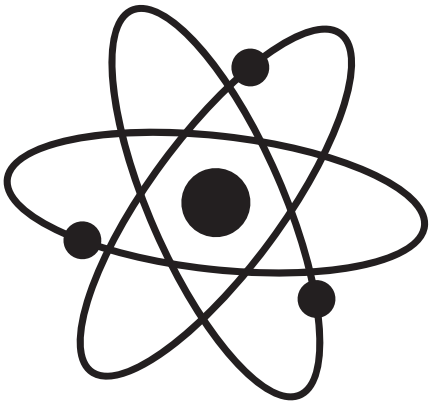
ASMOPSS THAILAND 2026

Asian Science & Mathematics Olympiad for Primary and Secondary Schools (Thailand)

Science Secondary G.7



Sunday, August 9, 2026

10:30 a.m. – 12:00 p.m. (90 minutes)

B

Instructions

1. This exam includes 40 questions, with 4 choices given (100 marks).
2. Use a 2B black pencil or darker one to fill in the circle.
3. Fill out your name, grade, school, test center, room, seat number, and identification number either in pen or in pencil.
4. If you want to change an answer that you have already marked, use a clean eraser to erase the incorrect answer and mark the new one.
5. It should be noted that figures in the exam are not drawn to scale.
6. Dictionaries, calculators, and electronic devices are not permitted in the test room.
7. Note taking can be done on the test paper only, with no extra sheet provided.
8. Do not write anything or make any symbols in the black barcode area along the edge of the paper except the answers on the answer sheet. Make sure the answersheet is not crumpled.
9. Submit the answer sheet to the proctor when the time is up.
10. Cheating in the exam may cause serious consequences including disqualification from receiving any award or joining the second round of the test held by ASMOPSS THAILAND.

Should any disagreement arise, the judgment of the panel is deemed final.

Announcement of the results via https://asmopssthailand.com on September 18, 2026

: ASMOPSS Thailand / Miraah Education

Contact US

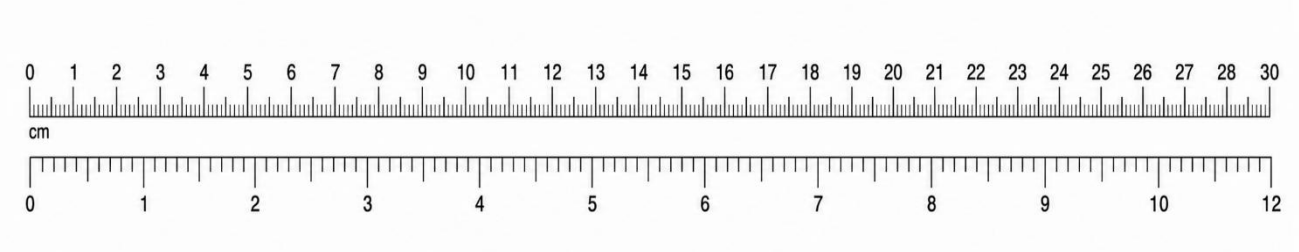
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Instructions :

1. Each question carries a different score, as indicated at the end of the question.
2. Students must select only the one best answer for each question.

1. A student wants to find the thickness of a single microscope slide (approximately 1mm thick). She has a box containing 50 identical slides and a typical plastic ruler as shown in the figure.



Which of these methods will give the most accurate result? (1.25 marks)

1. Measure the slide in ten different spots and calculate the overall average.
2. Measure the slide in inches and multiply by 25.4 for more precise decimal results.
3. Stack twenty identical slides together, measure the total height, and divide the result by twenty.
4. Switch to a metal ruler because metal resists the expansion and shrinkage which commonly occurs in plastic.

2. A microbiologist places a single-celled organism, a Euglena, in a nutrient-rich solution. The Euglena is observed to move actively towards a beam of light. A few hours later, the single organism has divided, and there are now two Euglenas. This simple organism is able to perform these actions because of its internal parts, which are called organelles.
This scenario best demonstrates which of the following characteristics of life? (1.25 marks)

1. Only metabolism and growth.
2. Response to stimuli and reproduction
3. Only cellular organization.
4. Only evolution and adaptation.

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3. A materials-testing laboratory receives a metal crown made for the opening ceremony of a science competition. The manufacturer claims that the crown is made entirely of pure gold. To test this claim, a scientist compares the crown with a standard bar of pure gold.
A high-precision balance shows that:

- the crown has a mass of exactly 1,000 grams.
- the pure gold bar also has a mass of exactly 1,000 grams.



Assume that the crown is solid, contains no hollow spaces, has no gemstones or other materials attached, and can be completely submerged in water without trapping any air bubbles. If some of the gold has been replaced by a metal that is less dense than gold, the crown will have a lower density than pure gold.

Which test would provide the clearest evidence that the crown is not made entirely of pure gold? (1.25 marks)

1. Place the crown and the gold bar on opposite sides of a balance. If the balance remains level, the crown must be made of pure gold.
2. Measure the length and width of both objects. If the crown is larger, it must have a greater mass than the gold bar.
3. Submerge each object separately in water. If the crown displaces more water than the gold bar, the crown has a lower density.
4. Examine the crown with a magnifying glass. If its surface is yellow and shiny, the crown must be made of pure gold.

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4. While heating a liquid in a test tube during a chemistry laboratory session, a student noticed that the liquid began to boil vigorously, causing it to splash and erupt under pressure.

Which of the following practices is the most appropriate safety measure and scientific rationale to prevent an accident? (1.25 marks)

1. Seal the mouth of the test tube with a rubber stopper to contain the splashing liquid, as the pressure will help the liquid heat evenly.
2. Point the mouth of the test tube away from yourself and others, as sudden boiling can cause the hot liquid to erupt under high pressure.
3. Add more liquid to the test tube, as a larger volume of liquid takes longer to boil; therefore, making it safer.
4. Look directly into the test tube to monitor the formation of gas bubbles, as observation is the key to scientific discovery.

5. A student is looking at an unknown single-celled organism under a high-powered school microscope. She notices that the cell has a clear cell wall, a cytoplasm full of ribosomes, and a green pigment, but she cannot find a distinct, dark central nucleus anywhere inside the cell. How should this cell be classified? (1.25 marks)

1. It is an animal cell that has lost its nucleus due to cell division.
2. It is a non-living viral particle because it does not have a properly formed nucleus.
3. It is a eukaryotic plant cell because it contains a rigid cell wall and photosynthetic pigments.
4. It is a prokaryotic cell (such as a cyanobacterium) because its genetic material floats freely in the cytoplasm without a nuclear membrane.

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6. A certain pure organic compound has a melting point exactly at 122.4 °C. A student tested four different samples of this compound (labeled as W, X, Y, and Z) and recorded the temperature range from when they began to melt until it finished melting, as follows:

Melting Point Recording Table

Sample	Initial melting point (°C)	Final melting point (°C)
W	122.3	122.5
X	115.0	120.0
Y	122.4	122.4
Z	118.5	119.2

Consider the following statements:

I. Sample Y is the purest sample because it has a sharp melting point and highest precision.

II. Sample X and sample Z contain impurities, which cause a "melting point depression" (lowering melting point).

III. In practice, sample W can be classified as a pure substance because it has a very narrow melting range.

IV. A mixture composed of two substances will always have a higher and sharper melting point than the melting points of its pure component substances.

Which of the following statements are CORRECT? (1.25 marks)

1. I and II
2. I, II, and III
3. II and IV
4. I, III, and IV

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7. An analytical chemist uses paper chromatography (a polar cellulose stationary phase) to investigate a mixture of plant pigments across two different solvent systems.

The experimental results are shown in the table below

Pigment	Distance Traveled in Solvent 1 (cm)	Distance Traveled in Solvent 2 (cm)
Solvent Front	10.0	12.0
Pigment X	2.0	9.6
Pigment Y	5.0	6.0
Pigment Z	8.5	3.6

Based on the data table, which statement provides the most accurate scientific analysis of the pigments' properties? (1.25 marks)

1. Pigment Z has a constant value of 0.85 in both solvent systems because its molecular mass remains unchanged.

2. The data demonstrates that Solvent 2 degraded Pigment Z, causing its migration distance to drop significantly.

3. Pigment Y has an identical partition coefficient because its absolute migration distance increased from 5.0 cm to 6.0 cm.

4. Pigment X is the most polar compound because it has the lowest value in Solvent 1 and binds tightly to the polar paper, but shows increased solubility in less polar Solvent 2.

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8. A laboratory assistant is attempting to identify an unknown substance by measuring its mass, volume, and melting behavior. The results are compared with standard values of pure substances in the table below:

Table of Standard Properties of Pure Substances

Substance	Density (g/cm³)	Melting Point (°C)
Aluminum	2.70	660.3
Magnesium	1.74	650.0
Pure Ice	0.92	0.0

Experimental Data for "Unknown Substance X"

Mass : 54.0 g

Volume : 20.0 cm^3

Melting Range : 645.0 °C - 655.0 °C

Analyze the following conclusions regarding Unknown Substance X:

I. The density of Substance X is 2.70 g/cm^3, which matches the standard density of aluminum.

II. Substance X is a pure sample of aluminum because its density perfectly matches the standard value.

III. Substance X is likely to be a mixture because it melts over a temperature range rather than at a single, sharp melting point.

IV. If Substance X were pure magnesium, it would still remain in a solid state at a temperature of 648°C.

Which of the following conclusions are CORRECT? (1.25 marks)

1. I and II only
2. III and IV only
3. I and III only
4. I, III, and IV only

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9. Consider the given list of substances represented by their chemical symbols and formulas:

a. O_3 (Ozone gas)
b. CO_2 (Carbon dioxide)
c. $C_6H_{12}O_6$ (Glucose)
d. Fe (Iron)

Analyze the characteristics of these substances based on the following claims:

I. Substances a. and d. are classified as elements because they consist of only one type of atom, even though the substance is a polyatomic molecule.

II. Substances b. and c. are classified as compounds because they consist of two or more different types of elements chemically bonded together in a fixed ratio.

III. One molecule of Glucose ($C_6H_{12}O_6$) consists of a total of 24 atoms from 3 different elements.

IV. The chemical decomposition of CO_2 yields carbon (C) and oxygen (O_2), both of which retain properties identical to the initial CO_2 gas.

Which of the following claims are VALID? (1.25 marks)

1. I and II only
2. I, II, and III only
3. II, III, and IV only
4. All of the above (I, II, III, and IV)

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10. A farmer wants to expand his garden using the principles learned from these species. Evaluate the following practical applications:

I. To ensure that a specific sweet-tasting mango tree remains exactly the same in the next generation, the farmer should use Grafting or Tissue Culture (asexual) rather than planting seeds (sexual).

II. Planting seeds from a single fruit will result in offspring that are all genetically identical to the mother plant.

III. Fragmentation and budding are common asexual methods used by simple organisms like Hydra and Starfish to regenerate or multiply quickly.

IV. Sexual reproduction is necessary for the long-term survival of a species in a changing environment because it provides the "raw material" (variation) for natural selection.

Which of the following claims are CORRECT? (1.25 marks)

1. I, III, and IV only
2. I and II only
3. II and IV only
4. I, II, and III only

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11. Environmental scientists are monitoring a mangrove ecosystem that has recently been affected by human activity. The food web in this area consists of the following key groups:

Producers : Phytoplankton and Mangrove trees.

Primary Consumers (Herbivores) : Zooplankton and Small herbivorous fish.

Secondary Consumers (Omnivores/Carnivores) : Large crabs, Shrimp, and Medium-sized fish.

Tertiary Consumers (Top Predators) : Herons (Birds) and Crocodiles.

A data table below shows population trends over a 5-year period after a neighboring farm began releasing high levels of nitrogen fertilizer into the water (eutrophication) and local hunting significantly reduced the crocodile population.

Species Group	Year 1 (Baseline)	Year 3 (Mid-term)	Year 5 (Current)
Phytoplankton	Normal	High (Algal Bloom)	Very Low (Oxygen Depletion)
Small Fish	5,000	8,500	1,200
Medium Fish	1,000	1,800	400
Crocodiles	50	15	2

Which of the following statements is INCORRECT? (1.25 marks)

1. Energy is transferred from phytoplankton to zooplankton with an efficiency of approximately 10%, meaning that 90% of the energy is lost as heat or through metabolic processes.

2. Mangrove trees and phytoplankton are classified as autotrophs because they can convert solar energy (inorganic substances) into chemical energy through photosynthesis.

3. In this ecosystem, herons and crocodiles occupy the highest trophic levels, meaning they will have the lowest total biomass compared to other trophic levels.

4. The relationship between small fish and medium fish is classified as mutualism because population index data shows that the populations of both species increased and decreased in the same direction.

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12. A team of botanists placed a healthy green plant inside a sealed glass chamber equipped with gas exchange sensors. The plant was exposed continuously to light from LED lamps for 12 hours (Phase A), followed by total darkness for 12 hours (Phase B).
Which of the following statements is INCORRECT? (1.25 marks)

1. During Phase B (dark condition), the plant stops producing oxygen because the light-dependent reactions cannot occur in the absence of photons.

2. The increase in CO_2 level during Phase B indicates that the plant is undergoing cellular respiration, breaking down stored sugars to sustain life.

3. If the research team coated all the stomata with waterproof wax, the rate of photosynthesis would increase because the plant is forced to retain all gases inside its tissue.

4. Stomata play a dual role: they serve as a pathway for CO_2 to enter cells for photosynthesis and as a pathway for water vapor (H_2O) to exit cells during transpiration.

13. Which of the following statements is CORRECT? (1.25 marks)

I. During a sunny afternoon, sucrose is transported through the phloem tissue from the leaves down to the roots.

II. In conditions of high relative humidity and low wind speed, the rate of water movement decreases because the water vapor concentration gradient between the leaf and the atmosphere is reduced.

III. As water is transported through the xylem tissue, if air bubbles form inside the vessel elements, it will obstruct the upward transport of glucose into the phloem tissue.

IV. Transport in the phloem is driven by gravity, while transport in the xylem tissue is driven by active pumping.

V. Mineral ions are typically transported into root hair cells via active transport rather than simple diffusion because mineral ions are too large to pass through the cell membrane.

1. I and II
2. II and III
3. I, II, and V
4. I, III, IV, and V

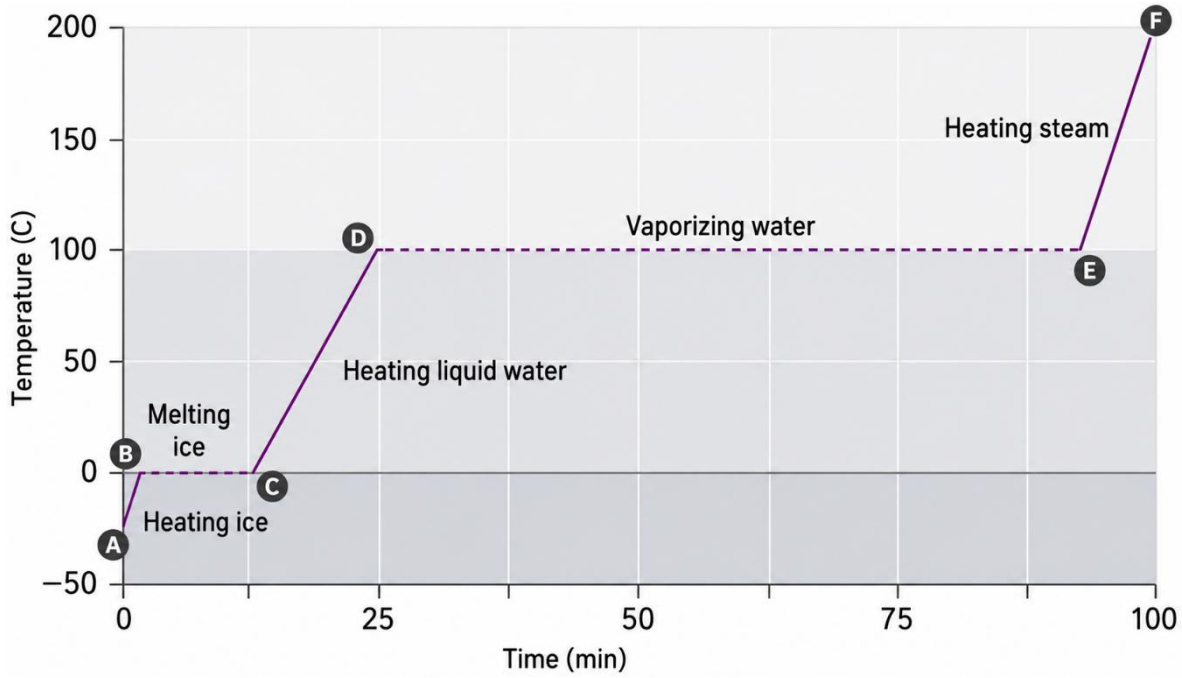
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14. A researcher observes water temperature rising from 25°C to 100°C.

What is the magnitude of this temperature increase in Kelvin? (1.25 marks)

1. -225K
2. 75K
3. 273K
4. 348K

15. A student heats a block of ice at a constant rate and plots a Temperature vs. Time graph, noting the specific time it takes for the ice to melt and the water to boil.



If the student repeats the exact same experiment but doubles the heating rate (supplying twice as much heat per second), what will be the primary change observed on the new graph? (2.5 marks)

1. The time required for each phase will decrease in half.
2. The time required for each phase will double.
3. The temperature of the melting and boiling points will double.
4. The temperature of the melting and boiling points will decrease in half.

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16. A group of biology students studied two unknown cell samples, Sample A and Sample B, using an electron microscope. Additionally, they performed a stress test by immersing both cell samples in a solution containing metabolic inhibitors, which completely halted the production of adenosine triphosphate (ATP).

Data Table Microscopic Observations of the Cells

Cellular Feature	Sample A	Sample B
Cell Wall	Present (Composed of Cellulose)	Absent
Chloroplasts	Present (Large, Distinctly Green)	Absent
Vacuoles	Single large central vacuole	Multiple small temporary vacuoles
Mitochondria	Present	Present (Highly abundant)
Endoplasmic Reticulum	Extensive Rough ER	Extensive Rough ER

Experimental Results (30 minutes after ATP production was inhibition)

Sample A : The rate of water movement out of the cell decreased, but the cell maintained a stable shape.

Sample B : Active transport of sodium ions (Na^+) stopped immediately. The cell began to swell and lose its normal structure.

Which of the following statements is incorrect? (2.5 marks)

1. Sample A is a plant cell, as evidenced by the presence of a cellulose cell wall and chloroplasts for photosynthesis.
2. Sample B is an animal cell, characterized by the absence of a cell wall and the presence of multiple small vacuoles.
3. The abundance of mitochondria in Sample B indicates that this cell type may be part of a high-energy-demanding tissue, such as muscle tissue.
4. Both cell samples are classified as prokaryotic cells because they contain specialized organelles, such as the endoplasmic reticulum and mitochondria.

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17. A researcher uses a pulse-chase labeling technique with radioactive amino acids to track the pathway of secreted proteins. Which of the following represents the correct sequence of organelles through which the radioactivity will pass? (2.5 marks)

1. Rough ER ⟶ Transport Vesicle ⟶ Golgi Apparatus ⟶ Secretory Vesicle ⟶ Plasma Membrane
2. Free Ribosomes ⟶ Rough ER ⟶ Golgi Apparatus ⟶ Plasma Membrane
3. Nucleus ⟶ Rough ER ⟶ Smooth ER ⟶ Golgi Apparatus ⟶ Plasma Membrane
4. Rough ER ⟶ Golgi Apparatus ⟶ Lysosome ⟶ Secretory Vesicle ⟶ Plasma Membrane

18. If a team of researchers places a live animal cell into a distilled water solution (which has a solute concentration of 0%), analyze the biological impact based on the principles of osmosis by considering the following statements:

I. Distilled water is classified as a hypotonic solution relative to the cell's cytoplasm.

II. Water molecules will move into the cell, causing it to swell and potentially undergo lysis because animal cells lack a cell wall.

III. If this scenario were to occur in a plant cell, the cell would not burst but would instead become turgid, as the rigid cell wall provides an opposing counter pressure.

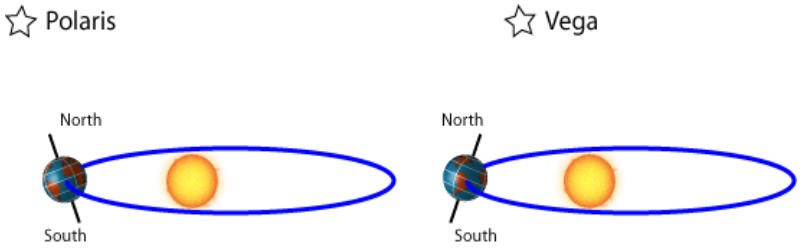
IV. Conversely, if the cell is placed in a hypertonic solution, such as a concentrated saline solution, the animal cell will shrink. This shrinking process is called plasmolysis and crenation in animal cells.

Which of the following statements are CORRECT? (2.5 marks)

1. I and II only
2. I, III, and IV only
3. II and III only
4. All of the above

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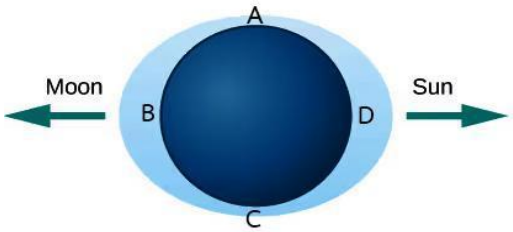
19. Currently, the Earth's rotational axis points towards Polaris. As a result, the Northern Hemisphere experiences winter and the Southern Hemisphere experiences summer during December, while during June, the Northern Hemisphere experiences summer and the Southern Hemisphere experiences winter. Due to this precession, the Earth's rotational axis is comparable to the rotation of a spinning top and will eventually point towards Vega in the future, as shown in the figure.



How will the change in the rotational axis of the Earth affect the seasons? (2.5 marks)

1. Earth's seasons will not differ from the present.
2. During December, the Northern Hemisphere will experience summer, while the Southern Hemisphere will experience winter.
3. The difference between the average air temperature in summer and winter will increase.
4. The average air temperature will be higher during summer and lower during winter.

20. A famous natural tourist attraction is known as "Talay Waek" (the Separated Sea). During low tide, ocean waves deposit sand to form a long sandbar that connects three islands in Krabi Province. This sandbar gradually disappears under the sea as the tide rises. To observe Talay Waek, at which position on Earth should the observer be located, using the diagram below? (2.5 marks)



1. Position A
2. Position B
3. Position A and C
4. Position B and D

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21. Two types of clear, colorless liquid, Sample A and Sample B, were heated under identical conditions. A student recorded the temperature every 2 minutes.

The observations are shown in the data table below:

Temperature Record Table for the Substance Samples

Time (min)	Temp of Sample A (°C)	Temp of Sample B (°C)
0	25.0	25.0
2	55.0	60.0
4	78.5	82.0
6	78.5	84.5
8	78.5	87.0
10	110.0 (Gas)	90.0

Consider the following statements:

I. Sample A is classified as a pure substance because its temperature remains constant during a phase change.

II. Sample B is classified as a mixture because its boiling point is not constant and its temperature increases over time.

III. At the 6^{th} minute, Sample A is undergoing a physical change, where thermal energy is being used to overcome intermolecular forces rather than increasing the temperature.

IV. If the quantity of Sample A is increased, its boiling point will increase to 100.0°C.

Which of the following statements are stated CORRECTLY? (2.5 marks)

1. I and II only
2. I, II, and III only
3. II, III, and IV only
4. I, II, III, and IV

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22. Heat stroke is a critical medical emergency. One of the best ways to treat it is by quickly submerging the person in an ice bath. Doctors keep the patient in the cold water until their core body temperature drops to 39.0°C. They remove the patient at this point to prevent their temperatures from dropping too low, since the body will continue to cool down slightly on its own.



https://www.mercy.net/newsroom/2017-07-28/prepping-for-serious-student-athlete-injuries/

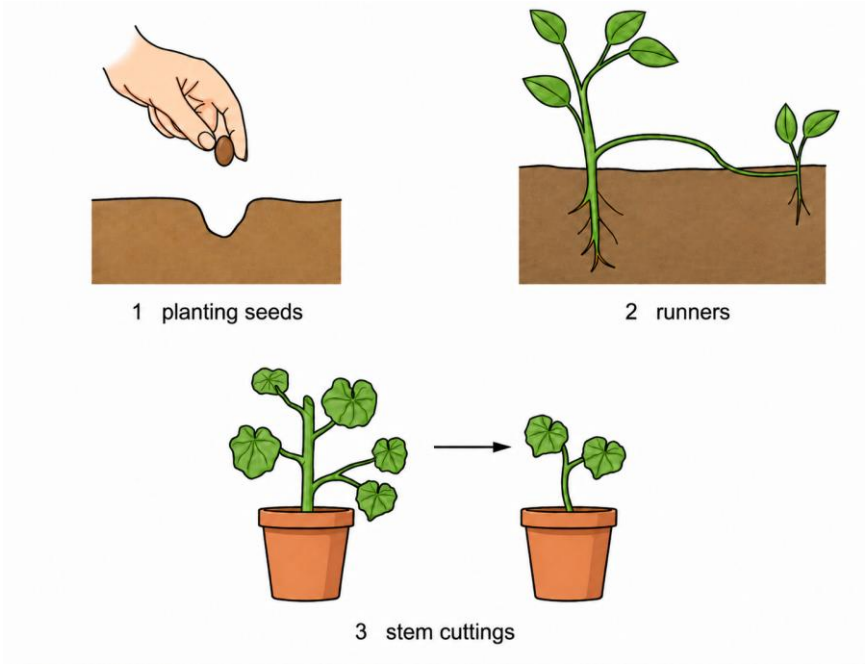
A 75.0-kg runner collapses after a long race with a dangerously high body temperature of 41.0°C. To cool him down, a team of doctors place him in a tub of water.

What is the minimum amount of ice (at 0°C) that requires melting to absorb his body heat and cool him down to 39.0°C? (Disregard any heat lost to the surrounding air or the tub. Assume the specific heat of the human body is 3340 J/(kg·°C) and the latent heat of fusion of ice is 334,000 J/kg.) (2.5 marks)

1. 0.75 kg
2. 1.50 kg
3. 2.00 kg
4. 30.8 kg

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23. A student is experimenting with three different ways to grow new plants that are exactly the same as the original parent plant. Based on the diagram, which methods will produce a plant that is a clone of its parent? (2.5 marks)



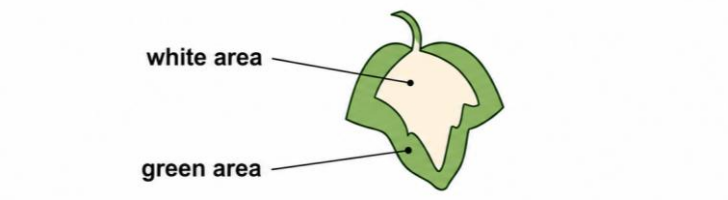
1. Method 1, 2, and 3
2. Method 1 only
3. Method 2 and 3 only
4. Method 1 and 2 only

24. A root hair cell absorbs mineral ions from the soil where the concentration of ions is much lower than inside the cell. Which of the following best describes this process?
(2.5 marks)

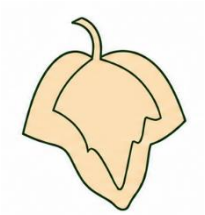
1. The ions move down a concentration gradient through carrier proteins using kinetic energy.
2. The ions move against a concentration gradient, from lower concentration to higher concentration, through protein carriers using energy from respiration.
3. The ions move into the cell by osmosis through a semi-permeable membrane to reach equilibrium.
4. The ions move out of the cell by diffusion to balance the concentration between the soil and the vacuole.

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25. In a photosynthesis experiment, a plant is left in bright sunlight for several hours. A leaf is then removed and tested for the presence of starch, using iodine solution.



Which diagram shows the most likely result of the iodine test on this leaf? (2.5 marks)

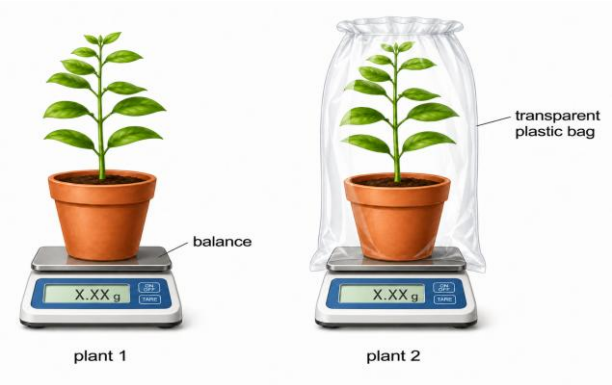
1. 

2. 

3. 

4. 

26. The diagram shows an experiment that investigates transpiration in two plants. Plant 1 is left open in the air, whereas plant 2 along with its pot are covered by a transparent plastic bag. The mass of each plant and its pot is measured at the beginning of the experiment and again after 2 hours.



What is the appropriate result? (2.5 marks)

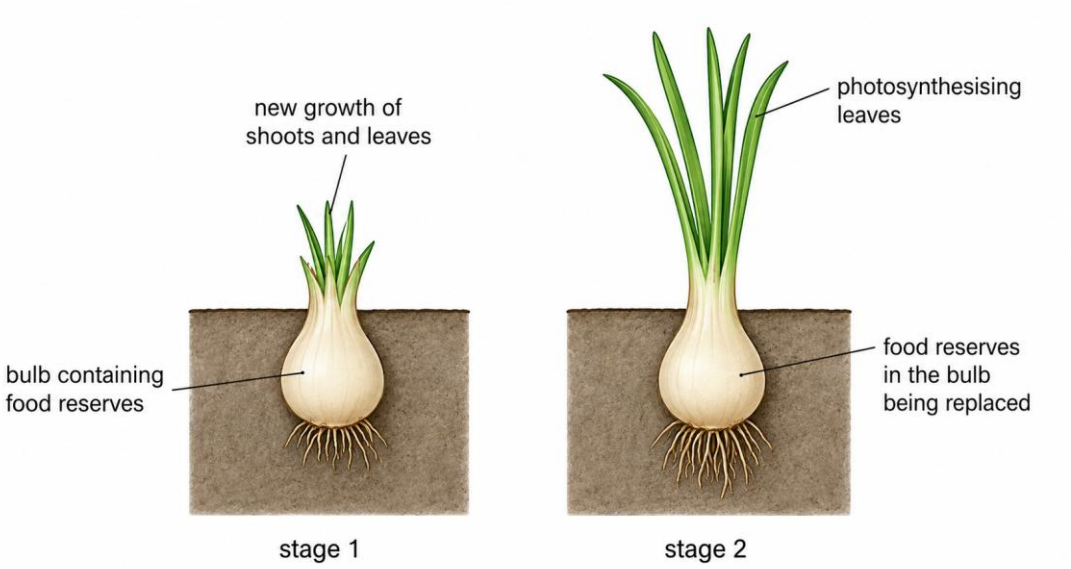
1. The mass of both plants decreases by the same percentage.
2. The mass of both plants remain unchanged.
3. The mass of plant 1 decreases more than the mass of plant 2.
4. The mass of plant 2 decreases more than the mass of plant 1.

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27. The diagram below shows a plant at different times of year.

Stage 1 – During the initial stage of the growing season, the plant mobilizes stored carbohydrates within the bulb to fuel the development of foliage and stem.

Stage 2 – Later in the season, the leaves of the plant photosynthesize and the food reserves in the bulb are replaced.



What is the role of the bulb during stage 1 and 2? (5 marks)

Choice	Stage 1	Stage 2
1.	Sink	Sink
2	Sink	Source
3	Source	Sink
4	Source	Source

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28. A group of young scientists conducted an experiment to investigate factors affecting the rate of photosynthesis in an aquatic plant, *Elodea canadensis*. They set up a light source at varying distances from a beaker containing the plant submerged in water with a fixed concentration of sodium bicarbonate ($NaHCO_3$) to serve as a source of CO_2. The rate of photosynthesis was measured by counting the number of oxygen (O_2) bubbles released from the plant's stem per minute.

The experimental data was recorded in the table below

Trial	Distance of Light Source (cm)	Light Intensity (Relative Units)	Temperature of Water (°C)	Average Bubbles per Minute
1	10	100	25	45
2	20	25	25	28
3	30	11	25	12
4	40	6	25	5
5	10	100	45	18

After reviewing the experimental setup and the data table, a student made several claims regarding the scientific process. Evaluate the following statements:

I. The independent variable in trials 1–4 is the distance from the light source, which directly controls light intensity.

II. The dependent variable is the number of O_2 gas bubbles, which serves as the 'operational definition' of the rate of photosynthesis in this study.

III. Trial 5 serves as a controlled variable to ensure that light intensity remains the same when the distance is changed.

IV. A comparison between trial 1 and trial 5 allows the scientists to explore "temperature" as a new independent variable while keeping the "distance" constant.

Which of the following statements are CORRECT? (5 marks)

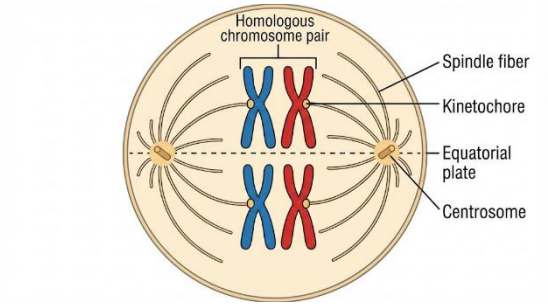
1. I and II only
2. I, II, and IV only
3. II, III, and IV only
4. All of the above

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29. While exercising on a hot summery day, an athlete notices his face becoming bright red. This physiological response is a homeostatic mechanism designed to prevent overheating. Which statement best describes the internal changes occurring in the athlete's skin to help with heat loss? (5 marks)

1. Arterioles near the skin get wider, but less blood reaches the skin surface.
2. Arterioles near the skin vasodilate, allowing more blood flow to the skin surface.
3. Arterioles near the skin narrow, but more blood reaches the skin surface.
4. Arterioles near the skin vasoconstrict, resulting in decreased blood flow to the skin surface.

30. Refer to the image of a cell that is undergoing division below:



The image shows a cell where homologous chromosomes are aligned in pairs along the equatorial plate. Spindle fibers are attached to the kinetochores of each chromosomal pair. Which phase of cell division is described, and what is its biological significance? (5 marks)

1. Metaphase II; it ensures sister chromatids separate to form identical daughter cells.
2. Prophase I; it helps sister chromatids separate to form identical daughter cells.
3. Metaphase of mitosis; it helps maintain the diploid chromosome number for tissue repair.
4. Metaphase I; it facilitates the independent assortment of chromosomes, which increases genetic diversity.

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31. A student wants to find out exactly how much water is best for growing sunflowers. She takes four identical sunflower seeds and plants them in the same type of soil and the same size pots. She places all the pots on the same sunny windowsill. The only thing she changes is the amount of water each plant receives each day. After two weeks, she measures the height of each plant in centimeters to see which one grew the tallest.
The results are displayed below:

Plant	Amount of water (ml)	Plant height (cm)
Plant 1	0	0 (Did not sprout)
Plant 2	50	10
Plant 3	100	25
Plant 4	200	15 (Yellow leaves)

What is an independent variable in this experiment? (1.25 marks)

1. The type of soil used
2. The height of the sunflowers
3. The amount of water given to each plant
4. The amount of sunlight from the windowsill

32. Which of the following correctly describe the process of osmosis? (1.25 marks)

1. Diffusion of water through a cell wall
2. Diffusion of water through a partially permeable membrane
3. Diffusion of water through the cell sap
4. Diffusion of water through the cytoplasm

33. A student is investigating the effect of temperature on the rate of transpiration.
Which environmental factors should be kept the same during this investigation? (2.5 marks)

Choice	Humidity	Light intensity	Temperature	Wind speed
1.	✓	✓	✓	✓
2.	✓	✓	✗	✓
3.	✗	✓	✗	✓
4.	✗	✗	✓	✗

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34. A student investigates four unknown samples, A, B, C, and D, and records their physical properties and additional test results in the table below.

Sample	Melting point (°C)	Boiling point (°C)	Additional test result
A	0	100	Electrolysis produces two different gases
B	1,538	2,862	Cannot be chemically decomposed into simpler substances
C	−114	78	Contains carbon, hydrogen, and oxygen in a fixed ratio
D	50–65	120–150	Separates into several liquids during fractional distillation

Evaluate the following statements:

I. Samples A and C are compounds because each contains more than one element in a fixed composition.

II. Sample B is an element because it cannot be chemically decomposed into simpler substances.

III. Sample D is a pure substance because it melts and boils over a range of temperatures.

IV. Sample A is an element because it is a commonly occurring liquid in the natural environment.

Which statements are correct? (2.5 marks)

1. Statements I and II only
2. Statements II and III only
3. Statements I, II, and IV only
4. Statements I, II, III, and IV

35. Consider the following data regarding the day of a solar eclipse:

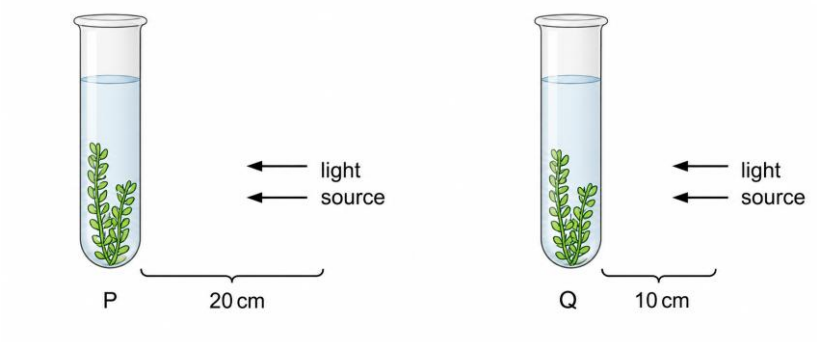
- The Sun is at its closest point to Earth (perihelion).
- The Moon is at its farthest point from Earth (apogee).
- The observer's position is in a straight line aligned with the centers of the Moon and the Sun.

Based on this information, what type of solar eclipse will the observer see? (2.5 marks)

1. A total solar eclipse
2. A partial solar eclipse
3. An annular solar eclipse
4. No solar eclipse occurs

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36. A scientist is investigating the effect of light intensity on waterweeds.



While photosynthesis occurred in both test tubes under the same temperature, there were 12 bubbles produced in test tube P per minute. What is the most likely number of bubbles produced in one minute in test tube Q? (2.5 marks)

1. 0 bubble
2. 3 bubbles
3. 12 bubbles
4. 48 bubbles

37. Most antacids contain active ingredients like Magnesium Hydroxide ($Mg(OH)_2$) or Aluminum Hydroxide ($Al(OH)_3$). Consider the chemical reaction occurring in the beaker:

$$Mg(OH)_2 + 2HCl \rightarrow MgCl_2 + 2H_2O$$

Evaluate the following scientific claims:

I. This reaction is a neutralization reaction, which produces a salt ($MgCl_2$) and water (H_2O).

II. The reaction is a chemical change because new substances with different properties are formed.

III. If a patient has a condition where their stomach pH is too basic, taking these antacids would help solve the problem.

IV. The bubbles sometimes seen when certain antacids (like Alka-seltzer) are added to water are CO_2 gas, indicating a reaction with carbonate compounds.

Which of the following claims are CORRECT? (5 marks)

1. I and II only
2. II and III only
3. I, II, and IV only
4. I, III, and IV only

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38. A group of young scientists is investigating the factors affecting the "oxygen production rate" of the aquatic plant, *Elodea canadensis*. They designed an experiment to test how light intensity and water temperature interact to affect the rate of photosynthesis, measured by the number of oxygen bubbles released per minute.

Experimental Setup:

Five identical *Elodea* shoots were placed in test tubes filled with 0.2% sodium bicarbonate ($NaHCO_3$) solution to provide a source of CO_2.

Light intensity was adjusted by placing an LED lamp at different distances: 10 cm (High light intensity), 30 cm (Medium light intensity), and 50 cm (Low light intensity).

The temperature was controlled using a water bath set at 15 °C, 25 °C, and 40 °C. Each experimental trial lasted for 10 minutes and the average number of oxygen bubbles per minute was recorded.

Trial	Light Distance (cm)	Water Temp (°C)	Avg. Bubbles/Min
1	10	15	12
2	10	25	45
3	10	40	18
4	30	25	28
5	50	25	14
6	50	40	5

Based on the data in the table, which conclusion regarding the 'optimal conditions' for photosynthesis of *Elodea* is most supported by the data? (5 marks)

1. High light intensity (lamp distance of 10 cm) at a moderate temperature of 25 °C provides the highest rate of photosynthesis.
2. Light intensity has no effect on the rate as long as the temperature is constant.
3. Low light intensity (lamp distance of 50 cm) is beneficial when at a high temperature.
4. Photosynthesis is highest at the maximum temperature of 25 °C regardless of light intensity.

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39. The table shows some physical properties of four types of rocks:

	Rock Type	Physical Properties
A.	Igneous	Coarse-grained, light-colored, with large visible mineral crystals.
B.	Igneous	Glassy texture, dark-colored, with no visible mineral crystals.
C.	Sedimentary	Fine-grained, gray, contain marine fossils.
D.	Metamorphic	Coarse-grained, with visible mineral crystals aligned in alternating, parallel white and black bands.

Which of the following choices correctly matches the use of rocks with its physical properties? (5 marks)

1. Rock A is used to make floor tiles
2. Rock B is used to make masonry mortar
3. Rock C is used to make stone necklace
4. Rock D is used to make cement powder

40. A group of students designed an experiment to study the factors affecting the rate of photosynthesis in the aquatic plant *Elodea canadensis*, aiming to understand how light energy influences the speed of this vital process.

Experimental Setup:

A 10-cm fresh shoot of *Elodea* was placed upside down inside a test tube filled with a 1% sodium bicarbonate ($NaHCO_3$) solution. The sodium bicarbonate was added to ensure that the plant had an adequate dissolved Carbon Dioxide (CO_2).

The test tube was then placed inside a large beaker filled with water to serve as a water bath. This helped maintain a constant temperature of 25°C throughout the experiment and prevented heat from the lamp from affecting the results. A 60W light bulb was used as the light source.

The students measured the rate of photosynthesis by counting the number of gas bubbles (O_2) released from the cut end of the plant stem within 1 minute.

Experimental Procedure:

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The students moved the lamp to 3 different distances from the beaker:10 cm, 20 cm, and 30 cm. At each distance, the plant was allowed to acclimatize for 5 minutes before counting the number of gas bubbles produced in 1 minute. The procedure was repeated 3 times at each distance, and the average was calculated.

Data Table

Lamp Distance (cm)	(bubbles/min)			
	Trial 1	Trial 2	Trial 3	Average Rate
10	42	45	48	45
20	26	29	29	28
30	10	12	14	12

When analyzing the context and all experimental procedures, consider the following statements regarding the variables in this experiment:

Which of the following statements is incorrect? (5 marks)

1. The independent variable is the distance of the lamp from the plant, which serves as a proxy for adjusting light intensity.

2. The dependent variable is the total number of gas bubbles produced, which serves as the operational definition for the rate of photosynthesis.

3. The size and species of the *Elodea* plant are independent variables because the students could select other sizes or species to perform the experiment.

4. The concentration of sodium bicarbonate solution and the temperature of the water bath are controlled variables that must be kept constant.

---------- End of Questions ----------

Please check your answers before submitting the answer sheet.

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Answers Keys : Science Secondary - Grade 7

No.	Answers	No.	Answers
1.	3	21.	2
2.	2	22.	2
3.	3	23.	3
4.	2	24.	2
5.	4	25.	3
6.	2	26.	3
7.	4	27.	3
8.	4	28.	2
9.	2	29.	2
10.	1	30.	4
11.	4	31.	3
12.	3	32.	2
13.	1	33.	2
14.	2	34.	1
15.	1	35.	3
16.	4	36.	4
17.	1	37.	3
18.	4	38.	1
19.	2	39.	1
20.	3	40.	3

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