

CLASS 10

SCIENCE

EXTRA QUESTIONS

Extra Questions: Class 10 Science Chapter 5 Life Processes

These go beyond the standard exercise into genuine HOTS territory — an assertion-reason question, a surface-area-to-volume-ratio explanation, an applied diagnostic-reasoning question, a compare-and-explain question, and a predict-the-consequence question. See the standard-level Chapter 5 Solutions first if you hav...

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Class 10 Science Chapter 5 – Solutions and Notes

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Extra Questions (HOTS Level): Life Processes (Class 10 Science Chapter 5)

Q1. (Assertion-Reason) Assertion (A): Plants do not have a specialised respiratory system like animals do. Reason (R): every part of a plant can independently exchange gases with the atmosphere through stomata (in leaves) and lenticels (in stems), and diffusion distances within a plant are generally small.

Plants indeed lack lungs or a dedicated breathing organ, and their decentralised gas exchange through stomata/lenticels, combined with most plant cells being close to a gas-exchange surface, makes a specialised system unnecessary. **Both A and R are true, and R is the correct explanation of A.**

Q2. (Conceptual HOTS) Why is diffusion insufficient to meet the oxygen requirements of multicellular organisms like humans, whereas it works fine for a unicellular organism like Amoeba? Explain using surface-area-to-volume ratio.

In a unicellular organism, the entire cell surface directly contacts the environment, and its surface-area-to-volume ratio is high (small size), so oxygen diffusing in and CO₂ diffusing out over such a short distance is fast enough to meet its needs. In a multicellular organism, most cells lie deep inside the body, and as overall body size increases, the surface-area-to-volume ratio drops sharply — diffusion over the resulting longer distances would be far too slow to supply oxygen to every internal cell. This is exactly why complex, multicellular organisms have evolved dedicated respiratory systems (lungs) and circulatory systems (heart, blood vessels) to actively transport oxygen quickly to every cell, rather than relying on diffusion alone.

Q3. (Applied/diagnostic reasoning) A patient's blood test shows an unusually low haemoglobin count. The patient also tires quickly during mild exertion and looks pale. Explain, using the role of haemoglobin, why these particular symptoms occur together.

Haemoglobin binds oxygen in the lungs and carries it to body tissues. With low haemoglobin (anaemia), less oxygen is delivered per unit of blood even if the lungs and heart work normally. Muscle cells then receive less oxygen, so aerobic respiration (which needs oxygen) slows down, generating less energy (ATP) during exertion — this is why the patient tires quickly. Paleness occurs because haemoglobin gives blood its red colour, which is visible through the skin via blood vessels near the surface; a lower haemoglobin concentration makes both the blood and the skin appear paler.

Q4. (Compare-and-explain) Phloem transport requires the plant's own metabolic energy (ATP), while xylem transport does not, to nearly the same extent. Explain this difference in terms of direction and mechanism.

Xylem only transports water and minerals **upward**, driven mainly by transpiration pull — a passive physical process where evaporation from leaf surfaces creates negative pressure that pulls the water column up through dead, non-living xylem cells, needing very little of the plant's own energy (root pressure contributes a small active component). Phloem must transport food (sucrose) in **either direction**, from a "source" (where it's made) to a "sink" (wherever it's currently needed or stored) — loading sucrose into living sieve-tube cells at the source requires active transport against a concentration gradient, which consumes ATP; the resulting rise in solute concentration then draws water in by osmosis, generating the pressure that pushes food along the sieve tubes.

Q5. (Predict-the-consequence) If the walls of alveoli were thick instead of just one cell thick, predict two specific consequences for a person's ability to exercise, and explain each.

(1) Slower gas exchange: a thicker wall increases the diffusion distance oxygen and CO_2 must cross between alveolar air and capillary blood; since diffusion rate falls as distance increases, oxygen would enter the blood more slowly and CO_2 would leave more slowly.

(2) Reduced exercise capacity / quicker fatigue: during exercise, muscles need a much higher oxygen supply rate than at rest. If the alveoli can't exchange gases fast enough, blood leaving the lungs would carry less oxygen than the muscles need, forcing them to rely more on anaerobic respiration (which yields less energy and builds up lactic acid), causing fatigue and breathlessness much sooner during physical activity.

See also: [Revision Notes](#) / [Formulas Handbook](#)

Class 10 Science Chapter 5 – Solutions and Notes

For complete step-by-step answers and a quick summary, check the [Class 10 Science Chapter 5 Solutions](#) and [Class 10 Science Chapter 5 Revision Notes](#).