

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)**

**Thursday 2 November 2023**

Morning (Time: 1 hour 45 minutes)

Paper  
reference

**4HB1/01**

**Human Biology**

**UNIT: 4HB1**

**PAPER: 01**

**You must have:**

Calculator, ruler

Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **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.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

P74491A

©2023 Pearson Education Ltd.  
Z:1/1/1/1/1



  
Pearson

Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 (a) The table gives components of the blood and their features.

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

(5)

| Feature              | Blood component |           |            |          |        |
|----------------------|-----------------|-----------|------------|----------|--------|
|                      | red blood cell  | phagocyte | lymphocyte | platelet | plasma |
| transports oxygen    |                 |           |            |          |        |
| contains haemoglobin |                 |           |            |          |        |
| is a fluid           |                 |           |            |          |        |
| produces antibodies  |                 |           |            |          |        |
| engulfs pathogens    |                 |           |            |          |        |

(b) Explain why it is important that blood clots when the skin is cut open.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for Question 1 = 9 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

**BLANK PAGE**



2 To find out if a person has diabetes, they can be given a glucose tolerance test.

This is how the test is done.

- the person does not eat for 12 hours
- after the 12 hours, blood glucose levels are measured
- the person is then given a solution of glucose to drink
- the blood glucose levels of the person are measured every 30 minutes for 3 hours

The table shows the results for a person without diabetes and a person with diabetes.

| Time in minutes | Blood glucose levels in mg per 100 cm <sup>3</sup> |                      |
|-----------------|----------------------------------------------------|----------------------|
|                 | person without diabetes                            | person with diabetes |
| 0               | 65                                                 | 110                  |
| 30              | 120                                                | 215                  |
| 60              | 130                                                | 230                  |
| 90              | 95                                                 | 200                  |
| 120             | 80                                                 | 190                  |
| 150             | 65                                                 | 180                  |
| 180             | 65                                                 | 170                  |



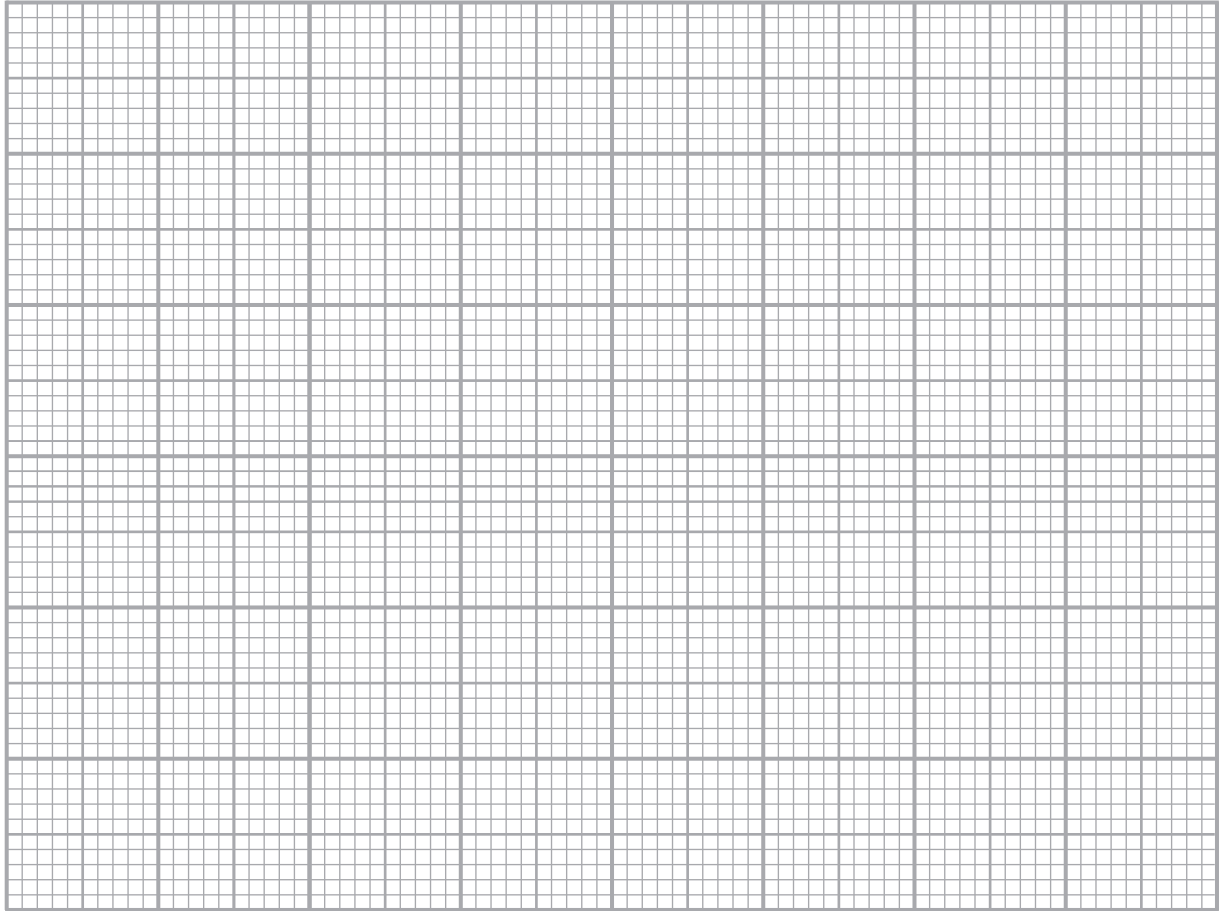
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

- (a) (i) Plot the results on the grid.  
Join the points with straight lines.

(6)



- (ii) Determine the difference between the highest and lowest blood glucose levels for each person.

(2)

without diabetes = ..... mg per 100 cm<sup>3</sup>  
with diabetes = ..... mg per 100 cm<sup>3</sup>





DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

**BLANK PAGE**



- 3 The table shows the flow of blood to different organs in a person at rest and during exercise.

|                  | Blood flow in cm <sup>3</sup> per minute |                 |
|------------------|------------------------------------------|-----------------|
|                  | at rest                                  | during exercise |
| Heart            | 250                                      | 750             |
| Skeletal muscles | 1000                                     | 12 500          |
| Skin             | 400                                      | 1900            |
| Gut              | 1400                                     | 600             |
| Brain            | 750                                      | 750             |
| Total flow       | 5600                                     | 17 500          |

- (a) (i) Give the ratio of the blood flow to the heart when at rest and during exercise.

Give your answer in the form 1 : n

(2)

Ratio = ..... : .....

- (ii) Calculate the percentage increase in the total flow of blood between rest and exercise.

Give your answer to two significant figures.

(3)

percentage increase = ..... %





(iii) Explain why the total blood flow at rest is greater than the flow to the heart, skeletal muscle, skin, gut and brain added together.

(3)

.....

.....

.....

.....

.....

.....

.....

(b) (i) Describe the main changes between the blood flow values at rest and during exercise.

(3)

.....

.....

.....

.....

.....

.....

.....

(ii) Explain the change in blood flow rate to the skin when at rest and during exercise.

(4)

.....

.....

.....

.....

.....

.....

.....

**(Total for Question 3 = 15 marks)**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



4 The mass of DNA in a body cell changes during the cell cycle.

(a) (i) Which structure in a cell contains DNA?

(1)

- A chromosome
- B endoplasmic reticulum
- C cell membrane
- D ribosome

(ii) Name **one** other type of nucleic acid.

(1)

(iii) Give **three** differences between DNA and the nucleic acid that you have named in (a)(ii).

(3)

| Differences | DNA | Named nucleic acid |
|-------------|-----|--------------------|
| 1           |     |                    |
| 2           |     |                    |
| 3           |     |                    |

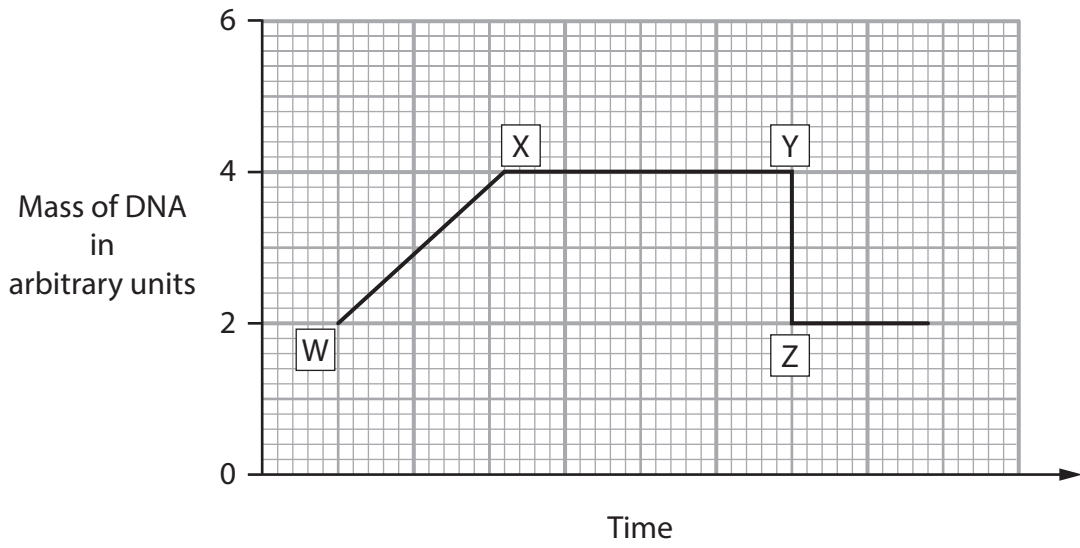


DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(b) The graph shows the changes in the mass of DNA in a body cell, during mitosis.



(i) Describe the process that produces the change in the mass of DNA between points W and X.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

(ii) Describe what is happening in the cell between points Y and Z.

(2)

.....

.....

.....

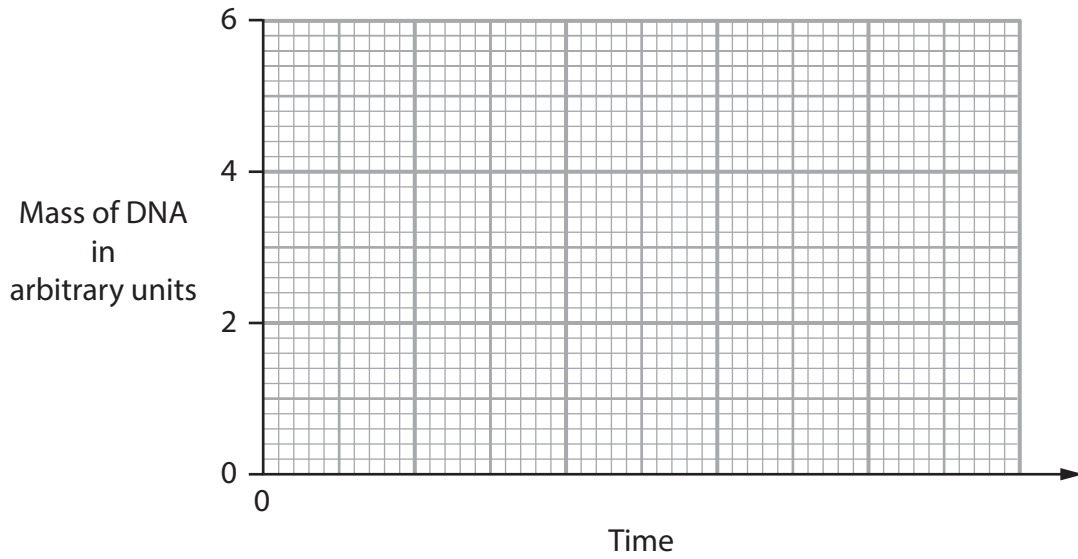
.....



(iii) The production of gametes involves the process of meiosis.

On the grid draw a line to show the changes in the mass of DNA during meiosis.

(3)



(Total for Question 4 = 14 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



5 DNA codes for the production of proteins in cells.

(a) The DNA code is read, three bases at a time. There are four different bases.

Calculate how many different three base codes are available.

(2)

number of codes = .....

(b) (i) Explain how a mutation in DNA can cause a change in the phenotype of a cell.

(3)

.....

.....

.....

.....

.....

.....

.....

(ii) State **one** factor that can cause mutation.

(1)

.....

(iii) A mutation can change the shape of an enzyme molecule.

Explain why this may change how the enzyme works.

(2)

.....

.....

.....

.....



(iv) State why some mutations have no effect on the phenotype of an organism.

(1)

.....

.....

**(Total for Question 5 = 9 marks)**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

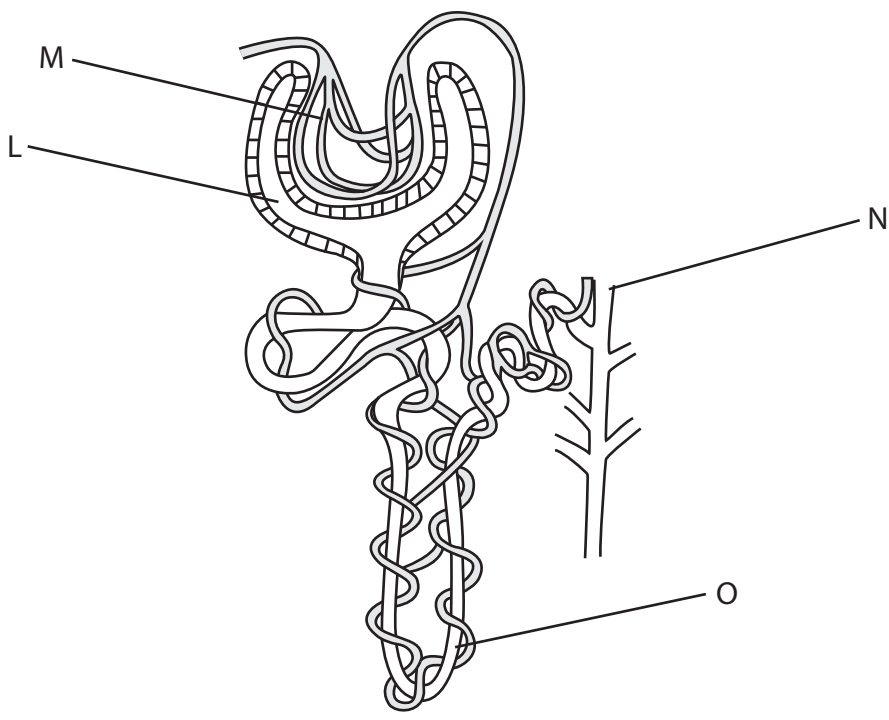
DO NOT WRITE IN THIS AREA

**BLANK PAGE**



P 7 4 4 9 1 A 0 1 5 2 0

6 The diagram shows a kidney tubule.



(a) Name structures L, M, N, and O.

(4)

L .....

M .....

N .....

O .....

(b) (i) Describe the process that causes fluid to be formed in L.

(3)

.....

.....

.....

.....

.....

.....

.....





(ii) Name **two** components of the blood that do not pass into L.

(2)

1 .....

2 .....

(iii) Label, with the letter G, the part of the kidney tubule where most of the glucose is reabsorbed.

(1)

(c) Explain why the volume of urine a person produces on a hot day is less than the volume of urine the same person produces on a cold day.

(5)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for Question 6 = 15 marks)

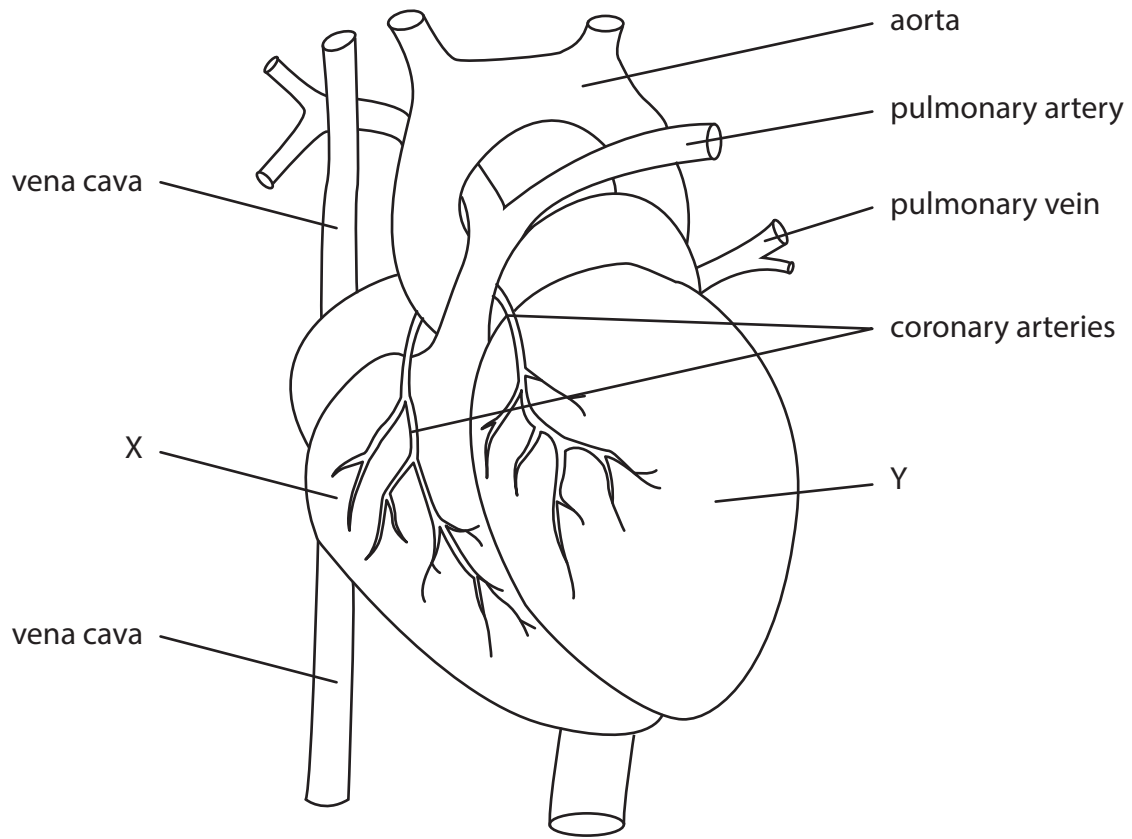
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



7 The diagram shows the heart as seen from the front.



(a) The vena cava carries deoxygenated blood.

Name a different blood vessel, shown on the diagram, that also carries deoxygenated blood.

(1)



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(b) Blood chambers X and Y have walls that are different in thickness.

Explain this difference.

(5)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(c) The coronary arteries can become blocked.

Explain the effect of this blockage on the functioning of the heart.

(3)

.....

.....

.....

.....

.....

.....

.....

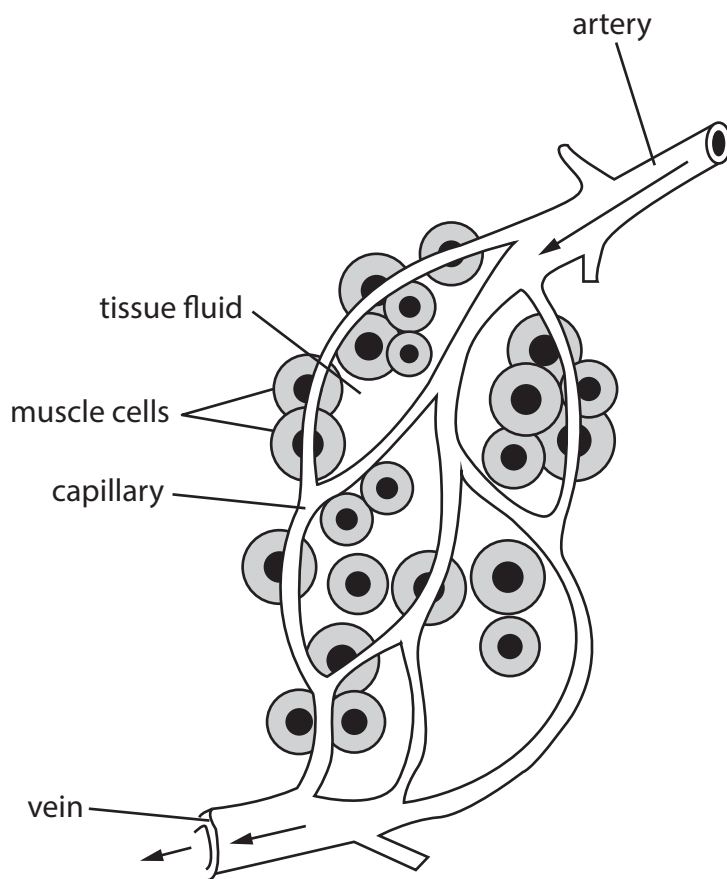
.....

.....

.....



(d) The diagram shows a capillary bed.



Use the diagram to explain the function of the tissue fluid.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

**(Total for Question 7 = 12 marks)**

**TOTAL FOR PAPER = 90 MARKS**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

