



22nd International Mathematics and Science Olympiad (IMSO) Science Theory 1 Test

**Kedah, Malaysia
06 October 2025**

Instructions:

1. Do not turnover this page until you are told to do so.
2. Write your ID Code and shade your Seat Number on the spaces provided in your scannable answer sheet.
3. Answer all the questions by shading the letter on the scannable answer sheet. Here are some shading reminders:

CORRECT SHADING

- 1 A ☒ B ☐ C ☐ D ☐
- 2 A ☐ B ☐ C ☐ D ☐
- 3 A ☐ B ☐ C ☐ D ☐
- 4 A ☐ B ☐ C ☐ D ☐

INCORRECT SHADING

- 1 A ☒ B ☐ C ☐ D ☐ 1 A ☒ B ☐ C ☐ D ☐
- 2 A ☐ B ☒ C ☐ D ☐ 2 A ☐ B ☒ C ☐ D ☒
- 3 A ☐ B ☐ C ☒ D ☐ 3 A ☒ B ☐ C ☒ D ☐
- 4 A ☐ B ☐ C ☐ D ☒ 4 A ☐ B ☒ C ☐ D ☐

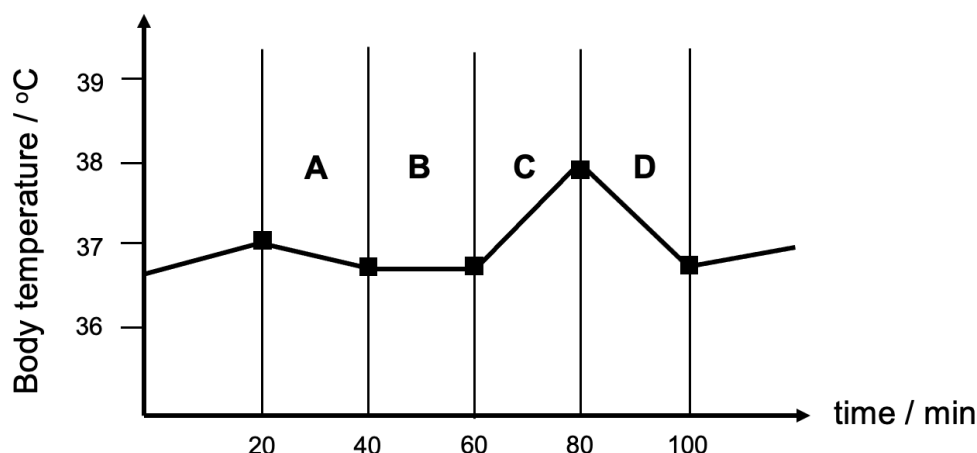
4. A correct answer for each question will be awarded 1 mark.
5. There are 30 questions printed on a total of 17 pages, excluding this cover page.
6. You have 60 minutes to complete this test.

1. The spotted lanternfly (SLF) is an invasive species native to Asia that has become a threatening pest in the United States. The SLF harms plants by using its piercing mouthpart to suck sap from stems and branches, which weakens the plants and can lead to their death. A major problem is that the SLF has no natural predators in the U.S. and secretes a sticky substance that attracts other insects and causes mold growth on plants. The SLF's preferred host is the invasive Tree of Heaven. Both the SLF and the Tree of Heaven are invasive species that were separately introduced to the United States. This relationship, is an example of what kind of ecological interaction?

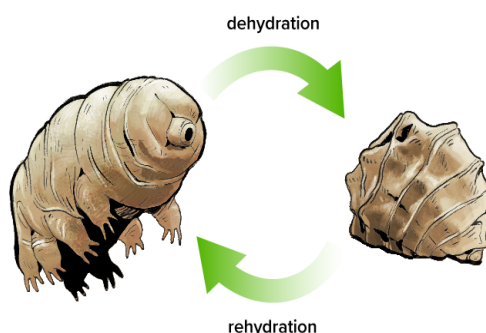


Source: <https://k-5impactnews4-5.mheducation.com/2025/03/17/spotted-lanternfly-natures-most-wanted/>

- A. Commensalism, because one species benefits while the other is unaffected.
B. Symbiosis, because the two species live closely together.
C. Parasitism, because the SLF benefits at the expense of its host.
D. Mutualism, because both organisms benefit from the relationship.
2. The diagram shows a person's body temperature over a period of time. During which period would the blood vessels supplying blood to the skin become dilated to cool down the body?



3. Tardigrades are microscopic invertebrates with a real-life superpower. The tardigrade's ability to survive extreme temperatures, from freezing cold to boiling hot, is primarily due to a state of dormancy called "cryptobiosis". In this state, the tardigrade expels nearly all the water from its body. What is the main scientific reason that removing water is a crucial step for surviving freezing temperatures?



Source: <https://k-5impactnewsg4-5.mheducation.com/2025/02/14/tardigrades-the-tiny-invertebrates-with-a-real-life-superpower/>

- A. The tardigrade's body can produce a special antifreeze protein that works best in a water-free environment.
- B. Removing water lowers the tardigrade's core temperature, which helps it to endure the cold.
- C. Water is a good conductor of heat, so its absence insulates the tardigrade from the cold.
- D. The removal of water prevents the formation of sharp ice crystals, which would otherwise rupture and destroy the tardigrade's cell membranes.
4. Leech therapy is a traditional treatment that uses live medicinal leeches to treat diseases. The leeches' saliva contains anticoagulants, anti-inflammatories, and anaesthetic substances. By sucking blood, the leeches inject this saliva into the patient's body, which may improve blood flow, reduce pain and inflammation, and promote healing. It is used for conditions such as arthritis, varicose veins, cardiovascular diseases, and skin disorders.

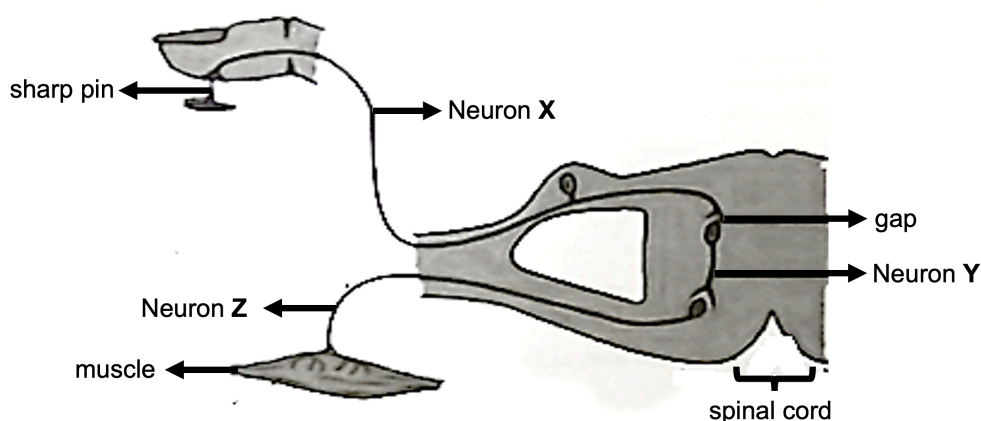
Why does bleeding often continue for some time after the leech is removed?

- A. Leeches secrete a specific toxin that reduces the blood's ability to clot.
- B. Leech saliva contains an anticoagulant substance called *hirudin*, which prevents blood clotting.
- C. Leeches rupture blood vessels, and the body does not have enough time to repair them.
- D. Leeches introduce bacteria into the body that disrupt the blood clotting process.

5. Kwashiorkor is a disease caused by nutrient deficiency. Symptoms include swelling in the abdomen and legs, changes in skin and hair, poor growth, and muscle weakness. It can be treated by eating foods such as meat, dairy, or soy.

A deficiency of which **MAJOR** nutrient leads to kwashiorkor?

- A. Protein
B. Carbohydrate
C. Vitamin
D. Minerals
6. While helping her mother stitch clothes, Aisha accidentally pricks her finger with a pin. Immediately, without thinking, her hand jerks back. This quick, automatic response is called a *reflex action*. This helps protect the body from harm by allowing it to respond to danger without waiting for the brain to process the information. Curious, she looks at a diagram showing this simple reflex arc with three neurons labelled X, Y, and Z.



Which sequence shows the **CORRECT** pathway of the nerve impulse during this reflex action?

- A. Neuron Z → Neuron Y → spinal cord → Neuron X
B. Neuron X → spinal cord → Neuron Z → Neuron Y
C. Neuron X → spinal cord → Neuron Y → Neuron Z
D. Spinal cord → Neuron Y → Neuron X → Neuron Z

7. Earl set up an experiment in a dark room as shown in Fig. 1. He then changed the variable **X** and counted the number of bubbles in the tube. He kept the other variables constant. His results are shown in Fig. 2.

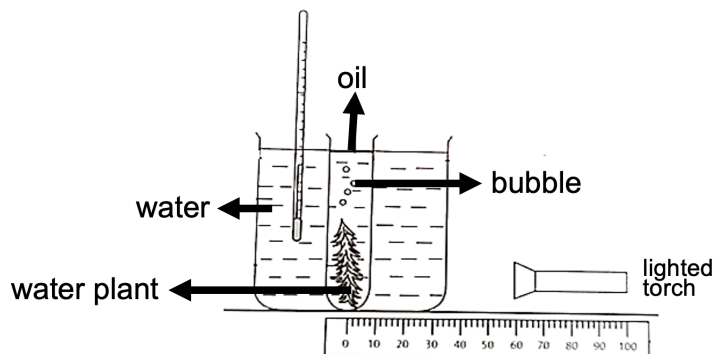


Fig. 1

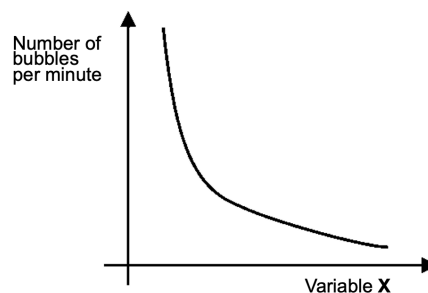


Fig. 2

Which of the following could be variable **X**?

- A. Number of bubbles
B. Distance of torch and the beaker
C. Amount of water
D. Type of water plant
8. Jennifer performed an experiment to test the ability of different heavy metals to inhibit normal enzyme activity in the liver. She placed 5 g of the liver in each of the 5 test tubes. In 4 of the tubes, she also placed equal amounts of heavy metal. She then added 6 mL of hydrogen peroxide to all five tubes. She used the resulting bubble column as an indicator of enzyme activity in the liver and recorded the data in the table below:

	Height of bubble column (cm)			
	Trial #1	Trial #2	Trial #3	Average
Control (No heavy metal)	7	8	8	7.7
Lead (Pb)	4	4	5	4.3
Mercury (Hg)	4	6	5	5.0
Magnesium (Mg)	5	5	6	5.3
Zinc (Zn)	10	9	9	9.3

Based on Jennifer's data, which of the 4 heavy metals inhibited enzyme activity the **LEAST**?

- A. Zn
B. Mg
C. Hg
D. Pb

9. In a pond, life is interconnected through a food chain. Algae, small green organisms, are primary producers, creating their own food using sunlight. They serve as the main food source for consumers like aquatic insects and small fish. These insects and small fish, in turn, become food for larger predators such as frogs.

Consider a scenario where environmental pollution causes a significant decline in the algae population. This change directly impacts the availability of food for the insects and small fish, potentially affecting their numbers. Based on these observations, what is the **MOST** likely result of the algae disappearing?

- A. All animals in the pond will grow faster due to less competition.
 - B. Small fish and insects may decrease because their main food source is gone.
 - C. Frogs will have more food since algae are not blocking the water.
 - D. Insects will start making their own food and become producers.
10. Biology students carried out an experiment to determine if a certain fertilizer increased the height of plants. The students selected 4 types of plants and planted 10 seeds of each type. Five seeds of each type were treated with fertilizer and 5 seeds of each type were not treated with fertilizer. All other conditions were identical. The students recorded the plant height after 120 days, as shown in the table.

Plant Height (cm)							
Eggplant		Tomato		Radish		Pepper	
fertilized	unfertilized	fertilized	unfertilized	fertilized	unfertilized	fertilized	unfertilized
150	145	150	140	15	10	75	70
145	150	145	130	20	15	80	80
155	150	155	135	25	20	75	70
160	155	155	145	20	15	75	65
140	140	160	120	20	20	75	70

Which plant type showed the **LEAST** change in average height between the fertilized and unfertilized groups?

- A. Eggplant
- B. Tomato
- C. Radish
- D. Pepper



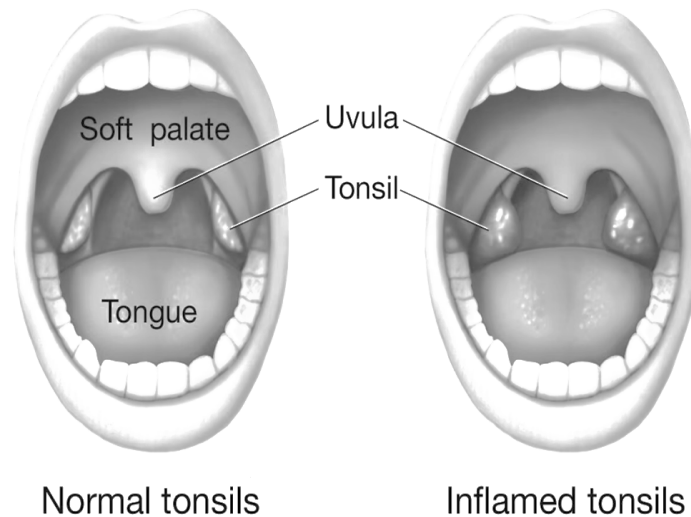
11. The table below compares the body temperatures of several animals in the cold and warm seasons.

Animal	Body Temperature	
	Cold Season (°C)	Warm Season (°C)
Lizard	10	30
Sparrow	40	42
Frog	5	25
Dog	38	39
Bat (hibernating)	8	38
Turtle	5	28

Based on the table above, which group of animals are poikilothermic (cold-blooded), and which animals show heterothermy?

	POIKILOTHERMIC	HETEROTHERMIC
A	Lizard, Frog, Turtle	Bat
B	Lizard, Dog, Turtle	Sparrow
C	Frog, Dog, Sparrow	Bat
D	Lizard, Frog, Turtle	Sparrow, Dog

12. Tonsillitis is inflammation of the tonsils, which are two oval-shaped pads of tissue located at the back of the throat, one on each side. The condition primarily affects children and teenagers. Tonsillitis can be caused by either a virus or a bacterium.

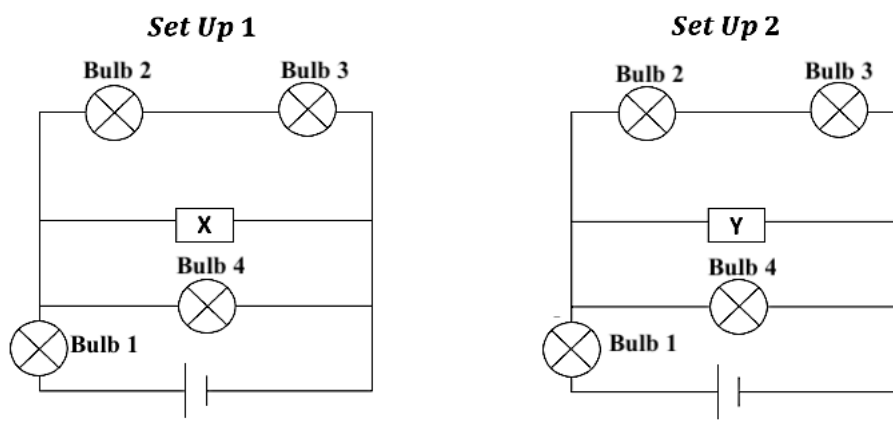


Source: <https://www.mayoclinic.org/diseases-conditions/tonsillitis/symptoms-causes/syc-20378479#>

Which of the following is a key difference in how a doctor would treat viral versus bacterial tonsillitis?

- A. A doctor would prescribe antibiotics for viral tonsillitis because the medication will directly kill the virus, whereas for bacterial tonsillitis, the body's immune system is left to fight the infection naturally
- B. A doctor would prescribe antibiotics for bacterial tonsillitis because these medications are designed to destroy bacteria or stop them from reproducing. Viruses, however, do not have the same cellular structures as bacteria, so antibiotics are ineffective against them.
- C. A doctor would recommend rest and fluids for both viral and bacterial tonsillitis, but would only prescribe antibiotics if the symptoms of bacterial tonsillitis last for more than two weeks, as this is when the infection becomes serious.
- D. A doctor would use antivirals for both because they are effective against all types of germs, but would only use antibiotics as a last resort if the patient's symptoms worsened and a secondary bacterial infection developed.

13. Look at the following circuit diagrams. Assume that all lamps are identical.



Component **X** is a very good conductor, while Component **Y** is an insulator. Which lamps are *on* and which are *off* in Setup 1 and Setup 2?

	Set Up 1				Set Up 2			
	Bulb 1	Bulb 2	Bulb 3	Bulb 4	Bulb1	Bulb 2	Bulb 3	Bulb 4
A	on	off	off	off	on	off	off	on
B	on	off	off	on	on	on	on	on
C	on	off	off	off	on	on	on	on
D	on	off	off	on	on	off	off	on

14. Alex and Bella are playing their guitars together. Alex plays a note with a frequency of 528 Hz, while Bella plays a note with a frequency of 396 Hz. Bella's guitar sounds noticeably louder than Alex's. The speed of sound in air is 330 m/s.

Based on this information, which statement is **INCORRECT**?

- A. The pitch of the note played by Alex is higher than that played by Bella.
- B. The amplitude of the sound wave from Bella's guitar is greater than that from Alex's guitar.
- C. The period of the sound wave from Alex's guitar is shorter than that from Bella's guitar.
- D. If this experiment were repeated on the Moon, the difference in loudness would be even more pronounced.

15. Several common optical phenomena are listed below:
- A rainbow after rain
 - A straw appearing bent in a glass of water
 - The bottom of a clear lake appearing shallower than it really is.
 - The Sun appearing slightly above the horizon when it has already set

Which statement **BEST** describes the role of refraction in these cases?

- Refraction is the only mechanism in all four phenomena.
 - Refraction is irrelevant for (i), but explains (ii), (iii), and (iv).
 - Refraction is important only for (i) and (ii), while (iii) and (iv) are caused by reflection and scattering.
 - Refraction alone explains (ii), (iii), and (iv), but (i) requires both refraction and internal reflection.
16. Azzam did an experiment to find the relationship between the diameter of a wire and the maximum current it can safely carry. He recorded the maximum current for different wire diameters as shown in the table below:

Wire diameter (mm)	Maximum current (A)
0.50	2
0.75	7
1.00	12
1.25	17
1.50	22
1.75	27

Based on this information, (assume the relationship between diameter and maximum current is linear.) if a wire of the same type with a diameter of 1.40 mm is connected to an electronic device with a voltage source of 220 V, calculate the resistance of the wire.

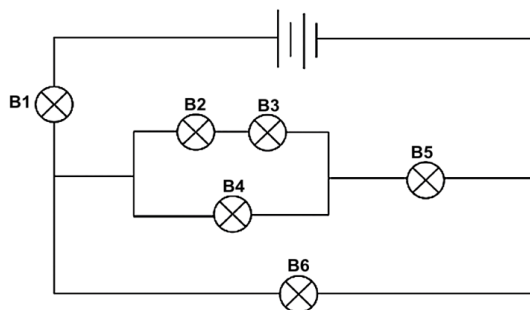
- 10 Ω
- 11 Ω
- 12 Ω
- 20 Ω

17. An oscilloscope is an electronic instrument that visually displays time-varying electrical signals as waveforms on a screen. When a light sensor is connected to the oscilloscope and exposed to monochromatic light, it converts the light into an electrical signal. The oscilloscope then displays the corresponding frequency of that light on the screen. Four of such observations are given below.



If you have to guess the color of the lights in order, which of the following options is the **BEST** assumption?

- | | | | |
|---------------|-------------|--------------|-------------|
| A. (i) Violet | (ii) Red | (iii) Blue | (iv) Yellow |
| B. (i) Yellow | (ii) Violet | (iii) Red | (iv) Blue |
| C. (i) Blue | (ii) Yellow | (iii) Violet | (iv) Red |
| D. (i) Red | (ii) Blue | (iii) Yellow | (iv) Violet |
18. Study the circuit below. The batteries and bulbs are working properly.

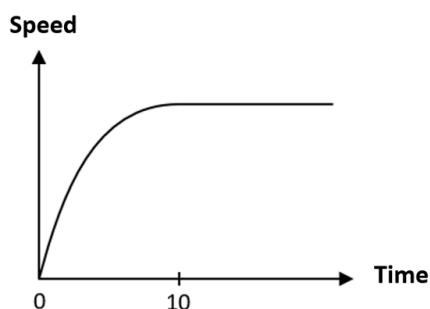


Which of the following correctly states the number of the bulb(s) that would be lit when bulbs are blown?

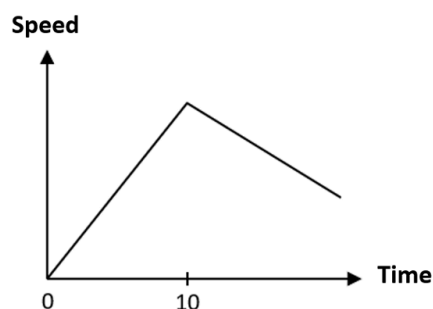
	Bulbs that are blown	Number of bulb(s) still lit
A	B4 and B5	1
B	B3 and B6	0
C	B2 and B4	2
D	B5 and B6	4

19. A bomb is dropped from a helicopter that is hanging above the sea. After falling for 10 s, the bomb enters the seawater.

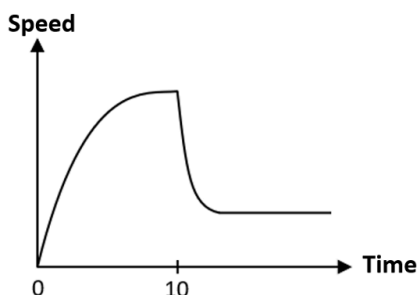
Which graph best shows how the speed of the bomb varies with time?



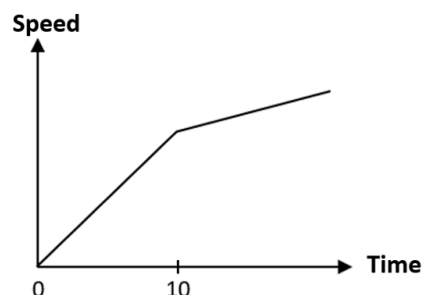
A



C



B



D

20. A grandmother with presbyopia gets a new pair of reading glasses from her doctor. The glasses are designed to provide clear vision at a standard reading distance of 30 cm. However, when she first uses them to read a newspaper on the table, the letters appear blurry. She experiments with a few actions.

Which action is **MOST LIKELY** to resolve the blurriness and allow her to see the letters clearly with her new glasses?

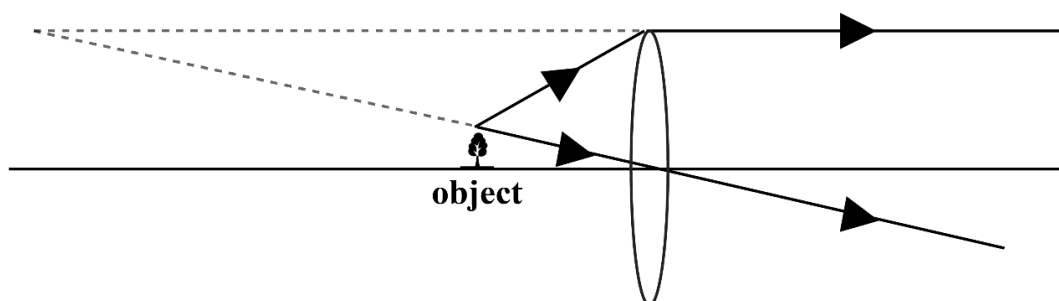
- A. Exchanging the glasses for a pair with larger lenses.
- B. Tilting her head to view the text through the edge of the lenses.
- C. Switching the table lamp to a brighter bulb to improve illumination.
- D. Leaning her head back from the table to increase the reading distance to approximately 40 cm.

21. Mary is investigating the factors affecting the period of a simple pendulum (assuming the string/rod has negligible mass and air resistance is ignored). She sets up two pendulums:

Pendulum	Length	Mass of bob
X	2.00 m	200 g
Y	0.50 m	400 g

She displaces both bobs by the same small angle and releases them simultaneously. Which of the following observations will Mary **MOST LIKELY** make about the motions of the two pendulums?

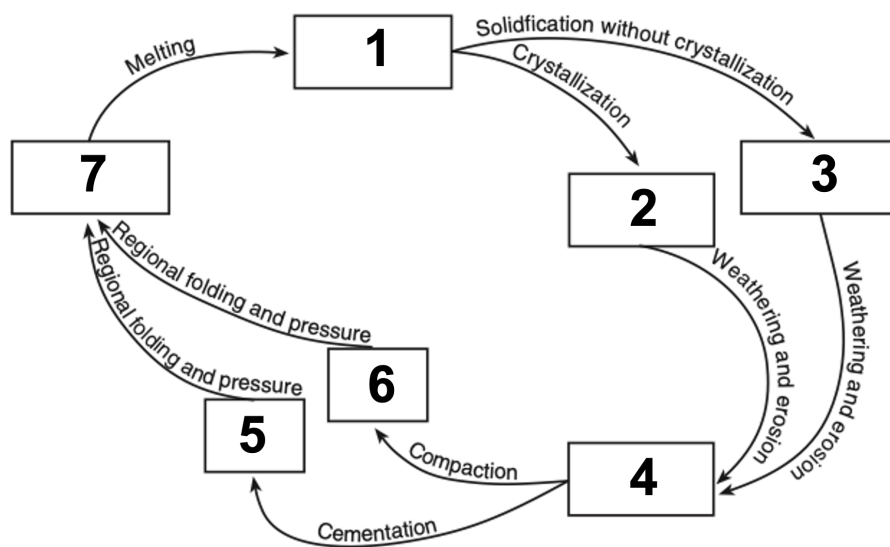
- A. The period of Pendulum X is exactly twice the period of Pendulum Y.
 - B. The period of oscillation is the same for both pendulums because they were released together.
 - C. Pendulum Y will have a greater period because its bob is heavier.
 - D. The frequency of Pendulum X is four times the frequency of Pendulum Y.
22. An object is placed in front of a convex lens as shown.



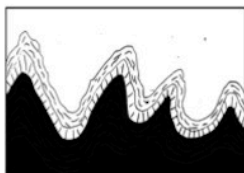
Which statement is **CORRECT** for this setup?

- A. The image is real, inverted, diminished, and forms behind the lens.
- B. The image is virtual, upright, magnified, and forms on the object's side (in front of the lens).
- C. The image is virtual, upright, diminished, and forms behind the lens.
- D. The object is at the focal point, so all emergent rays are parallel.

23. A skydiver jumps out of an airplane and initially accelerates downward due to gravity. After a while, the skydiver reaches a constant speed and no longer accelerates. What can be said about the forces acting on the skydiver at this point?
- The gravitational force is stronger than the air resistance, which is why the skydiver keeps moving downward.
 - The air resistance has become equal to the gravitational force, so the skydiver moves at a constant speed.
 - The gravitational force is weaker than the air resistance, which is why the skydiver stops accelerating.
 - The skydiver's weight decreases, which balances the forces and stops acceleration.
24. The diagram below represents the rock cycle. The boxes labeled 1 through 7 represent rocks and rock materials. Arrows represent the processes of the rock cycle.



If a certain rock is labeled 7, which of the following geological formations is Rock 7 most likely from?



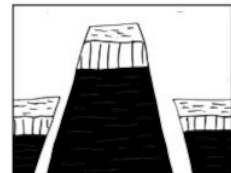
A



B

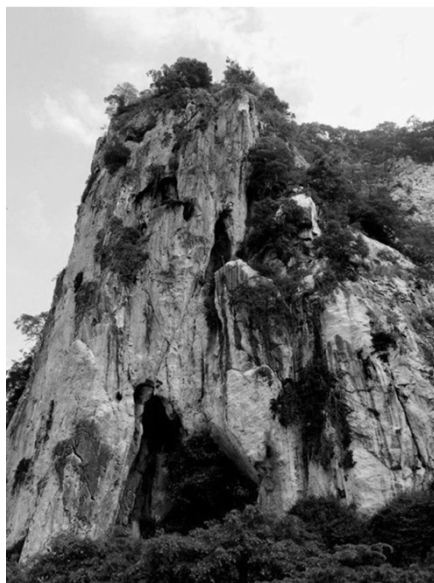


C



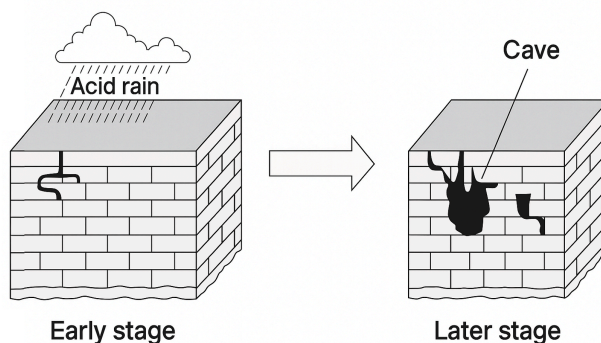
D

25. Gunung Keriang is a fascinating limestone rock formation in Kedah state. It is believed to be 250 million years old and resembles the shape of an elephant. More fascinating is that this unassuming mountain has multiple cave systems, one of which is Gua Keriang.



Source: <https://www.freemalaysiatoday.com/category/leisure/2019/05/13/gunung-keriang-recreational-park-all-out-of-glitz>

Caves are formed by the slow process of weathering and erosion as shown on the figure below:



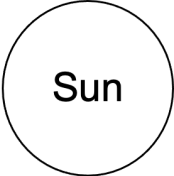
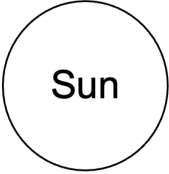
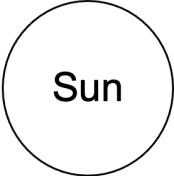
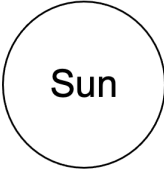
Which can be inferred from the figure above about the process of cave formation?

- A. Caves are formed mainly through chemical weathering caused by groundwater flow.
- B. Caves are formed mainly through chemical weathering caused by runoff.
- C. Caves are formed mainly through physical weathering caused by groundwater flow.
- D. Caves are formed mainly through physical weathering caused by runoff.

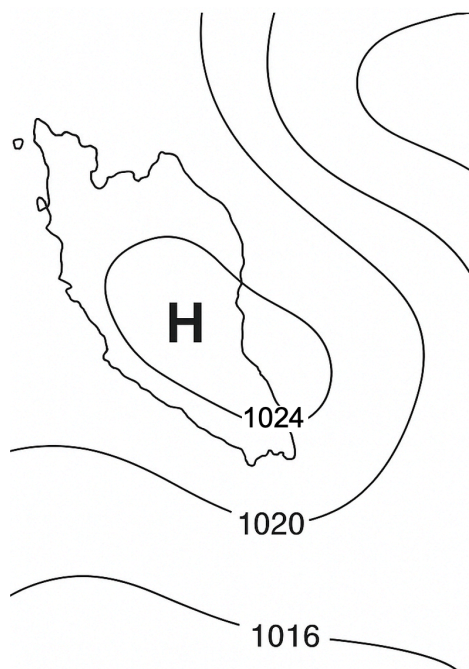
26. The figure below shows a partial eclipse.



Choose the correct type of eclipse and the respective position of sun, moon, and earth during this eclipse.

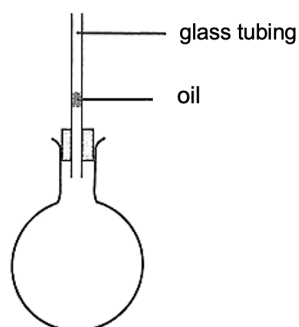
	Type of eclipse	Position of Sun, Moon, and Earth		
A.	Lunar			
B.	Lunar			
C.	Solar			
D.	Solar			

27. The weather map below shows the location of a high-pressure center over a portion of Malaysia. The isolines indicate surface air pressures.



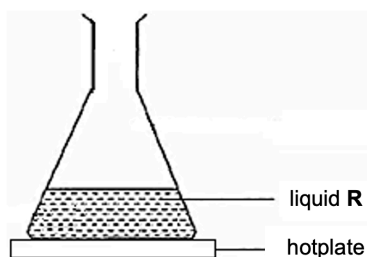
What would a weather forecaster report on what they would expect in this area?

- A. "We're anticipating mostly cloudy skies with periods of rain."
 - B. "Expect strong winds moving in, bringing the chance of thunderstorms."
 - C. "Conditions will be calm, with clear skies and fair weather throughout the day."
 - D. "A snowstorm is on the way, with blizzard conditions expected."
28. A flask contains air which is trapped by a drop of oil in a glass tubing. When the flask is warmed, the oil drop rises the tubing. Which of the following statements **DOES NOT** explain this observation?



- A. Particles of air in the flask move further apart.
- B. Particles of air in the flask gain energy and move faster.
- C. Particles in the oil drop increase in volume and take up more space.
- D. Particles in the oil drop are pushed away by particles in the trapped air.

29. A flask containing liquid **R** is heated on a hotplate.



Which of the following statements is/are **CORRECT**?

- (i) Evaporation of **R** occurs throughout the liquid.
- (ii) The temperature of **R** remains constant during the boiling of **R**.
- (iii) Heat energy is absorbed during the evaporation of **R**.
- (iv) Bubbles of air are seen rising to the surface when **R** is boiling.
- (v) Evaporation of **R** can occur before the hotplate is turned on.

- A. (ii) only
- B. (i) and (iv) only
- C. (ii), (iii) and (v) only
- D. (iii), (iv) and (v) only

30. This graph shows the volume of product produced over time for 4 different enzyme-catalyzed reactions. Between 0 s and 2 s, which of these 4 reactions has the greatest average rate of production?

