Pearson Edexcel GCSE (9-1) Biology

Paper 1: Key Concepts, Cells & Control, Genetics, Natural Selection, Health & Disease (Topics 1–5)

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 of the following correctly describes the induced fit model of enzyme action?

[1 mark]

Tick **ONE** box.

- ☐ A. The active site has a rigid shape that exactly matches the substrate
- ☐ B. The active site changes shape slightly when the substrate binds
- ☐ C. The substrate changes shape to fit the active site
- ☐ D. The enzyme and substrate have identical shapes

(b) A patient has HIV. Which cells does HIV specifically infect?

[1 mark]

Tick **ONE** box.

- ☐ A. Red blood cells
- ☐ B. Platelets
- ☐ C. CD4+ T helper lymphocytes
- ☐ D. Phagocytes

(c) In clinical trials, what is the purpose of a placebo?

[1 mark]

Tick **ONE** box.

- ☐ A. A lower dose of the real drug to test for side effects
- ☐ B. An inactive treatment used to compare with the real drug
- ☐ C. A faster-acting version of the drug

☐ D. A natural alternative to the drug being tested

(d) Which of the following represents the correct hierarchy of organisation?

[1 mark]

Tick **ONE** box.

☐ A. Molecule → Cell → Organ → Tissue → Organism

☐ B. Cell → Tissue → Organ → Organ system → Organism

☐ C. Tissue → Cell → Organ system → Organ → Organism

☐ D. Cell → Organ → Tissue → Organ system → Organism

Total for Question 1 ☐

Question 2

A student investigated the effect of pH on the activity of the enzyme pepsin. She measured the time taken to digest a fixed mass of protein at different pH values.

Figure 1: Time to digest protein vs pH for pepsin

(a) Describe the relationship between pH and pepsin activity shown in the graph.

[2 marks]

(b) Explain, using the term "active site," why pepsin does not function efficiently in the small intestine where pH is approximately 7.

[3 marks]

★ Higher Tier

(c) ★ Explain the difference between the lock and key model and the induced fit model of enzyme action.

[2 marks]

Total for Question 2

Question 3

This question is about cell division and stem cells.

(a) Describe the differences between mitosis and meiosis.

[3 marks]

(b) Embryonic stem cells are described as totipotent. Explain what this means and evaluate the use of embryonic stem cells in medical treatments.

[4 marks]

★ Higher Tier

(c) ★ Explain how cancer results from abnormal control of the cell cycle.

[2 marks]

Total for Question 3

Question 4

This question is about genetic inheritance.

(a) Huntington's disease is caused by a dominant allele (H). A person with Huntington's disease is heterozygous (Hh). They have children with an unaffected person. Use a Punnett square to calculate the probability that a child will have Huntington's disease.

[4 marks]

(b) Explain the difference between continuous variation and discontinuous variation. Give ONE example of each.

[3 marks]

★ Higher Tier

(c) ★ Explain what is meant by co-dominance. Give one example.

[2 marks]

Total for Question 4

Question 5

This question is about the immune system and communicable diseases.

(a) Describe the specific immune response that occurs when a pathogen enters the body for the first time. Explain how this leads to immunity.

[4 marks]

(b) Describe the process of developing a new drug from initial discovery to being available for patients. Explain why each stage is necessary.

[4 marks]

★ Higher Tier

(c) ★ Describe how monoclonal antibodies are produced and explain why they are particularly useful in treating cancer.

[2 marks]

Total for Question 5

Question 6

(a) ★ Quality of written communication. Evaluate the evidence that smoking causes lung cancer and other diseases. In your answer, consider what counts as good scientific evidence and what factors limit the conclusions that can be drawn.

[6 marks]

Total for Question 6

END OF QUESTIONS · Total marks: 45