Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International GCSE (9–1)

Friday 7 November 2025

Morning (Time: 1 hour 45 minutes)

Paper reference **4HB1/02**

Human Biology

UNIT: 4HB1

Paper: 02

You must have:
Ruler
Calculator

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- Show all the steps in any calculations and state the units.

Information

- The total mark for this paper is 90.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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M:1/1/1/1/1

P 7 8 9 6 7 A 0 1 2 0

Pearson

Answer ALL questions.

1 (a) The table gives some molecules and their features.

Complete the table by putting a tick (✓) in the box if the molecule shows the feature.

(6)

	Molecule					
Feature	**protein**	**DNA**	**glycogen**	**lipid**	**starch**	**vitamin C**
decolourises DCPIP						
is found only in the nucleus						
consists of glucose units						
consists of a chain of amino acids						
glycerol forms part of the molecule						

(b) A student is given a soluble white powder.

Describe how to test the powder for a reducing sugar.

(5)

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(c) Name two reducing sugars.

(2)

1 .....

2 .....

(Total for Question 1 = 13 marks)

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2 (a) Birth defects in humans can be caused by mutations.

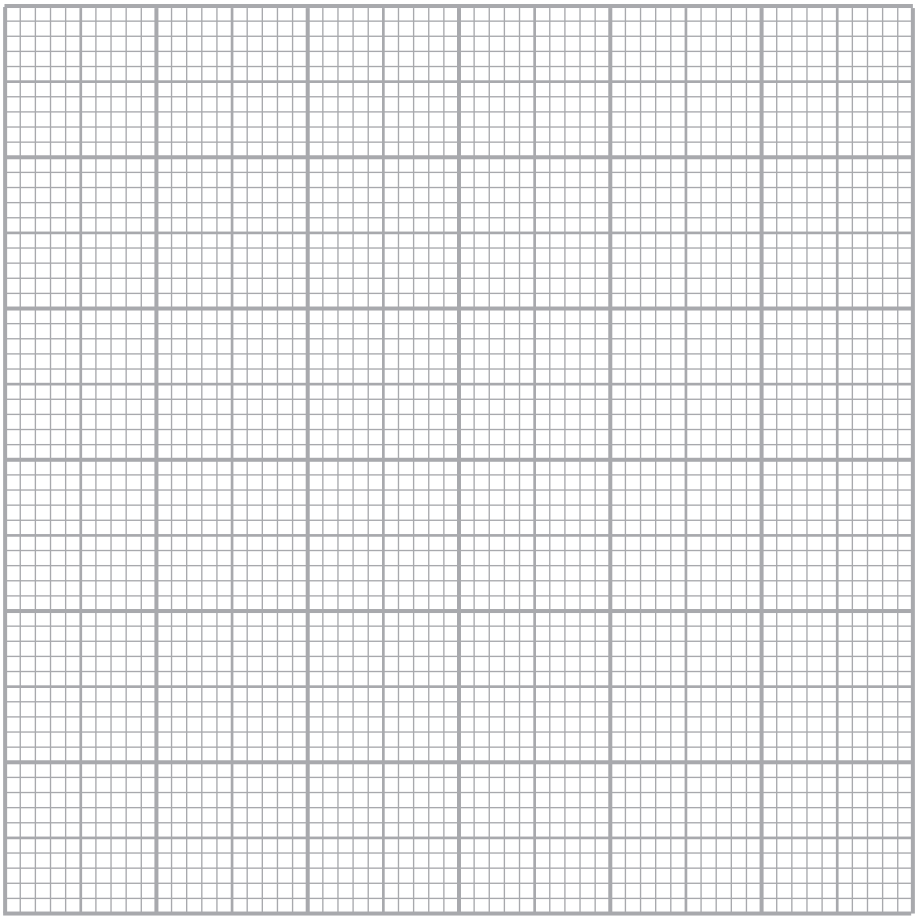
The table shows how the number of birth defects increases with the age of the mother.

Age of mother in years	Number of birth defects per 100 000 women
20	1.5
30	3.0
35	8.0
40	22.0
45	38.0

(i) Plot a graph of the results shown in the table.

Join the points with straight lines.

(4)



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(ii) In one year, 15000 40-year-old women gave birth to a baby.

Calculate the number of these babies that would have a birth defect.

(3)

number with a birth defect = ...

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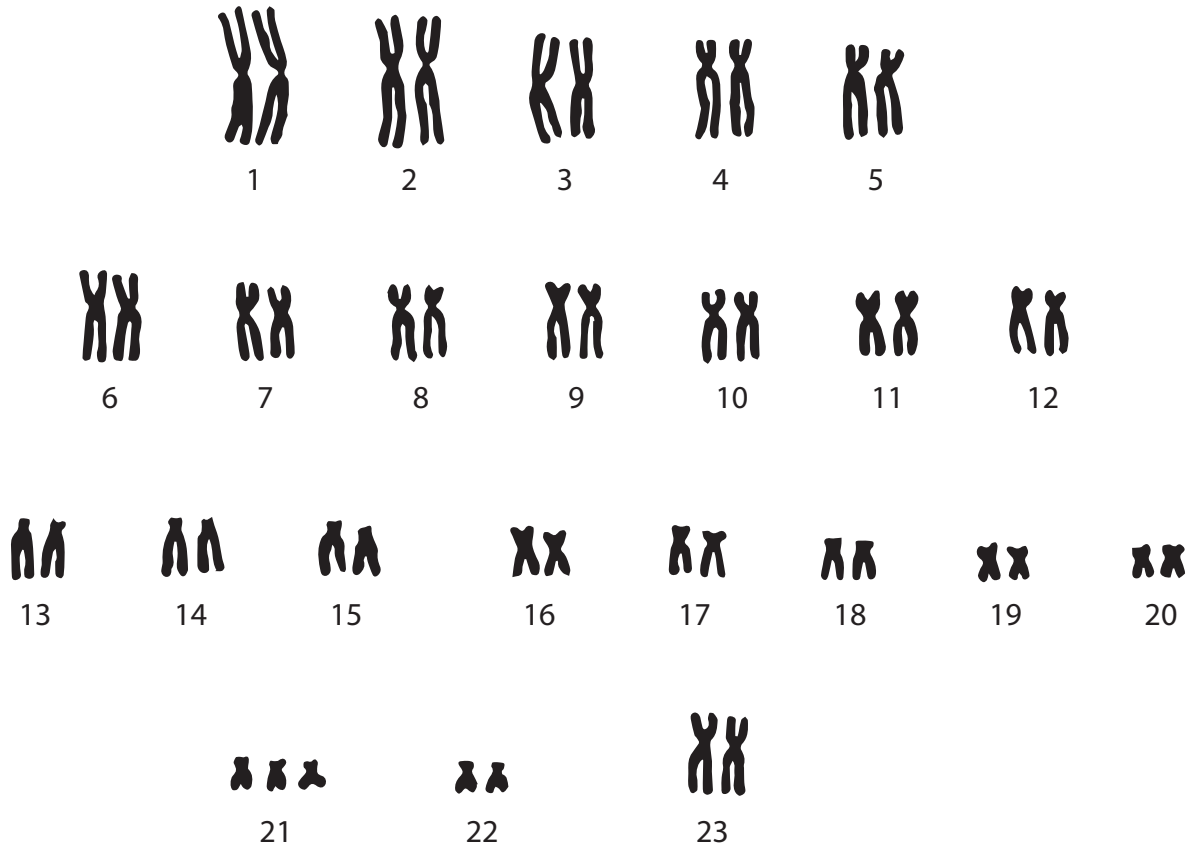
(b) The diagram shows the chromosomes of a person.



(i) Explain how the diagram shows that this person has a mutation.

(2)

(ii) Explain what other information the diagram shows about the person.

(3)

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(iii) Explain how the mutation shown in the diagram differs from the mutation that causes cystic fibrosis.

(3)

(Total for Question 2 = 15 marks)

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3 Read the passage below. Use the information in the passage and your own knowledge to answer the questions that follow.

Dog Saliva: The Next Wonder Drug?

A health clinic nurse stated that patients' wounds caused by human bites become infected more often than wounds caused by dog bites. The nurse also said that wounds heal more quickly if you let a dog lick them. A group of students investigated these statements.

The students collected samples of saliva from 102 dogs. They touched a circle of sterile filter paper directly onto the rear upper gum of the dogs' molars. Two salivary ducts empty saliva into the area where the samples were taken. The students used this method because they wanted saliva that had just been secreted, rather than saliva that had been on the dog's tongue for some time. After three samples from each of the 102 dogs had been collected, the saliva-soaked filter papers were placed into separate Petri dishes. Each Petri dish contained agar on which the bacterium *Escherichia coli (E.coli)* was growing. The Petri dishes were left for two days and the results were observed. The results showed that the saliva did inhibit the growth of *E.coli* in 16% of the samples. The students also found that there were quite a few bacteria in the dog saliva itself and so they concluded that probably dog saliva is not the next 'wonder drug'.

In another investigation done at the University of California in 1990, researchers found that dog saliva killed *E.coli* and *Streptococcus canis*, which is another harmful bacterium. A mother dog feeds her puppies using her teats, which supply milk. The researchers concluded that when a mother dog is feeding her puppies it is beneficial to the puppies for her to lick her teats. It is also beneficial for dogs to lick their own wounds.

(a) Dogs are carnivorous (meat eaters).

Suggest why dogs' saliva does not contain amylase.

(2)

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(b) Explain why the students collected saliva from 102 dogs rather than just one dog. (line 5)

(3)

(c) Explain why the students wanted saliva that had just been secreted. (lines 7 to 9)

(3)

(d) Inhibition of *E.coli* occurred in 16% of the samples.

Calculate the number of effective samples of saliva. (lines 9 to 13)

(2)

number of effective samples = ...

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(e) Explain why the students concluded that dog saliva is not the next wonder drug. (lines 12 to 15)

(2)

(f) (i) Give a reason why the mother dog licking her teats could be beneficial to the puppies. (lines 16 to 20)

(1)

(ii) Give a reason why it is beneficial for dogs to lick their own wounds. (lines 20 to 21)

(1)

(Total for Question 3 = 14 marks)

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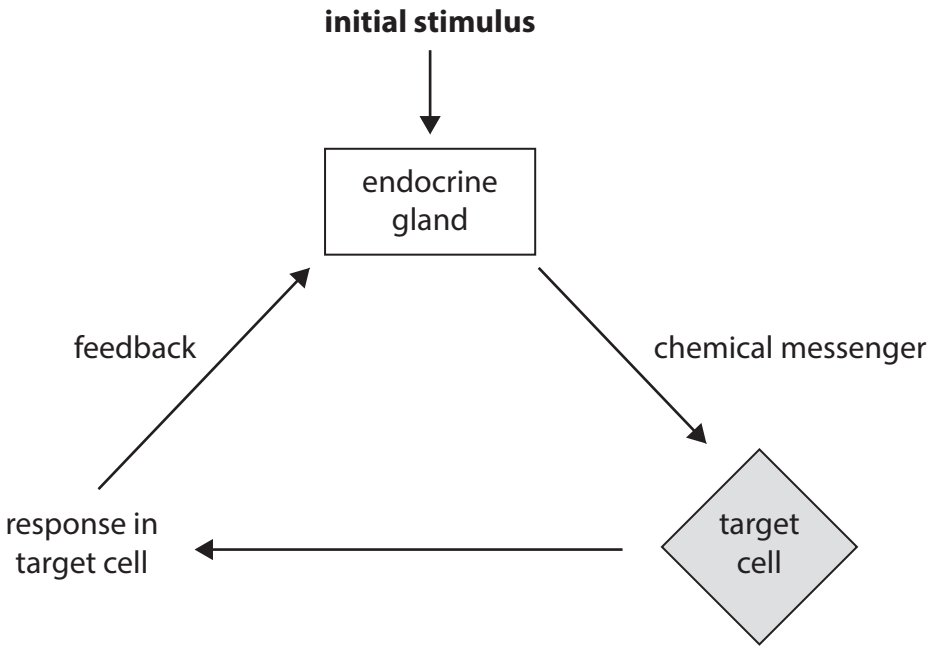
4 The diagram shows a model of feedback control used in homeostasis.



(a) State the meaning of the term **homeostasis**.

(3)

(b) Regulation of glucose levels in the blood is a process that uses the type of feedback control shown in the diagram.

(i) Describe the initial stimulus in this process.

(2)

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(ii) State exactly where, in the body, the chemical messenger is produced in this process.

(2)

(iii) Describe how chemical messengers travel from endocrine glands to target cells.

(2)

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(iv) Explain how the feedback control shown in the diagram regulates the level of glucose in the blood.

(5)

(Total for Question 4 = 14 marks)

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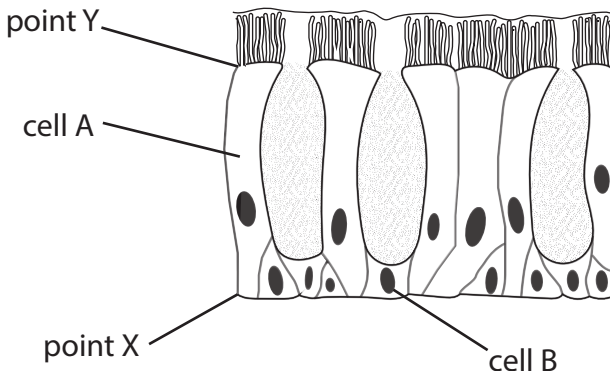
5 The diagram shows the lining of the trachea.



(a) (i) State the name of this type of lining.

(2)

(ii) State the function of cell B.

(1)

(iii) Explain why the lining of the trachea can be described as a tissue.

(3)

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(iv) The actual length of cell A from point X to point Y is 10 µm.

Calculate the magnification of cell A shown in the diagram.

Give your answer in standard form.

[1 mm = 1000 µm]

(4)

magnification = ...

(b) Smoking affects the lining of the trachea.

Describe the effect of smoking on the lining of the trachea.

(5)

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(Total for Question 5 = 15 marks)

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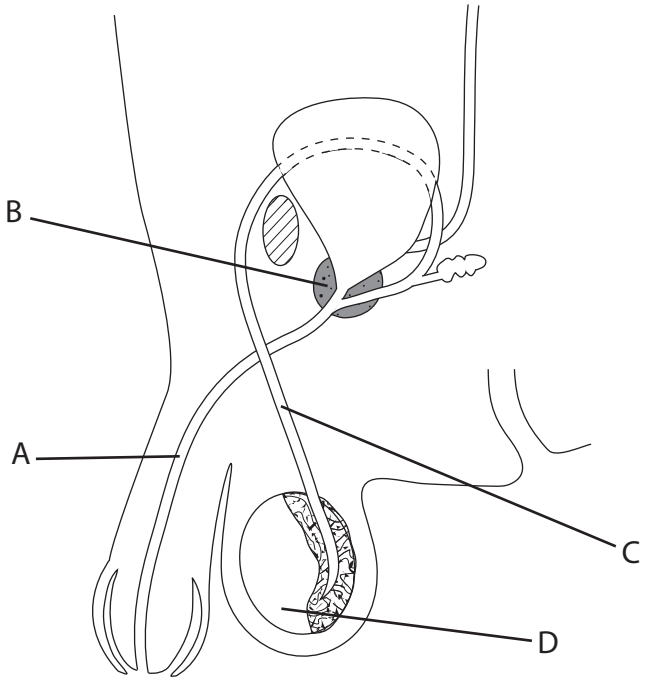
6 The diagram shows the male reproductive system.



(a) Name the parts of the reproductive system labelled A, B, C and D.

(4)

A .....

B .....

C .....

D .....

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(b) Semen is a mixture produced by the male reproductive system.
The mixture consists of fluid, sperm, sugar, proteins and other components.

Explain the role of semen in the process of fertilisation.

(4)

(Total for Question 6 = 8 marks)

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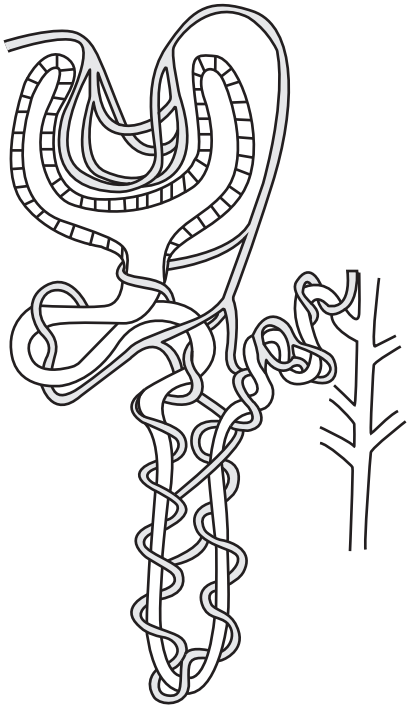
7 The diagram shows a kidney nephron.



(a) Using lines labelled A, B and C, indicate where the following processes occur.

(3)

- label A, filtration of the blood
- label B, reabsorption of glucose
- label C, concentration of urine increases

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(b) The table shows levels of ADH in the blood and the resulting rates of urine production.

ADH level in blood in arbitrary units	Rate of urine production in mm^3 per minute
7.5	2.1
7.5	2.1
7.5	2.1
17.0	1.5
22.0	1.3

Comment on the relationship between ADH levels in the blood and the rate of urine production.

(5)

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(c) The nephron is surrounded by a network of capillaries.

One of the functions of this network is filtering the blood.

Explain another function of the capillary network.

(3)

(Total for Question 7 = 11 marks)

TOTAL FOR PAPER = 90 MARKS

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