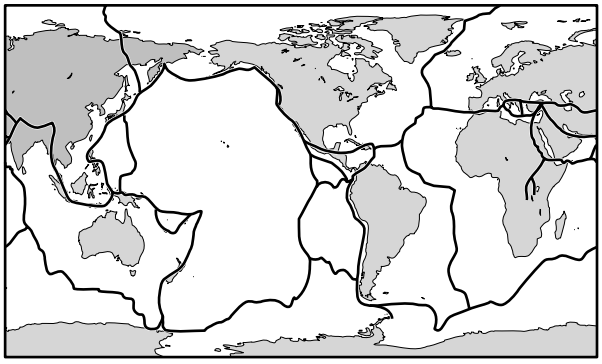
A The bacteria bind with the oil and bring it to land.
B The bacteria pull the oil down to the ocean floor.
C The bacteria chemically change the oil into less harmful substances.
D The bacteria die and absorb the oil.

20 A student sees a very bright star in the sky and thinks it might be the planet Venus. Which observation would lend support to this conclusion?

F After a few minutes, its position relative to the surrounding stars has changed significantly.
G After an hour, its position relative to the horizon has changed.
H After an hour, its brightness has faded significantly.
J After a month, its position relative to the surrounding stars has changed.

21

Plate Boundaries



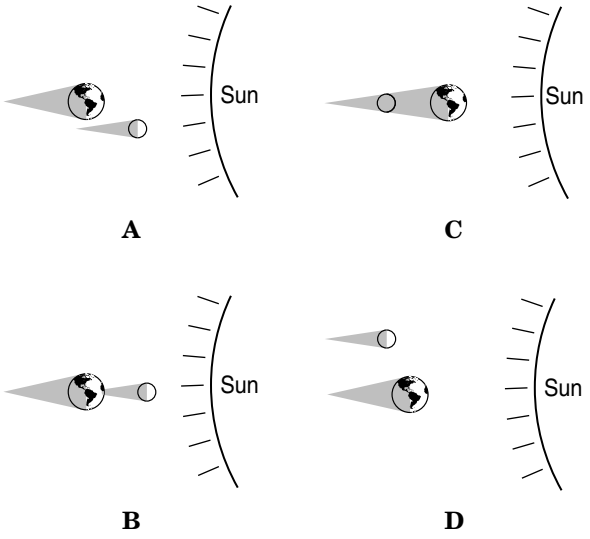
Which of the following major earthquakes did not occur at a boundary between tectonic plates?

A South Carolina (U.S.A.) 1886
B San Francisco (U.S.A.) 1906
C Messina (southern Italy) 1908
D Chillan (Chile) 1939

22 Sinkholes associated with natural processes are characteristic of what type of bedrock?

F Limestone
G Granite
H Basalt
J Gneiss

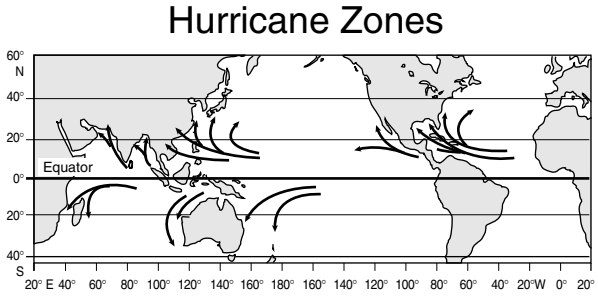
23 Which diagram represents the placement of the sun, Earth, and moon during a lunar eclipse?



A **C**

B **D**

24



According to the map, most hurricanes occur where —

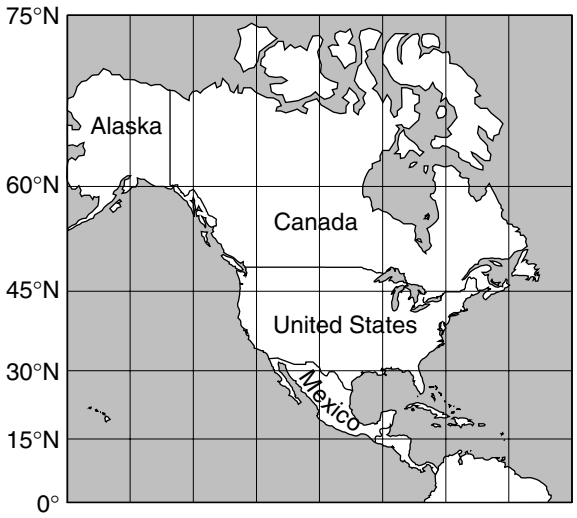
F the oceans are warmest
G the landmasses are largest
H the atmosphere is driest
J areas of greatest population exist

25 Geologists think that parts of the Appalachian Mountains formed originally from sediments accumulating in shallow swamps. The weight of the sediments caused the area beneath them to sink, allowing more sediments to accumulate. The process continued until many layers had formed. Then tectonic processes folded the layered sediments into a range of mountains. What evidence for this theory can be found in the current structure of these mountains?

A Some rocks making up these mountains show signs of volcanism.
B The form of these mountains is very eroded.
C The mountains exhibit folded layers of rocks containing fossils from shallow water.
D The mountain range consists of parallel ridges of different ages.

GO ON

26 Mercator Projection of North America



In this Mercator map of North America, Canada and Alaska together appear larger than the United States and Mexico together when in fact they are smaller. What causes this distortion?

F Mountains get flattened on a map so that mountainous areas look larger than they really are.

G The northern regions are enlarged because the shallower parts of the oceans are frozen.

H The latitude and longitude lines create an optical illusion.

J The map is a projection of a round world onto a flat surface.

27 Which of the following is an example of chemical weathering?

A Splits in a rock due to tree roots

B Pulverized rock resulting from a landslide

C A rock broken into chunks after being carried by rapidly flowing water

D The dissolving of limestone by acid rain

28 The pole star, Polaris, is nearly stationary and straight overhead when seen from the North Pole. When viewed from the Equator, it —

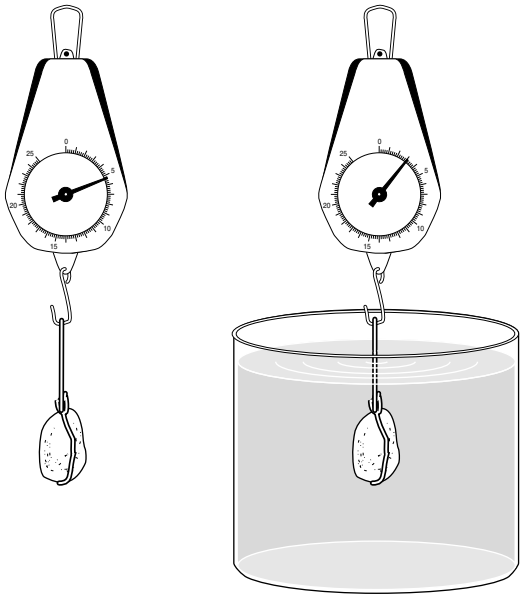
F is nearly stationary and on the horizon

G is nearly stationary and directly overhead

H rises barely above the eastern horizon, moves along the southern horizon, and sets in the West

J rises straight up in the East, passes directly overhead, and descends straight down in the West

29



Using this procedure, what property of a mineral can be found?

A Crystal arrangement

B Specific gravity

C Brittleness

D Fracture

30 Moist air from the Pacific Ocean rises and cools as it passes from west to east over the Sierra Nevada Mountains. Once it is over the mountain range, the air descends and warms on the other side. What is the result of the air ascending, then descending over the mountains?

F Desert on the west side of the mountains and heavy rains on the east side

G Heavy rains on the west side of the mountains and desert on the east side

H Heavy rains on the west side of the mountains and year-round snow on the east side

J Desert on the east and west sides of the mountains and heavy rains on top of the mountains

31 Because granite cools below the surface of the Earth, it is —

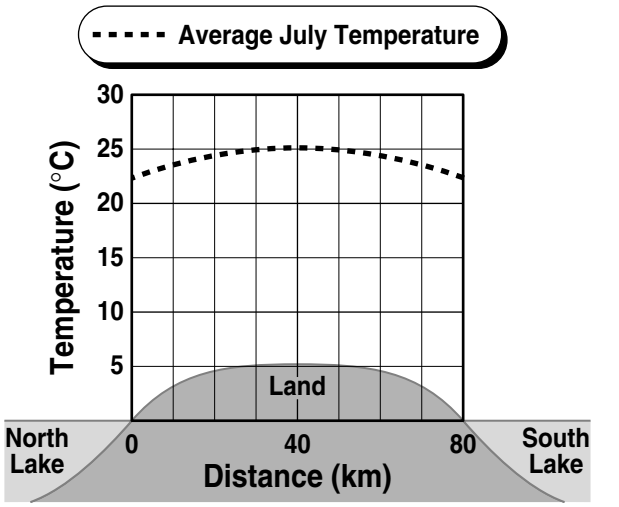
A an igneous extrusive rock

B an igneous intrusive rock

C a sedimentary rock

D a metamorphic rock

32



Hypothesis: In the summer, the warmest air will be closest to South Lake.

According to the data shown by the graph, the warmest air during the summer will be found —

F closest to North Lake

G above South Lake

H above the land between the lakes

J closest to the water level of the lakes

33 Fish are abundant in areas where the ocean is upwelling because it —

A causes currents that carry fish into the area

B brings nutrients to the surface

C causes surface turbulence that attracts fish

D changes tidal flow in that area

34 Parallax can be used to measure a star's —

F distance from Earth
G atmospheric temperature
H gravitational strength
J surface composition

35 Many quarries in Virginia produce crushed stone. What industry uses the most crushed stone?

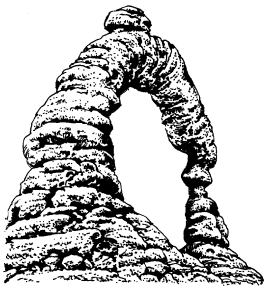
A Plastics
B Construction
C Electronics
D Steel

36 All of the following are characteristics of metamorphic rocks *except* —

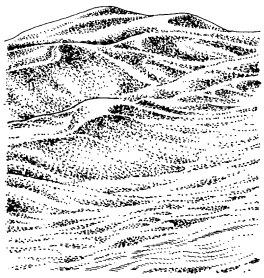
F flattened crystals
G colored, parallel layers
H bending from pressure
J holes from trapped gases

37 Which of these best shows wind-deposited sediments?

A



B

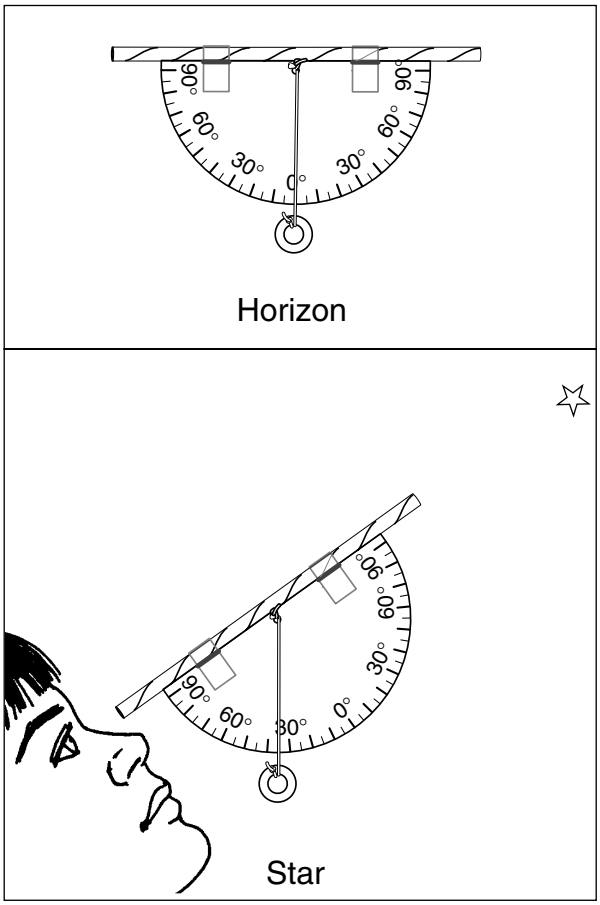


C

D

GO ON

38



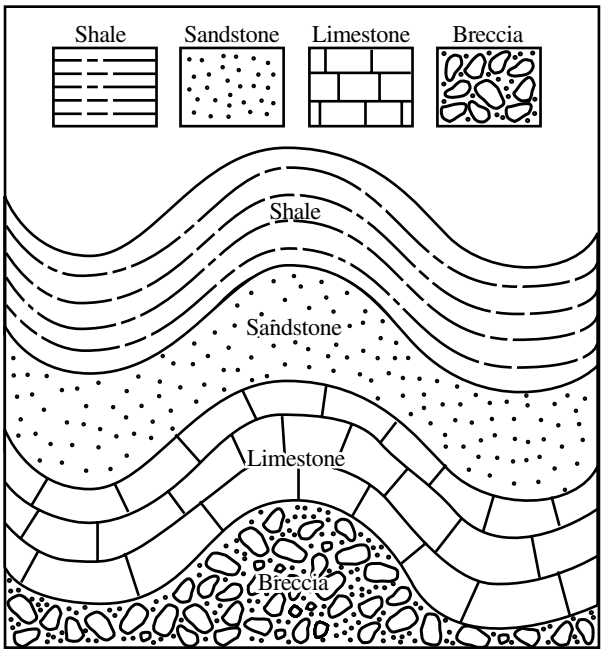
What is the position of the star above the horizon?

F 35°
G 40°
H 55°
J 60°

39 **Not all fossils have been preserved inside soil or rock. Explorers in Siberia have discovered the bodies of ancient mammoths so well-preserved that the flesh could be eaten. What do you think preserved the mammoths in such a perfect state?**

A Water
B Ice
C Leaf mold
D Carbon dioxide

40



Which layer in this area is the youngest?

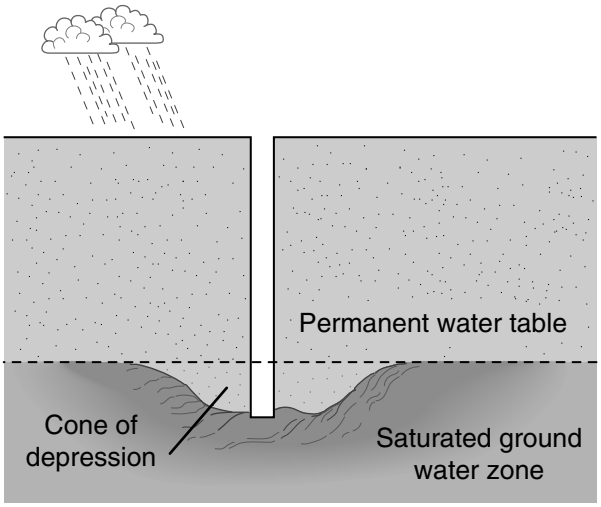
F Shale
G Sandstone
H Limestone
J Breccia

GO ON

41 What is the fewest number of seismographic stations that must record the arrival time of *P* and *S* waves in order for the epicenter of an earthquake to be located?

A 2
B 3
C 5
D 10

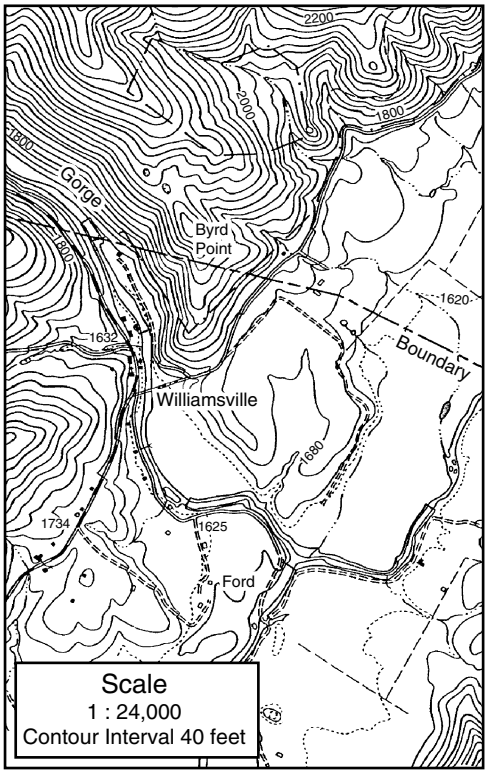
42



This picture shows a simple well that was dug down to the groundwater. What probably caused the lower level of groundwater, known as a "cone of depression," in the vicinity of the well?

F The weight of the atmosphere presses down on the groundwater in the well.
G The ground below the well acts as a vacuum sucking out the water.
H Gravity pulls down the water beneath the well.
J As water is drawn from the well, it takes time for the groundwater to percolate through the soil and restore the level.

43



What is the actual distance represented by 1 inch on this map?

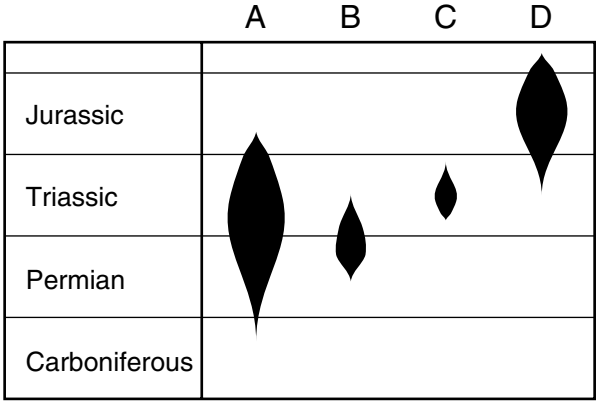
A 24 feet
B 40 feet
C 24,000 inches
D 48,000 inches

44 The amount of power that can be generated by a hydroelectric dam would be most dependent on which two factors?

F The width of the dam and the construction material of the dam
G The volume of water going over the dam and the distance that the water falls
H The surface area of the reservoir and the shape of the reservoir floor
J The temperature of the water and the amount of oxygen that it contains

45

Span of Different Fossils



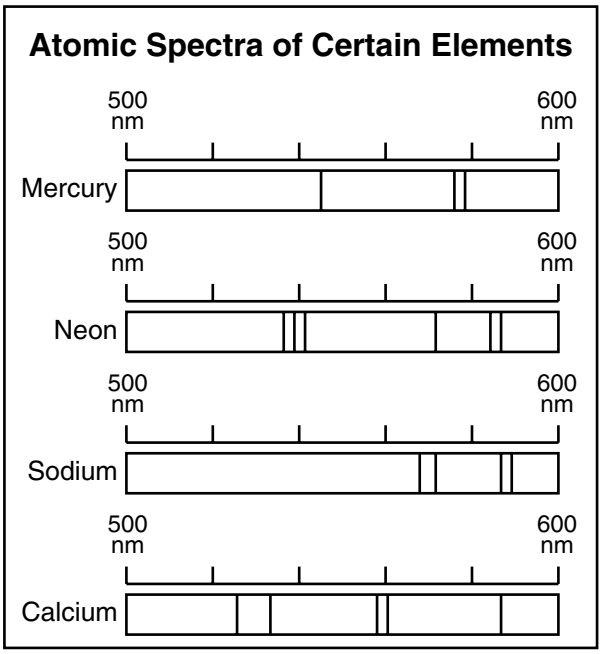
The diagram shows the distribution of different fossils. During what geologic time period would they have existed together?

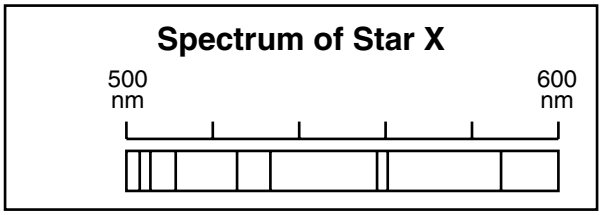
A Jurassic
B Triassic
C Permian
D Carboniferous

46 **A person weighs more on the Earth than on the moon because the Earth has a greater —**

F density
G atmospheric pressure
H magnetic strength
J gravitational pull

47





Which of these elements does this star contain?

A Mercury
B Calcium
C Sodium
D Neon

GO ON

48

Weather Observed at Charlottesville, Virginia	
Temperature	23°C
Humidity	38%
Dewpoint	8°C
Wind	East at 9.7 kph
Pressure	1020 mb
Sky Condition	Clear
Visibility	24 kilometers

Weather Observed at Norfolk NAS, Virginia	
Temperature	13°C
Humidity	89%
Dewpoint	11°C
Wind	East at 12.9 kph
Pressure	1020 mb
Sky Condition	Mist
Visibility	10 kilometers

Which factor would best explain why Charlottesville is clear while Norfolk has mist?

F Temperature
G Humidity
H Wind speed
J Pressure

49 The mineral resources of Virginia can be conserved by doing all of the following *except* —

A recycling
B reducing
C regenerating
D reusing

50 A boat will float higher in the Atlantic Ocean than it will in the Potomac River because ocean water has —

F a lower freezing point
G more organisms in it
H more oxygen in it
J a greater density

Answer Key

Test Sequence	Correct Answer	Reporting Category	Reporting Category Description
1	C	001	Scientific Investigation
2	F	003	“Meteorology, Oceanography, and Groundwater”
3	D	004	Astronomy and Space Science
4	J	002	Geology
5	B	003	“Meteorology, Oceanography, and Groundwater”
6	F	002	Geology
7	A	001	Scientific Investigation
8	H	002	Geology
9	A	002	Geology
10	H	002	Geology
11	A	004	Astronomy and Space Science
12	H	002	Geology
13	C	002	Geology
14	J	002	Geology
15	A	001	Scientific Investigation
16	F	004	Astronomy and Space Science
17	B	002	Geology
18	F	003	“Meteorology, Oceanography, and Groundwater”
19	C	003	“Meteorology, Oceanography, and Groundwater”
20	J	001	Scientific Investigation
21	A	002	Geology
22	F	002	Geology
23	C	004	Astronomy and Space Science
24	F	003	“Meteorology, Oceanography, and Groundwater”
25	C	002	Geology
26	J	001	Scientific Investigation
27	D	002	Geology
28	F	004	Astronomy and Space Science
29	B	002	Geology
30	G	003	“Meteorology, Oceanography, and Groundwater”
31	B	002	Geology
32	H	001	Scientific Investigation
33	B	003	“Meteorology, Oceanography, and Groundwater”
34	F	004	Astronomy and Space Science
35	B	002	Geology
36	J	002	Geology
37	B	002	Geology
38	F	001	Scientific Investigation
39	B	002	Geology
40	F	002	Geology
41	B	002	Geology
42	J	003	“Meteorology, Oceanography, and Groundwater”
43	C	001	Scientific Investigation
44	G	002	Geology
45	B	002	Geology
46	J	004	Astronomy and Space Science
47	B	004	Astronomy and Space Science
48	G	003	“Meteorology, Oceanography, and Groundwater”
49	C	002	Geology
50	J	003	“Meteorology, Oceanography, and Groundwater”