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Please check the examination details below before entering your candidate inf ation

Candidate surname | Other names

Centre Number | Candidate Numb

Pearson Edexcel International GCSE (9–1)

Time 1 hour 45 minutes

Paper reference **4HB1/01**

Human Biology

UNIT: 4HB1
PAPER: 01

You must have:
Ruler
Calculator

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.
- 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 ☒.

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.
- Good luck with your examination.

Turn over ▶

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Answer ALL questions.

1 The enzyme catalase is found in the liver.

Catalase acts as a catalyst when added to hydrogen peroxide solution, causing the solution to break down into water and oxygen.

A student investigates the increase in the rate of breakdown of hydrogen peroxide into water and oxygen using catalase.

This is the student's method.

- put 100 g of liver into 100 cm^3 of water, and mix into a smooth paste
- put 10 cm^3 of the paste into a beaker at room temperature
- add one drop of hydrogen peroxide to the paste
- assess how many oxygen bubbles are produced on a scale of 0 to 5, with 5 representing most bubbles and 0 representing no bubbles

The student repeats the investigation using different conditions.

The conditions he uses are:

- liver paste heated to 70 °C
- liver paste that has been kept at 3 °C for an hour
- acidified liver paste
- liver paste with an alkali added
- liver paste with no hydrogen peroxide added

These are the student's results.

room temperature = 5 heated to 70 °C = 0

kept at 3 °C = 1 acid added = 2 alkali added = 3

no hydrogen peroxide added = 0

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(a) (i) Give the student's results in the form of a suitable table.

3)

(ii) State why this investigation is not reliable.

(1)

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(iii) Give a reason why the results of this investigation are not accurate.

(1)

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(iv) Describe how the investigation could be improved so that the conclusions could be more accurate and reliable.

(3)

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(b) (i) State the condition where the enzyme was most active.

(1)

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(ii) State the reason for including the beaker with no hydrogen peroxide added.

(1)

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(iii) Explain the result obtained when the conditions were acidic.

(4)

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(Total for Question 1 = 14 marks)

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2 Molecules move in and out of cells by three methods.

These three methods are:

- diffusion
- active transport
- osmosis

(a) Give a definition of diffusion.

(2)

(b) Give a definition of active transport.

(3)

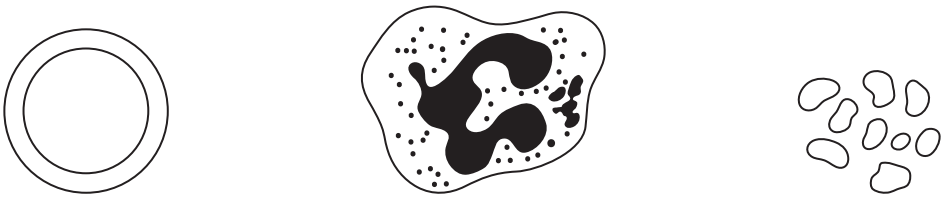
(c) Give a definition of osmosis.

(2)

(Total for Question 2 = 7 marks)

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3 The diagram shows some of the components of blood.



A **B** **C**

(a) Complete the table by giving the name of the component and its function.

Component A has been completed as an example.

(4)

Component	Name	Function
A	red blood cell	transports oxygen
B		
C		

(b) (i) Describe the process of blood clotting.

(5)

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(ii) Explain why it is important that blood clots.

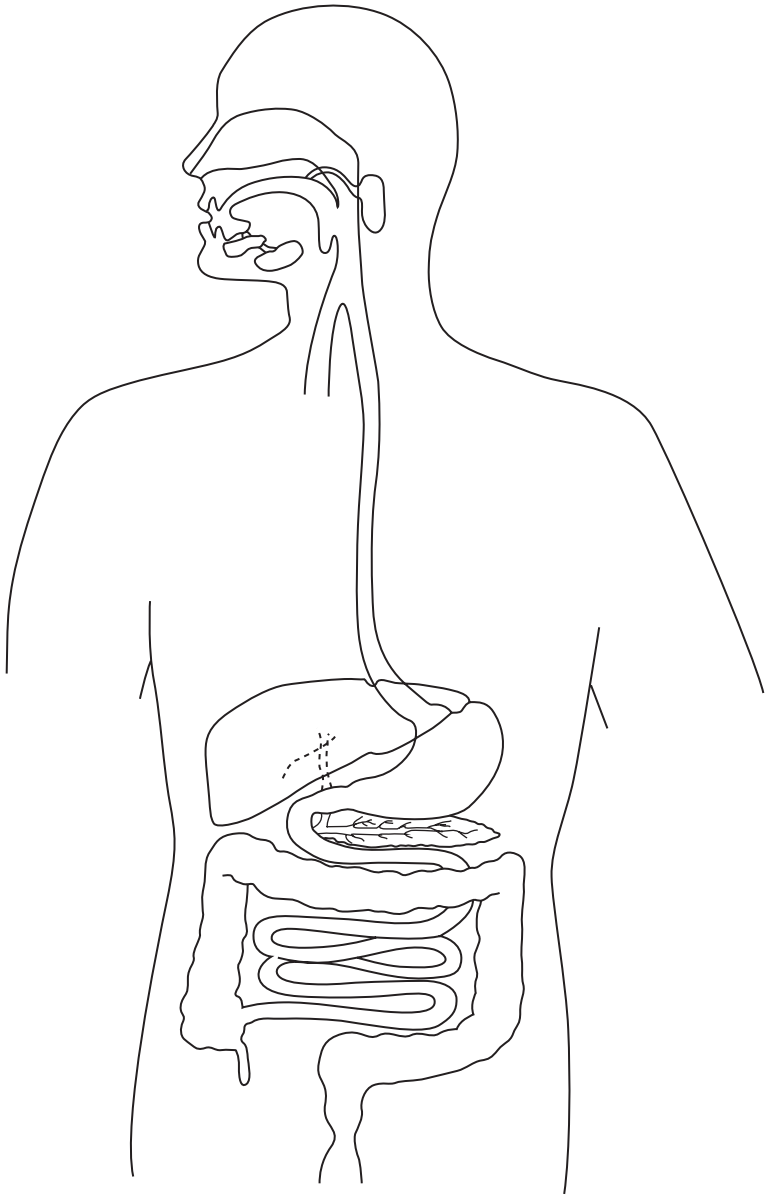
3)

(Total for Question 3 = 12 marks)

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4 The diagram shows the alimentary canal.



(a) Identify these areas of the alimentary canal using label lines and the correct letters.

(i) Label with an X the area where starch digestion begins.

(1)

(ii) Label with a Y the area that has a pH of 2

(1)

(iii) Label with a Z the area where both lipid and protein digesting enzymes are produced.

(1)

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(b) Some people have the condition known as coeliac disease. This results in the being flattened.

Explain why some people with untreated coeliac disease will eventually develop osteoporosis.

(4)

(c) Another condition of the alimentary canal is colon cancer. This is often treated by removal of the large intestine.

Explain why people who have this treatment often suffer from dehydration.

(2)

(Total for Question 4 = 9 marks)

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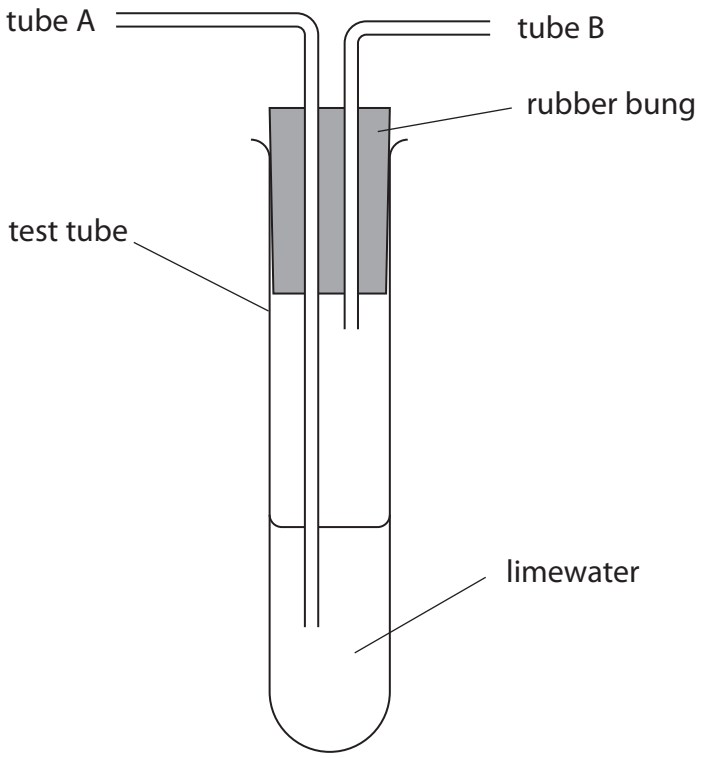
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5 The amount of carbon dioxide in inhaled air is different from the amount of carbo oxide in exhaled air.

The diagram shows a piece of apparatus that can be used to investigate this difference.



(a) (i) Describe how this apparatus should be used to compare the amount of carbon dioxide in inhaled and exhaled air.

(4)

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(ii) Explain the difference expected between the results.

3)

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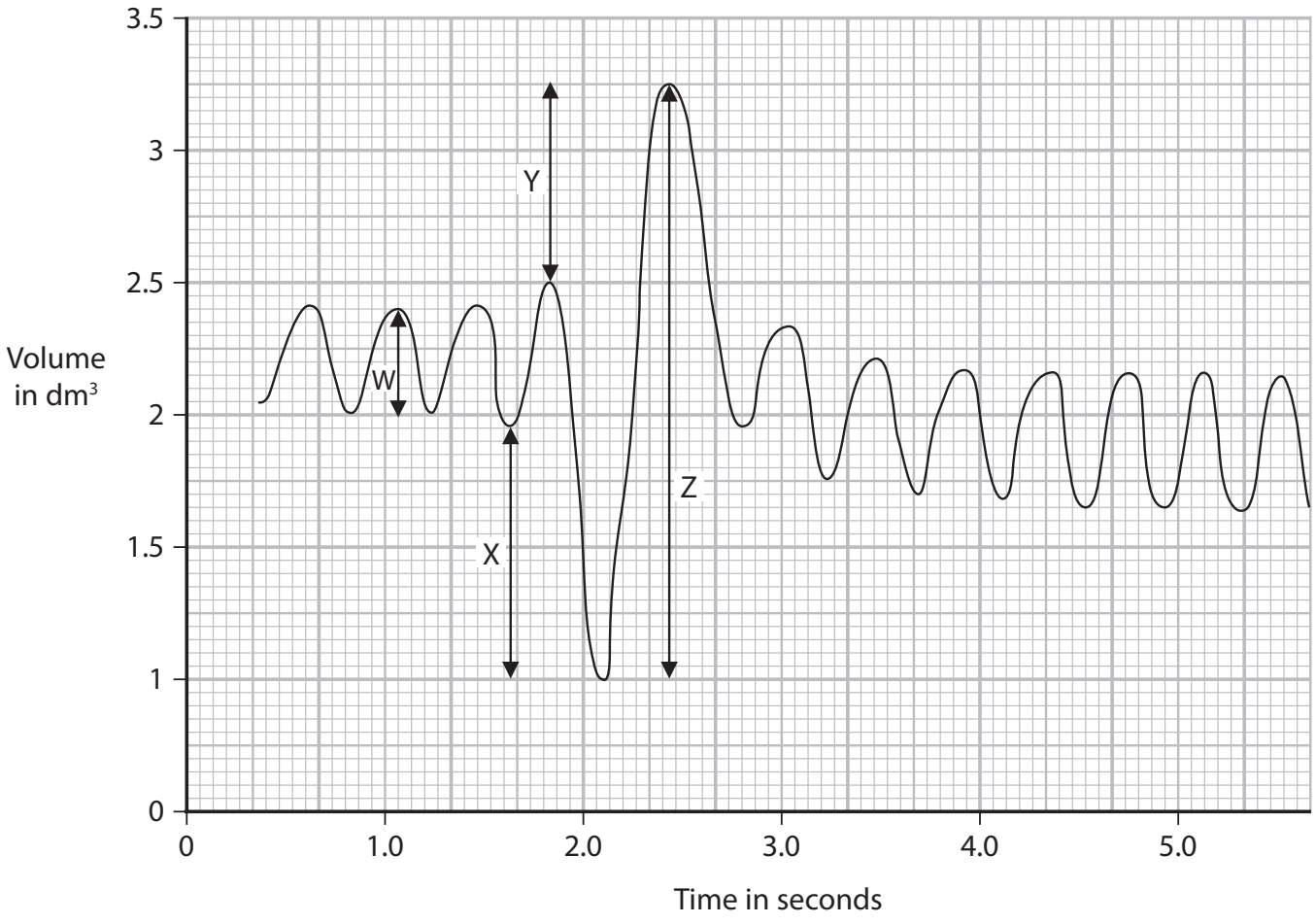
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(b) The movement of air in and out of the lungs can be measured using a spirometer.

The diagram shows a trace produced by a spirometer.



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(i) Complete the table using the correct letters from the trace to show the tid volume, the vital capacity and the volume of air in each case.

Lung volume	Letter	Volume in dm^3
tidal volume		
vital capacity		

(ii) Explain the pattern of breathing occurring to give lung volume Z.

(2)

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(Total for Question 5 = 13 marks)

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6 A form of skin cancer called melanoma has been increasing in both males and fe s.



(a) (i) Describe the trends shown by the graph.

(3)

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(ii) Suggest why cancer can occur in the skin.

2)

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(b) (i) Calculate the mean increase in the number of melanoma cases per 100 000 males per year between 1970 and 1995.

(3)

mean increase per 100 000 males per year = ...

(ii) In 1970, the population of this area of the world was 7 million.

Calculate the number of females who had melanoma.

(3)

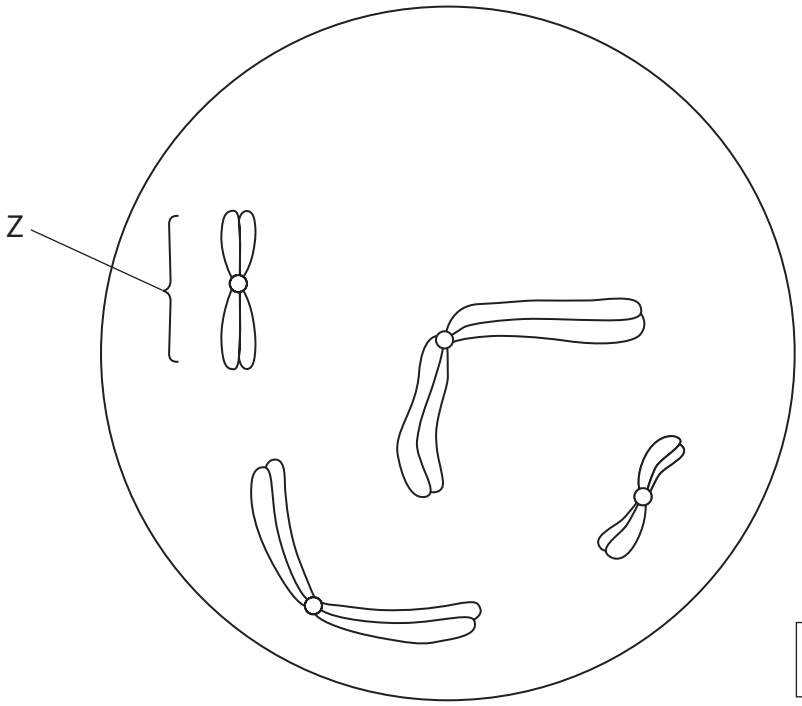
number of females with melanoma = ...

(Total for Question 6 = 11 marks)

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7 The diagram shows a cell in early stages of mitosis.



(a) The four stages of mitosis are:

- anaphase
- metaphase
- prophase
- telophase

(i) Give these stages in the correct order.

(2)

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(ii) Draw a diagram of the cell as it would appear at metaphase.

(3)

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(b) (i) Which one of these molecules would be found in structure Z?

1)

- ☒ **A** DNA
- ☒ **B** mRNA
- ☒ **C** tRNA
- ☒ **D** ribose sugar

(ii) Calculate the length of structure Z in micrometres.

[1 micrometre = 1×10^{-6} m]

(3)

length of structure Z = ... micrometres

(c) Describe what is produced when a cell undergoes mitosis.

(2)

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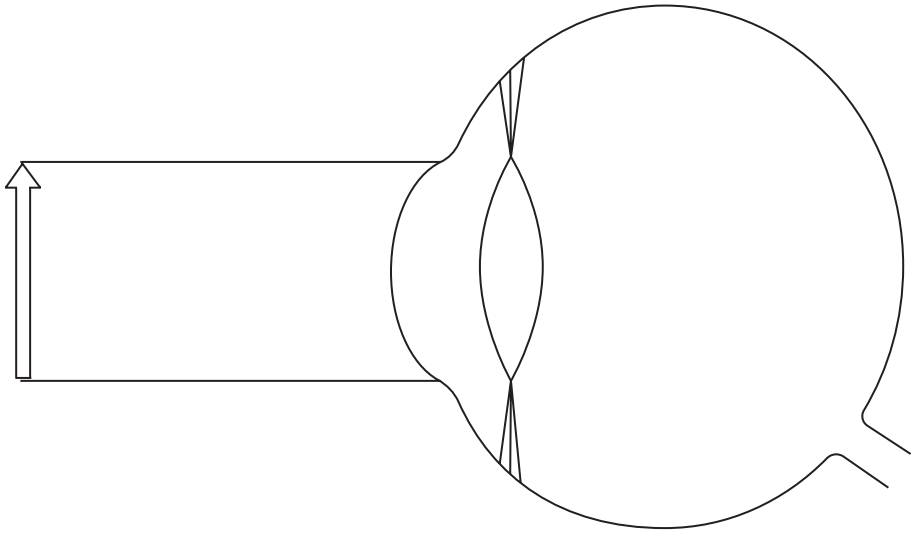
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(Total for Question 7 = 11 marks)

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8 The diagram shows a section through the eye.

The arrow is a near object.



(a) (i) Complete the diagram by continuing the rays from the arrow to show how the image of the arrow appears on the retina.

(5)

(ii) Describe the function of the optic nerve in allowing a person to see the image of the arrow.

(2)

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(b) (i) State where the image of the arrow would be formed for someone with the condition of long sight.

(1)

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(ii) Give a feature of the eye that can lead to long sight.

(1)

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(iii) Describe a method of treating long sight.

(2)

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(c) Corneal transplants can be used to treat eye defects.

Suggest two risks associated with corneal transplants.

(2)

1 .....

2 .....

(Total for Question 8 = 13 marks)

TOTAL FOR PAPER = 90 MARKS

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