MARK SCHEME

OCR Gateway GCSE Biology A · Paper 1: Cell-Level Systems, Scaling Up and Organism-Level Systems (B1–B3)

Foundation Tier — Separate Science · Total: 100 marks

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This mark scheme is designed for use by examiners. Alternative correct answers should be accepted. Marks in brackets [1] indicate one mark. Points separated by / indicate alternatives. Underlined words are essential. ★ indicates Higher Tier only marks.

Question 1 [4 marks]

(a) [1 mark]

Which of the following is found in BOTH plant and animal cells?

• D. Nucleus [1]

(b) [1 mark]

Active transport differs from diffusion because active transport:

• C. requires energy (ATP) [1]

(c) [1 mark]

Which of the following describes the role of phagocytes?

• B. Engulf and digest pathogens [1]

(d) [1 mark]

What is the correct order of the hierarchy of organisation?

• B. Cell → Tissue → Organ → Organ system → Organism [1]

Total for question 1: 4

Question 2 [5 marks]

Figure 1 shows a plant cell.

(a) [3 marks]

Label THREE structures that are found in a plant cell but NOT in an animal cell. For each, give one …

• Cell wall: provides structural support / prevents cell from bursting [1]

• Chloroplast: site of photosynthesis / contains chlorophyll [1]

• Permanent vacuole: stores cell sap / helps maintain turgidity [1]

(b) [2 marks]

State TWO differences between a plant cell and a bacterial cell.

• Bacterial cell has no nucleus/membrane-bound nucleus [1]

• Bacterial cell has no chloroplasts/mitochondria/membrane-bound organelles [1] — accept any two valid differences

Total for question 2: 5

Question 3 [7 marks]

A student investigates the effect of temperature on the digestion of starch by amylase.

(a) [2 marks]

Describe the function of amylase.

• Amylase is an enzyme [1]

• It digests/breaks down starch into simpler sugars (maltose/glucose) [1]

(b) [3 marks]

Explain how temperature affects enzyme activity. Use the term "active site" in your answer.

• As temperature increases up to the optimum, rate of reaction increases [1]

• At higher than optimum temperature, the active site changes shape permanently (enzyme is denatured) [1]

• Substrate can no longer bind to active site — reaction stops [1]

(c) [2 marks]

State ONE variable the student should control and explain why.

• e.g. pH: changes in pH affect the shape of the active site — controlling pH ensures it is not a variable [1] — accept any valid controlled variable with explanation

Total for question 3: 7

Question 4 [7 marks]

The human heart is a double pump.

(a) [2 marks]

Explain what is meant by a "double circulatory system."

• The blood passes through the heart twice for each complete circuit of the body [1]

• There are two circuits — one to the lungs (pulmonary) and one to the rest of the body (systemic) [1]

(b) [2 marks]

Explain why the left ventricle has a thicker muscular wall than the right ventricle.

• Left ventricle pumps blood to the whole body — needs more force [1]

• Thicker muscular wall generates more pressure [1]

(c) [3 marks]

Describe TWO adaptations of red blood cells and explain how each helps red blood cells carry oxygen.

• No nucleus — more room for haemoglobin / carries more O■ [1]

• Biconcave disc shape — large surface area for O■ to diffuse in and out [1]

• Contains haemoglobin — binds O■ in lungs and releases it in tissues [1] — accept any two with explanations

Total for question 4: 7

Question 5 [9 marks]

This question is about communicable disease.

(a) [3 marks]

Describe how the body defends itself against pathogens using non-specific defences. Give THREE examp…

• Skin: physical barrier prevents pathogens entering [1]

• Mucus in airways: traps pathogens before they reach lungs [1]

• Stomach acid (pH 2): kills pathogens ingested with food and water [1] — accept cilia sweeping mucus

(b) [4 marks]

Explain how vaccination protects an individual against a specific disease.

• Vaccine contains dead/weakened/harmless form of the pathogen or its antigens [1]

• Immune system responds and produces antibodies [1]

• Memory cells are produced [1]

• On re-exposure, rapid antibody production occurs before serious symptoms develop [1]

(c) [2 marks]

Explain why antibiotics cannot be used to treat viral diseases.

• Antibiotics work by targeting bacterial structures (e.g. cell walls) [1]

• Viruses do not have these structures / viruses live inside host cells [1]

Total for question 5: 9

Question 6 [9 marks]

(a) [3 marks]

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

• Aerobic uses oxygen; anaerobic does not [1]

• Aerobic produces CO■ + water; anaerobic produces lactic acid (animals) or ethanol + CO■ (yeast) [1]

• Aerobic releases much more energy per glucose than anaerobic [1]

(b) [3 marks]

A student runs a 100 m race. After the race, she breathes heavily for several minutes. Explain why.

• During the race, muscles used anaerobic respiration, producing lactic acid [1]

• Extra oxygen is needed after the race to break down the lactic acid [1]

• This is called the oxygen debt — heavy breathing continues until it is repaid [1]

(c) [3 marks]

Describe the structure of the villi in the small intestine and explain how they are adapted for abso…

• Finger-like projections that increase surface area [1]

• Walls one cell thick — short diffusion distance [1]

• Dense blood capillary supply — nutrients removed quickly, maintaining a concentration gradient [1]

Total for question 6: 9

Question 7 [6 marks]

(a) [6 marks]

Describe the role of the immune system in protecting the body against a new bacterial pathogen that …

• Non-specific first: phagocytes engulf and digest bacteria by phagocytosis [1]

• Specific response: pathogen has specific antigens on its surface [1]

• Lymphocytes produce antibodies that match those antigens specifically [1]

• Antibodies bind to antigens, flagging the bacteria for destruction [1]

• Memory cells are produced and remain in the body long-term [1]

• On future exposure to the same bacteria, memory cells rapidly produce antibodies — infection destroyed quickly [1]

Total for question 7: 6