This is the **Higher Combined Science** version. Higher Tier questions (★) are included. Some Separate-only content has been omitted.

Cell Structure and Organisation (1.1–1.3)

Specification reference: 1.1

Q1. Describe THREE differences between animal cells and plant cells.

[3 marks]

Q2. Explain, with an example, how cell specialisation allows multicellular organisms to function efficiently.

[3 marks]

★ HIGHER TIER

Q3. ★ Explain why larger organisms need specialised exchange surfaces, using the concept of surface area to volume ratio.

[3 marks]

Enzymes (1.4–1.6)

Specification reference: 1.4

Q4. Explain the induced fit model of enzyme action.

[4 marks]

Q5. Explain why the enzyme pepsin works best in the stomach but not in the small intestine.

[3 marks]

Transport Across Membranes (1.7–1.10)

Specification reference: 1.7

Q6. A red blood cell is placed in a very dilute (hypotonic) solution. Predict and explain what happens.

[3 marks]

Q7. Compare diffusion and active transport. State ONE similarity and TWO differences.

[3 marks]

Total: 22 marks

Key Concepts in Biology

Edexcel · Higher Tier

Cell Structure and Organisation (1.1–1.3)

Q1 (3 marks)

Describe THREE differences between animal cells and plant cells.

- Plant cells have a cell wall (cellulose); animal cells do not [1]
- Plant cells have chloroplasts; animal cells do not [1]
- Plant cells have a permanent vacuole; animal cells do not [1]

Q2 (3 marks)

Explain, with an example, how cell specialisation allows multicellular organisms…

- Specialisation: cells differentiate to perform a specific function — genes switched on or off [1]
- Example: red blood cells — no nucleus, biconcave shape, haemoglobin [1]
- These features allow red blood cells to carry maximum O■ efficiently throughout the body [1]

Q3 (3 marks) [★ HT]

★ Explain why larger organisms need specialised exchange surfaces, using the con…

- As organisms increase in size, SA:V ratio decreases [1]
- Diffusion alone is too slow to supply all cells in a large organism [1]
- Specialised surfaces (lungs, gills, villi) provide large surface area and thin walls to maximise diffusion rate [1]

Enzymes (1.4–1.6)

Q4 (4 marks)

Explain the induced fit model of enzyme action.

- Substrate enters the active site of the enzyme [1]
- The active site changes shape slightly to better accommodate the substrate (not rigid like lock and key) [1]
- This brings reactive groups into position to catalyse the reaction [1]
- Products are released; enzyme returns to original shape and can be reused [1]

Q5 (3 marks)

Explain why the enzyme pepsin works best in the stomach but not in the small int…

- Pepsin has an optimum pH of approximately 2 — matches the acidic stomach [1]
- The small intestine has a neutral/slightly alkaline pH (~7-8) — far from pepsin's optimum [1]
- At pH 7-8, the active site of pepsin changes shape (denaturation) — substrate cannot bind [1]

Transport Across Membranes (1.7–1.10)

Q6 (3 marks)

A red blood cell is placed in a very dilute (hypotonic) solution. Predict and ex…

- Water enters the red blood cell by osmosis [1]
- The solution has a higher water potential than inside the cell — water moves down the water potential gradient [1]
- Cell swells and bursts (lyses) — no cell wall to withstand the increased pressure [1]

Q7 (3 marks)

Compare diffusion and active transport. State ONE similarity and TWO differences…

- Similarity: both move substances across cell membranes [1]
- Difference 1: diffusion is passive (no energy); active transport requires ATP [1]
- Difference 2: diffusion moves substances from high to low concentration; active transport moves against the gradient [1]