



SCIENCE TEST QUESTIONS

THEORY 1

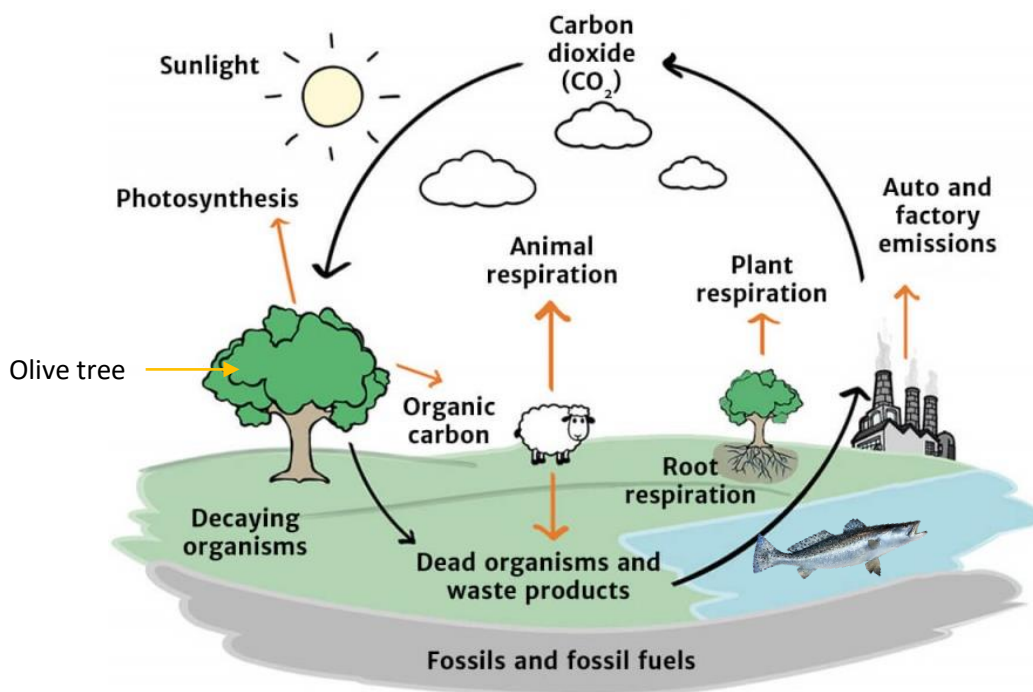
Total time: 60 minutes

Printed name: *ID:*

Instructions:

- Do not open the test booklet until you are told to do so.
- Be sure that your name and ID are written on spaces provided.
- **Only write your answers in the ANSWER SHEET provided.**
- There are 40 multiple-choice questions, each worth 1 point. There is only one correct answer for each question.
- Use ONLY pencils to write on the Answer Sheet.
- Your Answer Sheet will be read by a machine. So please be careful not to doodle or write anything extra on the Answer Sheet. If you want to change an answer or remove any marks, use a plastic eraser and be sure to remove all marks and smudges.
- Diagrams are not drawn to scale. They are intended as aids only.
- After the contest, the invigilator will collect the contest papers.

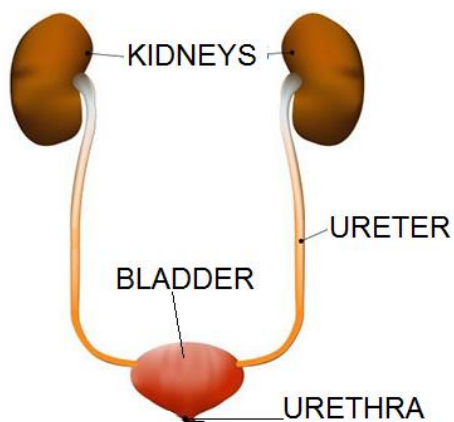
Use the following figure for questions 1 to 4. This figure shows the cycle of a element in nature.



Adapted from <https://onlinesciencenotes.com/>

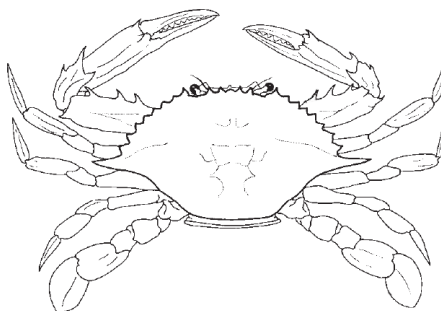
1. The figure represents the cycle of which element below?
 - A. Carbon
 - B. Hydrogen
 - C. Nitrogen
 - D. Water
2. Which organism can absorb the solar energy and transfer it into the ecosystem?
 - A. Animals
 - B. Fish and olive tree
 - C. Human
 - D. Plants

3. What kind of gas that olive trees use for making food and growing new parts of the plant?
- A. CO₂ - carbon dioxide
 - B. N₂ - nitrogen
 - C. O₂ - oxygen
 - D. SO₂ - sulfur dioxide
4. Which factor provides gasoline for most vehicles in the world?
- A. Dead organisms and waste products
 - B. Fossils
 - C. Fossil fuels
 - D. Sunlight
5. The human urinary system consists of the kidneys, ureters, urinary bladder, and urethra. Its function is to filter blood and eliminate waste, called as urine, from the body. Which structure of the human urinary system stores urine until it is excreted?



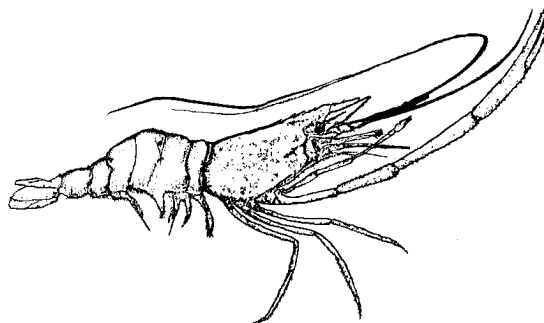
- A. Bladder
- B. Kidneys
- C. Ureter
- D. Urethra

6. Which of the following food is mostly chemically digested in the stomach?
- A. Butter
 - B. Chicken meat
 - C. Fruits
 - D. Rice
7. If someone wants to hold a book in his/her hand for 20 minutes, which type of muscle tissue is specialized for contraction and generation of force to hold the book?
- A. Cardiac muscle tissue
 - B. Skeletal muscle tissue
 - C. Smooth muscle tissue
 - D. None of the above
8. Marine swimming crabs use their gills for breathing underwater. However, they can stay alive out of water for hours or even a few days. How can these crabs stay alive when they are out of the water environment?



- A. They breathe by their gills by keeping them moist
- B. They breathe by their lung
- C. They hold their breath until going to water again
- D. They use the stored oxygen in the blood

9. A freshwater prawn of genus *Macrobrachium* has 5 pairs of pereopods (thoracic legs). Two first pairs transform into chelipeds. Three remaining pairs are normal walking legs with 7 segments. How many segments does a cheliped have?



- A. 3 segments
B. 5 segments
C. 7 segments
D. 8 segments
10. The diagram below shows a food web in a forest.
- ```
graph LR; plant --> aphid; plant --> caterpillar; aphid --> ladybird; ladybird --> snake; caterpillar --> small_bird[small bird]; caterpillar --> shrew; small_bird --> owl; shrew --> owl; shrew --> badger;
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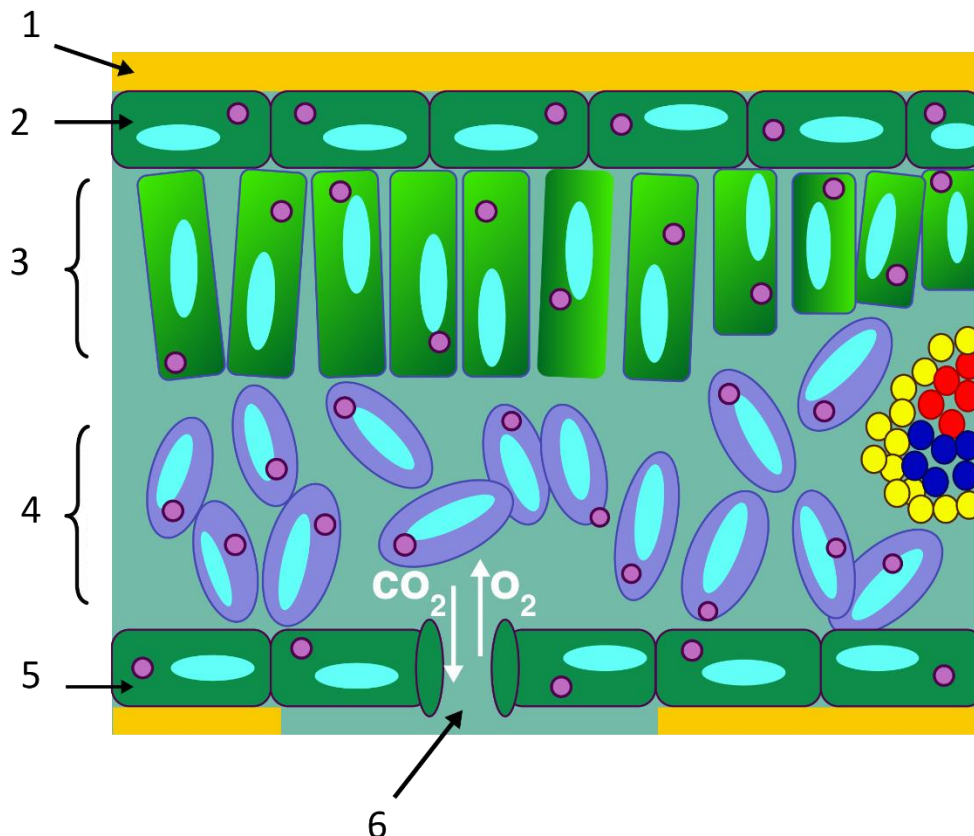
How many secondary consumers are there?

- A. 2  
B. 3  
C. 4  
D. 5

11. A residential area disposes untreated sewage into a lake. Untreated sewage pollutes water in the lake and causes a \_\_\_\_\_.

- A. decrease in the carbon dioxide concentration
- B. decrease in the dissolved nitrate concentration
- C. decrease in the number of bacteria
- D. decrease in the oxygen concentration

12. The picture below shows a typical anatomy of a leaf structure. Which group of structures contains chloroplasts?



- A. 1, 2 & 3
- B. 2, 3 & 4
- C. 3, 4 & 5
- D. 4, 5 & 6

13. Three sealed glass tanks were kept outside on a sunny day for twelve hours.

Which of the following answers is true about the level of carbondioxide and oxygen in each tank?



Tank X



Tank Y



Tank Z

|   | Tank X                                          | Tank Y                                          | Tank Z                                       |
|---|-------------------------------------------------|-------------------------------------------------|----------------------------------------------|
| A | carbon dioxide<br>increases<br>oxygen decreases | carbon dioxide<br>decreases<br>oxygen increases | carbon dioxide increases<br>oxygen decreases |
| B | carbon dioxide<br>increases<br>oxygen increases | carbon dioxide<br>decreases<br>oxygen decreases | carbon dioxide decreases<br>oxygen decreases |
| C | carbon dioxide<br>decreases<br>oxygen increases | carbon dioxide<br>decreases<br>oxygen increases | carbon dioxide increases<br>oxygen decreases |
| D | carbon dioxide<br>decreases<br>oxygen decreases | carbon dioxide<br>decreases<br>oxygen increases | carbon dioxide increases<br>oxygen decreases |

- 14.** What does organ system in the body have highest ratio of dry mass?
- A. Immune system
  - B. Muscular system
  - C. Nervous system
  - D. Skeletal system
- 15.** When the body is infected with Dengue virus, a fever reaction can occur. Which of the following is NOT a symptom that occurs when the body is raising its temperature.
- A. Constricting of blood vessels under the skin
  - B. Increasing metabolic rate
  - C. Shivering
  - D. Sweating
- 16.** A person currently living in the delta moves to a high mountain ( $> 2000$  m). After a few weeks living in the mountains, which of the following blood index will increase most noticeably?
- A. Plasma volume
  - B. The number of platelet
  - C. The number of red blood cells
  - D. The number of white blood cells
- 17.** There are different types of sugar in our food such as glucose, fructose, sucrose, maltose, lactose, galactose and saccharose. Which set of food contains sugar in all its components?
- A. Banana, water, fish
  - B. Meat, rice, milk
  - C. Noodle, apple, cane
  - D. Salt, bread, egg



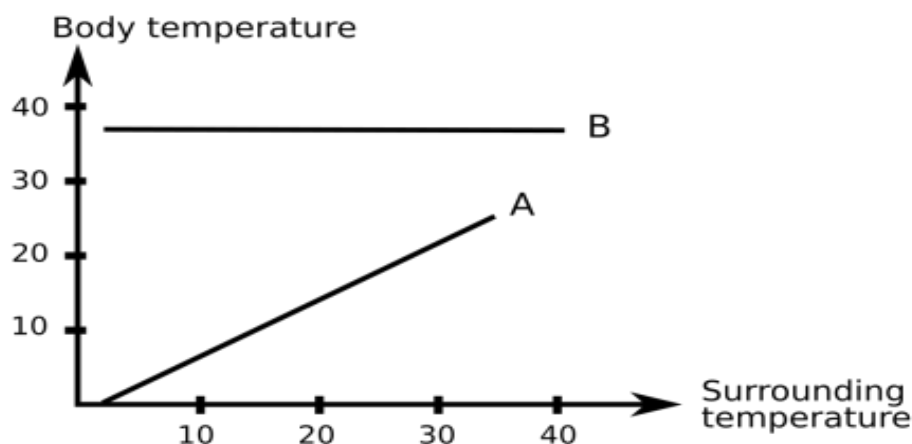
**18.** Which sentence describes best the components of the human blood?

- A. The blood contains red blood cells, white blood cells, green blood cells and plasma.
- B. The blood contains only red blood cells, white blood cells and platelet
- C. The blood contains red blood cells, white blood cells, platelet and serum
- D. The blood contains red blood cells, white blood cells, platelet and plasma

**19.** Which molecule was modified to generate a genetic modified organism (GMO)?

- A. Carbohydrate
- B. Deoxyribonucleic acid
- C. Lipid
- D. Protein

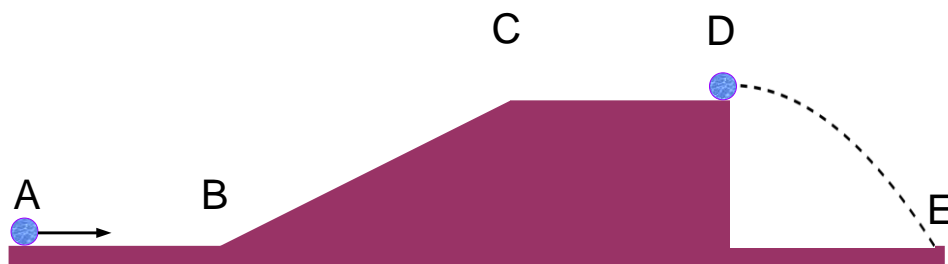
**20.** The graph shows the relationship between the body temperature of the animals and the temperature of the surrounding.



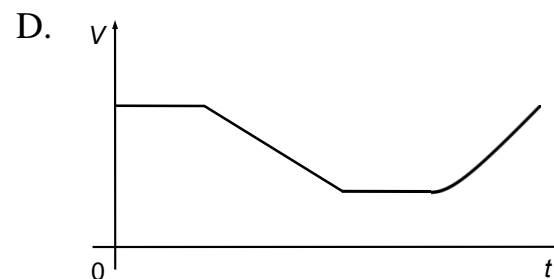
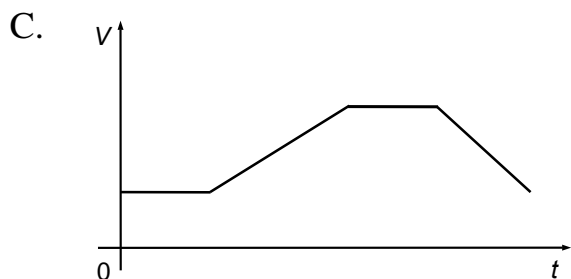
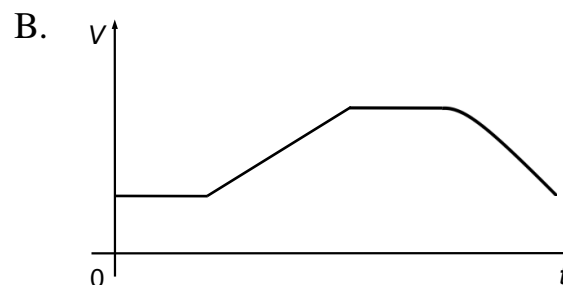
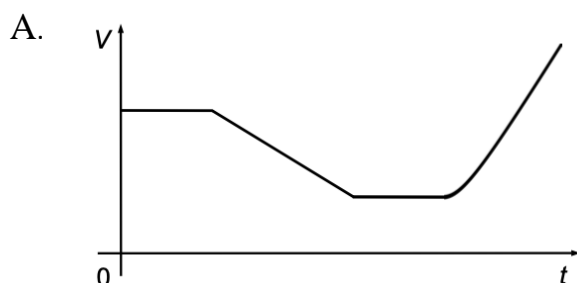
What are animals A and B respectively?

- A. panda, salamander
- B. shark, rat
- C. snake, crane
- D. turtle, chameleon

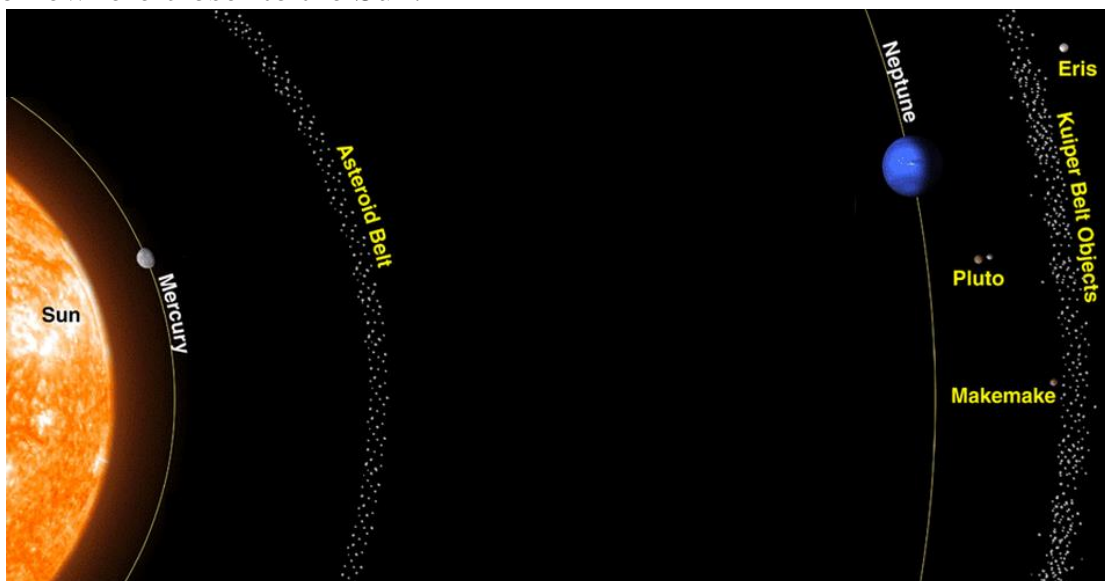
- 21.** A marble is set in motion at point A on a frictionless surface. It moves along the horizontal surface AB, up the slope BC, along another horizontal surface CD, and finally along the curve DE as a projectile motion.



Which of the following graphs represents the variation of the marble's speed  $V$  with time  $t$ ?

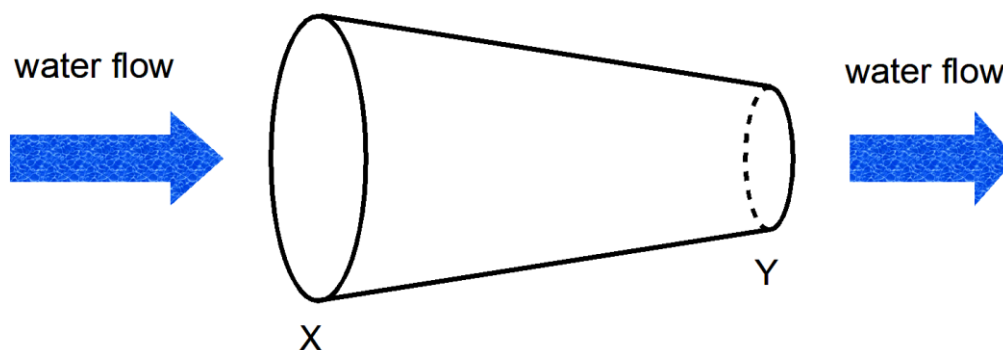


22. The asteroid belt and the Kuiper belt are two circumstellar discs around the Sun which consist of numerous irregularly shaped bodies. While the Kuiper belt is at the outer Solar System, as shown in the figure, the asteroid belt is somewhere closer to the Sun.



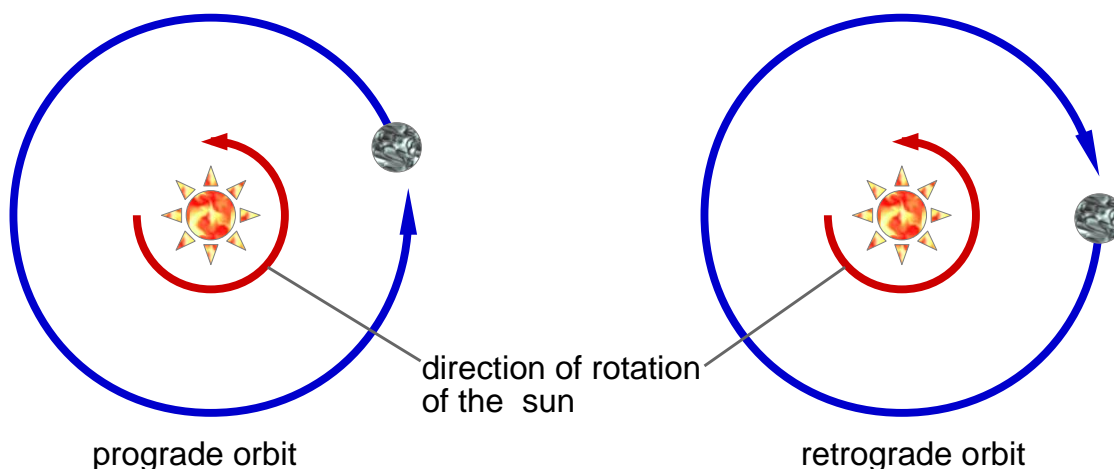
Where exactly is the position of the asteroid belt?

- A. It is between the orbits of the planets Jupiter and Saturn.
  - B. It is between the orbits of the planets Mars and Jupiter.
  - C. It is between the orbits of the planets Earth and Mars.
  - D. It is between the orbits of the planets Venus and Earth.
23. Consider a pipe of non-uniform cross-section. The diameter of the pipe at X is larger than that at Y, as shown in the figure.



When water is flowing steadily through the full pipe, which of the following statements is correct?

- A. In the same time interval, the amount of water that passes through the cross-section at X is larger than the amount of water that passes through the cross-section at Y.
  - B. In the same time interval, the amount of water that passes through the cross-section at X is smaller than the amount of water that passes through the cross-section at Y.
  - C. The speed of water at X is larger than the speed of water at Y.
  - D. The speed of water at X is smaller than the speed of water at Y.
24. In the solar system, if an object moves around the sun in the same direction as the sun rotates, we say that the object has a prograde orbit. In case the object moves in the opposite direction, we say that its orbit is retrograde. An illustration for the two types of orbit is shown in the figure.



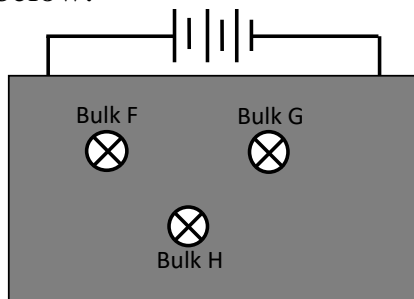
Which of the following statements is correct?

- A. The orbits of all planets and all comets are prograde.
- B. The orbits of all planets are prograde but some comets have retrograde orbits.
- C. The Earth's orbit is prograde while the orbits of all other planets are retrograde.
- D. All terrestrial planets have prograde orbits and all giant planets have retrograde orbits.

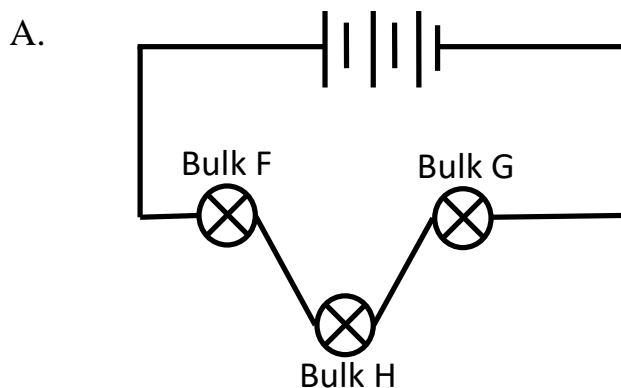
25. In general, the Earth has been considered four layers: the solid crust on the outside, the mantle, the outer core and the inner core. Which is the thickest layer of the Earth?
- A. Inner core.  
B. Outer core.  
C. The mantle.  
D. The solid crust
26. Using three identical bulbs and three identical batteries, a student set up a circuit. She alternately removed bulbs F, G, and H one at a time, and observed the other two bulbs. She recorded her observation in the table below.

| Bulb removed | Observation                    |
|--------------|--------------------------------|
| F            | Bulbs G and H did not light up |
| G            | Bulbs F and H lighted up       |
| H            | Bulbs F and G lighted up       |

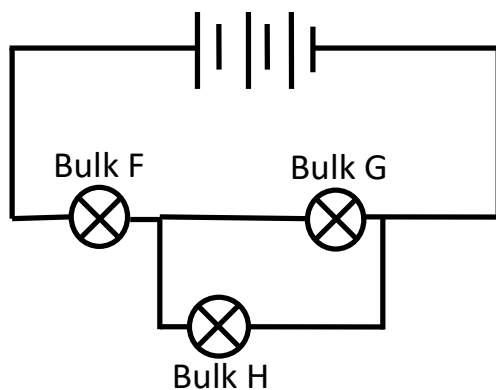
After recorded the results, she lost all connections to bulbs accidentally. The circuit could be seen as below:



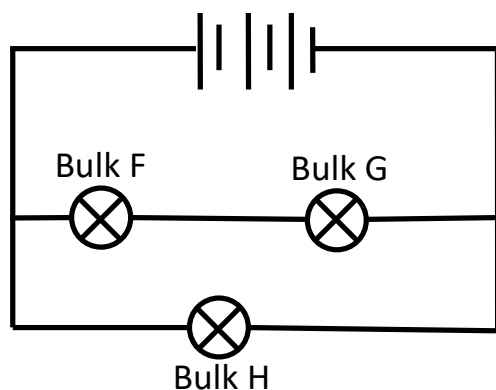
Which one of these circuits is her set-up?



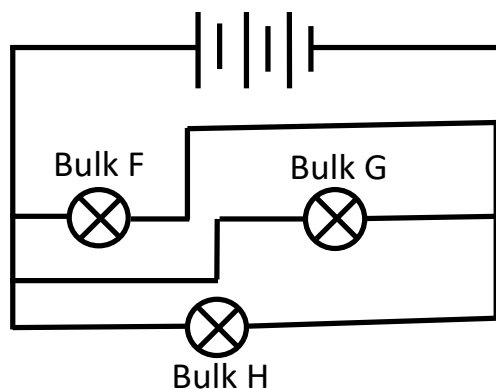
B.



C.



D.



27. Each of the following procedures results in the formation of bubbles. Which of these is a physical change?

- A. Heating water to its boiling point.
- B. Pouring an acid onto calcium carbonate.
- C. Dropping an antacid tablet into water.
- D. Pouring vinegar onto baking soda.

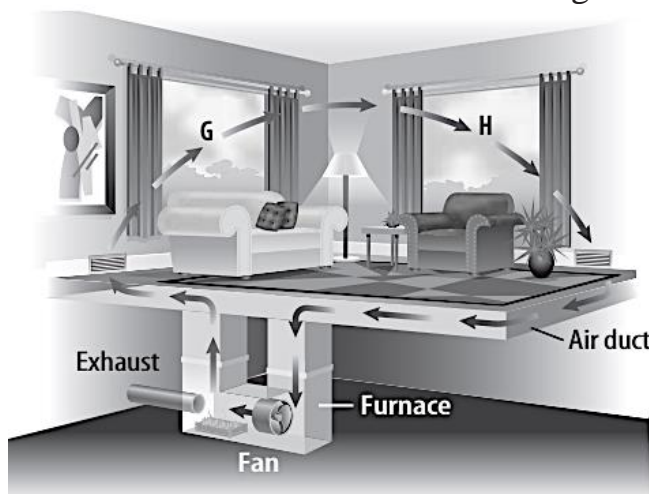
28. If the gravitational force between Earth and an object always causes the same acceleration, why does a feather fall more slowly than a hammer does?
- A. Because the hammer has greater weight.
  - B. Because the wind blows.
  - C. Because the air withstands the falling of objects.
  - D. Because the feather is thinner than the hammer.
29. The following figure shows some relation between the volume and pressure of a gas.



What relationship between the volume and pressure of a gas in a closed cylinder?

- A. As volume decreases, pressure remains the same.
- B. As the volume increases, pressure remains the same.
- C. As volume decreases, pressure decreases.
- D. As volume decreases, pressure increases.

30. The figure below shows the circulation of hot air through a room.



How does the air at point G compare to the air at point H?

- A. Air at point G is warmer and denser.
  - B. Air at point G is warmer and less dense.
  - C. Air at point G is cooler and denser.
  - D. Air at point G is cooler and less dense.
31. Which of the following is an example of thermal energy transfer by conduction?
- A. The warmth you feel holding a cup of hot milk
  - B. Water moving in a pot of boiling water
  - C. Warm air rising from hot pavement
  - D. The warmth you feel sitting near a fire
32. A sample of each of the metals in the table below is formed into a 200-g cube. If 50 J of thermal energy are applied to each of the samples, which metal would change temperature by the greatest amount? (Specific Heat is the amount of heat per unit mass required to raise the temperature by 1°C.)

| Material | Specific Heat (J/kg °C) |
|----------|-------------------------|
| aluminum | 897                     |
| copper   | 385                     |
| lead     | 129                     |
| nickel   | 444                     |
| zinc     | 388                     |



- A. Aluminum
- B. Copper
- C. Lead
- D. Nickel

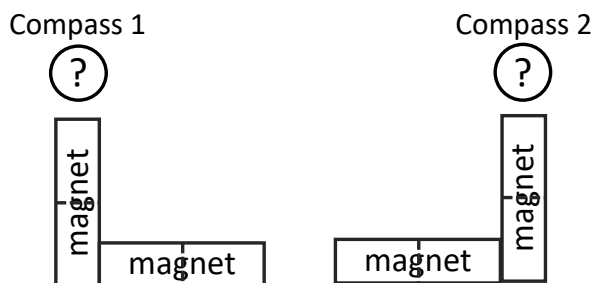
33. What biofuel can be made from corn or sugar cane?

- A. Ethanol
- B. Gasoline
- C. Natural gas
- D. Diesel

34. Which of the following exerts the force that pushes you forward when you walk?

- A. Static friction
- B. Sliding friction
- C. Gravity
- D. Air resistance

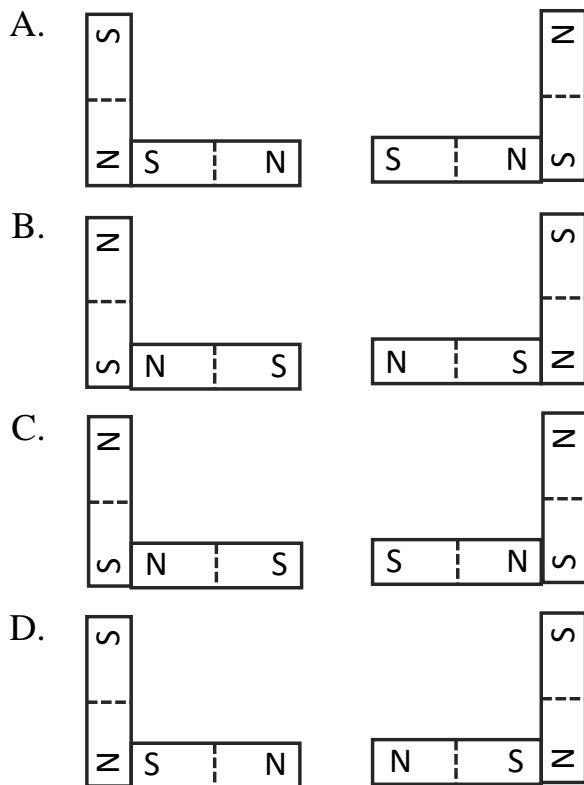
35. There is an arrangement with 4 magnet bars and 2 compasses as shown below.



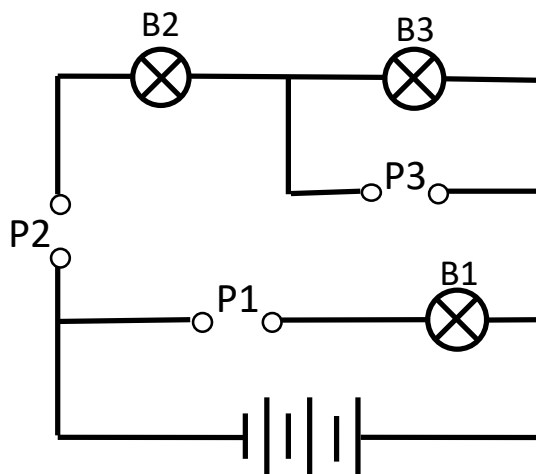
Which of the following compasses correctly represents compass 1 and compass 2 in the above set-up?

- |    | Compass 1 | Compass 2 |
|----|-----------|-----------|
| A. |           |           |
| B. |           |           |
| C. |           |           |
| D. |           |           |

- 36.** Using your above solution to answer this question.  
Which one of the following arrangements of magnet bars represents correctly the above arrangement?



- 37.** In order to find out whether rod X, Y and Z are conductor or insulator, a student set up a circuit below:



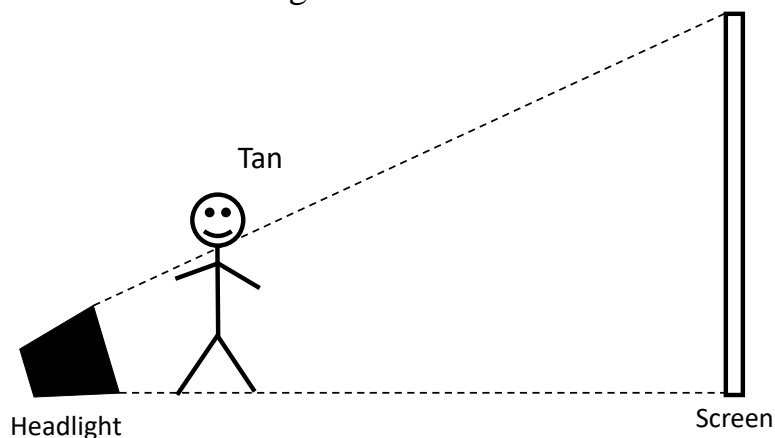
He placed rod X, Y and Z at different positions P1, P2 and P3; and recorded if any light bulbs light up. The result was shown in the table below.

|                               | P1 | P2 | P3 | Did B1<br>light<br>up? | Did B2<br>light<br>up? | Did B3<br>light<br>up? |
|-------------------------------|----|----|----|------------------------|------------------------|------------------------|
| <b>1<sup>st</sup><br/>try</b> | X  | Y  | Z  | Yes                    | No                     | No                     |
| <b>2<sup>nd</sup><br/>try</b> | Y  | Z  | X  | No                     | Yes                    | No                     |
| <b>3<sup>rd</sup><br/>try</b> | Z  | X  | Y  | Yes                    | Yes                    | Yes                    |

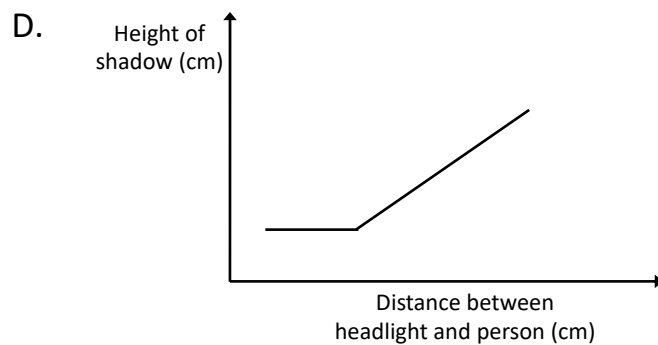
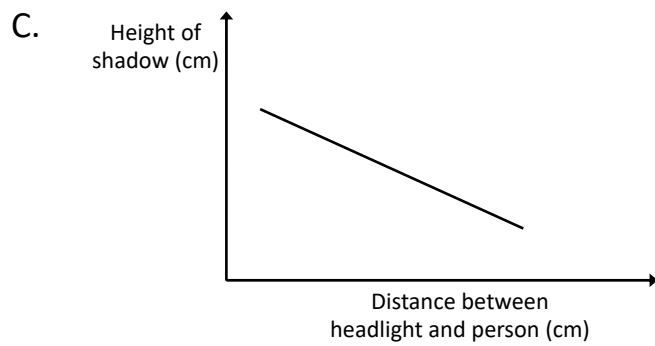
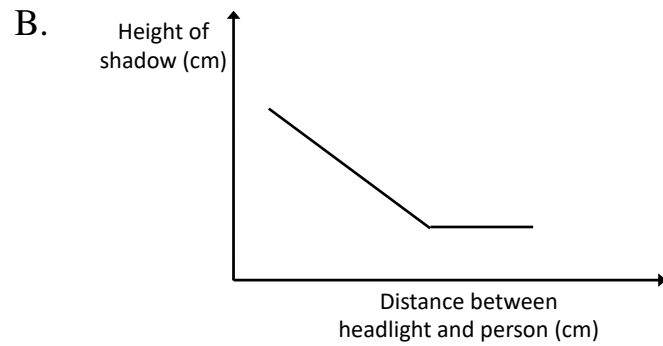
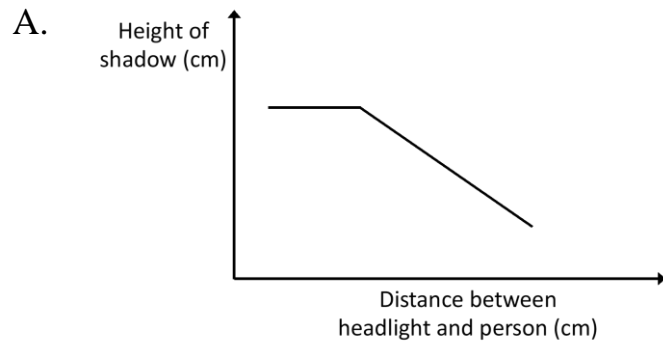
Which one of these conclusions is correct?

- |    | <b>Rod X</b> | <b>Rod Y</b> | <b>Rod Z</b> |
|----|--------------|--------------|--------------|
| A. | Insulator    | Conductor    | Conductor    |
| B. | Conductor    | Insulator    | Insulator    |
| C. | Insulator    | Conductor    | Insulator    |
| D. | Conductor    | Insulator    | Conductor    |

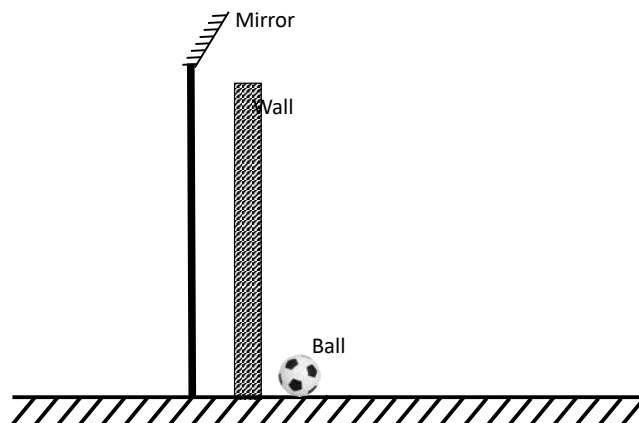
38. Tan carried out an experiment by standing between a fixed headlight and a fixed screen as shown in the diagram below.



When the headlight was switch on, the shadow of Tan formed on the screen. Which of the following graphs shows the relationship between the height of Tan's shadow on the screen and the distance between headlight and Tan?



39. Le and friends played football on the playground; and accidentally lost the soccer ball when kicking over nearby wall. In order to find the ball behind the wall, Le placed a mirror on top of a pole to look for the ball as shown in the diagram below.



However, he could not see the soccer ball. Which one of the following was the reason why Le could not see the ball?

- A. The mirror did not reflect light.
  - B. The ball did not reflect light.
  - C. The ball did not allow light to pass through.
  - D. The wall did not allow light to pass through.
40. Map out the energy changes when an aerosol can produce hairspray.



- A. Kinetic energy  $\rightarrow$  heat energy + sound energy
- B. Chemical energy  $\rightarrow$  kinetic energy  $\rightarrow$  heat energy
- C. Potential energy  $\rightarrow$  kinetic energy  $\rightarrow$  heat energy
- D. Potential energy  $\rightarrow$  sound energy + heat energy

**THE END**