DIRECTIONS
Read each question carefully and choose the best answer.

SAMPLE

These animals are grouped together because all of them —
A live in the water
B are fish
C are warm-blooded
D lay eggs

1 The picture shows dinosaur tracks found in rocks. How many dinosaurs left their tracks here?
A 2
B 4
C 14
D 24

2 Which of these best completes the statement about the interaction of the respiratory system with the circulatory system? The lungs add —
F nutrients to the blood
G bile to the blood
H oxygen to the blood
J carbon dioxide to the blood

3 Which of these will cause water to change to ice?
A Removing heat from the water
B Stirring the water
C Adding salt to the water
D Putting the water in the sunlight
Crickets chirp to attract other crickets. The temperatures and rates of their chirping are graphed above. Which statement below is most likely true for the data represented in the graph?

F The cooler the temperature, the louder the crickets chirp.

G The crickets cannot chirp at temperatures lower than 10°C.

H The warmer the temperature, the more often crickets chirp.

J The temperature and the chirping of crickets are not related.

Which of the following elements belongs to the family indicated?

A Nitrogen belongs to the halogen family.

B Helium belongs to the noble gas family.

C Calcium belongs to the alkali family.

D Sodium belongs to the alkaline earth family.
Lemmings are small mammals that experience a population explosion about once every four years. Snowy owls eat lemmings. Which of these statements is supported by the data in this graph?

F  The snowy owls are becoming extinct.
G  Lemmings live much longer than snowy owls.
H  The habitat of the lemmings is continuously decreasing in size.
J  The snowy owl population increases because of an increase in lemmings.

Which of these has the greatest number of different simple machines?
8 The atom is composed of electrons, protons, and neutrons. What is the electric charge on the neutron?

F  -1
G  +1
H  0
J  +2

9 A tick that feeds on the blood of animals is a —

A  predator
B  host
C  competitor
D  parasite

10 The distance between one point on a compression and the corresponding point on the next compression in a sound wave is called a —

F  wavelength
G  rarefaction
H  crest
J  trough

11 Which of the following do typical plant cells have that typical animal cells do not?

A  Cytoplasm
B  Nuclei
C  Mitochondria
D  Chloroplasts

12 What is the mass of the rock?

F  335.6 g
G  350.6 g
H  354.6 g
J  356.0 g
The picture shows the results of putting a drop of orange ink from a marking pen on a piece of filter paper and allowing the colors in the ink to separate. About how much farther on the filter paper has the yellow pigment moved than the red pigment?

A 0.5 cm  
B 1.6 cm  
C 2.7 cm  
D 3.5 cm

Note that due to varying printer properties, measurement items may not appear in exact proportions.

14 The kangaroo rat is able to get all of the water it needs through its food and, therefore, never needs to drink liquids. This animal has adapted to survive in which biome?

F Forest  
G Tundra  
H Desert  
J Grassland

15 The science of astronomy is concerned with the observation and analysis of the movements of celestial objects. The invention of which instrument was most helpful to the advancement of astronomy?

A Telescope  
B Microscope  
C Camera  
D Geiger counter
16  There are many reasons why the use of oil needs to be managed carefully. Which of the following is not one of these reasons?

F  There are only limited supplies of oil in the Earth.
G  Oil spills at sea have killed many marine animals.
H  Burning oil contributes to acid rain and the greenhouse effect.
J  Oil was created by plants and animals.

17  Several centuries ago, men called alchemists tried to transform common metals into gold. Even though they tried many different chemical and physical methods, they never succeeded because —

A  they could not heat common metals to extremely high temperatures
B  the common metals they worked with were not pure
C  they did not add the correct material to the common metal
D  elements cannot be changed to other elements by physical or chemical means

18  The chart shows the results of an experiment to test the effects of different plant lights on plant seedling growth. Which group of plants showed the greatest gain in height?

<table>
<thead>
<tr>
<th>Group</th>
<th>Group Size</th>
<th>Brand of Artificial Plant Light</th>
<th>Average Height Before Using Plant Light (cm)</th>
<th>Average Height 2 Weeks After Using Plant Light (cm)</th>
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<tbody>
<tr>
<td>1</td>
<td>25</td>
<td>A</td>
<td>5.4</td>
<td>28.0</td>
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<tr>
<td>2</td>
<td>25</td>
<td>B</td>
<td>5.3</td>
<td>27.0</td>
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<td>3</td>
<td>25</td>
<td>C</td>
<td>5.2</td>
<td>28.0</td>
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<td>4</td>
<td>25</td>
<td>D</td>
<td>5.5</td>
<td>25.5</td>
</tr>
</tbody>
</table>

F  Group 1
G  Group 2
H  Group 3
J  Group 4
19 Mercury is a liquid metal that is used in many thermometers. The mercury in the thermometer rises because it —

A is sucked upward by vacuum
B expands when heated
C is compressed by air pressure
D increases in density when heated

20 Which of these could cause a decrease in the number of squirrels in a population?

F An increase in cooperation with birds in the area
G An increase in the squirrels’ territory
H An increase in competition with other nut-eating animals
J An increase in the squirrels’ food supply

21 The picture represents five red blood cells seen through a microscope. The lines represent a scale also visible through the microscope. Each division on the scale represents one micrometer. Use the scale to estimate the diameter of the average red blood cell.

A 4—5 micrometers
B 7—8 micrometers
C 10—11 micrometers
D 12—13 micrometers
22 Which level of organization below is the most basic or primary level of organization?

F Cell
G Tissue
H Organ
J Organ system

23 Ellen noticed that she often sneezes when she visits her friend Robert, who has a cat and a parrot. Ellen wonders if she may have allergies to Robert’s pets and decides to conduct a scientific investigation. What should Ellen do next?

A Ellen should tell Robert that she cannot visit him until he gives away his pets.
B Ellen should visit Sue who has a horse, a dog, a goldfish, and a hamster.
C Ellen should call her doctor and insist that she needs shots for allergies.
D Ellen should visit a friend who has only cats and one who has only parrots.

24 Because burning fossil fuels creates much pollution, alternatives are being investigated. What might limit the use of wind as a major energy source?

F The strength of the wind varies.
G Wind machines have huge blades to capture the wind.
H Turbines and generators in the wind machines create electricity.
J Wind power does not create pollution.

25 Sponges are classified as animals because they cannot —

A move from place to place
B make their own food
C get rid of waste products
D catch their own food

26 Which of the following is shown in this diagram?

F Alternating current
G Short circuit
H Series circuit
J Parallel circuit

27 Which of the following is a physical property of copper?

A Ductile, can be drawn into a wire
B Liquid at room temperature
C Readily reacts with water to form an acid
D Readily reacts with oxygen
28 Northern garter snakes exhibit a unique behavior in which they gather in deep dens by the hundreds or thousands. They then coil together in a huge ball. This behavior could help to —

F  reduce heat loss  
G  increase camouflage  
H  locate food sources  
J  increase oxygen consumption

29 When plants perform photosynthesis, they use sunlight to produce food. This is an example of light energy being converted to —

A  heat energy  
B  electrical energy  
C  mechanical energy  
D  chemical energy

30 Number of Moths By Year (x100)

<table>
<thead>
<tr>
<th>Kind of Moth</th>
<th>1800</th>
<th>1850</th>
<th>1875</th>
<th>1900</th>
<th>1925</th>
<th>1950</th>
<th>1975</th>
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<tr>
<td>light</td>
<td>100</td>
<td>97</td>
<td>90</td>
<td>65</td>
<td>21</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>dark</td>
<td>0</td>
<td>3</td>
<td>10</td>
<td>35</td>
<td>79</td>
<td>90</td>
<td>93</td>
</tr>
</tbody>
</table>

Scientists have spent many years studying the peppered moth, which is a species that has adapted its color from light to dark in reaction to environmental pollution. Which of the following line graphs represents the data from the table?
31 Mendel's early work with pea plants demonstrated a significant genetic discovery. The crossing of homozygous tall pea plants with homozygous short pea plants always resulted in tall plants and demonstrated that tallness in pea plants is a trait that is —

A blended  
B dominant  
C mutated  
D recessive

32 At which of these points is it 12:00 noon?

F 1  
G 2  
H 3  
J 4

33 Which of the following is an example of kinetic energy?

A A baseball moving from the pitcher to the catcher  
B A rock sitting on the top of a large hill  
C A pendulum at the top of its swing  
D A new flashlight battery

34 Many scientists believe that nuclear fusion will become a possible energy source within the next 10 years. What resource would be most effective in tracking the progress of this energy source?

F The local newspaper  
G A chemical encyclopedia  
H A physics textbook  
J Scientific periodical

35 Objects with like charges repel and unlike charges attract. The girl's hair and the comb have —

A unlike charges  
B like charges  
C neutral charges  
D no charges
The loss of which of these would have the least effect on the water cycle?

F  Soil
G  Rivers
H  Animals
J  Plants

Which of these processes helps extract energy from food?

A  Reproduction
B  Digestion
C  Excretion
D  Circulation

Which of these is a change in chemical composition?

F  A lake freezes solid.
G  Gravel, sand, and water are mixed.
H  A copper bar is rolled into a flat sheet.
J  Vinegar bubbles when baking soda is added.

The picture shows a test for non-slip surfaces to be used on a ramp. Which of these must be done to provide more meaningful results?

A  Use the same shoe on each surface
B  Use boards of the same thickness
C  Use the same shoe size for each type of shoe
D  Use shoes with soles designed for sports
### Table: Average Distance from Sun (kilometers)

<table>
<thead>
<tr>
<th>Planet</th>
<th>Average Distance from Sun (kilometers)</th>
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</thead>
<tbody>
<tr>
<td>Earth</td>
<td>149.5 million</td>
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<tr>
<td>Jupiter</td>
<td>777.3 million</td>
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<tr>
<td>Mars</td>
<td>227.9 million</td>
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<tr>
<td>Mercury</td>
<td>57.9 million</td>
</tr>
<tr>
<td>Venus</td>
<td>108.2 million</td>
</tr>
</tbody>
</table>

According to this chart, which planet will most likely have the highest temperatures?

- **F** Earth
- **G** Mars
- **H** Mercury
- **J** Venus

### Diagram: Magnetic Field

At which point is the magnetic field the strongest?

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

### Diagram: Animal Habitat

The picture above illustrates the habitat of a population of animals and its distance from the nearest water source. How far does an animal have to travel to obtain water?

- **A** 6 centimeters
- **B** 12 meters
- **C** 50 meters
- **D** 300 meters

According to this diagram, both of these fish —

- **A** eat bacteria
- **B** give off toxic wastes
- **C** take in minerals through their gills
- **D** get their energy from other animals
44 Most of the hereditary information within the cell is carried in the —

F ribosomes  
G vacuoles  
H chromosomes  
J Golgi bodies

45 The time in which Earth makes one revolution around the sun is approximately one —

A year  
B season  
C month  
D day

46 Which picture illustrates the structure of a molecule of water?

- [Image of water molecule options]

He — He

O

He

O

H

O

H

O
These birds all live in Virginia. One of the bird’s main sources of food is the nectar inside long, trumpet-shaped flowers. A second bird eats mostly rodents. The third bird often is seen pecking into the bark of the local trees to get the insects just inside. Which of the following lists has correctly matched the pictured birds with their diets?

A Ruby-throated Hummingbird–nectar; Red-tailed Hawk–insects; Yellow-bellied Sapsucker–rodents
B Ruby-throated Hummingbird–insects; Red-tailed Hawk–nectar; Yellow-bellied Sapsucker–rodents
C Ruby-throated Hummingbird–rodents; Red-tailed Hawk–nectar; Yellow-bellied Sapsucker–insects
D Ruby-throated Hummingbird–nectar; Red-tailed Hawk–rodents; Yellow-bellied Sapsucker–insects
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