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Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International GCSE

Wednesday 30 October 2024

Morning (Time: 1 hour 45 minutes)

Paper reference **4HB1/01**

Human Biology

UNIT: 4HB1
PAPER: 01

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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Answer ALL questions.

1 The table gives some body processes.
Each substance or structure listed in the box is responsible for a body process.

Use information from the box to complete the table.

ADH adrenaline cerebellum cerebrum cochlea haemoglobin liver semicircular canals stomach thyroxine

Body processes	Substance or structure responsible
regulation of water levels in the blood	
conscious thought	
transport of oxygen	
urea formation	
control of metabolic rate	
detection of body position	
reduction of blood flow to the gut	

(Total for Question 1 = 7 marks)

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2 A student investigates the activity of an enzyme on fat found in milk.
This is the student's method.

- pour milk and enzyme solution into a test tube
- determine the pH of the solution every minute for 10 minutes

The table shows the student's results.

Time in minutes	pH of solution
1	6.8
2	6.4
3	6.0
4	5.8
5	5.6
6	5.2
7	5.0
8	4.8
9	4.6
10	4.6

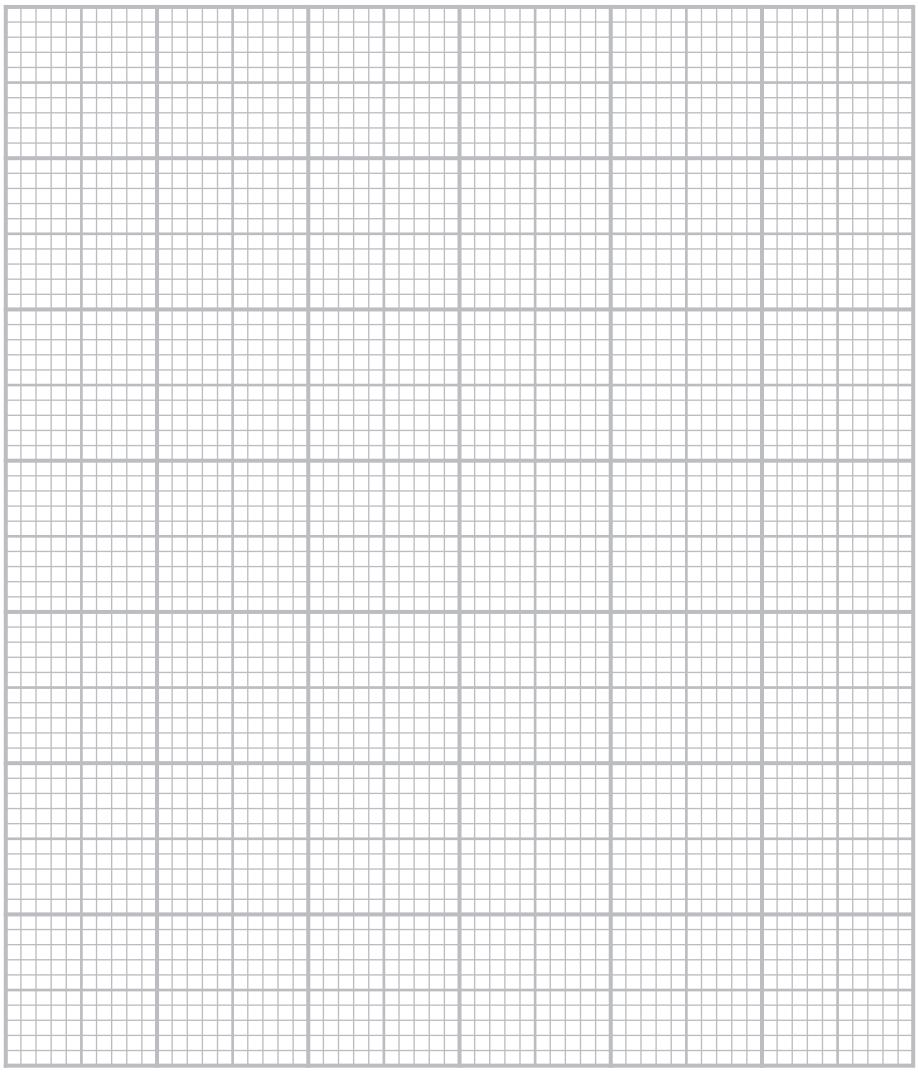
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(a) (i) Plot a graph of the student's results.

(3)



(ii) Draw a line of best fit.

(1)

(iii) Give the trend shown by the graph.

(1)

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(b) Explain the difference in the pH at 1 minute and the pH at 10 minutes.

(3)

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(c) Name the independent variable in this investigation.

(1)

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(d) Give two variables that the student should control in this investigation.

(2)

1 .....

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2 .....

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(e) State how the student could improve the reliability of their results.

(1)

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(Total for Question 2 = 12 marks)

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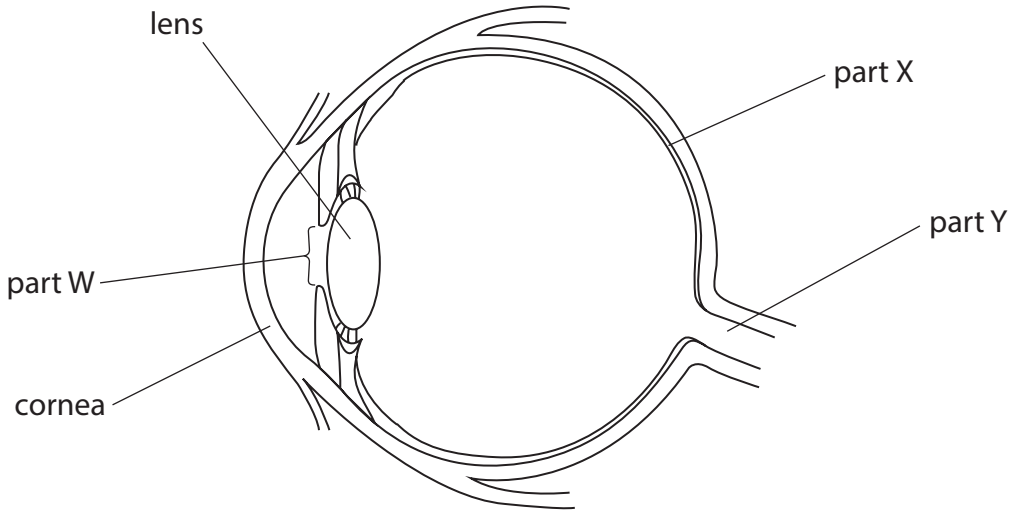
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3 (a) The diagram shows the human eye.



(i) Name part W and part X.

(2)

W .....

X .....

(ii) Describe the function of part Y.

(2)

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(iii) Explain the change in the shape of the lens when the eye views a distant object.

(2)

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(iv) Describe how corneal transplants help to restore normal vision for people with corneal disease.

(2)

(b) The iris reflex controls the amount of light entering the eye.

Describe a method that could be used to investigate how the eye responds to different light intensities.

(4)

(Total for Question 3 = 12 marks)

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4 Carbohydrates are large molecules found in many body cells.

(a) Glycogen is a carbohydrate.

(i) Describe how the liver produces glycogen.

(2)

(ii) Name the hormone that stimulates the liver to produce glycogen.

(1)

(iii) Name a hormone that stimulates the liver to increase blood sugar levels.

(1)

(b) Consuming a diet high in carbohydrates can increase the BMI of a person.

The table gives information on the BMI categories of individuals.

BMI	Category
less than 18.5	underweight
18.5 to 24.9	healthy weight
25 to 29.9	overweight
30 to 34.9	obese
35 to 39.9	severely obese
more than 39.9	morbidly obese

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(i) A person has a height of 1.69 m and a mass of 67.0 kg.

Calculate the BMI of this person.

(2)

BMI .....

(ii) Give the BMI category of this person.

(1)

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(c) Obesity is a risk factor for heart disease.

Explain how obesity can cause heart disease.

(2)

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(Total for Question 4 = 9 marks)

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5 (a) The table gives information about some blood components in three people.

Blood component	Healthy person number per cm^3	Person A number per cm^3	Person B number per cm^3
white blood cells	7500	13 750	7250
red blood cells	5.0×10^6	5.0×10^6	5.0×10^6
platelets	3.0×10^5	3.0×10^5	0.8×10^5

(i) Calculate the ratio of the number of white blood cells in the healthy person compared with the number of white blood cells in person A.
Write your answer in the form of 1 : n

(2)

1 : .....

(ii) Explain a possible reason for the difference in the number of white blood cells in the healthy person and person A.

(2)

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(iii) Describe the effect that the lower number of platelets per cm^3 would have on the health of person B.

(2)

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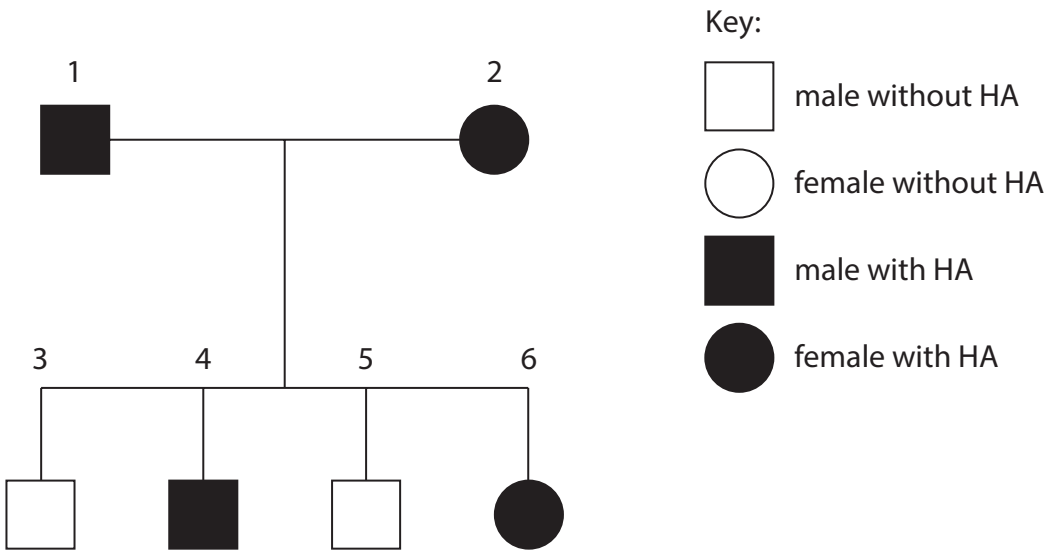
(b) (i) Haemolytic anaemia (HA) is an inherited condition.
People with this condition have a low number of red blood cells in their blood.

Explain one symptom that people with HA will have.

(4)

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(ii) The diagram shows the inheritance of HA in one family.



Explain how HA is inherited.

(4)

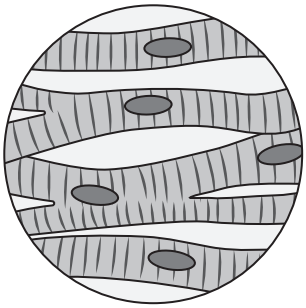
(Total for Question 5 = 14 marks)

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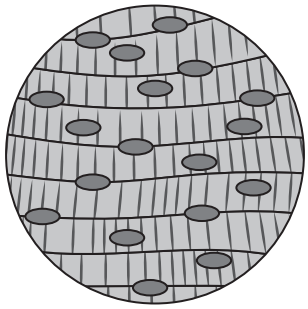
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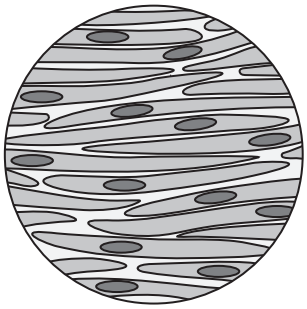
6 (a) The diagram shows three types of muscle tissue.



cardiac muscle



voluntary muscle



involuntary muscle

(Source: © udaix/Shutterstock)

(i) Describe the structure of each type of muscle tissue.

(6)

cardiac

voluntary

involuntary

(ii) Give one structure of the human body where involuntary muscle tissue is found.

(1)

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(b) Magnetic resonance imaging (MRI) can be used to measure the percentage muscle mass of an individual.

In one year, 20 female athletes had their percentage muscle mass measured using MRI.

These are the results.

74%	75%	70%	82%	74%	74%	78%	82%	70%	82%
78%	74%	82%	78%	82%	75%	84%	72%	82%	72%

(i) Calculate the mean percentage muscle mass.

(2)

mean percentage muscle mass = ...%

(ii) Draw a frequency table to show the number of each percentage muscle mass recorded for the female athletes.

(3)

(iii) Determine the mode of these percentage muscle masses.

(1)

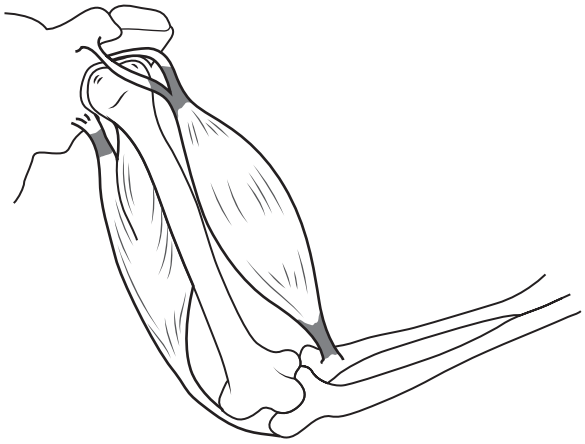
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(c) The diagram shows two muscles in the arm.



Explain how these muscles help to raise the forearm.

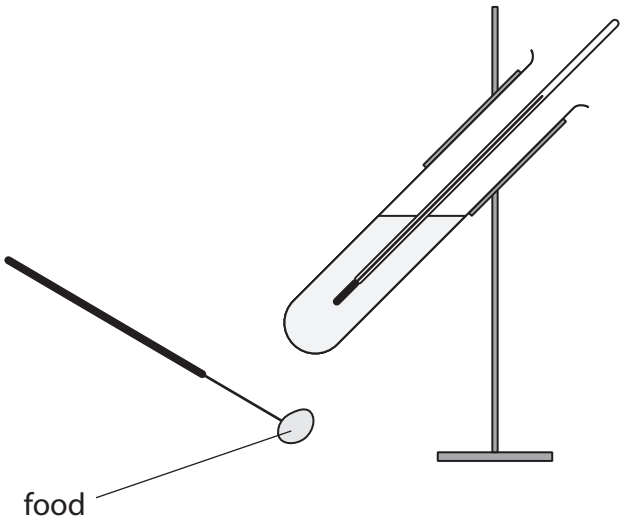
(4)

(Total for Question 6 = 17 marks)

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7 In a healthy person, the amount of energy in the daily diet should equal the amount of energy used by the body.

(a) The equipment shown can be used to measure the amount of energy in food.



Describe how this equipment could be used to compare the energy content of different foods.

(6)

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(b) Describe a named method of transport that uses energy to move molecules across a cell membrane.

(2)

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(Total for Question 7 = 8 marks)

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8 Body cells are surrounded by tissue fluid.

(a) Describe the function of tissue fluid.

(2)

(b) Explain how tissue fluid is formed.

(4)

(c) Some people have a condition called cellular oedema.

In these people too much water enters body cells.

Explain how water can enter body cells from the surrounding tissue fluid.

(3)

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(d) Suggest the effect that cellular oedema has on body cells.

(2)

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(Total for Question 8 = 11 marks)

TOTAL FOR PAPER = 90 MARKS

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