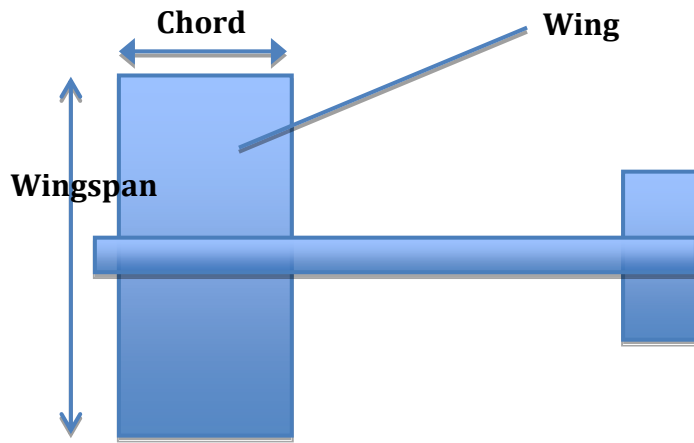


**Multiple Choice Questions No. 1-15 (each number = 0.5 point)**  
**Circle the correct answer on the answer sheet.**

1. The diagram shows a view of a model glider from above.



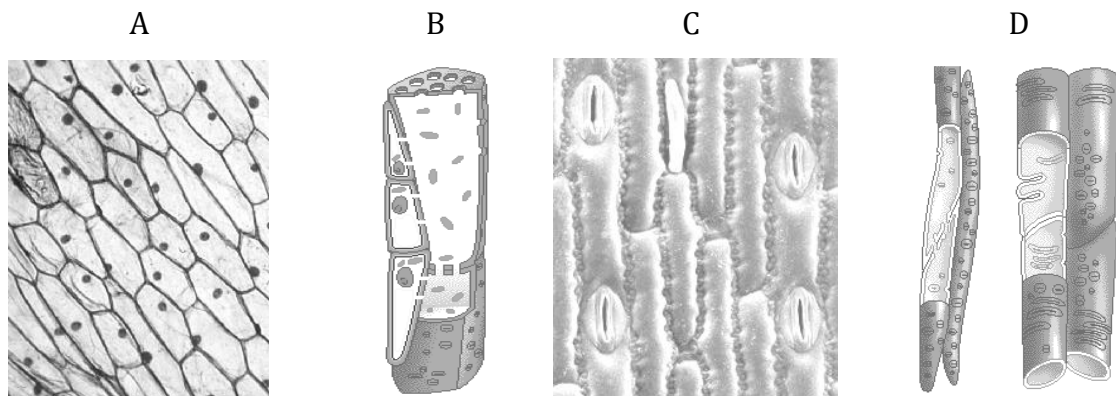
The aspect ratio of a wing is the length of the wingspan divided by the length of the chord. The higher the aspect ratio, the more effectively a plane will glide.

The following photographs show four birds.

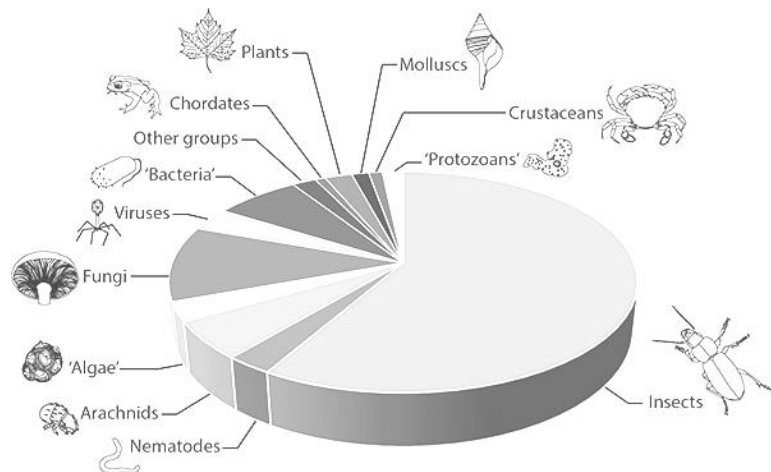
Which bird would be the most effective glider?



2. Plants produce sugar through the photosynthesis pathway. The products are stored in parts of plants such as a fruit, bulb or tuber. Which tissue is most likely to transport the dissolved sugar to the storage?



3. Study the diagram below!



Which of the following characteristics does not explain why insects are so successful at dispersing to distant environments and high diversities?

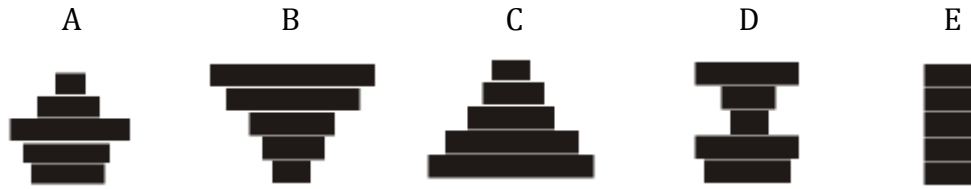
- A. Different nutrition between the larva and the adult insects
- B. Wings
- C. Small size
- D. External fertilization

4. Ebola is one of the most dangerous diseases in the world. The symptoms start two days to three weeks after infection, in the forms of fever, sore throat, muscle pain, and headaches. The current outbreak in West Africa (first case was notified in March 2014) is the largest and the most complex Ebola outbreak since the Ebola disease was first discovered in 1976.

Which of the following statements about the Ebola disease is not correct?

- A. The illness infects humans and non-human primates.
- B. Ebola virus destroys the membrane of the red blood cells.
- C. Fruit bats are natural Ebola disease hosts.
- D. Ebola virus spreads through the bodily fluids of infected people.

5. Analyze the age structure diagrams of six different representative countries shown in the following figure. The age structure diagrams are typical of many countries in the world. Which diagram shows a rapidly growing country?

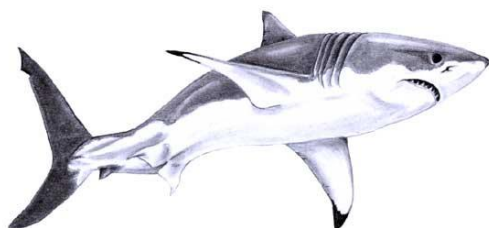


6. Observe the image of the cat below, and choose the INCORRECT statement!



- A. The state of the cat is called “Goosebumps”
- B. It happens when the cat gets frightened
- C. This also is a mechanism for trapping air.
- D. It is caused by the contraction of the muscle cells in the epidermis.

7. Sharks belong to the class of *Chondrichthyes* (*chondrichthyans*), which is different

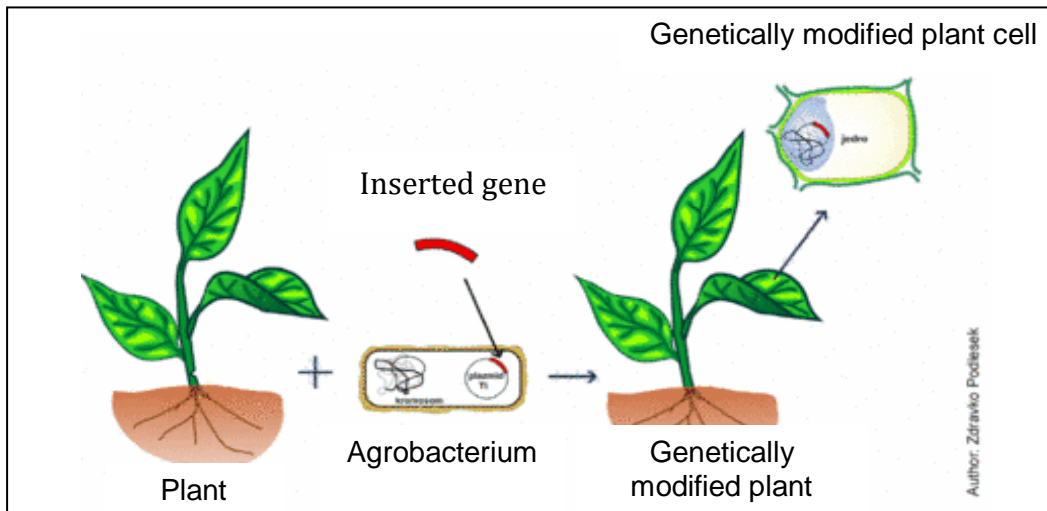


from the *Osteichthyes* or bony fish as their skeleton is cartilaginous. Sharks do not have any protective organs covering over their gills (called an operculum).

Consequently, to breathe, sharks have to \_\_\_\_\_

- A. constantly move to keep the water flowing
- B. breathe oxygen from the air
- C. swim below the water surface
- D. always open their mouth

8. The diagram below shows a process of a genetically modified plant



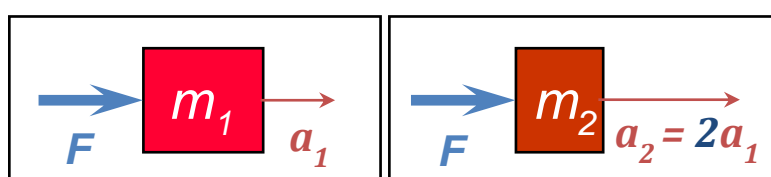
What is the main purpose of the genetically modified organism (GMO) on food crops?

- A. To create pest and disease irrsistance.
- B. To produce crop improvements: herbicide tolerance and resistance.
- C. To improve nitrogen release and more hormone production.
- D. To improve product characteristics: fewer nutrients, fewer allergens, and more functional attributes.

9. Ahmad and Badru are standing at the top of a cliff of height  $H$ . Both of them, then, throw a ball with the initial speed of  $v_0$ . Ahmad throws the ball straight down and Badru straight up. The speed of the balls when they hit the ground is  $v_A$  and  $v_B$  respectively. Neglecting air resistance, which of the following statements is true?

- A.  $v_B = 0$
- B.  $v_A = v_B$
- C.  $v_A < v_B$
- D.  $v_A > v_B$

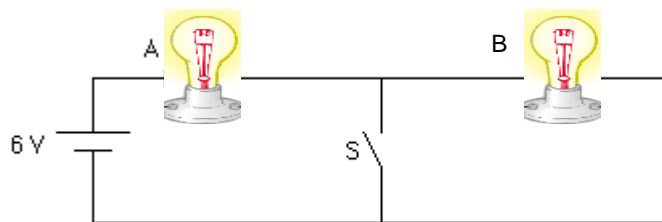
10. A force  $F$  is acting on a mass of  $m_1$  resulting in an acceleration of  $a_1$ . The same force is acting on a different mass of  $m_2$  resulting in an acceleration of  $a_2 = 2a_1$ .



If  $m_1$  and  $m_2$  are glued together and the same force  $F$  acts on this combination, what is the resulting acceleration?

- A.  $1/3 a_1$
- B.  $2/3 a_1$
- C.  $4/3 a_1$
- D.  $3/2 a_1$

11. Two identical light bulbs are arranged in a circuit with a battery and a switch S, as shown in the figure with the opened switch.



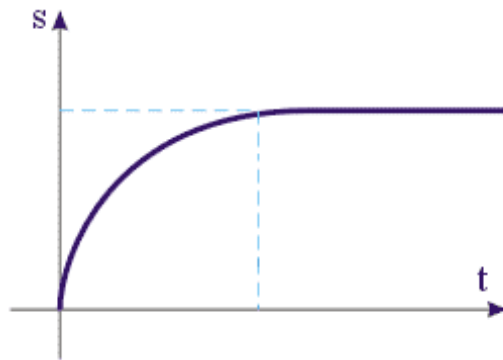
If the switch S is closed, which is the correct statement?

- A. The brightness of bulb A stays the same
  - B. The brightness of bulb A increases
  - C. The brightness of bulb A decreases
  - D. The brightness of bulb B increases
12. The following are the structures of the Earth. Which one is the thinnest layer?
- A. Inner core
  - B. Outer core
  - C. Mantle
  - D. Crust
13. The range of sound that can be heard by human is the sound which has \_\_\_\_\_
- A. Intensity of 20 dB – 20000 dB (dB is decibels)
  - B. Amplitude of 20 mm – 20000 mm
  - C. Frequency of 20 Hz – 20 kHz
  - D. Energy of 20 J – 20 kJ

14. In an area of a volcano, we can find hot water at the temperature of  $300\text{ }^{\circ}\text{C}$  at the depth of  $3000\text{ m}$  in fluid phase. The main aspect that causes the water in fluid phase is \_\_\_\_\_

- A. High Temperature
- B. High Pressure
- C. High Humidity
- D. High Volume of water

15. The graph below shows the position versus the time of the motion of a particle. It can be concluded that \_\_\_\_\_

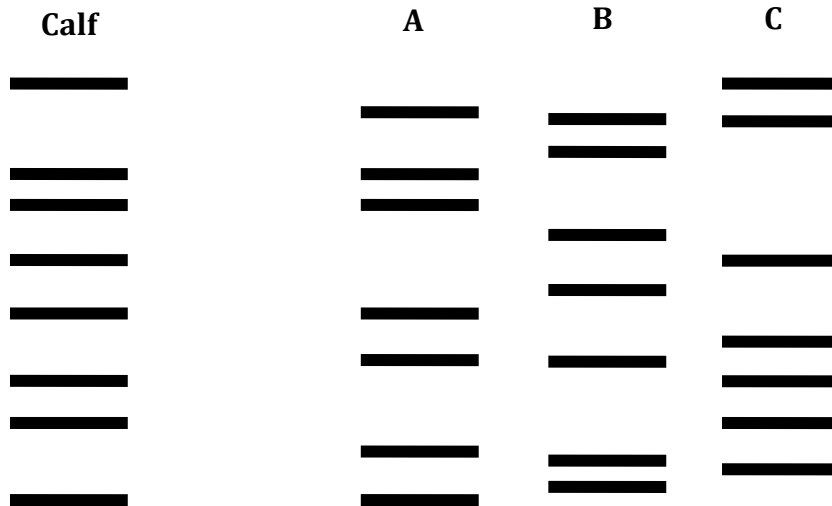


- A. The particle decelerates, and then moves with constant velocity
- B. The particle decelerates, and then stops
- C. The particle accelerates, and then moves with constant velocity
- D. The particle accelerates, and then stops

**Short Questions No. 1-5**

**Answer the questions on the answer sheet.**

1. (3 points) Look at the pictures below!



Mr Umar, a cattle rancher from Lombok, Nusa Tenggara Barat, Indonesia, is trying to hybridize some cows to improve his cattle quality. In order to know which cow will produce high quality of calves, he has already done a DNA test to the parents and their offspring. The DNA test result can be seen in the pictures above. Match the parents of cows with the right calf!

\_\_\_\_\_ and \_\_\_\_\_

2. (2 points) In the diagram below, give the label [X] to show the part that contains the female reproductive cells!



3. **(2 points)** The following table shows the densities (g/ml) of some common metals.

Substance	Density (g/ml)
Aluminum	2.70
Copper	8.93
Pure Gold	19.32
Cast Iron	7.03
Lead	11.34
Silver	10.50
Zinc	7.14

Andri has a sample of silver with a mass of 1000 g. What would be its approximate volume? \_\_\_\_\_

4. The South African Climate Change and Air Quality Intergovernmental Committee monitor air quality using a Regional Pollution Index (RPI). The RPI for a particular pollutant is calculated by:

$$RPI = \frac{\text{pollutant concentration}}{\text{pollution standard level}} \times 50$$

<b>low</b>	RPI between 0 and 24
<b>medium</b>	RPI between 25 and 49
<b>high</b>	RPI 50 or higher

**(1 point)** Ozone is a pollutant. On a particular day the RPI of ozone was 85. Was the concentration of ozone less than the pollutant's standard level? \_\_\_\_\_

**(2 points)** The standard level for the pollutant, nitrogen dioxide, is 0.12 parts per million (*ppm*) per hour. Scientists monitored the levels of nitrogen dioxide for one hour and determined that the RPI was 25. What was the concentration (*ppm* per hour) of the nitrogen dioxide? \_\_\_\_\_

5. **(2.5 points)** Power  $P$  is defined as a time rate of energy or the work done in a time interval  $\Delta t$ ,  $P = W/\Delta t$ . There are two engines, A and B, which have a power ratio of 2:1. If engine A does a work of 1000 joule in 200 seconds, the work done by engine B in 300 seconds is \_\_\_\_\_