



B1H Cell Biology: Higher Tier Practice

AQA 8461 · Calculator allowed · about 110 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

1 Eukaryotic cells have internal membrane-bound organelles that perform specialised functions.

(a) State the organelle where aerobic respiration occurs in a eukaryotic cell. (1)

(Total for Question 1 is 1 mark)

2 A student views a thin section of a tissue under a light microscope and measures a cell as 120 micrometres long using an eyepiece graticule calibrated to 10 micrometres per division.

(a) How many graticule divisions correspond to the 120 micrometres length? (1)

(b) Convert the measured cell length into millimetres. (1)

(Total for Question 2 is 2 marks)

3 Prokaryotic cells are smaller and lack membrane-bound organelles. Bacterial cells often have a single loop of DNA and plasmids.

(a) Explain three differences between a typical prokaryotic cell and a typical animal eukaryotic cell. (3)

(Total for Question 3 is 3 marks)

4 Osmosis is the movement of water across a partially permeable membrane from a dilute to a more concentrated solution.

- (a)** A plant cell with internal solute concentration of 0.30 mol per litre is placed in a solution of 0.10 mol per litre. Describe and explain what happens to the plant cell. **(4)**

(Total for Question 4 is 4 marks)

5 A cultured population of yeast cells was grown for a respiration experiment. The number of cells was counted at 0, 2 and 5 hours. A student recorded: 0 hours 1.0×10^5 cells; 2 hours 2.0×10^5 cells; 5 hours 8.0×10^5 cells.

- (a)** Calculate the factor by which the population increased between 2 hours and 5 hours. **(2)**

- (b)** Suggest one biological reason why the population growth increased faster after 2 hours than in the first 2 hours. **(2)**

(Total for Question 5 is 4 marks)

Mark scheme · B1H Cell Biology: Higher Tier Practice

Question 1

- (a) **B1** mitochondrion (accept mitochondria) cao
- (a) **Answer: Mitochondrion**

Question 2

- (a) **B1** 12 divisions (120 micrometres / 10 micrometres per division)
- (a) **Answer: 12 divisions**
- (b) **B1** 0.120 mm (120 micrometres = $120 / 1000 = 0.120$ mm) cao
- (b) **Answer: 0.120 mm**

Question 3

- (a) **B1** prokaryote has no nucleus; eukaryote has a nucleus
- (a) **B1** prokaryote lacks membrane-bound organelles (eg mitochondria); eukaryote has membrane-bound organelles
- (a) **B1** prokaryote has circular DNA and plasmids or is smaller / simpler in structure; eukaryote has linear DNA in nucleus
- (a) **Answer: Three differences: prokaryotes have no nucleus while eukaryotes do; prokaryotes lack membrane-bound organelles such as mitochondria; prokaryotes have circular DNA and plasmids while eukaryotes have linear DNA in a nucleus.**

Question 4

- (a) **B1** water moves into the cell by osmosis (down water potential gradient) from the 0.10 mol l to the 0.30 mol l
- (a) **B1** the cell becomes turgid as the vacuole and cytoplasm swell
- (a) **B1** the rigid cell wall prevents bursting so cell becomes turgid not lysed
- (a) **B1** reference to water potential or concentration difference as the driving factor, oe
- (a) **Answer: Water moves into the cell by osmosis because the external solution is less concentrated; the vacuole and cytoplasm swell and the cell becomes turgid; the cell wall prevents bursting.**

Question 5

- (a) **M1** method: divides 8.0×10^5 by 2.0×10^5
- (a) **A1** 4 cao
- (a) **Answer: 4**
- (b) **B1** cells entered exponential growth phase (shorter generation time) oe
- (b) **B1** more nutrients available or waste products lower per cell allowing faster reproduction, or enzymes active, oe
- (b) **Answer: They entered an exponential growth phase so each cell divided more frequently (for example more nutrients per cell or reduced inhibitory waste), increasing the rate of population growth.**