

**Paper 1:  
Marking Scheme****Sample Paper****1 hour****Mark Scheme Criteria**

Examiners must apply positive marking only. Do not deduct any marks for incorrect responses. Provide marks in line with this scheme only.

Response(s) must be in line with prescribed marking indicators shown below. Variation is permissible only with prior acknowledgment from Chief Examiner.

Text shown below, in the majority of instances, is a text perfect response. Learners do not have to provide a text perfect response in order to qualify for a mark; their response must be in line with the text shown within the response, but the wording can vary.

For single mark questions, learner response must meet the stated characteristics as indicated in this mark scheme. Where more than one option is shown, learners can deviate from the prescribed responses, as long as they meet the general theme of the response.

For multiple mark questions, learner responses must meet the stated characteristics as indicated in this mark scheme. However, where the examiner feels a learner has demonstrated more than a basic response, and which meets the minimum stated characteristics, additional marks may be awarded. Where this occurs, the examiner must flag this response for enhanced moderation by the Chief Examiner.

Whilst indicative responses are shown below, and particularly for multiple mark responses, where 2 or more marks are permissible (as shown for each question), where learner responses do not align with the suggested response, examiners can use best judgement. Where this occurs, the examiner must flag this response for enhanced moderation by the Chief Examiner

## Biology Section (Questions 1-15)

**Question 1:** Which structure in a plant cell is responsible for photosynthesis?

Correct answer: **b) Chloroplast**

Explanation: Chloroplasts contain chlorophyll, which captures light energy for photosynthesis. The nucleus controls the cell, mitochondria produce energy, and the vacuole stores substances but does not perform photosynthesis.

**Question 2:** What is the primary function of the xylem in plants?

Correct answer: **b) Transport water**

Explanation: Xylem vessels transport water and dissolved minerals from roots to leaves. Other options refer to functions performed by phloem or other plant systems.

**Question 3:** Which organ produces bile?

Correct answer: **c) Liver**

Explanation: The liver produces bile, which aids in fat digestion. The pancreas produces enzymes, while the stomach and small intestine are involved in food digestion but do not produce bile.

**Question 4:** Which of the following is a characteristic of osmosis?

Correct answer: **a) Movement of water molecules through a partially permeable membrane**

Explanation: Osmosis is the passive movement of water molecules through a selectively permeable membrane, driven by a concentration gradient.

**Question 5:** Which of the following best describes the role of enzymes in digestion?

Correct answer: **a) Breaking down large molecules into smaller molecules**

Explanation: Enzymes catalyze the breakdown of macromolecules (e.g., proteins, carbohydrates) into smaller, absorbable molecules.

**Question 6:** Which of the following correctly describes the term allele?

Correct answer: **b) A different form of a gene**

Explanation: Alleles are variations of the same gene that determine different traits.

**Question 7:** What is the correct sequence of energy flow in a food chain?

Correct answer: **b) Producer → Herbivore → Carnivore → Decomposer**

Explanation: Producers (plants) convert sunlight into energy, herbivores consume plants, carnivores consume herbivores, and decomposers break down organic material.

**Question 8:** What is the role of red blood cells in the human body?

Correct answer: **c) Transporting oxygen**

Explanation: Red blood cells carry oxygen via hemoglobin to body tissues. Other options describe functions of different cell types.

**Question 9:** What is the main waste product removed by the lungs?

Correct answer: **b) Carbon dioxide**

Explanation: The lungs expel carbon dioxide, a byproduct of respiration. Urea is excreted by the kidneys, and ammonia is a toxic byproduct converted into urea.

**Question 10:** Which type of variation is shown by human blood groups?

Correct answer: **b) Discontinuous variation**

Explanation: Blood groups are discrete categories, showing discontinuous variation. Continuous variation applies to traits like height and weight.

**Question 11:** What is the function of stomata in plants?

Correct answer: **b) Allow gas exchange**

Explanation: Stomata are openings on leaves that facilitate gas exchange ( $\text{CO}_2$  and  $\text{O}_2$ ) and water vapor transpiration.

**Question 12:** In which part of the cell does aerobic respiration occur?

Correct answer: **c) Mitochondria**

Explanation: Mitochondria are the site of aerobic respiration, where glucose is broken down to release ATP.

**Question 13:** Which of the following organisms is a decomposer?

Correct answer: **c) Fungi**

Explanation: Fungi break down dead organic matter, recycling nutrients into the ecosystem.

**Question 14:** Which process involves the loss of water from the leaves of a plant?

Correct answer: **b) Transpiration**

Explanation: Transpiration is the evaporation of water from plant leaves.

**Question 15:** What is the role of insulin in the body?

Correct answer: **b) To decrease blood sugar levels**

Explanation: Insulin lowers blood glucose by facilitating glucose uptake into cells and storage as glycogen.

### **Chemistry Section (Questions 16-30)**

**Question 16:** What is the relative charge of a proton?

Correct answer: **a) +1**

Explanation: Protons have a positive charge of +1. Neutrons are neutral (0), and electrons are negatively charged (-1).

**Question 17:** What is the atomic number of this element?

Correct answer: **b) 6**

Explanation: The atomic number is determined by the number of protons in the nucleus, which equals the number of electrons in a neutral atom.

**Question 18:** Which of the following describes a chemical change?

Correct answer: **c) Burning of paper**

Explanation: Burning paper involves a chemical reaction that produces new substances. Melting and dissolving are physical changes.

**Question 19:** Which process is used to separate a mixture of liquids with different boiling points?

Correct answer: **b) Distillation**

Explanation: Distillation separates liquids based on their boiling points by heating and condensing the vapor.

**Question 20:** Which substance has a giant covalent structure?

Correct answer: **b) Diamond**

Explanation: Diamond is a giant covalent structure with strong covalent bonds. Sodium chloride has an ionic lattice.

**Question 21:** What happens to the particles in a solid when it melts?

Correct answer: **b) They vibrate more vigorously**

Explanation: As a solid melts, particles gain energy, vibrate more, and eventually break free to form a liquid.

**Question 22:** Which gas is produced when hydrochloric acid reacts with calcium carbonate?

Correct answer: **c) Carbon dioxide**

Explanation: The reaction produces calcium chloride, water, and carbon dioxide gas:



**Question 23:** What is the chemical formula for ammonium sulfate?

Correct answer: **b)  $(\text{NH}_4)_2\text{SO}_4$**

Explanation: Ammonium sulfate contains two ammonium ions ( $\text{NH}_4^+$ ) and one sulfate ion ( $\text{SO}_4^{2-}$ ).

**Question 24:** Which of the following is a property of metals?

Correct answer: **d) Malleable**

Explanation: Metals are malleable, meaning they can be hammered into shape. Poor conductivity and brittleness are properties of non-metals.

**Question 25:** The graph below shows the rate of reaction at different temperatures. What conclusion can be drawn?

Correct answer: **c) Reaction rate increases with temperature**

Explanation: Higher temperatures provide reactants with more energy, increasing collision frequency and reaction rate.

**Question 26:** Which of the following solutions has the highest pH?

Correct answer: **c) Sodium hydroxide**

Explanation: Sodium hydroxide is a strong alkali, with a high pH (typically >13). Lemon juice, vinegar, and water have lower pH values, being acidic or neutral.

**Question 27:** Which is the main component of natural gas?

Correct answer: **a) Methane**

Explanation: Methane ( $\text{CH}_4$ ) is the primary component of natural gas, making up approximately 70-90%. Ethane, propane, and butane are present in smaller quantities and are secondary constituents.

**Question 28:** How many electrons are shared in a double covalent bond?

Correct answer: **b) 4**

Explanation: A double covalent bond involves the sharing of two pairs of electrons (4 electrons in total) between two atoms.

Other options:

- **2 electrons** (incorrect: single bond).
- **6 electrons** and **8 electrons** (incorrect: triple bonds or beyond the scope of double bonds).

**Question 29:** What is the purpose of a catalyst in a chemical reaction?

Correct answer: **b) To speed up the reaction without being consumed**

Explanation: Catalysts lower the activation energy, increasing the reaction rate while remaining chemically unchanged at the end of the reaction.

Other options:

- **Slow down the reaction** (incorrect: opposite of what catalysts do).
- **Increase the reactants' energy** (incorrect: catalysts affect activation energy, not reactants).
- **Decrease the amount of product** (incorrect: catalysts do not alter the reaction yield).

**Question 30:** Which compound is a hydrocarbon?

Correct answer: **c) C<sub>2</sub>H<sub>6</sub>**

Explanation: Hydrocarbons consist only of carbon and hydrogen atoms.

Other options:

- **H<sub>2</sub>O** (incorrect: water is not a hydrocarbon).
- **CO<sub>2</sub>** (incorrect: carbon dioxide contains oxygen).
- **NaCl** (incorrect: sodium chloride is an ionic compound, not a hydrocarbon).

### Physics Section (Questions 31-45)

**Question 31:** A car accelerates uniformly from rest to a velocity of 20 m/s in 5 seconds. What is the car's acceleration?

Correct answer: **b) 4 m/s<sup>2</sup>**

Explanation: Acceleration is calculated using the formula:

$$a = (v - u) / t = (20 - 0) / 5 = 4 \text{ m/s}^2.$$

**Question 32:** The graph below shows the motion of an object. At a time in the journey, the object travels at a constant speed. Calculate the distance travelled by the object during this time.

Correct answer: **150 m**

Explanation: The distance is calculated from the area under the speed-time graph during the constant speed interval.

**Question 33:** Which of the following represents a scalar quantity?

Correct answer: **c) Distance**

Explanation: Scalars have magnitude only. Distance is scalar, while force, velocity, and acceleration are vectors with direction.

**Question 34:** Which of the following is the unit of power?

Correct answer: **c) Watt**

Explanation: Power is measured in watts (W), defined as energy per unit time ( $1\text{ W} = 1\text{ J/s}$ ).

**Question 35:** A pendulum completes 10 oscillations in 5 seconds. What is the frequency of the pendulum?

Correct answer: **b) 2 Hz**

Explanation: Frequency is the number of oscillations per second:  $f = \text{oscillations} / \text{time} = 10 / 5 = 2\text{ Hz}$ .

**Question 36:** A student observes that sound travels faster in water than in air. What is the reason for this?

Correct answer: **b) Water particles are closer together than air particles**

Explanation: Sound travels faster in denser media where particles are closer, facilitating quicker transmission of vibrations.

**Question 37:** The diagram below shows a ray of light undergoing total internal reflection. Which row below is correct?

Correct answer: **a) Greater than critical angle; Greater refractive index than substance B**

Explanation: Total internal reflection occurs when the angle of incidence exceeds the critical angle, and the medium has a higher refractive index.

**Question 38:** Which of the following electromagnetic waves has the longest wavelength?

Correct answer: **d) Radio waves**

Explanation: Radio waves have the longest wavelength and lowest frequency in the electromagnetic spectrum.

**Question 39:** What current is going through the battery in the given circuit?

Correct answer: **a) 1.5 A**

Explanation: Use Ohm's law and the total resistance to calculate the current:  
 $I = V / R$ .

**Question 40:** A force of 10 N is applied to a spring, stretching it by 0.2 m. What is the spring constant?

Correct answer: **b) 50 N/m**

Explanation: Use Hooke's law:  $k = F / x = 10 / 0.2 = 50\text{ N/m}$ .

**Question 41:** Which of the following is a correct description of nuclear fission?

Correct answer: **b) The splitting of a heavy nucleus into two smaller nuclei, releasing energy**

Explanation: Fission splits a heavy nucleus, releasing energy. Fusion involves joining nuclei.

**Question 42:** Using the wave diagram, which wave has the greatest amplitude and frequency?

Correct answer: **c) Wave 2; Wave 1**

Explanation: Amplitude is determined by wave height, frequency by the number of cycles per second.

**Question 43:** A box of mass 5 kg is lifted 2 m vertically. How much work is done against gravity?

Correct answer: **d) 100 J**

Explanation: Work is calculated as  $W = mgh = 5 \times 10 \times 2 = 100 \text{ J}$ .

**Question 44:** Which of the following statements best describes renewable energy?

Correct answer: **b) Energy that can be replenished naturally**

Explanation: Renewable energy sources, such as solar and wind, can replenish naturally over time.

**Question 45:** Which statement about magnetism is correct?

Correct answer: **d) The North pole of a permanent bar magnet can repel another North pole of a different magnet**

Explanation: Like poles repel, while unlike poles attract.

### Experimental Skills Section (Questions 46-50)

**Question 46:** What is the purpose of adding iodine to the solution during the enzyme activity experiment?

Correct answer: **b) To check for the presence of starch**

Explanation: Iodine turns blue-black in the presence of starch, indicating whether starch is still present in the reaction.

**Question 47:** Why is a leaf boiled before testing it for starch?

Correct answer: **b) To kill the cells and stop chemical reactions**

Explanation: Boiling stops enzymatic reactions that might alter starch content during testing.

**Question 48:** What color change occurs at the endpoint of an acid-alkali titration using phenolphthalein?

Correct answer: **b) Pink to colorless**

Explanation: Phenolphthalein is pink in alkaline solutions and turns colorless in acidic solutions at the endpoint.

**Question 49:** Which apparatus is most suitable for measuring the volume of gas produced?

Correct answer: **b) A gas syringe**

Explanation: Gas syringes provide accurate measurements of gas volume in experiments.

**Question 50:** How can a student increase the accuracy of timing pendulum swings?

Correct answer: **b) Use a stopwatch with a higher resolution**

Explanation: A stopwatch with finer resolution reduces timing errors, improving accuracy.