MARK SCHEME

Pearson Edexcel GCSE (9-1) Biology · Paper 2: Plant Structures, Animal Coordination, Exchange & Transport, Ecosystems (Topics 6–9)

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]

What is transported in the xylem vessels of a plant?

- C. Water and mineral ions [1]

(b) [1 mark]

What is the role of insulin in the body?

- B. Lowers blood glucose concentration [1]

(c) [1 mark]

Which of the following is a greenhouse gas?

- C. Methane [1]

(d) [1 mark]

Which structure in a leaf allows gas exchange?

- C. Stoma [1]

Total for question 1: 4

Question 2 [6 marks]

Figure 1 shows a section through a leaf.

(a) [3 marks]

Name THREE adaptations of a leaf for photosynthesis and state the function of each.

- Palisade cells with chloroplasts — absorb light for photosynthesis [1]
- Air spaces in spongy layer — allow CO■ to diffuse to palisade cells [1]
- Stomata — allow entry of CO■ and exit of O■ (gas exchange) [1]

(b) [3 marks]

Describe the differences between xylem and phloem vessels in plants.

- Xylem: dead hollow cells with lignified walls; transports water and minerals upward [1]
- Phloem: living cells; transports dissolved sugars (sucrose) in any direction [1]
- Xylem: one-way flow; phloem: bidirectional / both directions [1]

Total for question 2: 6

Question 3 [6 marks]

Diabetes is a condition affecting blood glucose control.

(a) [3 marks]

Describe what happens in the body when blood glucose rises above normal. Name the hormone involved.

- Beta cells in the pancreas detect the rise [1]

- Insulin is released [1]
- Insulin causes cells to take up glucose; liver stores excess as glycogen → blood glucose falls [1]

(b) [3 marks]

Compare Type 1 and Type 2 diabetes. Give ONE difference in cause and ONE difference in treatment.

- Type 1: pancreatic beta cells destroyed (autoimmune) → no insulin. Type 2: cells resistant to insulin [1]
- Type 1: treated with insulin injections. Type 2: managed with diet and exercise / weight loss [1]
- One valid additional difference with evidence [1] — award 2 for cause/treatment differences

Total for question 3: 6

Question 4 [8 marks]

The heart pumps blood around the body.

(a) [3 marks]

Compare the structure of arteries, veins and capillaries.

- Arteries: thick elastic walls, small lumen, no valves [1]
- Veins: thinner walls, valves, large lumen [1]
- Capillaries: walls one cell thick, smallest vessels, site of exchange [1]

(b) [3 marks]

Describe how the alveoli in the lungs are adapted for efficient gas exchange. Give THREE adaptations…

- Large surface area (millions of alveoli) [1]
- Thin walls (one cell thick) — short diffusion distance [1]
- Good blood supply — maintains concentration gradient for O■ and CO■ [1]

(c) [2 marks]

Explain why the left ventricle has thicker walls than the right ventricle.

- Left ventricle pumps blood to the whole body — much greater distance [1]
- Thicker muscular walls can generate more force/pressure needed [1]

Total for question 4: 8

Question 5 [8 marks]

This question is about ecosystems and the impact of human activity.

(a) [1 mark]

Define the term "biodiversity."

- The variety of different species in an area [1]

(b) [4 marks]

Describe the process of eutrophication. Explain how it results from agricultural practices.

- Fertilisers (nitrates and phosphates) are applied to farmland [1]
- They wash off into rivers and lakes during rain (runoff) [1]
- Algae grow rapidly (algal bloom) on the surface, blocking light to aquatic plants [1]
- Plants die; bacteria decompose them and use up oxygen; fish and aquatic life suffocate [1]

(c) [3 marks]

State THREE consequences of deforestation.

- Habitat destruction → loss of biodiversity [1]
- Increased CO■ in atmosphere → global warming [1]
- Soil erosion / disruption of water cycle [1]

Total for question 5: 8

Question 6 [11 marks]

(a) [2 marks]

State the word equation for aerobic respiration.

• Glucose + oxygen → carbon dioxide + water [1]

• (+ energy released) [1] — accept mentioning energy/ATP

(b) [3 marks]

Explain the role of decomposers in the carbon cycle.

• Decomposers (bacteria and fungi) break down dead organisms and organic waste [1]

• They release carbon dioxide into the atmosphere through respiration [1]

• They also return mineral ions (e.g. nitrates) to the soil, which plants can absorb [1]

(c) [6 marks]

Describe and explain how human activities are causing a loss of biodiversity. Include at least THREE…

• Deforestation: destroys habitat → species lose food/shelter → extinction [1]

• Pollution: pesticides/chemicals kill non-target species; water pollution kills aquatic organisms [1]

• Climate change: rising temperatures shift habitats; some species cannot adapt quickly enough [1]

• Overexploitation: overfishing depletes fish populations; hunting reduces populations below viable levels [1]

• Invasive species introduced by humans outcompete native species [1]

• These threats operate simultaneously — combined effect is accelerating extinction rates [1]

Total for question 6: 11