Student Name: _____

# MISSISSIPPI *Science Test*

## Grade 8 Test Booklet

## Practice Test 3

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**Mississippi Department of Education**
**Office of Student Assessment**

RIVERSIDE

HOUGHTON MIFFLIN HARCOURT

# Science

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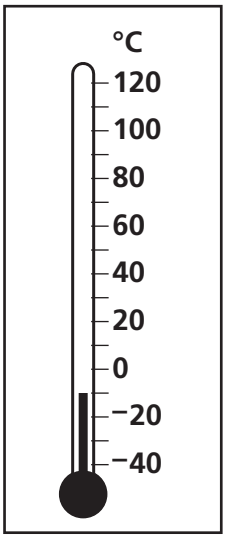
## Sample Items

**1. Look at the following thermometer. The thermometer measures temperature in degrees Celsius (°C).**




**What is the temperature shown on the thermometer?**

A. 10°C

B. 0°C

C. −5°C

D. −10°C

**2. What type of tissue is attached to the skeletal system and helps bones move?**

F. Muscle tissue

G. Cardiac tissue

H. Adipose tissue

J. Epithelial tissue

STOP

**Mark your answers for questions 1–60 on your answer document. Mark only one answer for each question. You may write in your test booklet, but you must mark your answers on your answer document.**

**1. Cellular respiration converts the energy stored in sugars to high-energy molecules called ATP.**

**Which cell structure carries out cellular respiration?**

A. Nucleus
B. Chloroplast
C. Mitochondrion
D. Endoplasmic reticulum

**2. Which of these describes the lithosphere?**

F. Topmost solid part of Earth in which crust is located
G. Middle liquid, flowing layer of Earth on which crust floats
H. Middle plastic, flowing layer of Earth on which the asthenosphere floats
J. Topmost semisolid part of Earth in which magma chambers for volcanoes form

**3. The following chemical equation shows the process of photosynthesis.**

$$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$$

**What is the common name of $C_6H_{12}O_6$?**

A. Sugar
B. Water
C. Table salt
D. Baking soda

**4. Which of these describes a pathogen that infects a human by injecting its DNA into a body cell?**

F. A parasite that robs the cell of nutrients, interfering with organ functions
G. A bacterium that creates a toxin that destroys the cell, keeping the cell from working in a normal manner
H. A fungus that eats keratin found in skin cells, causing inflammation and interfering with the skin tissues' ability to protect
J. A virus that changes the way a cell works, causing the cell to make more viruses instead of performing its intended function



GO ON

**5. The following picture shows Tasha pulling a wagon holding her brother.**

**Tasha notices that even though she stops pulling the wagon, her brother's body moves forward. Which of Newton's laws of motion explains Tasha's observation?**

A. The first law, in which an object moves forward in a straight line unless acted upon by an outside force

B. The second law, in which force is a product of an object's acceleration and mass

C. The third law, in which every action has an equal and opposite reaction

D. The fourth law, in which energy is never lost but is transformed from one object to another



GO ON

**6. Sara wants to know if lithium (Li) and bromine (Br) will bond. She uses the following table to find the properties of the two elements.**

## Periodic Table of Elements

| Period \ Group | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 H Hydrogen 1.01 | | | | | | | | | | | | | | | | | 2 He Helium 4.00 |
| 2 | 3 Li Lithium 6.94 | 4 Be Beryllium 9.01 | | | | | | | | | | | 5 B Boron 10.81 | 6 C Carbon 12.01 | 7 N Nitrogen 14.01 | 8 O Oxygen 16.00 | 9 F Fluorine 19.00 | 10 Ne Neon 20.18 |
| 3 | 11 Na Sodium 22.99 | 12 Mg Magnesium 24.31 | | | | | | | | | | | 13 Al Aluminum 26.98 | 14 Si Silicon 28.09 | 15 P Phosphorus 30.97 | 16 S Sulfur 32.07 | 17 Cl Chlorine 35.45 | 18 Ar Argon 39.95 |
| 4 | 19 K Potassium 39.10 | 20 Ca Calcium 40.08 | 21 Sc Scandium 44.96 | 22 Ti Titanium 47.88 | 23 V Vanadium 50.94 | 24 Cr Chromium 52.00 | 25 Mn Manganese 54.94 | 26 Fe Iron 55.85 | 27 Co Cobalt 58.93 | 28 Ni Nickel 58.69 | 29 Cu Copper 63.55 | 30 Zn Zinc 65.39 | 31 Ga Gallium 69.72 | 32 Ge Germanium 72.61 | 33 As Arsenic 74.92 | 34 Se Selenium 78.96 | 35 Br Bromine 79.90 | 36 Kr Krypton 83.80 |
| 5 | 37 Rb Rubidium 85.47 | 38 Sr Strontium 87.62 | 39 Y Yttrium 88.91 | 40 Zr Zirconium 91.22 | 41 Nb Niobium 92.91 | 42 Mo Molybdenum 95.94 | 43 Tc Technetium 98.00 | 44 Ru Ruthenium 101.07 | 45 Rh Rhodium 102.91 | 46 Pd Palladium 106.42 | 47 Ag Silver 107.87 | 48 Cd Cadmium 112.41 | 49 In Indium 114.82 | 50 Sn Tin 118.71 | 51 Sb Antimony 121.76 | 52 Te Tellurium 127.60 | 53 I Iodine 126.91 | 54 Xe Xenon 131.29 |
| 6 | 55 Cs Cesium 132.91 | 56 Ba Barium 137.33 | 57 La Lanthanum 138.91 | 72 Hf Hafnium 178.49 | 73 Ta Tantalum 180.95 | 74 W Tungsten 183.85 | 75 Re Rhenium 186.21 | 76 Os Osmium 190.20 | 77 Ir Iridium 192.22 | 78 Pt Platinum 195.08 | 79 Au Gold 196.97 | 80 Hg Mercury 200.59 | 81 Tl Thallium 204.38 | 82 Pb Lead 207.20 | 83 Bi Bismuth 208.96 | 84 Po Polonium 208.98 | 85 At Astatine 210.00 | 86 Rn Radon 222.00 |
| 7 | 87 Fr Francium 223.00 | 88 Ra Radium 226.00 | 89 Ac Actinium 227.03 | 104 Rf Rutherfordium (261) | 105 Db Dubnium (262) | 106 Sg Seaborgium (263) | 107 Bh Bohrium (264) | 108 Hs Hassium (265) | 109 Mt Meitnerium (268) | | | | | | | | | |

**Which statement describes the type of bond formed from these two elements?**

F. Both Li and Br are metals that will form a metallic bond.

G. Li is a metal and Br is a nonmetal that will form an ionic bond.

H. Li is a nonmetal and Br is a metal that will form a covalent bond.

J. Both Li and Br are transition metals that will form a metalloid bond.



GO ON

7. **A family adds solar panels to their home. How will the addition of these solar panels affect the power grid?**

   A. Any unused power created from the panels will remain at the house and not be added to the power grid.

   B. The added voltage will overload the grid, overheating transmission lines and tripping circuit breakers at the power station.

   C. The added voltage will flow in the opposite direction on the grid, decreasing the total power available to other customers.

   D. Any unused power created by the panels will be added to the grid, increasing the amount of electricity available to other customers.

8. **Astronomers use instruments that orbit Earth in order to detect cosmic x-rays emitted by stars.**

   **Which of these explains why these instruments must be located in Earth's orbit in order to work properly?**

   F. Cosmic x-rays are too weak to reach Earth's surface.

   G. Earth's atmosphere absorbs much of the cosmic radiation.

   H. The only sources of cosmic rays are far from our solar system.

   J. Earth's orbit traps x-rays so they can be detected by instruments.

9. **Scientists are researching the use of natural products in technologies.**

   **Which of these is a justifiable reason supporting this research?**

   A. Using natural substances makes stronger products.

   B. Using natural substances reduces the cost of manufacturing.

   C. Using natural substances replaces the need for renewable energy sources.

   D. Using natural substances reduces the amount of waste that cannot decompose in landfills.

10. **Bacteria on the roots of soybean plants are able to change nitrogen from the air into a form usable by plants. Scientists have engineered other plants to support the growth of these nitrogen-fixing bacteria.**

    **Which of these describes a benefit of this research?**

    F. The need for space will decrease, allowing more land to be available for other crops.

    G. The need for water will decrease, allowing more water to be available for other crops.

    H. The need for fertilizer will decrease, reducing both the amount of fertilizer runoff and the algae growth in streams and ponds.

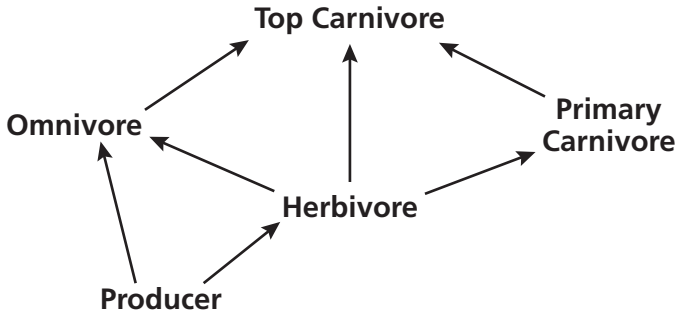
    J. The need for pesticides will decrease, reducing both the amount of chemicals applied to crops and the pollution of the water table.



GO ON

**11. The following food web shows the flow of energy between organisms in an ecosystem.**

**Ecosystem Food Web**




**More producers are introduced into the ecosystem. How will this introduction likely affect the other organisms in the ecosystem?**

A. The additional producers may not affect the other organisms because there is plenty of room in the ecosystem for plants.

B. The number of organisms may decrease because the producers will require more energy, which they will receive from the other organisms.

C. The additional producers may decrease the number of herbivores because they may outcompete the herbivores for energy from the omnivores.

D. The number of organisms may increase because plants provide energy to primary consumers, which then transfer energy to the carnivores.



GO ON

**12. Ethan investigated which of three liquids had the highest boiling point. He put equal amounts of liquid in different beakers and placed each beaker over the same amount of heat. To compare the liquids' boiling points, he measured how long it took for each liquid to boil. The following table shows his results.**

**Amount of Time for Liquid to Boil**

| Liquid | Time (seconds) |
|---|---|
| A | 94 |
| B | 230 |
| C | 196 |

**Ethan concluded that Liquid B had the highest boiling point.**

**Which of these led to this conclusion?**

F. Qualitative observation of how hot the liquids got

G. Quantitative measurement of how hot the liquids got

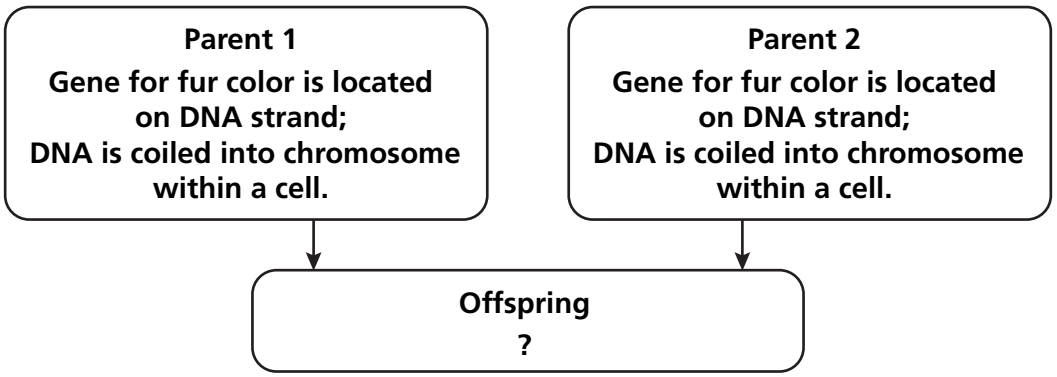
H. Qualitative observation of how long it took for the liquids to boil

J. Quantitative measurement of how long it took for the liquids to boil



GO ON

**13. Lisa notices that her pet rabbits have similar fur color to their parents. Lisa draws the following diagram to show how fur color passes from the parents to the offspring.**




**Which offspring description will complete the diagram?**

A.
- Offspring receives two DNA strands from each parent.
- DNA strands contain chromosomes.
- Chromosomes from Parent 1 determine appearance of fur.

B.
- Offspring receives half of DNA strand from each parent.
- Each half of DNA strand connects to form chromosome.
- One chromosome determines appearance of fur.

C.
- Offspring receives a set of two chromosomes, one from each parent.
- Chromosomes contain DNA strands.
- DNA strands contain genes.
- A pair of genes determines appearance of fur.

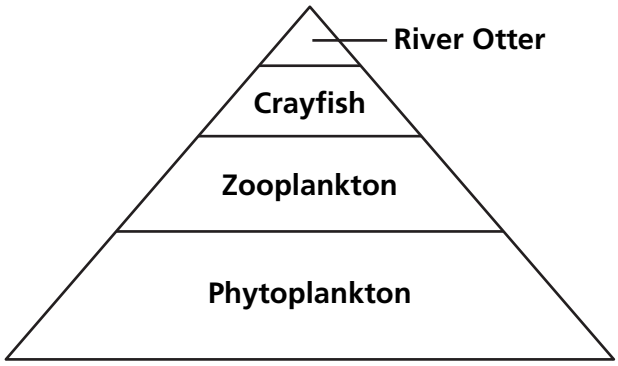
D.
- Offspring receives a set of two chromosomes, one from each parent.
- Chromosomes contain genes.
- Genes contain DNA strands.
- Two sets of DNA strands determine appearance of fur.



GO ON

**14. The following diagram shows an energy pyramid for a wetland in Mississippi.**

**Energy Pyramid of Mississippi Wetland**




**Which conclusion is supported by this diagram?**

F. River otters are tertiary consumers and have the least energy available to them.

G. Crayfish are secondary consumers and have the most energy available to them.

H. Phytoplankton are primary producers and have the least energy available to them.

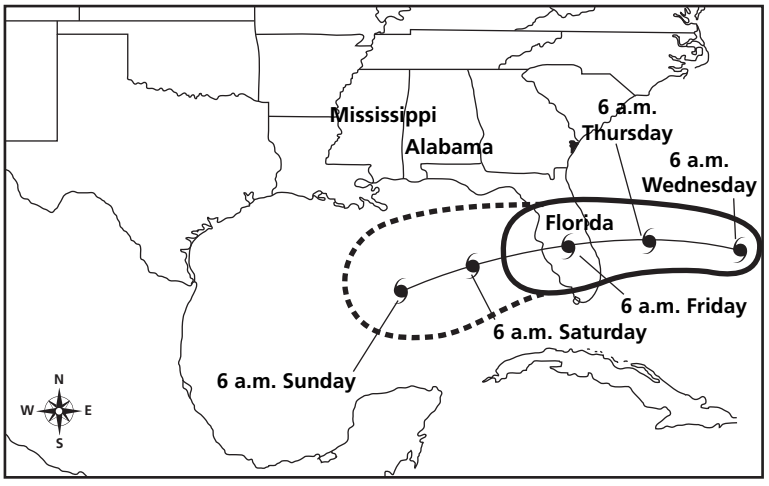
J. Zooplankton are secondary producers and have the most energy available to them.



GO ON

**15. The following map shows the predicted range of a hurricane's location over a 3-day period and a 5-day period.**

**Hurricane Prediction Track**




**Key**

**= hurricane**
**= 1–3 day track**
**= 4–5 day track**

**Based on the information in the map, what is the likelihood that the hurricane will make landfall in southern Alabama?**

A. There is no chance because the predicted path is too far south.

B. There is a small chance because of possible changes in the hurricane's path.

C. Chances are good because another hurricane will deflect the hurricane into southern Alabama.

D. There is no chance because the hurricane will make landfall in Florida and weaken significantly.



GO ON

16. **Bubbles form when an acid is mixed with baking soda, a base. Allie wanted to know which household liquids are acids. She mixed several household liquids with two different white powders, baking soda and powdered sugar. The following data show her findings.**

| Liquid | Forms Bubbles with Baking Soda? | Forms Bubbles with Powdered Sugar? |
|---|---|---|
| Lemon juice | Yes | No |
| Water | No | No |
| Milk | No | No |
| Vinegar | Yes | No |
| Dish soap | No | No |

**Which statement uses evidence from the table to form a conclusion?**

F. Water, milk, and dish soap must be acids because they did not form bubbles when mixed with baking soda.

G. Lemon juice and vinegar must be acids because they did not form bubbles when mixed with powdered sugar.

H. Water, milk, and dish soap must not be acids because they did not form bubbles when mixed with baking soda.

J. Lemon juice and vinegar must not be acids because they did not form bubbles when mixed with powdered sugar.



GO ON

**Directions: Use the information below to answer questions 17 through 19.**

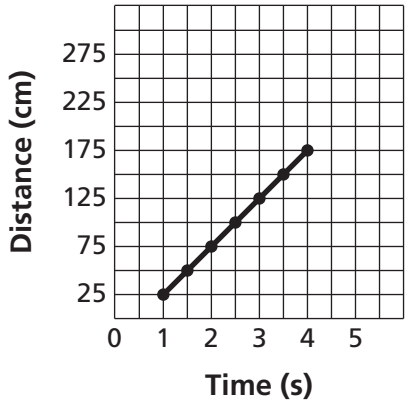
**Roll with It**

**Tara and Cory investigated the motion of an object for a school science project. They wanted to know whether ramp height affected the distance a toy car would roll. They used a 30-centimeter long board for the ramp. For the first trial, they placed the board flat on the floor. For the other trials, they propped the board up to 5-, 10-, and 15-centimeter heights. For each trial, Tara placed the same 5-gram toy car at the top of the board. She released the toy car and Cory measured the time, in seconds (s), the toy car traveled on the flat floor until it stopped. Tara measured the distance the toy car traveled on the floor, in centimeters (cm). Cory calculated the average speed during each trial in centimeters per second $\left(\frac{\text{cm}}{\text{s}}\right)$. The following table shows all their data, and the graph shows the motion of the toy car in Trial 2.**

**Toy Car Rolling Data**

| Trial | Ramp height (cm) | Ramp angle (degrees) | Distance (cm) | Time (s) |
|---|---|---|---|---|
| 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2 | 5.0 | 9.0 | 175.0 | 4.0 |
| 3 | 10.0 | 16.0 | 300.0 | 6.0 |
| 4 | 15.0 | 23.5 | 485.0 | 8.7 |

**Motion of Toy Car in Trial 2**




**While setting up their investigation, Cory placed the 7-gram stopwatch on the floor in front of the ramp during Trial 3. Tara accidentally bumped the ramp, causing the toy car to roll down the ramp and hit the stopwatch, which was at rest. They moved the stopwatch, repeated the trial, and recorded the data, as shown above.**



GO ON

**17. If the Trial 2 toy car had not stopped rolling and had continued in a straight line, how far would the car have rolled at 5 seconds?**

A. 200 cm

B. 225 cm

C. 250 cm

D. 275 cm

**18. Based on the data, what is the cause-and-effect relationship between the ramps and the toy cars?**

F. The farther the toy cars rolled, the longer the ramps.

G. The slower the toy cars, the greater the ramps' angle.

H. The shorter the ramps, the greater the speed of the toy cars.

J. The greater the ramps' angle, the farther the toy cars rolled.

**19. Which description applies to the toy car on Trial 1?**

A. An object at rest will stay at rest.

B. For every action, there is an equal and opposite reaction.

C. The rate at which an object falls is dependent upon the height from which the object is dropped.

D. The force needed to move an object is dependent upon the mass and acceleration of the object.



GO ON

**20. Until recently, a certain type of fossil in rock beds was thought to be about 10,000 years old. A new, more accurate way of dating rock samples shows that it is actually 40,000 years old. However, this new evidence does not match scientists' current explanations for how this species came to the area.**

**Why should scientists revise their current explanations for how this species came to the area?**

F. Fossils that are older than 10,000 years are extremely rare.

G. Newer explanations are more correct than older explanations.

H. The current explanations were based on less-accurate dating methods.

J. Revising explanations every few years is a part of the scientific method.

**21. Which situation is an example of Newton's third law of motion?**

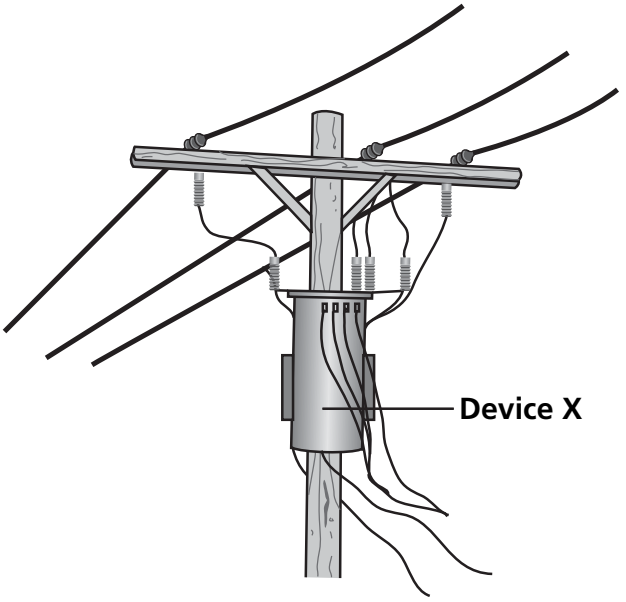
A. A ball in a vacuum container moves in a straight line at a constant velocity.

B. A ball in a vacuum container accelerates when kicked with a great amount of force.

C. A person riding in a forward-moving car continues to move forward when the car stops suddenly.

D. A person in a canoe moves the paddle backward in the water, and the canoe moves forward in the water.

**22. The following image shows Device X, found in a power grid system.**




**What is the role of this device within the electrical grid system?**

F. It is a generator that produces the current needed inside the home.

G. It is a distributor that diverts power from the distribution line to the home.

H. It is a transformer that reduces the voltage between the power line and the home.

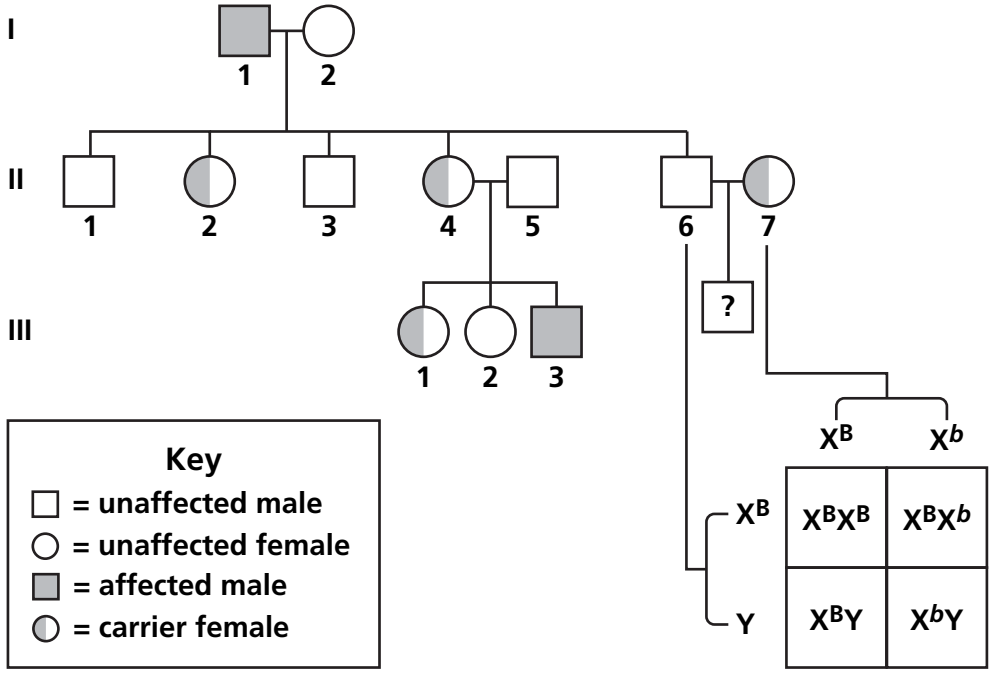
J. It is a regulator that limits the amount of electric power in the wire to the home.



GO ON

**23. Some people are unable to see red and green colors. This condition, colorblindness, is a recessive trait carried on the X chromosome, $X^b$. The following pedigree shows a family in which some individuals are affected by colorblindness.**

**Family Pedigree Showing Colorblindness Trait**




**Family members 6 and 7 in Generation II are expecting a son. The father's genotype is $X^BY$, while the mother's is $X^BX^b$, as shown in the Punnett square.**

**Which of the following describes the possibility of this son being colorblind?**

A. Zero percent, because the father is not colorblind

B. Twenty-five percent, because in the Punnett square, only one box out of four shows an affected male

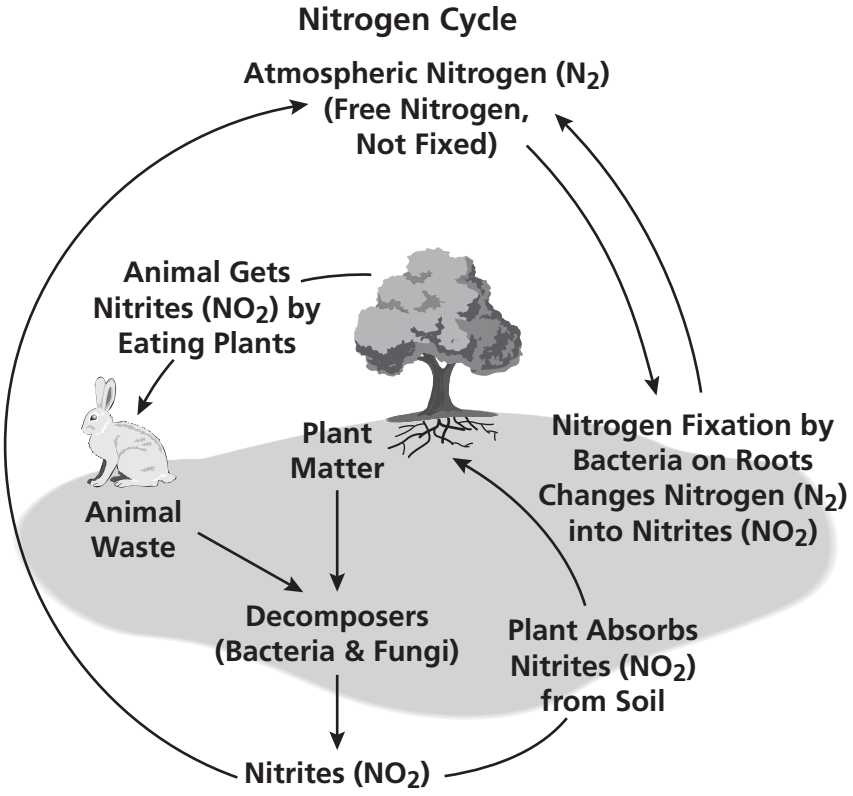
C. Fifty percent, because only one of the two males in the Punnett square has the genotype for being affected

D. One hundred percent, because the mother will pass the colorblindness trait to all offspring through her X chromosome



GO ON

**24. The following diagram shows the nitrogen cycle.**




**Animals need nitrite ($NO_2$) to make proteins. Nitrogen ($N_2$) is found in the air but is not in a form that animals can use. Through the nitrogen cycle, nitrogen from the atmosphere becomes nitrite.**

**Which of these can be concluded about the importance of bacteria in the nitrogen cycle?**

F. Bacteria are important because they make nitrites that animals need.

G. Bacteria are important because they change nitrogen into nitrites that animals need.

H. Bacteria are important because they allow plant roots to absorb nitrites from the air.

J. Bacteria are important because they decompose plant matter that compete with living plants for nitrites.



GO ON

**25. Benito studied magnetic fields. He learned that a magnetic field is created when an electric current passes through a wire. He found the following data showing how the magnetic field strength changes with distance from the wire.**

**Strength of Magnetic Field**

| Distance from Wire (centimeters) | Magnetic Field Strength (microtesla) |
|---|---|
| 0.5 | 100 |
| 1.0 | 50 |
| 2.0 | 25 |
| 3.0 | 17 |
| 5.0 | 10 |

**Benito wanted to know the magnetic strength 10 centimeters away from the wire.**

**Which summary of data provides a logical prediction for Benito?**

A.
- The magnetic field strength increases as the distance from the wire increases.
- The field strength at 10 centimeters will be 1 microtesla.

B.
- The magnetic field strength decreases as the distance from the wire increases.
- The field strength at 10 centimeters will be 5 microteslas.

C.
- The magnetic field strength decreases linearly as the distance from the wire increases.
- The field strength at 10 centimeters will be 1 microtesla.

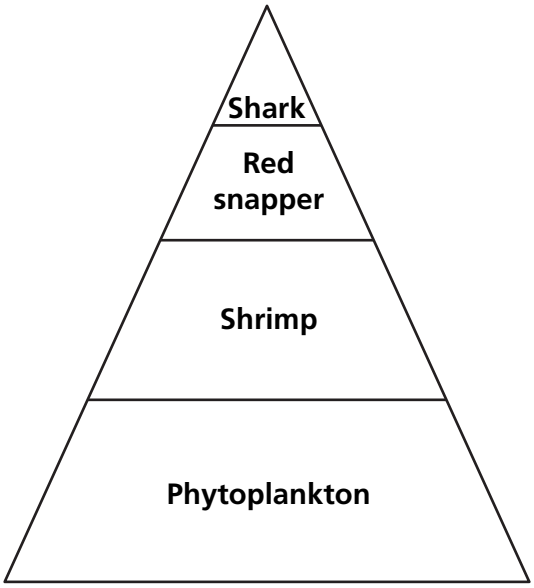
D.
- The magnetic field strength increases linearly as the distance from the wire increases.
- The field strength at 10 centimeters will be 5 microteslas.



GO ON

**26. The following diagram shows an energy pyramid for an area within an ocean ecosystem.**

**Food Energy Pyramid**




**How is the shape of the pyramid related to energy flow within the ecosystem?**

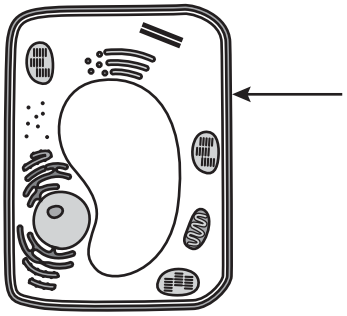
F. Most energy is concentrated at the highest trophic level.

G. Energy is equally distributed among the organisms in each trophic level.

H. Only a small amount of energy is available to organisms in ocean ecosystems.

J. Only a small amount of energy from one trophic level is available to organisms at the next highest level.

**27. Nate used a microscope to view a cell. He drew the following sketch with an arrow pointing to an unknown structure.**



**Which of these describes the unknown structure in Nate's sketch?**

A. Vacuole in a plant cell

B. Nucleus in an animal cell

C. Cell wall around a plant cell

D. Cell membrane around an animal cell

**28. Twice a year on Earth, the number of hours of darkness is equal to the number of hours of sunlight. These events, where both day and night are 12 hours, are the spring and autumn equinoxes.**

**Which of these describes the orientation of the sun and Earth on these two days?**

F. Earth is located at its most distant point away from the sun.

G. The tilt of Earth's axis is neither toward nor away from the sun.

H. The axes of the sun and Earth are pointed in the same direction.

J. Earth is located at its closest point to the sun, and its axis is pointed away from the sun.



GO ON

29. **Greg is studying a grassland system. His data show that the area experiences a short drought every year. During this drought, the amount of vegetation is reduced, and little water is available.**

    **Which adaptations provide an organism with the greatest chance for surviving the drought?**

    A.
    - Long tongue for catching insects
    - Able to camouflage to avoid predators

    B.
    - Thick, white fur that reflects heat from the sun
    - Able to hibernate for long period of time

    C.
    - Long neck to reach vegetation in tall trees
    - Able to survive long periods without water

    D.
    - Horns for defense when competing for vegetation
    - Able to run away from predators quickly

30. **The raising of catfish is a major industry in Mississippi. Catfish farmers in Mississippi want scientists to research diseases affecting catfish. The following list describes the farmers' reasons for wanting catfish diseases researched:**

    1) **Understanding catfish diseases may lead to preventing these diseases.**
    2) **Researching catfish diseases may help prevent diseases in other fish.**
    3) **Curing catfish diseases may allow catfish farmers to raise more, healthier fish.**
    4) **Studying catfish diseases may create catfish medications that the farmers could sell to earn a profit.**

    **Which reasons from the list are logical justifications for researching catfish diseases?**

    F. 1 and 4 only

    G. 2 and 3 only

    H. 1, 2, and 3 only

    J. 2, 3, and 4 only



GO ON

**31. The mayor of a town wants to conserve resources and reduce global warming. A committee of engineers suggests building a hydropower plant instead of one that burns fossil fuels. A hydropower plant generates electricity by harnessing the force of flowing water.**

**Which justification for building the hydropower plant is logical and supports the mayor's wish?**

A. Water flowing through a hydropower plant is renewable and does not emit greenhouse gases.

B. The soil from which a dam is dug for a hydropower plant can be packaged and sold, providing extra income for the town.

C. A road can be built on top of the dam so that a separate bridge does not have to be built to connect the land on either side of the river.

D. A hydropower plant will cause more water to flow through rivers, increasing the water's renewability and helping fresh water reach wetland ecosystems.

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**32. The following table shows data about hydrogen and oxygen.**

| Element Name | Hydrogen | Oxygen |
|---|---|---|
| Periodic Table Location | Column 1 | Column 16 |
| Element Box on Periodic Table | 1 H Hydrogen 1.01 | 8 O Oxygen 16.00 |
| Electron Dot Diagram | ·H | :Ö: |

**How many bonds form when hydrogen and oxygen combine?**

F. 1

G. 2

H. 3

J. 4



GO ON

**33. Scientists found an organism that can live without water for long periods of time. The scientists made copies of its DNA, then injected this new DNA into corn.**

**Which of these describes the process the scientists used?**

A. Cloning

B. Selective breeding

C. Genetic engineering

D. Asexual reproduction

**34. Which of these describes how the absence of mitochondria would affect a cell?**

F. Heat would build up and cause the cell to become dehydrated because mitochondria release energy.

G. Toxins would collect and slow the production of ATP because mitochondria remove waste from cells.

H. Cells would be unable to undergo cellular respiration because mitochondria convert glucose into energy.

J. Cells would be unable to undergo fermentation because mitochondria convert carbohydrates into sugars.

**35. One proposal for reducing global warming is to decrease the use of fossil fuels and increase the use of renewable energy.**

**Which statement explains why using renewable energy will help reduce global warming?**

A. Renewable energy sources are more efficient than fossil fuels.

B. Renewable energy sources produce fewer greenhouse gases than fossil fuels.

C. Fossil fuels require more expensive technology than renewable energy sources.

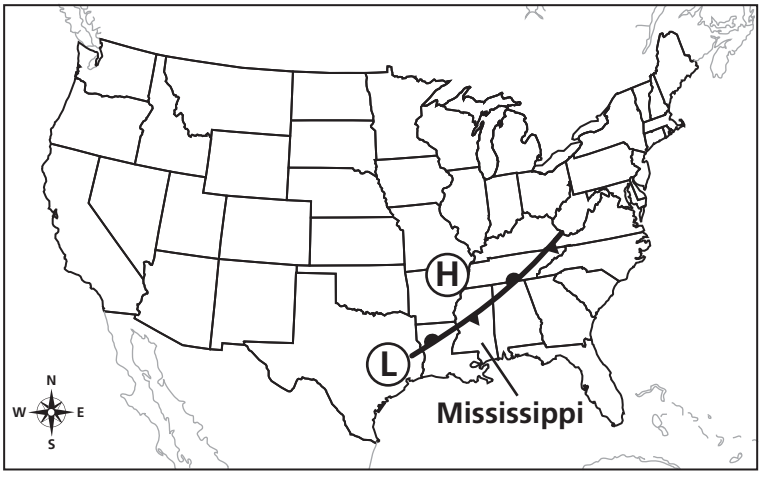
D. Fossil fuels produce chemicals that destroy ozone, but renewable energy sources do not.



GO ON

**36. A cold front traveling southeast collided with a warm front traveling northwest. The following map shows the weather on Monday, the day the two fronts collided.**

**Weather Map for Monday**




**Key**
**L = low pressure**
**H = high pressure**
**= front**

**Which of these describes the weather forecast for Mississippi on Tuesday and Wednesday?**

F. Tuesday: cold temperatures with light snow
Wednesday: warm temperatures with clear skies

G. Tuesday: thunderstorms with heavy rainfall
Wednesday: cold temperatures with sleet and rain

H. Tuesday: cloudy with rainfall on and off during the day
Wednesday: windy in the morning, clear skies in the afternoon

J. Tuesday: cold temperatures with clear skies
Wednesday: clear skies in the morning, windy with light rain in the afternoon



GO ON

**37. Laura is studying a species of fish living around an ocean reef system. She lists the following observations:**

- **Males have brightly colored scales to attract the females for mating.**
- **Females are brown without brightly colored scales.**
- **The fish species normally has few predators.**
- **Within a few months, a species of carnivores enters the reef system area.**
- **These carnivores prey upon the colorful fish.**

**Laura measured the population size of the fish species a year after the introduction of the predators. She found that there were fewer males, but overall the population size was similar to before the predators arrived.**

**Which of these adaptations is preventing the extinction of this fish species?**

A. The female fish can change their appearance to display bright colors.

B. Both the males and females can lay their eggs in the cracks found in the reef.

C. The female fish can produce offspring through sexual and asexual reproduction.

D. Both the males and females can change their diet to include more types of prey.



GO ON

**38. Some plants make chemicals that cause insects to avoid eating any portion of the plant. Scientists want to research these plants.**

**Which statement is a logical justification for researching these plants?**

F. This research may lead to understanding why insects are attracted to plants.

G. Studying these plants may allow scientists to understand how to grow larger crops.

H. Studying these plants may lead to the development of products that will remove insects from plant environments.

J. This research may allow for the development of products that will repel insects naturally and not harm the environment.

**39. Which activity is an example of selective breeding?**

A. Collecting wild saplings from a forest and replanting them

B. Cross-pollinating plants that produce large numbers of fruit

C. Allowing a population of laboratory mice to mate randomly

D. Raising sheep that have been cloned from adult sheep tissues

**40. A meteorologist is monitoring the weather around Capital City. She collects the following data from her weather instruments:**

- **Air pressure dropping quickly**
- **Warm air rising rapidly**
- **Water droplets being pushed upward to the topmost part of a cumulonimbus cloud**
- **Doppler radar map shows pockets of air with the wind blowing in opposite directions**

**Based on the weather data, what should the meteorologist include in the weather forecast for the Capital City area?**

F. Increasing humidity with light rain

G. Drop in air temperature with light snow

H. Tornado watch with heavy rain and hail

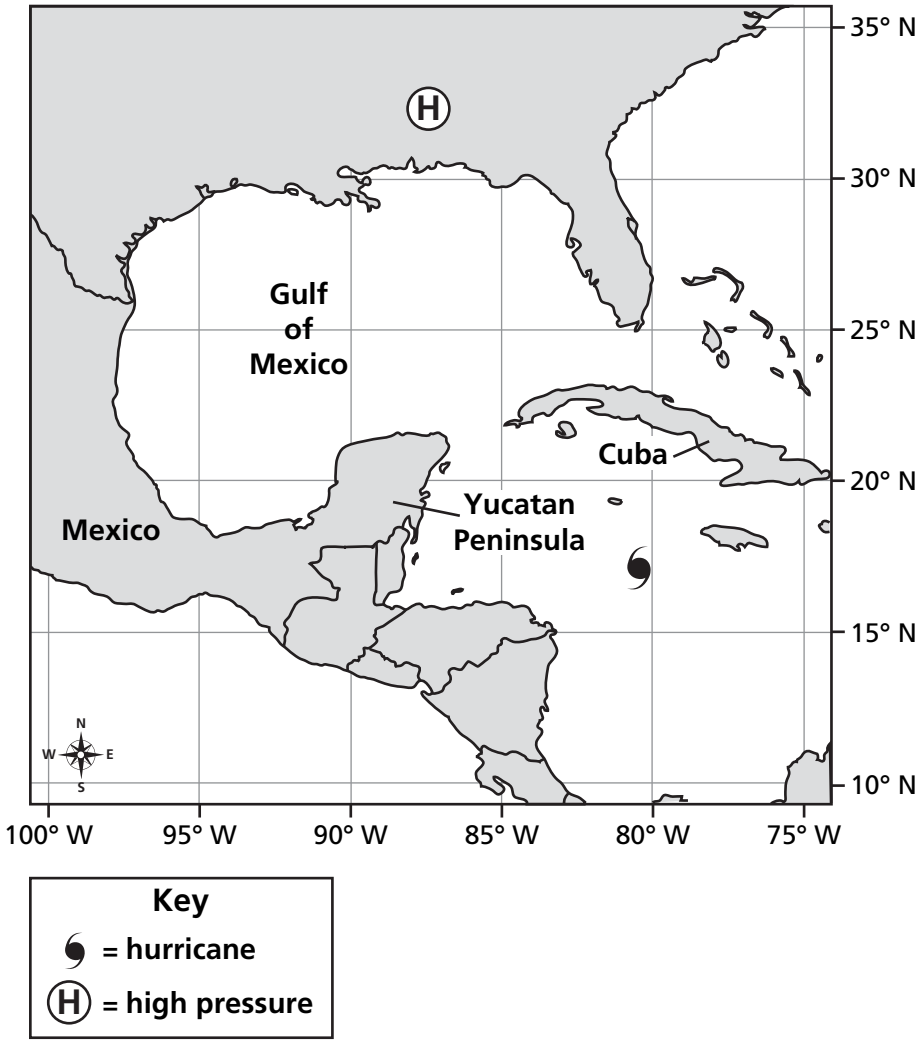
J. Approaching hurricane with heavy rain and strong winds



GO ON

**41. The following map shows the location of a hurricane in the Gulf of Mexico at 81° W and 17° N.**

**Hurricane in the Gulf of Mexico**




**Which of these describes the likely outcome for this hurricane?**

A. The rotation of Earth will force the hurricane to the southeast, where it will make landfall.

B. The dry land surrounding the hurricane will absorb moisture from the hurricane, causing it to break apart.

C. Strong trade winds will blow the hurricane across the Yucatan Peninsula toward Mexico, where it will make landfall.

D. Strong ocean currents moving from the equator to the north will push the hurricane into Cuba, where it will break apart into many smaller storms.

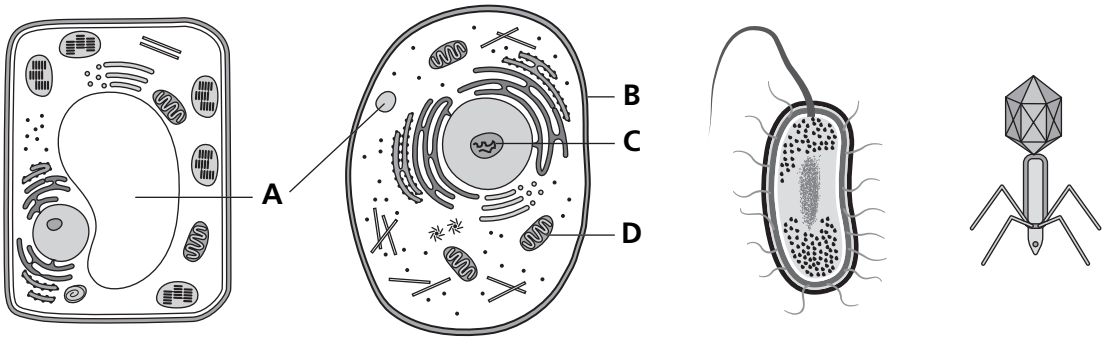


GO ON

**Directions: Use the information below to answer questions 42 through 44.**

**Microscopic Investigations**

**Karen and Thad were working together on a science project. Karen's part of the project involved identifying specimens and analyzing their reproduction. Karen viewed four specimens using an electron microscope at different levels of magnification. The microscope displayed the images on a computer. Karen printed the following images and labeled the structures she was studying with letters.**




**Slide 1**
**400X**

**Slide 2**
**400X**

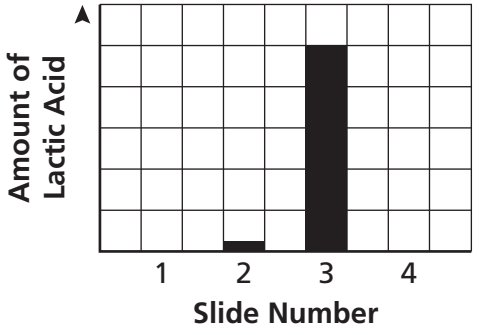
**Slide 3**
**1,000X**

**Slide 4**
**20,000X**

**Karen placed each specimen into its own Petri dish. She used the electron microscope to count the number of specimens in each Petri dish every day for one week. Her data showed that the Petri dish with the specimen on Slide 4 was empty. Karen concluded that the specimen in Slide 1 was a plant cell and that the specimen in Slide 4 was a virus. She concluded that the specimens in Slide 2 and 3 were different types of animal cells.**

**Thad's part of the project involved determining whether one of the specimens was a bacterium. Thad learned that some bacteria change milk lactose into lactic acid. The lactic acid causes milk proteins to stick together, eventually forming yogurt. Thad wanted to know if any of the slides held bacteria. After adding milk to each specimen, he measured the amount of lactic acid produced. The following table shows Thad's data.**

**Lactic Acid Production**






GO ON

**42. Karen observed that structure A found in Slide 1 has the same function as structure A found in Slide 2. Which of these explains why the structure found in Slide 1 is larger than the same structure found in Slide 2?**

F. Structure A is a ribosome. It is larger in an animal cell than in a plant cell because animals need protein to build muscles.

G. Structure A is a vacuole. It is larger in a plant cell than in an animal cell because plants must store large amounts of water.

H. Structure A is a chloroplast. It is larger in a plant cell than in an animal cell because plants must convert sunlight into sugar.

J. Structure A is a nucleus. It is larger in an animal cell than in a plant cell because animals store memories of what they have learned.

**43. One of the slides contains an infectious agent that does the following:**

- **Enters a body cell**
- **Takes over cell functions**
- **Makes the body cell replicate the infectious agent**
- **Causes the body cell to burst, spreading copies of the infectious agent**

**Based on appearance, which slide contains the infectious agent described?**

A. Slide 1

B. Slide 2

C. Slide 3

D. Slide 4

**44. Karen concluded that the specimen in Slide 2 and Slide 3 is an animal cell. Which is a logical reason why Karen should revise this conclusion?**

F. Karen's investigation was not repeated and lacked a control.

G. Thad's investigation indicates that the specimen in Slide 3 is a type of bacteria.

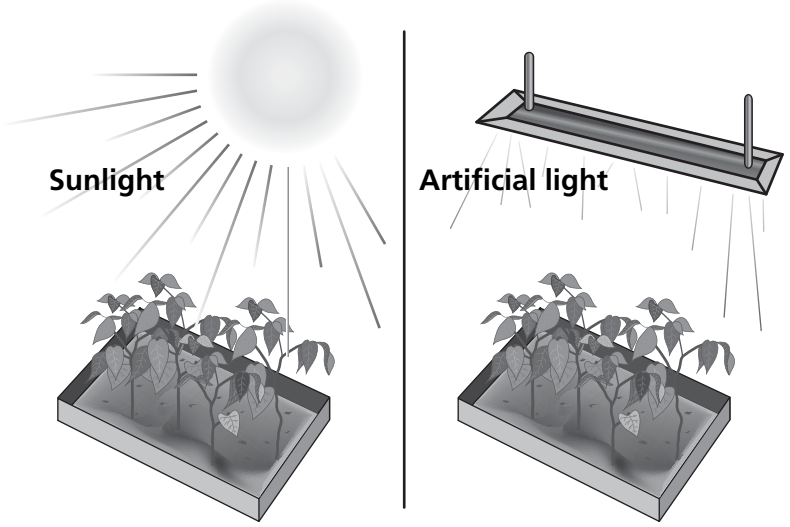
H. Karen's conclusion is based on observations made with a less accurate compound microscope.

J. Thad's conclusion indicates that the specimen in Slide 2 becomes infected with the lactic acid of bacteria.



GO ON

**45. Dan wanted to know whether plants grow best in sunlight or artificial light. He set up an investigation, making sure each plant received the same amount of light for the same amount of time. The following diagram shows his setup.**




**Dan found that the outside plants grew one inch taller than the inside plants. He concluded that sunlight is better for plant growth than artificial light. A classmate, Carlos, is skeptical of Dan's conclusion. Carlos thinks that Dan did not control other conditions that the plants grew under, such as temperature and available water.**

**Which of these describes how Dan should respond to Carlos's skepticism?**

A. Dan should revise his original conclusion to match Carlos's predictions about temperature and air quality.

B. Dan should dismiss Carlos's criticism of his methods because Carlos did not carry out the original experiment.

C. Dan should invite Carlos to run the exact same experiment again to confirm that the original conclusions are valid.

D. Dan should run new tests to include other variables that Carlos mentioned to confirm that the original conclusions are valid.



GO ON

**46. Nickel (Ni) is an element found in Group 10 of the periodic table of elements.**

## Periodic Table of Elements

| Period \ Group | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 H Hydrogen 1.01 | | | | | | | | | | | | | | | | | 2 He Helium 4.00 |
| 2 | 3 Li Lithium 6.94 | 4 Be Beryllium 9.01 | | | | | | | | | | | 5 B Boron 10.81 | 6 C Carbon 12.01 | 7 N Nitrogen 14.01 | 8 O Oxygen 16.00 | 9 F Fluorine 19.00 | 10 Ne Neon 20.18 |
| 3 | 11 Na Sodium 22.99 | 12 Mg Magnesium 24.31 | | | | | | | | | | | 13 Al Aluminum 26.98 | 14 Si Silicon 28.09 | 15 P Phosphorus 30.97 | 16 S Sulfur 32.07 | 17 Cl Chlorine 35.45 | 18 Ar Argon 39.95 |
| 4 | 19 K Potassium 39.10 | 20 Ca Calcium 40.08 | 21 Sc Scandium 44.96 | 22 Ti Titanium 47.88 | 23 V Vanadium 50.94 | 24 Cr Chromium 52.00 | 25 Mn Manganese 54.94 | 26 Fe Iron 55.85 | 27 Co Cobalt 58.93 | 28 Ni Nickel 58.69 | 29 Cu Copper 63.55 | 30 Zn Zinc 65.39 | 31 Ga Gallium 69.72 | 32 Ge Germanium 72.61 | 33 As Arsenic 74.92 | 34 Se Selenium 78.96 | 35 Br Bromine 79.90 | 36 Kr Krypton 83.80 |
| 5 | 37 Rb Rubidium 85.47 | 38 Sr Strontium 87.62 | 39 Y Yttrium 88.91 | 40 Zr Zirconium 91.22 | 41 Nb Niobium 92.91 | 42 Mo Molybdenum 95.94 | 43 Tc Technetium 98.00 | 44 Ru Ruthenium 101.07 | 45 Rh Rhodium 102.91 | 46 Pd Palladium 106.42 | 47 Ag Silver 107.87 | 48 Cd Cadmium 112.41 | 49 In Indium 114.82 | 50 Sn Tin 118.71 | 51 Sb Antimony 121.76 | 52 Te Tellurium 127.60 | 53 I Iodine 126.91 | 54 Xe Xenon 131.29 |
| 6 | 55 Cs Cesium 132.91 | 56 Ba Barium 137.33 | 57 La Lanthanum 138.91 | 72 Hf Hafnium 178.49 | 73 Ta Tantalum 180.95 | 74 W Tungsten 183.85 | 75 Re Rhenium 186.21 | 76 Os Osmium 190.20 | 77 Ir Iridium 192.22 | 78 Pt Platinum 195.08 | 79 Au Gold 196.97 | 80 Hg Mercury 200.59 | 81 Tl Thallium 204.38 | 82 Pb Lead 207.20 | 83 Bi Bismuth 208.96 | 84 Po Polonium 208.98 | 85 At Astatine 210.00 | 86 Rn Radon 222.00 |
| 7 | 87 Fr Francium 223.00 | 88 Ra Radium 226.00 | 89 Ac Actinium 227.03 | 104 Rf Rutherfordium (261) | 105 Db Dubnium (262) | 106 Sg Seaborgium (263) | 107 Bh Bohrium (264) | 108 Hs Hassium (265) | 109 Mt Meitnerium (268) | | | | | | | | | |

**Based on its location in the periodic table, which of these is a property of nickel?**

F. Low density

G. Strong semiconductor

H. Highly reactive with other elements

J. Good conductor of heat and electricity



GO ON

**47. Satellite observations of a hurricane in the middle of the Atlantic Ocean show that the hurricane is moving toward a large area of cool water.**

**What does this observation indicate about the likelihood that the hurricane will strike land along the coast of the United States?**

A. The likelihood of a land strike is decreased because hurricanes that move over cool water lose intensity.

B. The chance that the hurricane will strike land is increased because cool waters are located near the coast.

C. The chance that the hurricane will strike land is decreased because the hurricane is located far from the coast.

D. The likelihood of a land strike is increased because cold water tends to strengthen hurricanes and make them last longer.

**48. The following shows a food chain in a garden environment.**

**Sun → grass → grasshopper → bird**

**Which statement describes the energy transfer in this food chain?**

F. The energy from the bird is transferred back to the grasshopper.

G. The grass passes all of the energy it receives from the sun to the grasshopper.

H. Only a small amount of the energy the bird receives from the grasshopper is used by the bird.

J. More energy is transferred from the grass to the grasshopper than from the grasshopper to the bird.

**49. When plant tissues are damaged, bacteria and other microorganisms can invade the plant. Scientists are studying plants that produce chemicals to fight these bacterial infections. The plants they are studying do not have any agricultural use.**

**Which statement logically supports continuing this research?**

A. The research could lead to the discovery of how to prevent damage to plant tissue.

B. The research could lead to the discovery of new chemicals that are useful for controlling weeds.

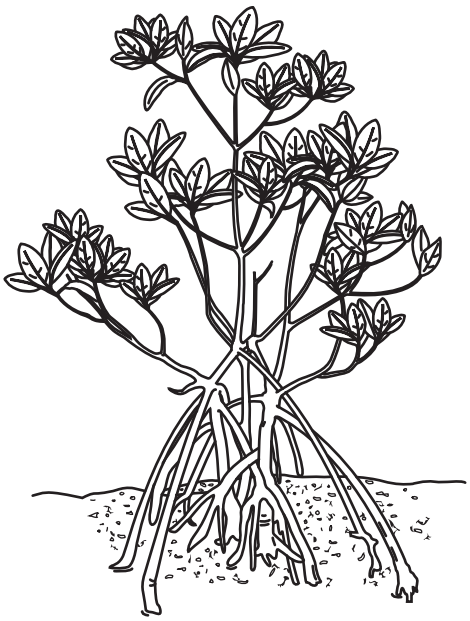
C. The chemical compounds could be useful as antibiotics for bacteria that invade other organisms.

D. The chemical compounds discovered by the researchers could be added to the list of known chemicals.



GO ON

**50. Jesse is studying the red mangrove trees in a coastline environment. The following illustration shows the structure of a red mangrove.**



**Jesse's data indicate that the salt content in the water on this coastline is increasing. Which of the following adaptations allows the red mangrove to survive in this coastline environment?**

F. Flowers that attract insects for pollination, causing genetic variation in offspring

G. Large leaves that allow for oxygen and gas exchange from the air instead of the sand

H. Roots with a filtration system that allows water to enter but keeps out the larger salt molecules

J. Roots that prop the tree above the sand, giving it support so it can withstand the force of ocean tides



GO ON

**51. Deforestation is the removal of naturally occurring forests. These forests are cleared in order to provide land for farms or buildings. Some scientists want to reduce the amount of deforestation.**

**How would reducing deforestion affect global warming?**

A. It would prevent farmers from planting renewable biofuels that would have reduced global warming.

B. It would decrease the amount of carbon dioxide reaching the atmosphere, reducing global warming.

C. It would increase the amount of oxygen released into the atmosphere, which would bond together and create ozone, increasing global warming.

D. It would prevent destruction of animal homes, allowing these animals to survive and breathe in oxygen that would otherwise increase global warming.

**52. Which statement describes how a single-celled organism helps make a food product?**

F. Viruses that cause diseases are weakened and used to make vaccines.

G. Yeast changes carbohydrates into carbon dioxide to make dough rise.

H. Fungi release a chemical that keeps bacteria colonies from growing larger.

J. Bacteria eat oil spilled in rivers and change it into less dangerous compounds.

**53. Aluminum is a metal that is used to produce beverage cans, machines, computers, wire, and many other products. An environmental organization decides to start a program to educate people about recycling aluminum products.**

**Which of these logically explains the importance of recycling aluminum?**

A. It is important because more aluminum means more products can be stored in aluminum cans.

B. It is unimportant because aluminum products make up only a small amount of landfill and produce little pollution.

C. It is important because the amount of aluminum on Earth is limited and reusing aluminum conserves this resource.

D. It is unimportant because more aluminum can be mined, so there is little need to keep reusing the same aluminum.



GO ON

**54. Which table describes adaptations that allow organisms to survive in a desert environment?**

F.

| Organism | Adaptation to Environment |
|---|---|
| Plant | Sharp needles for protection |
| | Thick stems that store water |
| Animal | Hump of fatty tissue that cools animal |
| | Nostrils that close, trapping exhaled water vapor |

H.

| Organism | Adaptation to Environment |
|---|---|
| Plant | Leaves drop off trees to avoid fungal infections |
| | Produces cones that protect seeds |
| Animal | White-colored fur to blend in with environment |
| | Active at night and sleep during day |

G.

| Organism | Adaptation to Environment |
|---|---|
| Plant | Broad, flat leaves that capture sunlight |
| | Deep roots that anchor plant during windstorms |
| Animal | Dark-colored fur that absorbs heat |
| | Sharp claws for digging in soil |

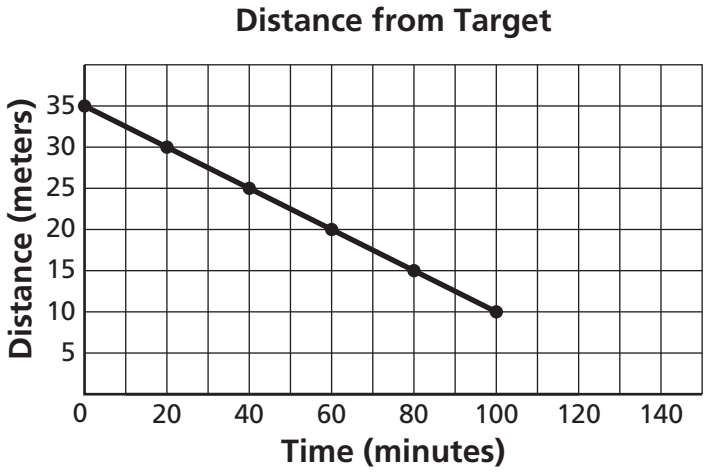
J.

| Organism | Adaptation to Environment |
|---|---|
| Plant | Produces colorful flowers to attract pollinators |
| | Grows long vines to climb toward sunlight |
| Animal | Oily fur for water resistance |
| | Webbed feet for swimming in water |



GO ON

**55. The following graph shows the distance of an object from its target every 20 minutes.**




**If the object's speed is constant, when will it reach its target?**

A. about 105 minutes

B. about 110 minutes

C. about 120 minutes

D. about 140 minutes

**56. Darnel wants to list types of radiation based on their ability to penetrate human skin.**

**Which list shows the order of radiation types from lowest to highest penetration?**

F. Infrared radiation, microwaves, radio waves, visible light, x-rays, gamma rays, UV rays

G. X-rays, gamma rays, infrared radiation, microwaves, radio waves, UV rays, visible light

H. Visible light, infrared radiation, UV rays, microwaves, radio waves, x-rays, gamma rays

J. Radio waves, microwaves, infrared radiation, visible light, UV rays, x-rays, gamma rays

**57. Chloroplasts are organelles that are found in plant cells. Some plant tissue contains cells with large numbers of chloroplasts, while other tissue contains few chloroplasts.**

**Which type of plant tissue contains cells with many chloroplasts?**

A. Stem, because chloroplasts are needed for plant growth

B. Root, because chloroplasts are needed for water uptake

C. Leaf, because chloroplasts are needed for photosynthesis

D. Flower, because chloroplasts are needed for reproduction



GO ON

**58. Synthetic fibers are used to make fabric, such as polyester. These fibers tend to last longer than cotton fibers. To address this, researchers are investigating cotton fibers that are more resistant to wear.**

**Which of these is a logical justification for using cotton fibers in fabric instead of synthetic fibers?**

F. Cotton is a renewable resource, but the materials used to make polyester are not.

G. Cotton fabric is better than polyester fabric because it has been used for a longer time.

H. Increasing the use of cotton will reduce the cost of producing it, making it a less expensive fabric than polyester.

J. Clothes made of cotton fabric take up less room in a box, making them easier to ship than clothes made of polyester fabric.

**59. Animal cells contain an enzyme that breaks down hydrogen peroxide. Gas is released when hydrogen peroxide is broken down. A scientist used a pipette to drop hydrogen peroxide onto a sample of muscle tissue. Bubbles formed on the tissue. The scientist concluded that the enzyme was present in the muscle tissue.**

**Which type of observation led the scientist to form this conclusion?**

A. Qualitative observation of the amount of enzyme present in the tissue

B. Qualitative observation of the bubbles formed from enzyme activity

C. Quantitative observation of how much gas formed in the bubbles

D. Quantitative observation of the amount of enzyme present in the tissue

**60. What can scientists conclude about a galaxy whose light is shifted toward shorter wavelengths?**

F. The galaxy is very distant and is moving away from Earth very rapidly.

G. The galaxy is orbiting the center of the Milky Way at a very high speed.

H. The galaxy is expanding so rapidly that it appears to be moving toward Earth.

J. The galaxy is relatively close since a distant galaxy's light is shifted toward longer wavelengths.

BE SURE YOU HAVE MARKED ALL YOUR ANSWERS
ON THE ANSWER DOCUMENT.