CBSE CLASS X

Science (086)

QUESTION PAPER

AI-generated question paper

Code: 6JN1FR **Questions: 45** **Maximum Marks: 126** **Generated: 2026-06-25 17:29**

SELECTIONS USED

Subject	Science
Lessons	5 Life Processes
Level of understanding	Thorough understanding
Question selection	Curated chapter coverage (~5 questions per section + 8 synthesis)
Model	claude-sonnet-4-6

Composition — Difficulty: 2 straightforward · 25 medium · 18 deep | Types: 33 Short · 5 Long · 4 Very short · 3 MCQ

Q1. deep · thorough-understanding · § Introduction **[3]**

A researcher observes a microscopic particle that shows no sign of any metabolic activity when isolated in a test tube, but resumes all metabolic functions as soon as it enters a living host cell. (i) On the basis of this observation, would you classify this particle as living or non-living? Give a reason. (ii) Explain why the presence or absence of metabolic processes is used as a defining criterion for life.

◆ **Life Processes**

Q2. deep · thorough-understanding · § 5.1 WHAT ARE LIFE PROCESSES? **[3]**

A student argues: 'A seed sitting in a dry jar is not alive because it shows no visible movement and carries out no life processes.' Using your understanding of life processes, evaluate this argument. Is the student correct? Justify your answer.

◆ **Life Processes**

Q3. medium · thorough-understanding · § 5.1 WHAT ARE LIFE PROCESSES? **[1]**

Explain why nutrition occupies a central position among all life processes. How would the absence of nutrition affect the other life processes in an organism?

◆ **Life Processes**

Q4. medium · thorough-understanding · § 5.2 NUTRITION **[3]**

A student sets up two identical potted plants under bell jars sealed airtight to glass plates. A watch-glass containing potassium hydroxide solution is placed inside one of the bell jars. After two hours in sunlight, a starch test is performed on a leaf from each plant. The plant without potassium hydroxide shows a strong positive starch test, while the plant with potassium hydroxide shows little or no starch. Explain why this difference occurs, and identify which specific step of photosynthesis is being disrupted in the second plant.

◆ **Life Processes**

Q5. medium · thorough-understanding · § 5.2.1 Autotrophic Nutrition **[3]**

A variegated plant has green and white (non-green) regions on the same leaf. When such a leaf is tested for starch after being kept in sunlight, only the green regions turn blue-black with iodine while the white regions remain colourless. What does this result tell us about the role of chlorophyll in photosynthesis?

◆ **Life Processes**

Q6. deep | thorough-understanding | § 5.2.1 Autotrophic Nutrition **[3]**

Desert plants such as cacti open their stomata only at night to absorb carbon dioxide, which is stored as an organic acid until daytime, when stomata close and photosynthesis is completed using sunlight. Using this example, explain how the process of photosynthesis can be separated into distinct stages, and identify what each stage requires.

◆ Life Processes

Q7. medium | thorough-understanding | § 5.2.1 Autotrophic Nutrition **[1]**

Guard cells control whether stomatal pores are open or closed. On a hot, dry day a plant begins to wilt due to water loss. Which of the following best explains the stomatal response and its trade-off for the plant?

A Guard cells shrink, closing the stomata; this prevents further water loss but also stops the entry of CO_2 needed for photosynthesis.
B Guard cells swell, opening the stomata; this increases CO_2 uptake and simultaneously reduces water loss.
C Guard cells shrink, closing the stomata; this stops water loss and increases the rate of photosynthesis by trapping CO_2 inside the leaf.
D Guard cells swell, opening the stomata; this allows excess water vapour to leave and prevents the leaf from overheating without affecting photosynthesis.

◆ Life Processes

Q8. deep | thorough-understanding | § 5.2.1 Autotrophic Nutrition **[3]**

A farmer notices that even after providing adequate water, sunlight, and carbon dioxide, his crop plants show stunted growth and pale yellow leaves. He suspects a deficiency of certain soil minerals. Explain why mineral elements absorbed from the soil are essential for a plant's autotrophic nutrition even though they are not used directly to synthesise carbohydrates during photosynthesis.

◆ Life Processes

Q9. medium | thorough-understanding | § 5.2.2 Heterotrophic Nutrition **[3]**

Fungi like bread moulds and mushrooms cannot engulf food particles the way Amoeba does, yet they successfully obtain nutrition from complex organic material. Explain how fungi achieve this, and why this strategy is particularly effective for organisms that lack the ability to move toward their food source.

◆ Life Processes

Q10. deep | thorough-understanding | § 5.2.3 How do Organisms obtain their Nutrition? **[3]**

Bread mould and Amoeba are both heterotrophs, yet they obtain nutrition in fundamentally different ways. Compare their mechanisms of obtaining and breaking down food, and explain which strategy would be better suited to a food source that cannot be engulfed whole.

◆ Life Processes

Q11. medium | thorough-understanding | § 5.2.4 Nutrition in Human Beings **[3]**

The small intestine receives secretions from both the liver and the pancreas. What specific problem does each of these secretions solve for the digestion process occurring in the small intestine?

◆ Life Processes

Q12. medium | thorough-understanding | § 5.2.4 Nutrition in Human Beings **[3]**

A person's stomach lining produces insufficient mucus. Explain the consequence this would have, and why the stomach needs this protection in the first place.

◆ Life Processes

Q13. medium | thorough-understanding | § 5.2.4 Nutrition in Human Beings **[1]**

Herbivores like cows have a much longer small intestine than carnivores like tigers. What is the functional reason for this difference?

◆ Life Processes

Q14. medium | thorough-understanding | § 5.2.4 Nutrition in Human Beings **[2]**

The large intestine does not produce any digestive enzymes. Despite this, explain why it is considered an essential organ in the process of digestion and excretion.

◆ Life Processes

Q15. deep | thorough-understanding | § 5.2.4 Nutrition in Human Beings **[5]**

A student argues: 'Since digestion is already complete in the small intestine, the specific structure of the villi does not matter — nutrients would be absorbed into the blood regardless.' Critically evaluate this argument using your understanding of the structure and function of villi.

◆ Life Processes

Q16. straightforward | thorough-understanding | § 5.3 RESPIRATION **[1]**

Glucose is a six-carbon molecule. When it is broken down during cellular respiration, the first step produces a three-carbon molecule. What is this molecule, and where in the cell does this first step occur?

◆ Life Processes

Q17. medium | thorough-understanding | § 5.3 RESPIRATION **[3]**

A student says: 'Anaerobic respiration in yeast and anaerobic respiration in human muscle cells are the same process.' Is this correct? Explain the key similarity and the key difference between the two.

◆ Life Processes

Q18. medium | thorough-understanding | § 5.3 RESPIRATION **[3]**

Both aerobic and anaerobic respiration begin with the same glucose molecule, yet aerobic respiration releases far more ATP. Explain why, referring to what happens to the pyruvate produced in glycolysis under each condition.

◆ Life Processes

Q19. medium | thorough-understanding | § 5.3 RESPIRATION **[3]**

After an intense sprint, a runner experiences painful cramps in the leg muscles. Explain the biochemical reason for this, tracing the exact pathway that leads to cramp formation.

◆ Life Processes

Q20. deep | thorough-understanding | § 5.3 RESPIRATION **[3]**

A sealed jar contains a germinating seed respiring aerobically. After 24 hours the oxygen inside is almost used up, but the seed is still alive and releasing CO_2. Which respiratory pathway has the seed most likely switched to, and what waste product, other than CO_2, would you expect to accumulate?

◆ Life Processes

Q21. medium | thorough-understanding | § 5.3 RESPIRATION **[2]**

During bright daylight, a student holds a lit candle near a healthy potted plant and notices the flame is not extinguished. Yet the same plant placed in the dark causes the flame to flicker and go out after some time. Explain the biochemical basis of this observation in terms of the balance between photosynthesis and respiration.

◆ Life Processes

Q22. medium | thorough-understanding | § 5.3 RESPIRATION **[2]**

Aquatic fish breathe much faster than terrestrial mammals of a similar body size. What is the underlying reason for this difference in breathing rate?

◆ Life Processes

Q23. medium | thorough-understanding | § 5.3 RESPIRATION **[3]**

Carbon dioxide and oxygen are both transported through the same blood vessels, yet by entirely different mechanisms. (i) Describe how each gas is transported in human blood. (ii) Red blood corpuscles lack a nucleus. How does this structural feature directly aid their primary function in gas transport?

◆ Life Processes

Q24. straightforward | thorough-understanding | § 5.4 TRANSPORTATION **[1]**

Deoxygenated blood returning from the body enters the right atrium of the heart. Why is it essential that this blood is kept completely separate from the oxygenated blood leaving the left ventricle?

◆ Life Processes

Q25. medium | thorough-understanding | § 5.4 TRANSPORTATION **[3]**

Arteries have thick, elastic walls while veins have thinner walls but contain valves. Explain why each of these structural features is necessary for the function that vessel performs.

◆ Life Processes

Q26. deep | thorough-understanding | § 5.4 TRANSPORTATION **[3]**

Why do birds and mammals need a completely four-chambered heart with fully separated oxygenated and deoxygenated blood, while amphibians and many reptiles survive with a three-chambered heart that allows some mixing?

◆ Life Processes

Q27. deep | thorough-understanding | § 5.4 TRANSPORTATION **[3]**

In fish, blood passes through the heart only once during a single trip around the body. In humans, blood passes through the heart twice. What is the physiological advantage of this double circulation over the single circulation seen in fish?

◆ Life Processes

Q28. medium | thorough-understanding | § 5.4 TRANSPORTATION **[3]**

Lymph is often described as 'returned tissue fluid.' (i) Explain how lymph is formed from blood plasma. (ii) State two ways in which the lymphatic system contributes to the body's functioning beyond simply returning fluid to the blood.

◆ Life Processes

Q29. deep | thorough-understanding | § 5.4 TRANSPORTATION **[2]**

Plants have two separate conducting tissues — xylem and phloem — for transport. Why can the same tissue not be used to transport both water and the products of photosynthesis?

◆ Life Processes

Q30. deep | thorough-understanding | § 5.4 TRANSPORTATION **[3]**

During the day, transpiration pull is the major force driving water movement up the xylem, but at night, root pressure becomes more important. Why does this shift occur?

◆ Life Processes

Q31. deep | thorough-understanding | § 5.4 TRANSPORTATION **[3]**

Translocation of food in phloem requires ATP energy, whereas the ascent of water through xylem does not directly require cellular energy. What does this difference indicate about the mechanism of each transport process? Name the physical forces that drive water movement in xylem.

◆ Life Processes

Q32. medium | thorough-understanding | § 5.4 TRANSPORTATION **[3]**

A patient is found to have a systolic blood pressure of 160 mm Hg and a diastolic pressure of 100 mm Hg. (i) What condition does this indicate? (ii) If the arterioles are constricted, explain the mechanism by which this leads to the observed readings.

◆ Life Processes

Q33. medium | thorough-understanding | § 5.4 TRANSPORTATION **[5]**

Compare the transport of water and minerals through xylem with the transport of food through phloem under the following heads: (i) direction of transport, (ii) driving force, (iii) role of energy, and (iv) types of substances transported. Using this comparison, explain why a herbicide that blocks ATP synthesis in phloem companion cells would affect food translocation but not water transport.

◆ Life Processes

Q34. medium | thorough-understanding | § 5.5 EXCRETION **[3]**

The kidneys filter approximately 180 litres of blood plasma per day, yet the composition of urine is very different from the original filtrate. (a) Which substances are selectively reabsorbed from the filtrate back into the blood, and why is this reabsorption necessary? (b) What would be the consequences for the body if this selective reabsorption did not take place?

◆ Life Processes

Q35. deep | thorough-understanding | § 5.5 EXCRETION **[3]**

A patient's kidneys have failed and they are put on hemodialysis. The dialysing fluid used in the artificial kidney is prepared to have the same osmotic pressure as blood, but contains no urea or other nitrogenous wastes. Why is this specific composition of the dialysing fluid critical for the machine to work correctly?

◆ Life Processes

Q36. medium | thorough-understanding | § 5.5 EXCRETION **[1]**

Which of the following correctly explains why plants do not need a specialised excretory organ like the kidneys found in animals?

((A)) Plants excrete all their waste products through their stomata as gases, eliminating the need for any storage.

((B)) Plants produce very little metabolic waste, and much of what is produced is either reused in other metabolic processes or stored in dead cells and vacuoles.

((C)) Plants absorb their waste products back from the environment through their roots, so none accumulates in the body.

((D)) Plants release all nitrogenous wastes into the soil through their roots, which acts as a natural excretory organ.

A Plants do not produce any metabolic waste products at all.

B Plants can store wastes in dead cells, vacuoles, shed leaves, and as gums and resins, and also release some wastes into the soil.

C All waste products in plants are broken down by enzymes and recycled within the same cell.

D Plants excrete all their wastes as gases through the stomata.

◆ Life Processes

Q37. medium | thorough-understanding | § 5.5 EXCRETION **[2]**

Oxygen released during photosynthesis is described as a waste product of plants. Justify this statement, and explain how plants manage to dispose of this 'waste' without a dedicated excretory organ.

◆ Life Processes

Q38. deep | thorough-understanding | § 5.5 EXCRETION **[5]**

The initial filtrate produced in the kidneys of a healthy adult is about 180 litres per day, yet only 1–2 litres of urine is actually excreted. (a) Identify the structure in the nephron responsible for this massive reduction in volume and describe how it achieves this. (b) The composition of urine varies — for example, a person who drinks very little water produces more concentrated urine. Using your understanding of reabsorption in the tubular part of the nephron, explain how the body adjusts the final composition and volume of urine according to its needs.

◆ Life Processes

Q39. deep | thorough-understanding | § (whole-chapter synthesis) **[3]**

Trace the journey of a single glucose molecule from its synthesis in a leaf cell to its use in releasing energy in a root cell of the same plant. In your answer, name the tissue that transports it, the energy source used for that transport, and the cellular location where energy is finally released from glucose.

◆ Life Processes

Q40. deep | thorough-understanding | § (whole-chapter synthesis) **[5]**

Both the alveolus in the lungs and the nephron in the kidney perform filtration across thin-walled capillaries, yet their roles in maintaining the body are fundamentally different. Compare the two structures by explaining (i) what is filtered in each, (ii) what happens to the useful substances after filtration, and (iii) what the body ultimately expels from each.

◆ Life Processes

Q41. deep | thorough-understanding | § (whole-chapter synthesis) **[3]**

A plant simultaneously performs photosynthesis, aerobic respiration and transpiration during a sunny afternoon. Explain how the opening of stomata during this period creates a situation where one gas exchange process directly benefits another, and identify one unavoidable cost the plant pays as a result.

◆ Life Processes

Q42. medium | thorough-understanding | § (whole-chapter synthesis) **[3]**

In human beings, the circulatory system acts as a link between the respiratory system and the excretory system. Explain what specific substances the blood transports that make this linkage essential for each of these two systems to function.

◆ Life Processes

Q43. medium | thorough-understanding | § (whole-chapter synthesis) **[1]**

Assertion (A): Mammals and birds maintain a complete separation between oxygenated and deoxygenated blood in their hearts, whereas amphibians do not.
Reason (R): Mammals and birds use energy to maintain a constant body temperature, so they require a more efficient and uninterrupted oxygen supply to their tissues.

Choose the correct option:
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

A Both A and R are true, and R is the correct explanation of A.
B Both A and R are true, but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

◆ Life Processes

Q44. medium | thorough-understanding | § (whole-chapter synthesis) **[5]**

Both autotrophic plants and heterotrophic animals ultimately depend on ATP as their cellular energy currency, yet they obtain the raw materials for making it in completely different ways. Compare the two nutritional strategies, and explain how, despite starting from different raw materials and energy sources, both organisms arrive at the same final cellular process for ATP generation.

◆ Life Processes

Q45. deep | thorough-understanding | § (whole-chapter synthesis) **[3]**

A plant is placed in a well-lit but very dry environment, and its stomata close in response. Explain how this single stomatal response creates a chain of consequences for photosynthesis, the ascent of water through the xylem, and the supply of minerals to the leaves.

◆ Life Processes

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