Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International GCSE

Thursday 8 May 2025

Afternoon (Time: 1 hour 45 minutes)

Paper reference **4HB1/01R**

Human Biology

UNIT: 4HB1
PAPER: 01R

You must have:
Ruler
Candidates may use a 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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P 7 4 6 2 8 A 0 1 2 0

Pearson

Answer ALL questions.

1 (a) The sentences are about the heart.

Complete the sentences by using words or numbers from the box.

(8)

80	100	120	atria	body	diastolic	elastic tissue
lungs	muscle	systolic	tendon	vena cava	ventricles	

The heart consists of four chambers.

The two upper chambers are called ..... .

The left upper chamber receives blood from the ..... whilst the right upper chamber receives blood from the body through the ..... .

The two lower chambers are called ..... .

The left lower chamber pumps blood to the ..... .

This left lower chamber has a very thick wall made of ..... .

When the chamber contracts, it generates a pressure known as the ..... pressure.

The average value for this pressure is about ..... mmHg.

(b) Cardiac output is the volume of blood pushed out of the heart in one minute.

Cardiac output is calculated using this formula.

cardiac output = heart rate × stroke volume

The stroke volume is the volume, in dm^3, of blood pushed out during one heartbeat. The heart rate is the number of beats per minute.

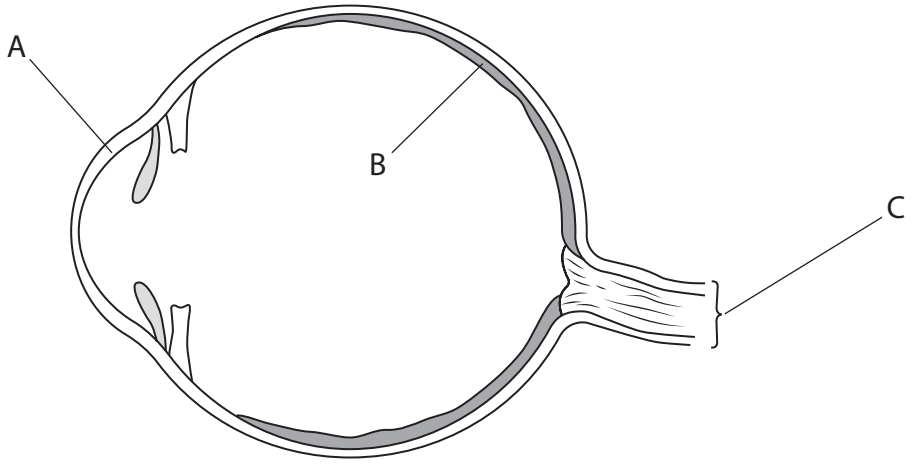
Calculate the stroke volume for a person with a heart rate of 68 beats per minute and a cardiac output of 6.1 dm^3.
Give your answer in cm^3.

(3)

stroke volume = ... cm^3

(Total for Question 1 = 11 marks)

2 The diagram shows a section through the eye with the lens missing.



(a) (i) Complete the diagram by drawing in the lens and suspensory ligaments as they would appear when the eye is looking at a near object.

(2)

(ii) Name the parts labelled A, B and C.

(3)

A .....

B .....

C .....

(b) A person is looking at a near object.

Describe the changes that occur in the eye if the person then looks at a distant object.

(4)

.....

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(Total for Question 2 = 9 marks)

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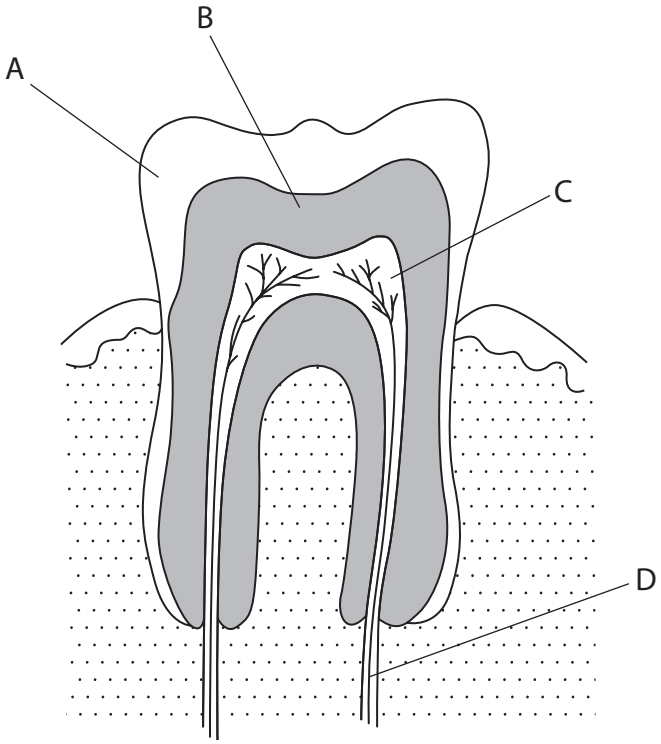
3 (a) The diagram shows a tooth.



(i) Name the type of tooth.

(1)

.....

(ii) Identify the parts of the tooth labelled A, B, C and D.

(4)

A .....

B .....

C .....

D .....

(iii) Explain why this type of tooth is more likely to have tooth decay than other types of teeth.

(3)

(b) Explain why the minerals obtained from a balanced diet are important in developing and maintaining healthy teeth.

(4)

(c) State three other ways to keep teeth healthy.

(3)

1 .....

2 .....

3 .....

(Total for Question 3 = 15 marks)

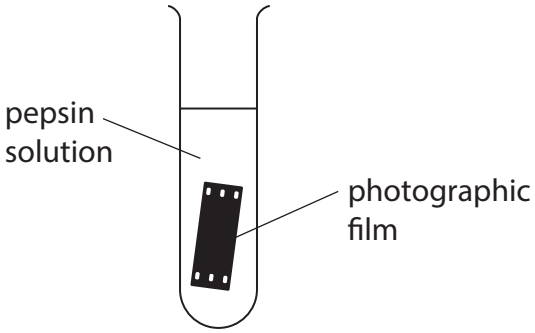
4 Photographic film is made of clear plastic, coated in a protein. The protein contains silver compounds which give the film its black colour.

Pepsin is an enzyme that digests protein.

A student investigates how the concentration of pepsin affects the time taken to digest the protein in a piece of photographic film.

This is the student's method.

- place a piece of photographic film into a test tube
- add a 1% pepsin solution
- measure the time for the film to become clear
- repeat the investigation using other concentrations of pepsin



The table shows the student's results.

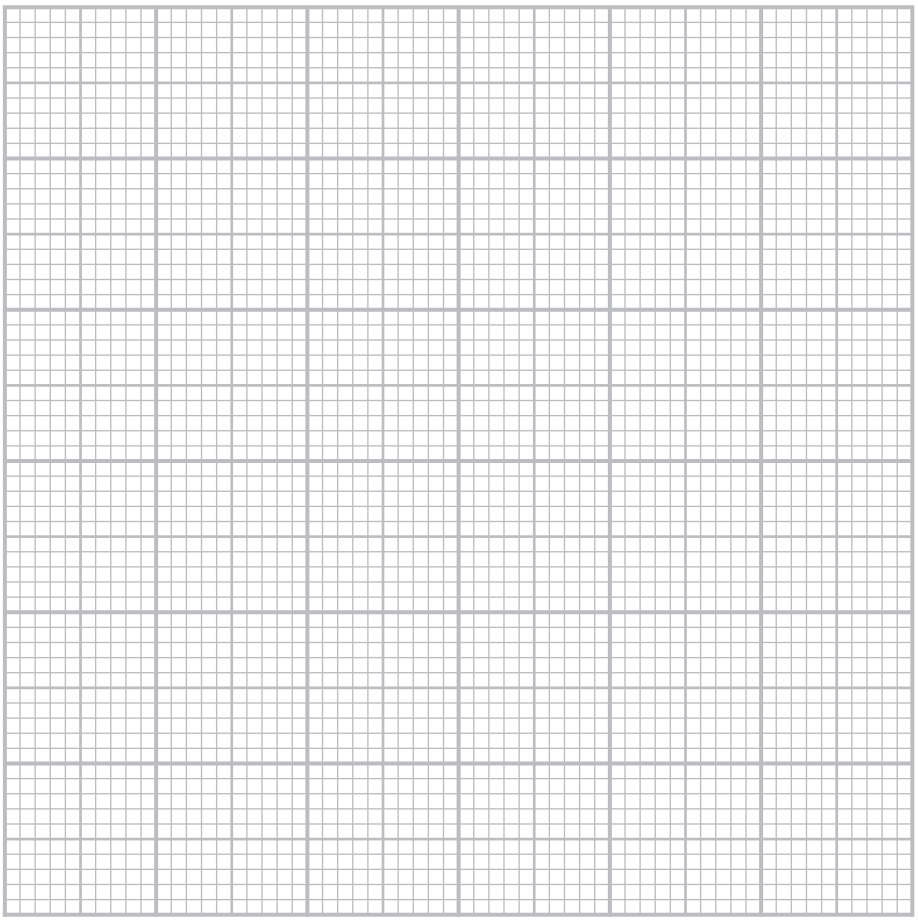
Percentage pepsin concentration (%)	Time taken for film to become clear in seconds
1	112
2	102
3	93
4	84
5	84
6	84

(a) (i) Plot a graph of the results on the grid.

(4)

(ii) Draw a curve of best fit.

(1)



(b) (i) Explain why the photographic film becomes clear.

(3)

(ii) Explain which would be the best pH to carry out this investigation.

(2)

(iii) State three variables that should be controlled during this investigation other than pH.

(3)

1

2

3

(c) Suggest why the time taken for the film to become clear is the same for 4%, 5% and 6% concentrations of pepsin.

(2)

(Total for Question 4 = 15 marks)

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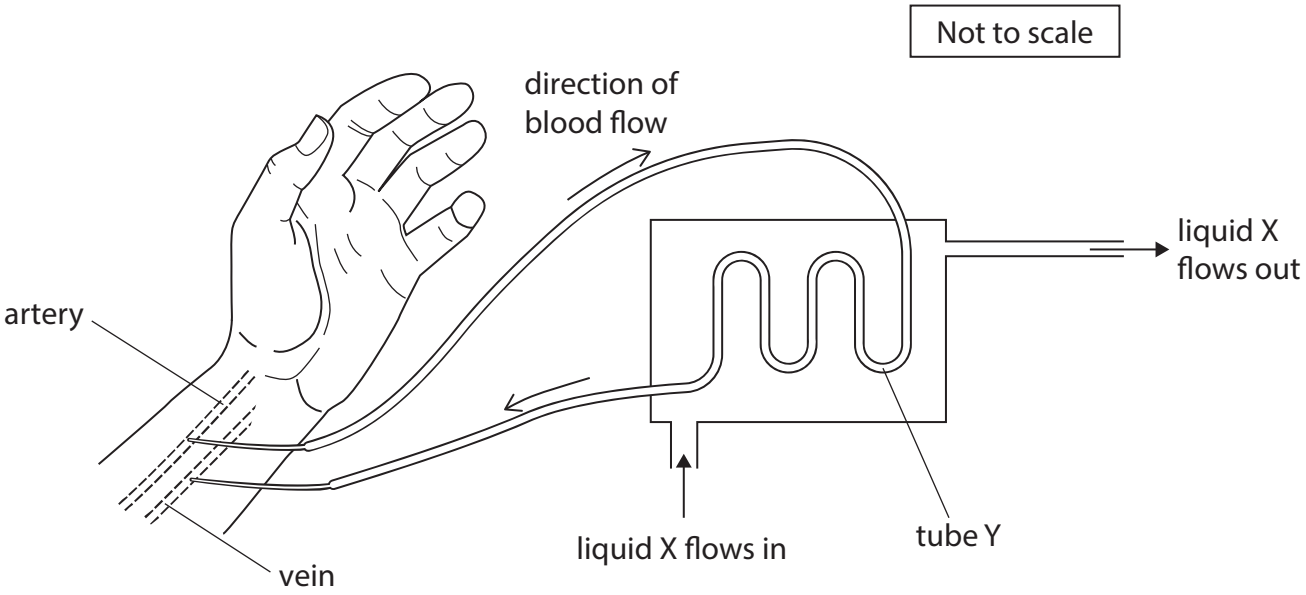
5 The diagram shows a kidney dialysis machine.

The wall of tube Y is partially permeable so it allows the passage of small molecules.



(a) (i) Explain why the blood flow is in the direction shown in the diagram.

(4)

(ii) State which part of the kidney nephron has the same role as tube Y.

(1)

(iii) Explain why tube Y has a length of several metres in the dialysis machine.

(2)

(iv) State one difference between the composition of liquid X as it flows into the machine and as it flows out of the machine.

(1)

(b) Glucose is added to liquid X before it passes into the dialysis machine.

Explain why glucose is added.

(3)

(c) Explain why people who have to use kidney dialysis machines are often told to eat less protein in their diet.

(4)

(Total for Question 5 = 15 marks)

6 (a) Red-green colour blindness is caused by a genetic mutation.

The table shows the percentage of red-green colour blind males and colour blind females in different regions.

Equal numbers of males and females were tested in each region.

Region	Total number of people tested	Percentage of colour blind males	Percentage of colour blind females
A	150	10.00	1.00
B	16 000	6.60	0.40
C	5000	0.80	0.01

(i) Calculate the number of colour blind males in the test group in region C.

(3)

number of males = ...

(ii) State why the results from region A are not considered to be reliable.

(1)

.....

(iii) Justify the statement that colour blindness is a recessive sex-linked condition.

(5)

(b) A woman who is heterozygous for the red-green colour blind condition has a child. The father does not have the condition.

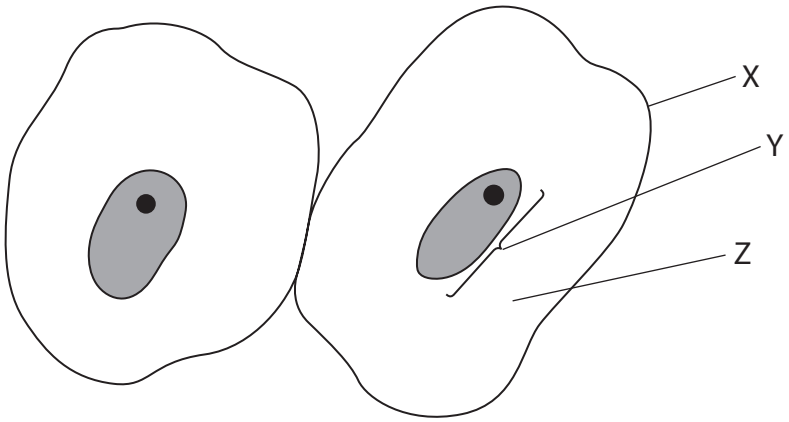
Use a genetic diagram to determine the possible genotypes and phenotypes of the child.

Use B to represent the allele for normal vision and b to represent the allele for the colour blind condition.

(4)

(Total for Question 6 = 13 marks)

7 The diagram shows two cheek cells from the inside of the mouth.



(a) Complete the table by giving the missing information.

(6)

Part	Name of part	Function of part
X		
Y		
Z		

(b) Describe how a student would obtain and prepare these cells so the student can view them using a light microscope.

(4)

(c) Name two other structures inside the cells that could be seen if an electron microscope is used.

(2)

1 .....

2 .....

(Total for Question 7 = 12 marks)

TOTAL FOR PAPER = 90 MARKS

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