This paper covers the **full Higher Separate** specification. Higher Tier questions are marked ★. Separate-only questions are marked ◆.

Cell Structures (B1a)

Specification reference: B1a

Q1. State TWO differences between a plant cell and an animal cell.

[2 marks]

Q2. Explain how cells become specialised. Give ONE example with named adaptations.

[3 marks]

★ HIGHER TIER

Q3. ★ Compare the structure of a bacterial cell with that of a eukaryotic plant cell. Give FOUR differences.

[4 marks]

Respiration (B1c)

Specification reference: B1c

Q4. Compare aerobic and anaerobic respiration in terms of oxygen requirement, products and energy released.

[4 marks]

Q5. Explain what is meant by an oxygen debt and when it occurs.

[3 marks]

Photosynthesis (B1d)

Specification reference: B1d

Q6. Write the word equation for photosynthesis and state where it occurs in plant cells.

[2 marks]

Q7. Describe how light intensity, CO■ concentration and temperature each affect the rate of photosynthesis.

[4 marks]

Cell Division (B1a)

Specification reference: B1a.2

Q8. State THREE differences between mitosis and meiosis.

[3 marks]

★ HIGHER TIER

Q9. ★ Explain how crossing over during meiosis contributes to genetic variation.

[3 marks]

Total: 28 marks

Cell Structures (B1a)

Q1 (2 marks)

State TWO differences between a plant cell and an animal cell.

• Plant cell has a cell wall (cellulose); animal cell does not [1]
• Plant cell has chloroplasts; animal cell does not [1] — accept: permanent vacuole

Q2 (3 marks)

Explain how cells become specialised. Give ONE example with named adaptations.

• Differentiation: certain genes are switched on/off causing cells to develop specific features [1]
• Example: red blood cells — no nucleus [1] — biconcave shape increases surface area for O■ diffusion; haemoglobin carries oxygen [1]

Q3 (4 marks) [★ HT]

★ Compare the structure of a bacterial cell with that of a eukaryotic plant cell…

• Bacterial: no membrane-bound nucleus; plant cell: has nucleus [1]
• Bacterial: circular DNA/plasmids in cytoplasm; plant: linear chromosomes in nucleus [1]
• Bacterial: no chloroplasts/mitochondria; plant: has both [1]
• Bacterial: cell wall not made of cellulose; plant: cellulose cell wall [1]

Respiration (B1c)

Q4 (4 marks)

Compare aerobic and anaerobic respiration in terms of oxygen requirement, produc…

• Aerobic requires oxygen; anaerobic does not [1]
• Aerobic produces CO■ and water; anaerobic produces lactic acid (animals) or ethanol + CO■ (yeast) [1]
• Aerobic releases much more energy than anaerobic [1]
• Both start with glucose as substrate [1]

Q5 (3 marks)

Explain what is meant by an oxygen debt and when it occurs.

• During intense exercise, muscles switch to anaerobic respiration — lactic acid accumulates [1]
• After exercise, extra oxygen is needed to convert lactic acid back to glucose (in the liver) [1]
• This extra oxygen required is the oxygen debt — explains continued heavy breathing after stopping exercise [1]

Photosynthesis (B1d)

Q6 (2 marks)

Write the word equation for photosynthesis and state where it occurs in plant ce…

• Carbon dioxide + water → glucose + oxygen (light energy required) [1]
• Chloroplasts [1]

Q7 (4 marks)

Describe how light intensity, CO■ concentration and temperature each affect the …

• Light intensity: increases rate up to a limit (then another factor becomes limiting) [1]
• CO■ concentration: increases rate up to a limit [1]
• Temperature: increases rate up to optimum; above optimum enzymes denature → rate drops [1]
• Any one factor can be limiting — the one in shortest supply controls the rate [1]

Cell Division (B1a)

Q8 (3 marks)

State THREE differences between mitosis and meiosis.

- Mitosis: 2 daughter cells; meiosis: 4 daughter cells [1]
- Mitosis: daughter cells genetically identical; meiosis: genetically different [1]
- Mitosis: daughter cells diploid; meiosis: daughter cells haploid [1]

Q9 (3 marks) [★ HT]

★ Explain how crossing over during meiosis contributes to genetic variation.

- During prophase I, homologous chromosomes pair up [1]
- Sections of chromatids are exchanged between homologous chromosomes [1]
- This creates new combinations of alleles on each chromosome — gametes are genetically unique [1]