OCR Gateway GCSE Biology A

Paper 1: Cell-Level Systems, Scaling Up and Organism-Level Systems (B1–B3)

Higher Tier — Separate Science · Time: 1 hour 45 minutes · Total: 100 marks

Higher Tier — Separate Science

Name:	
Centre number:	**Candidate number:**

- Answer **ALL** questions.
- Use black ink or black ball-point pen.
- Write your answers in the spaces provided.
- The marks for questions are shown in brackets.
- Total marks: 100
- Questions marked ★ are Higher Tier only.

Question 1

(a) Which of the following is a difference between a eukaryotic and a prokaryotic cell?

[1 mark]

Tick **ONE** box.

- ☐ A. Eukaryotic cells have ribosomes; prokaryotic cells do not
- ☐ B. Eukaryotic cells have a cell membrane; prokaryotic cells do not
- ☐ C. Eukaryotic cells have a membrane-bound nucleus; prokaryotic cells do not
- ☐ D. Eukaryotic cells are always smaller than prokaryotic cells

(b) Osmosis is defined as the net movement of water from a region of:

[1 mark]

Tick **ONE** box.

- ☐ A. Low water potential to high water potential through a partially permeable membrane
- ☐ B. High water potential to low water potential through a partially permeable membrane
- ☐ C. Low solute concentration to high solute concentration
- ☐ D. High solute concentration to low solute concentration

(c) Which blood vessel has valves to prevent backflow of blood?

[1 mark]

Tick **ONE** box.

- ☐ A. Artery
- ☐ B. Capillary
- ☐ C. Arteriole

☐ D. Vein

(d) Anaerobic respiration in yeast produces:

[1 mark]

Tick **ONE** box.

☐ A. Lactic acid and carbon dioxide

☐ B. Ethanol and oxygen

☐ C. Ethanol and carbon dioxide

☐ D. Lactic acid and water

Total for Question 1 ☐

Question 2

Scientists use microscopes to study cells. The photograph below was taken using an electron microscope and shows the internal structure of a cell.

Figure 1: Electron micrograph of a cell

(a) State TWO reasons why an electron microscope was used rather than a light microscope to take this photograph.

[2 marks]

(b) The cell in the photograph has a nucleus and mitochondria but no chloroplasts. State the type of cell shown.

[1 mark]

(c) Explain how cells become specialised. Give ONE example of a specialised cell and describe how its structure is adapted for its function.

[3 marks]

★ Higher Tier

(d) ★ A cell is 8 µm in diameter. A student draws the cell with a diameter of 48 mm. Calculate the magnification. Show your working. (1 mm = 1000 µm)

[2 marks]

Total for Question 2

Question 3

A student investigates the effect of temperature on the rate of respiration in yeast. She measures the volume of CO■ produced per minute at different temperatures.

Figure 2: Volume of CO■ vs temperature

(a) Write the word equation for anaerobic respiration in yeast.

[2 marks]

(b) Using the graph, describe and explain the relationship between temperature and the rate of respiration in yeast.

[3 marks]

(c) State TWO variables the student must control to make this a fair investigation.

[2 marks]

Total for Question 3

Question 4

The diagram shows the human circulatory system.

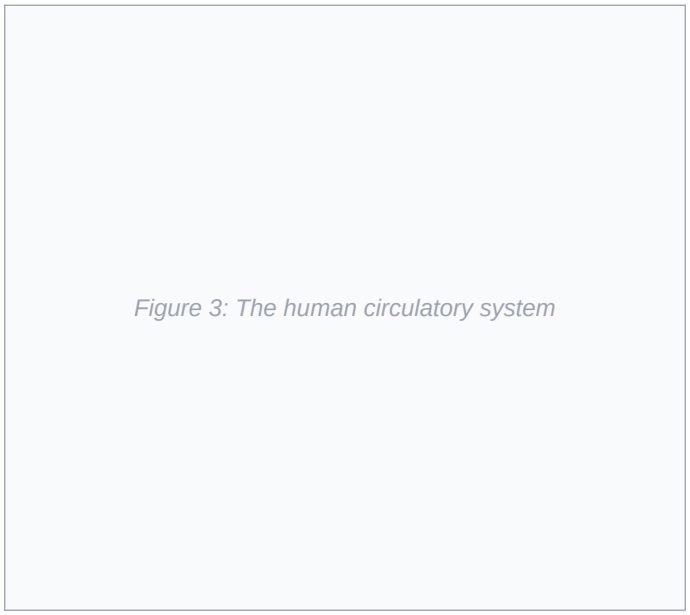

Figure 3: The human circulatory system

(a) Explain why the mammalian circulatory system is described as a "double" circulatory system.

[2 marks]

(b) Compare the structure of arteries, veins and capillaries. Relate each structural feature to its function.

[4 marks]

★ Higher Tier

(c) ★ Calculate the cardiac output for a patient with a heart rate of 65 bpm and stroke volume of 85 cm^3. Give appropriate units.

[2 marks]

Total for Question 4

Question 5

This question is about the immune system and vaccination.

(a) Describe the specific immune response when a pathogen enters the body for the first time, and explain how this response provides protection against future infection.

[5 marks]

(b) Explain why some viral diseases, such as influenza, are difficult to vaccinate against effectively in the long term.

[3 marks]

★ Higher Tier

(c) ★ Describe how monoclonal antibodies are produced.

[2 marks]

Total for Question 5

Question 6

(a) Describe the role of the small intestine in the digestion and absorption of lipids (fats).

[4 marks]

(b) Explain why bile is NOT classified as an enzyme.

[2 marks]

★ Higher Tier

(c) ★ Explain how the structure of the small intestine is adapted for efficient absorption. Include reference to FOUR specific adaptations.

[4 marks]

Total for Question 6

Question 7

(a) A scientist claims: "Natural selection acting on genetic variation is the only mechanism responsible for evolution." Evaluate this claim. Consider the evidence for and against, and whether other mechanisms might contribute to evolutionary change.

[6 marks]

Total for Question 7

END OF QUESTIONS · Total marks: 53