

# Pearson Edexcel GCSE (9-1) Biology

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

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

Higher Tier — Separate Science

<b>Name:</b>	
<b>Centre number:</b>	<b>Candidate number:</b>

- 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 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

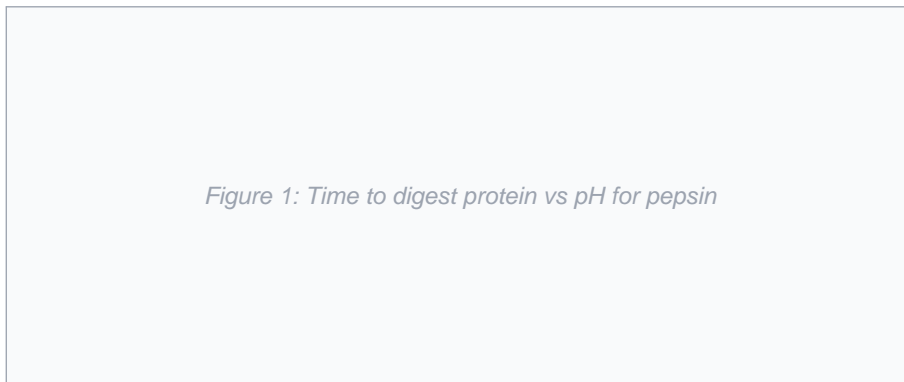
C. Tissue → Cell → Organ system → Organ → Organism

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.



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

[2 marks]

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

[3 marks]

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### ★ Higher Tier

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

[2 marks]

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**Question 3**

*This question is about cell division and stem cells.*

**(a)** Describe the differences between mitosis and meiosis.

[3 marks]

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**(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]

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★ Higher Tier

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

[2 marks]

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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]

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

[3 marks]

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★ Higher Tier

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

[2 marks]

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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]

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(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]

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★ Higher Tier

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

