

**VIRGINIA
STANDARDS OF LEARNING ASSESSMENTS**

Spring 2003 Released Test

**END OF COURSE
EARTH SCIENCE**

Property of the Virginia Department of Education

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Earth Science

DIRECTIONS

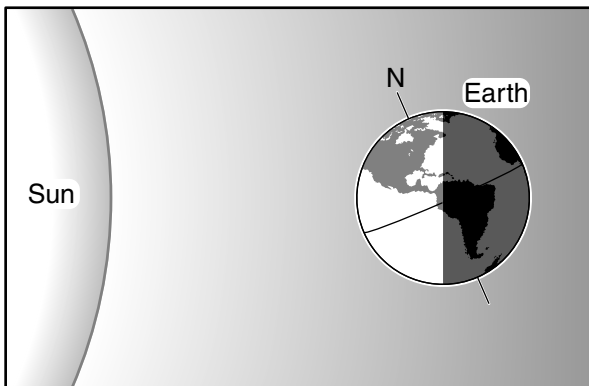
Read each question carefully and choose the best answer.

SAMPLE

Which of these can be used to measure atmospheric pressure?

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

1



When the Earth is at its greatest distance from the sun, its Northern Hemisphere is tilted toward the sun, as shown in the drawing. What season takes place in the Southern Hemisphere at this time?

- A Spring
- B Summer
- C Autumn
- D Winter

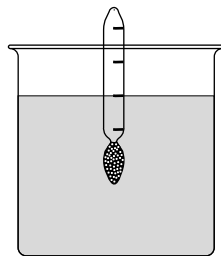
2 Which of these can determine the size of grains in igneous rocks?

- F Amount of rare minerals
- G Distance from a plate boundary
- H Size of the volcano
- J Cooling rate of molten rock

3 Which element in Earth's atmosphere is essential for human life and is extremely rare or nonexistent in the atmospheres of other planets in our solar system?

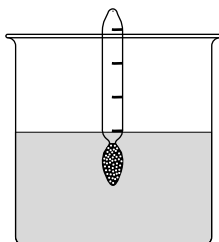
- A Carbon dioxide
- B Hydrogen
- C Nitrogen
- D Oxygen

4

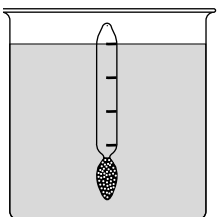


The picture above shows a hydrometer in water. The same hydrometer was placed in the liquids below. Which liquid is denser than water?

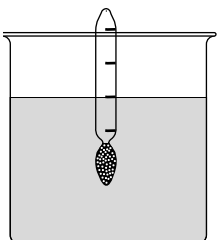
F



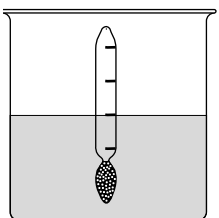
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H



J



5 Which of the following is part of a valid process for supporting a hypothesis?

- A Altering results
- B Single trials
- C Experimentation
- D Limited research

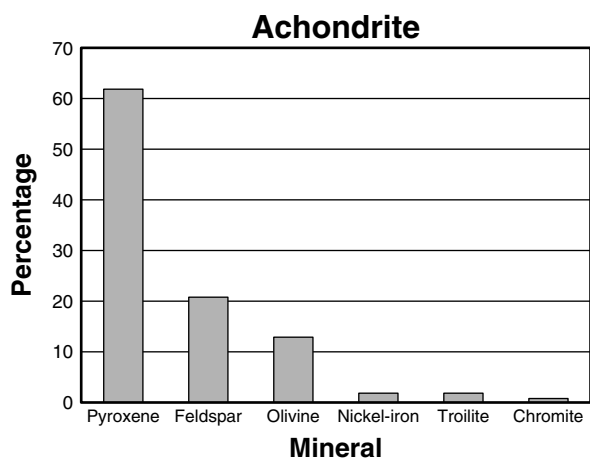
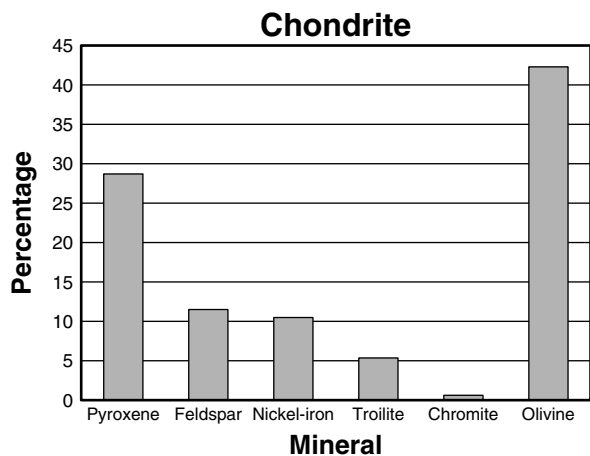
6 The numerous rocks orbiting the sun between Jupiter and Mars are —

- F comets
- G asteroids
- H meteorites
- J satellites

7 What property is shared by many gemstones, such as diamonds, rubies, sapphires, emeralds, and topaz?

- A Extreme hardness
- B High specific gravity
- C Carbon as the primary element
- D Ductility

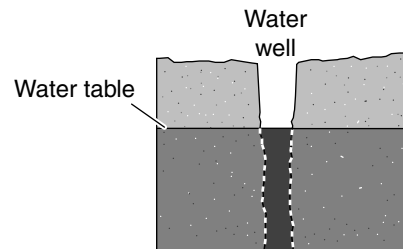
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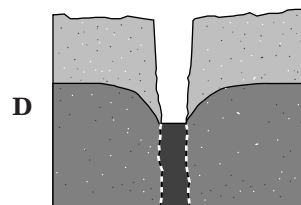
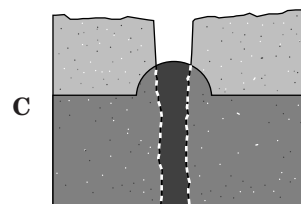
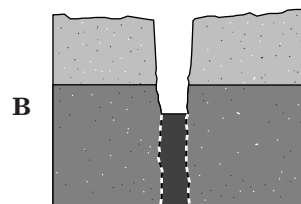
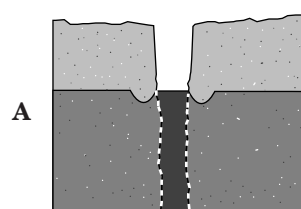
Most meteorites that fall to Earth are either chondrites or achondrites. The charts above show the composition of these meteorites. Based on these charts, which is a valid conclusion?

- F Both types are predominately pyroxene.
- G Both types are predominately olivine.
- H Achondrites contain more feldspar.
- J Achondrites contain more nickel-iron.

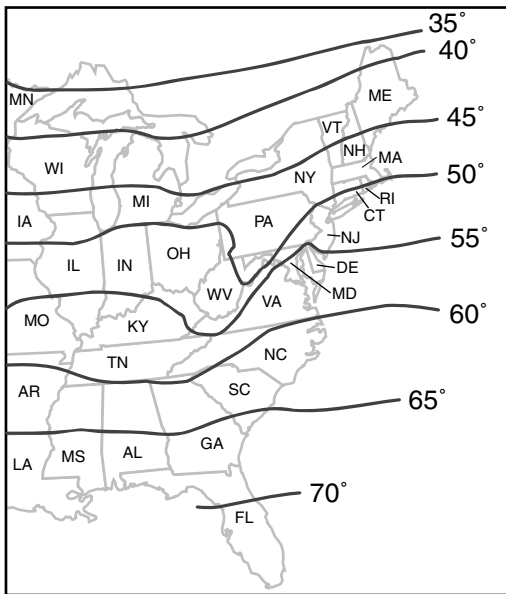
9



The drawing above shows the water table in the vicinity of a newly drilled well. Which of the drawings below shows the appearance of the water table several months later when the well has been in regular use?



10 **Mean Annual Temperature**



According to this map, the mean annual temperature for most of the eastern half of Virginia is between —

- F 45°F and 50°F
- G 50°F and 55°F
- H 55°F and 60°F
- J 65°F and 70°F

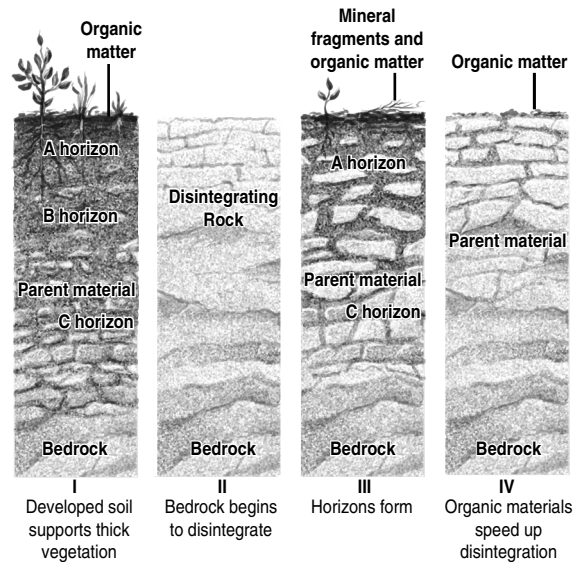
11 **The density of a mineral is determined by its mass and —**

- A hardness
- B luster
- C volume
- D shape

12 **What causes currents in the atmosphere?**

- F Ocean waves and currents
- G Pressure from the ozone layer
- H Solar heating of the upper atmosphere
- J Warm air rising and cold air sinking

13



The pictures above represent various stages of soil development. The correct order in which these pictures should be ordered is —

- A I, II, IV, III
- B III, I, II, IV
- C II, IV, III, I
- D III, II, IV, I

14 The first manned-mission to land on the moon was commanded by Neil Armstrong and was called —

- F Apollo 11
- G Gemini 3
- H Viking 2
- J Mariner 7

15 The Marianas Trench in the Pacific Ocean is 36,160 feet below sea level. This deep oceanic trench is caused by —

- A swift ocean currents eroding away the ocean floor
- B the collapse of an empty magma chamber in a large volcano
- C excessive boat traffic disrupting the normal sedimentation process
- D two tectonic plates colliding and one plunging below the other

16 The sun emits energy by converting hydrogen into helium. What is this process called?

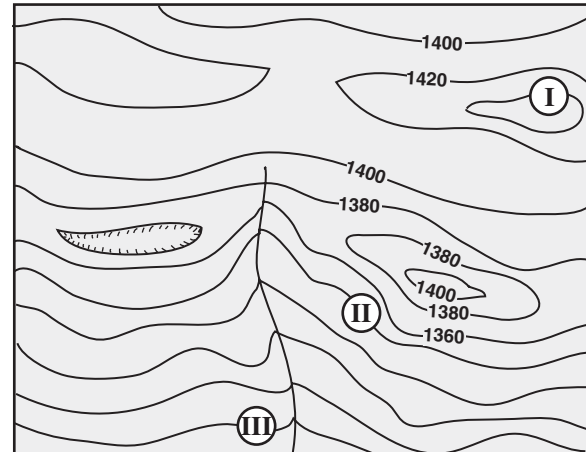
- F Fusion
- G Fission
- H Sunspot formation
- J Solar wind

17 One part of California is on the Pacific Plate, while the remainder of the state is on the North American Plate. The two plates are moving to the northwest at different speeds, causing one plate to slide past the other. This movement in plates creates a —

- A normal fault
- B reverse fault
- C strike-slip fault
- D thrust fault

18

Topographic Map



Contour Interval: 20 feet

On the topographic map provided, what is the elevation of point III?

- F 1260 feet
- G 1280 feet
- H 1300 feet
- J 1360 feet

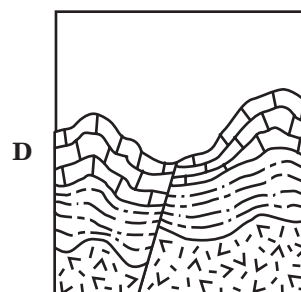
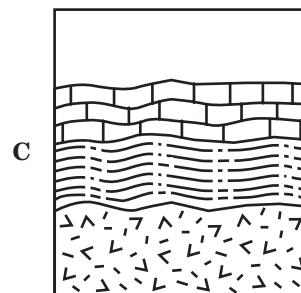
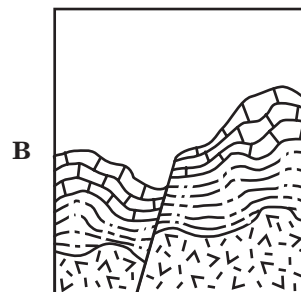
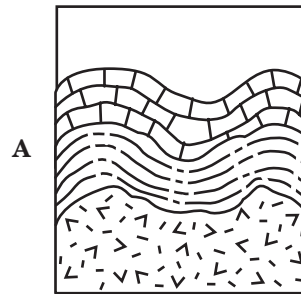
19 Which of the following is *not* a fossil fuel?

- A Coal
- B Wood
- C Petroleum
- D Natural gas

20 Periodically, there are spectacular meteor showers on Earth. These showers usually occur because the Earth's orbit passes through the remains of —

- F a star
- G a comet
- H solar flares
- J the rings of Saturn

21 Which of these pictures shows the last in the sequence of events?



22 Which of these is important in the formation of clouds?

- F The relative length of day and night
- G The Coriolis effect
- H The melting of the polar ice caps
- J The cooling of air as it rises

23 What is usually responsible for an earthquake?

- A Pressure buildup within the mantle
- B Slippage along faults within Earth's crust
- C Weathering along coastlines
- D Force changes from the moon pulling on Earth

24 When Venus passes between the Earth and the sun, it is visible as a tiny black dot on the sun's bright disk. Why is Mars never visible in this same way?

- F The orbit of Mars is more eccentric than that of Venus.
- G The orbit of Mars is outside that of the Earth's orbit.
- H Mars is too small to be seen against the backdrop of the sun.
- J Mars shines too brightly to be visible against the sun.

25 Wetlands are more prevalent in which physiographic province of Virginia?

- A Coastal Plain
- B Piedmont
- C Blue Ridge
- D Appalachian Plateau

26 If the polar ice caps were to melt, all of the following would occur *except* —

- F increased coastal flooding
- G increased sea level
- H decreased ocean salinity
- J decreased tidal action

27 Caves are found in Virginia's Valley and Ridge province because the area is underlain by —

- A granite
- B shale
- C gneiss
- D limestone

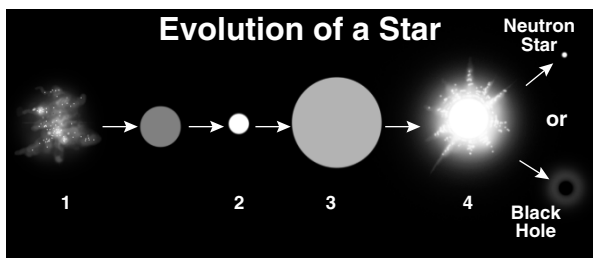
28 What is one of the major indications that the Earth's climate has varied over time?

- F Land forms carved by glaciers in temperate areas
- G Depletion of oxygen in lakes and rivers
- H Ocean currents
- J Magnetic reversals in layers of rock

29 Why does water move more slowly through clay than through humus?

- A Clay has greater permeability.
- B Clay has very small pore spaces.
- C Clay prevents capillary attraction of water.
- D Clay reduces evaporation rates.

30



Which of the above evolutionary stages of a massive star is called a supernova?

- F 1
- G 2
- H 3
- J 4

31 Which of the following minerals, when in the form of sand, can be used to manufacture glass?

- A Gypsum
- B Diamond
- C Calcite
- D Quartz

32 The two *most* common ions found in ocean water are —

- F chloride and sodium
- G potassium and calcium
- H phosphate and nitrate
- J magnesium and sodium

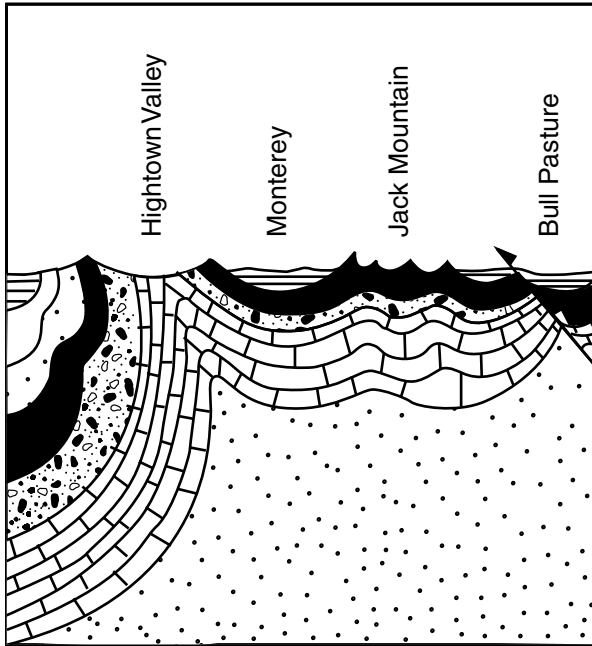
33 If there were a slight increase in the amount of solar energy that reached the Earth, there would be an immediate increase in —

- A erosion
- B evaporation
- C volcanic activity
- D groundwater flow

34 Scientists use volcanoes and earthquake activity to establish —

- F plate boundaries
- G lines of latitude
- H borders between countries
- J the density of rock layers

35



The map shows some of the bedrock in Virginia. Which of these has the oldest exposed bedrock?

- A Hightown Valley
- B Monterey
- C Jack Mountain
- D Bull Pasture

36 Which of the following properties refers to the colored powder resulting from rubbing a mineral against a harder surface?

- F Hardness
- G Luster
- H Cleavage
- J Streak

37 Metamorphic rocks whose minerals are arranged in layers or bands are called —

- A unfoliated
- B nonclastic
- C clastic
- D foliated

38 Slate is a fairly common rock that can be used for roofing shingles. What property makes it *most* suitable for this use?

- F It can be split into thin, flat layers.
- G It feels soft and smooth.
- H It is hard and brittle.
- J It can occur in different colors.

39

Planet	Diameter (kilometers)	Mass (10^{23} kilograms)	Time for Complete Rotation (Earth time)
Mercury	4,878	3.3	58.6 days
Mars	6,787	6.4	1 day
Jupiter	142,800	18,990	10 hours
Saturn	120,540	5,686	11 hours

Which planet rotates the fastest?

- A Mercury
- B Mars
- C Jupiter
- D Saturn

40 Heat and pressure can transform igneous rock into metamorphic rock. What processes can transform igneous rock into sedimentary rock?

- F Heat and pressure
- G Rifting and subduction
- H Erosion and sedimentation
- J Evaporation and condensation

41 Mineral Identification Table

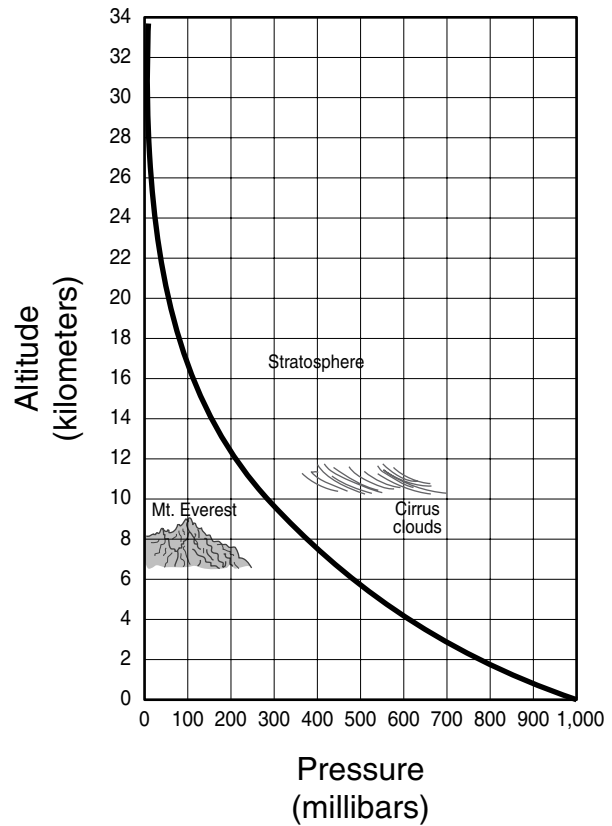
Mineral	Color	Hardness	Crystal
Garnet	yellow-red, green, black	7.5	Cubic
Magnetite	black	6.0	Cubic
Pyrite	light, brassy yellow	6.5	Cubic
Topaz	colorless, various colors	8.0	Orthorhombic

The mineral in the above table that has a blue color and will scratch garnet is —

- A pyrite
- B garnet
- C magnetite
- D topaz

42

Change in Pressure with Altitude



The chart shows the relationship between altitude and air pressure. What is the approximate air pressure at an altitude of 22 kilometers?

- F 40 millibars
- G 120 millibars
- H 200 millibars
- J 400 millibars

43 Which of these is most important in determining how a rock was formed?

- A Color and shape
- B Luster and hardness
- C Composition and texture
- D Size and weight

44 Which of these parts of a saber-toothed cat was *most* likely to become fossilized?

- F Hair
- G Skin
- H Muscles
- J Jaws

45 Government programs to reduce acid rain have resulted in cleaner emissions from U.S. industries in recent years. As a result, the sulfate concentration in rainwater has declined significantly. But the sulfate concentration in some lakes is showing little, if any, change. Why might this be true?

- A There is no connection between emissions from industry and the acidity of lake water.
- B The sulfate in American lakes is actually coming from industries in Europe and Asia.
- C Sulfate that accumulated earlier in the soil is still being flushed into the lakes by run-off.
- D Individual industries produce fewer emissions but the amount of precipitation has increased.

46 Limestone is a valuable resource in Virginia because limestone can be processed to make —

- F plastic
- G steel
- H concrete
- J plywood

47 Lightweight and strong, the metal that has been recycled with the *greatest* success is —

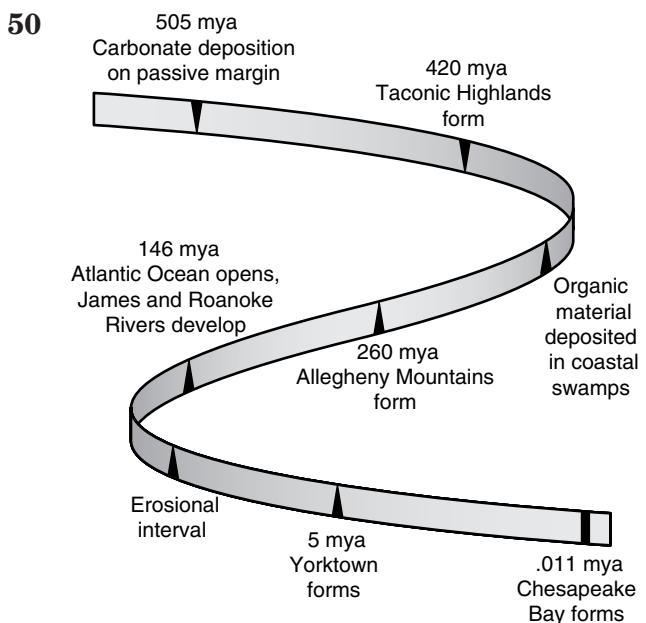
- A steel
- B tin
- C aluminum
- D titanium

48 Photographs of the surface of Mars reveal the presence of sand dunes that shift over time. These dunes demonstrate the presence of what phenomenon on Mars?

- F Precipitation
- G Winds
- H Magnetic pole reversals
- J Plate tectonics

49 Which planet in the solar system has an orbit so eccentric that it crosses the orbit of another planet?

- A Mars
- B Mercury
- C Jupiter
- D Pluto



According to the geologic time chart of Virginia shown above, the *most recent* formation in Virginia is the —

- F Allegheny Mountains
- G Chesapeake Bay
- H James River
- J Taconic Highlands



Answer Key

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