Pearson Edexcel GCSE (9-1) Biology

Paper 2: Plant Structures, Animal Coordination, Exchange & Transport, Ecosystems (Topics 6–9)

Higher Tier — Combined Science · Time: 1 hour 10 minutes · Total: 60 marks

Higher Tier — Combined 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: 60
- Questions marked ★ are Higher Tier only.

Question 1

(a) Which process drives water movement from the roots to the leaves of a plant?

[1 mark]

Tick **ONE** box.

- ☐ A. Translocation
- ☐ B. Active transport in the roots only
- ☐ C. Transpiration
- ☐ D. Osmosis in the phloem

(b) Which hormone is released by the pituitary gland when blood water content is low?

[1 mark]

Tick **ONE** box.

- ☐ A. Insulin
- ☐ B. Glucagon
- ☐ C. Adrenaline
- ☐ D. ADH

(c) At which trophic level are producers found?

[1 mark]

Tick **ONE** box.

- ☐ A. Level 2
- ☐ B. Level 3
- ☐ C. Level 1

☐ D. Level 4

(d) Which of the following correctly describes eutrophication?

[1 mark]

Tick **ONE** box.

☐ A. Increase in biodiversity due to nutrient enrichment

☐ B. Oxygen depletion in water due to algal bloom and bacterial decomposition

☐ C. Increase in fish population due to nutrient-rich water

☐ D. Direct toxicity of fertilisers to aquatic plants

Total for Question 1 ☐

Question 2

Figure 1 shows a cross-section through a leaf.

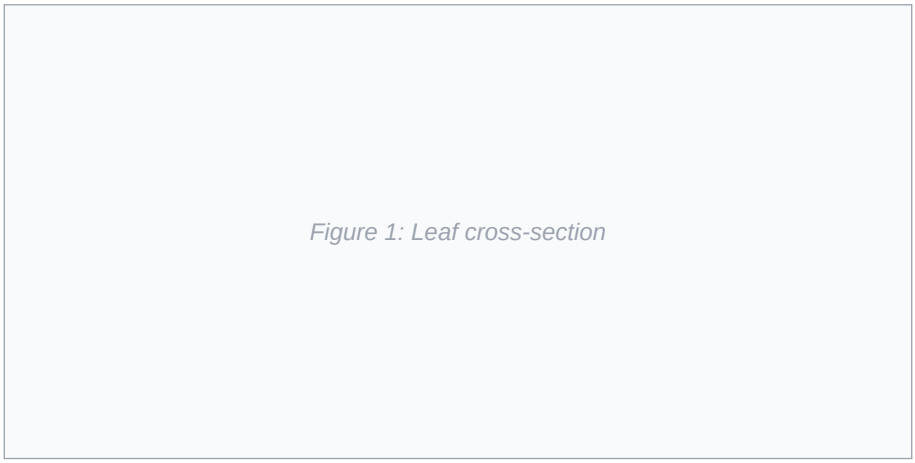

Figure 1: Leaf cross-section

(a) Identify THREE adaptations of a leaf for efficient photosynthesis and explain how each adaptation helps.

[3 marks]

(b) Explain how guard cells control the opening and closing of stomata.

[3 marks]

★ Higher Tier

(c) ★ Explain how auxin causes a plant shoot to show positive phototropism.

[4 marks]

Total for Question 2

Question 3

This question is about blood glucose homeostasis and kidney function.

(a) Describe how blood glucose concentration is regulated after a meal. Use the terms insulin, glycogen and negative feedback.

[4 marks]

★ Higher Tier

(b) ★ Describe the processes of ultrafiltration and selective reabsorption in the kidney. Explain what happens to glucose and urea.

[4 marks]

★ Higher Tier

(c) ★ Explain the role of ADH in regulating urine concentration.

[2 marks]

Total for Question 3

Question 4

This question is about exchange surfaces in animals.

(a) Explain how the alveoli of the lungs are adapted for efficient gas exchange.

[4 marks]

(b) Describe the pathway of blood from the right atrium to the aorta. Name all four chambers of the heart in your answer.

[3 marks]

★ **Higher Tier**

(c) ★ A patient has a heart rate of 68 bpm and stroke volume of 80 cm^3. Calculate the cardiac output in dm^3/min.

[2 marks]

Total for Question 4

Question 5

This question is about ecosystems and biodiversity.

(a) Explain why only approximately 10% of energy transfers from one trophic level to the next. Describe THREE specific ways energy is lost.

[4 marks]

(b) Describe the full chain of events that leads to eutrophication of a lake. Start with the application of fertilisers to farmland.

[4 marks]

★ Higher Tier

(c) ★ Evaluate international agreements as a strategy for reducing threats to biodiversity.

[2 marks]

Total for Question 5

Question 6

(a) ★ Quality of written communication. Selective breeding and genetic engineering are both methods of altering the characteristics of organisms. Compare these two methods and evaluate the advantages and disadvantages of genetic engineering for producing organisms with useful traits.

[6 marks]

Total for Question 6

END OF QUESTIONS · Total marks: 49