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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 (9–1)

Tuesday 14 May 2024

Afternoon (Time: 1 hour 45 minutes)

Paper reference **4HB1/01R**

Human Biology

UNIT: 4HB1
PAPER: 01R

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 ▶

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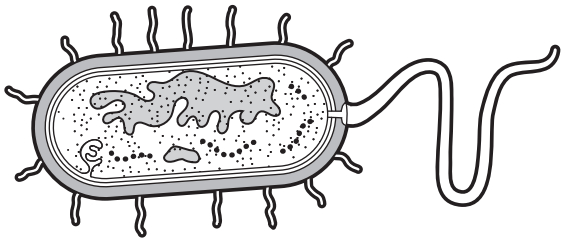
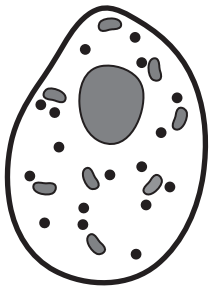
Answer ALL questions. Write your answers in the spaces provided.

1 (a) The diagrams show a bacterial cell and a human skin cell.



Bacterial cell



Human skin cell

(i) Give **two** similarities between the bacterial cell and the human skin cell.

(2)

1 .....

.....

2 .....

.....

(ii) Give **two** differences between the bacterial cell and the human skin cell.

(2)

1 .....

.....

2 .....

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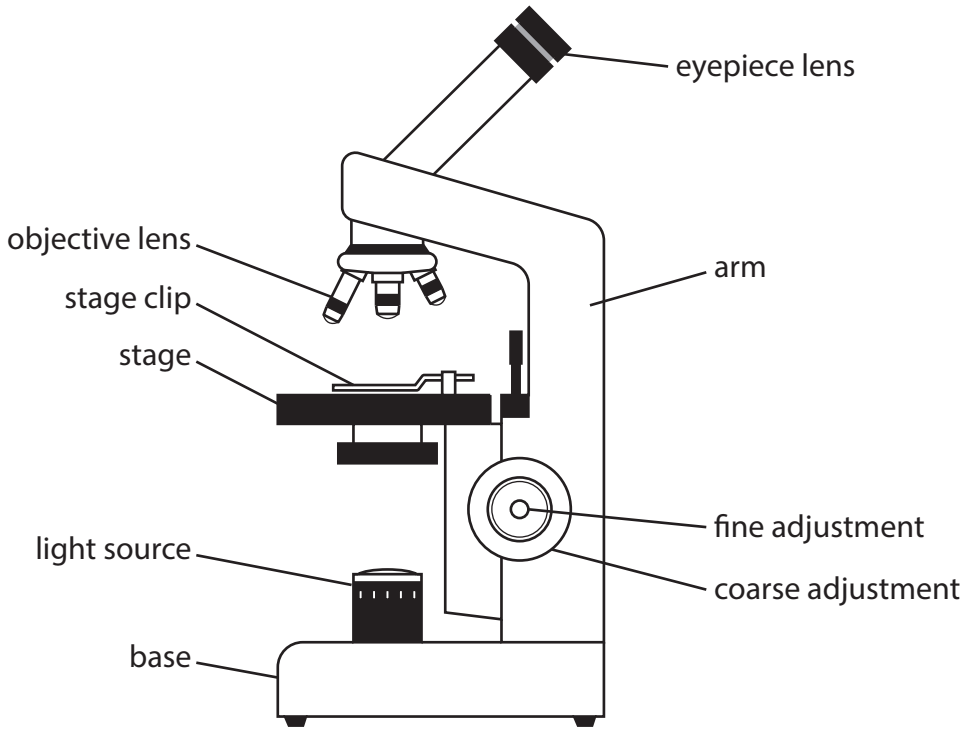
(b) Many structures in cells can be viewed more clearly using a light microscope.

The diagram shows a light microscope.



(i) Draw **one** straight line from each part of the light microscope to its function.

(3)

Part of microscope	**Function**
objective lens	holds the microscope slide in place
stage clip	moves the stage to produce a clear, focused image
fine adjustment	magnifies the sample
	keeps the microscope steady

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(ii) The image size of a bacterial cell viewed using an electron microscope is 5.0 cm.

The bacterial cell has been magnified 50 000 times.

Calculate the actual size of this bacterial cell in mm.

image size = actual size × magnification

(3)

actual size of bacterial cell = ... mm

(Total for Question 1 = 10 marks)

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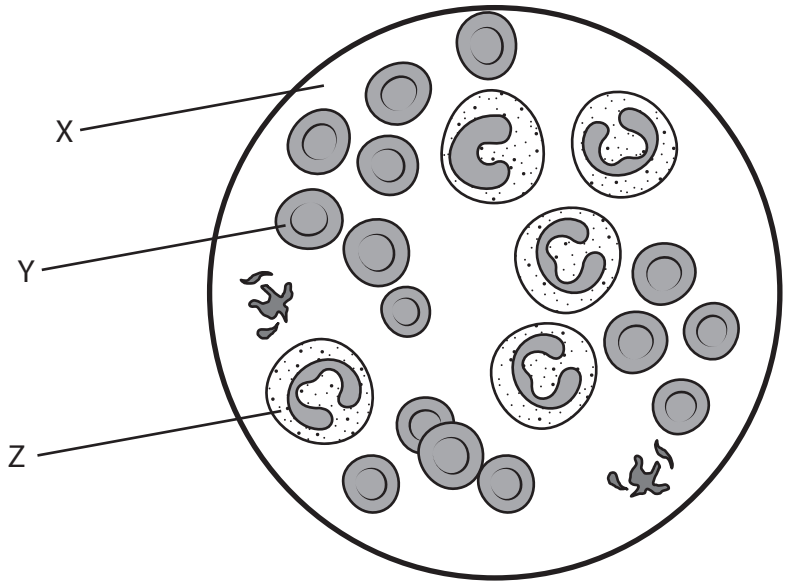
2 (a) The diagram shows components, X, Y and Z, in a sample of human blood.



(i) Name components X, Y and Z.

(3)

X .....

Y .....

Z .....

(ii) Describe the function of component Y.

(2)

.....

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.....

.....

(iii) A sample of blood from a patient is analysed in a hospital.

A scientist finds that the number of component Z in the blood sample is higher than normal.

State a possible reason for the increase in the number of component Z.

(1)

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(b) Blood is transported around the body inside blood vessels.

Draw **one** straight line from each blood vessel to a feature of the blood vessel.

(2)

Blood vessel	Feature of blood vessel
artery	contains valves to prevent backflow of blood
vein	has muscular walls to maintain high blood pressure
capillary	has thin walls for exchange of materials

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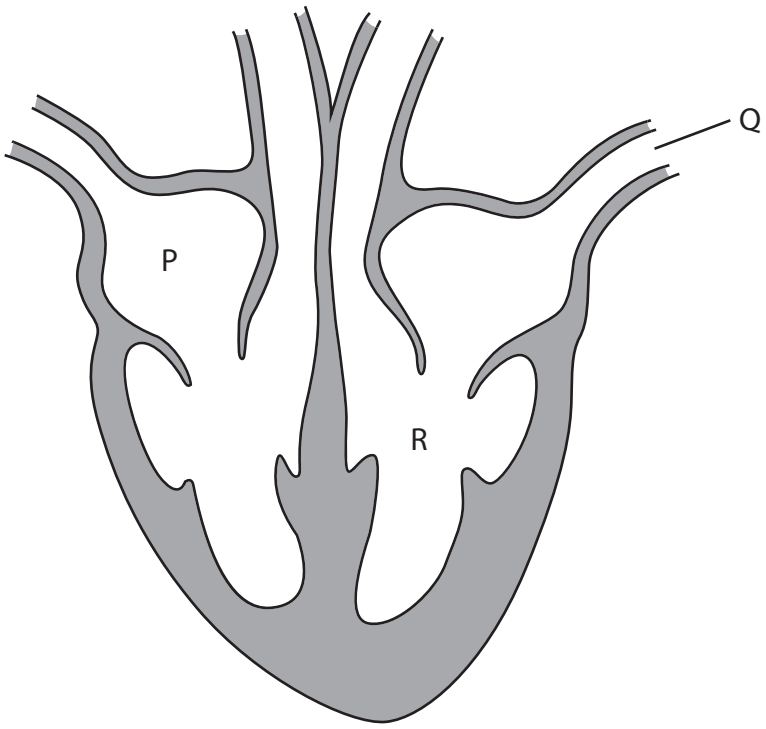
(c) The heart pumps blood around the body.

The diagram shows a human heart.



(i) The heart is divided into two halves.

Each half is divided into two chambers.

Name chamber R.

(1)

(ii) Describe the route that the blood travels from part P to part Q.

(4)

(Total for Question 2 = 13 marks)

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3 (a) The table gives the recommended daily dietary intake for different groups of males and females.

Group	Energy in kJ	Protein in g	Vitamin A in mg	Vitamin C in mg	Iron in mg
MALES					
15 to 18 years old	12 600	59	0.9	50	12
25 to 50 years old	12 200	63	0.9	60	10
FEMALES					
15 to 18 years old	9200	46	0.7	50	15
25 to 50 years old	9200	50	0.7	60	15

(i) Describe what is meant by a balanced diet.

(2)

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(ii) Explain the difference between the amount of energy needed by males compared with females in the age range 25 to 50 years.

Use data from the table to help your answer.

(3)

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(iii) Explain why females in the age range 25 to 50 years need more iron in their diet than males in the same age range.

(2)

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(iv) State a nutrient, shown in the table, that can help to reduce night blindness.

(1)

.....

(v) Red meat and some green vegetables are good sources of iron.

100 g of red meat contains 2.5 mg of iron.

100 g of broccoli contains 0.70 mg of iron.

A male in the age range 15 to 18 years eats 250 g of red meat and 200 g of broccoli in one meal.

Calculate the extra mass, in mg, of iron the male needs to eat to meet his recommended daily dietary intake of iron.

(4)

extra mass = ... mg

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(b) In the 19th century more than two million sailors on long ocean voyages died from a nutritional disease called scurvy.

(i) Give a symptom of scurvy.

(1)

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(ii) Suggest why scurvy is an uncommon nutritional disease in the modern world.

(1)

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(Total for Question 3 = 14 marks)

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4 (a) The table gives information on how the time taken to digest starch by an enzyme varies at different pH levels.

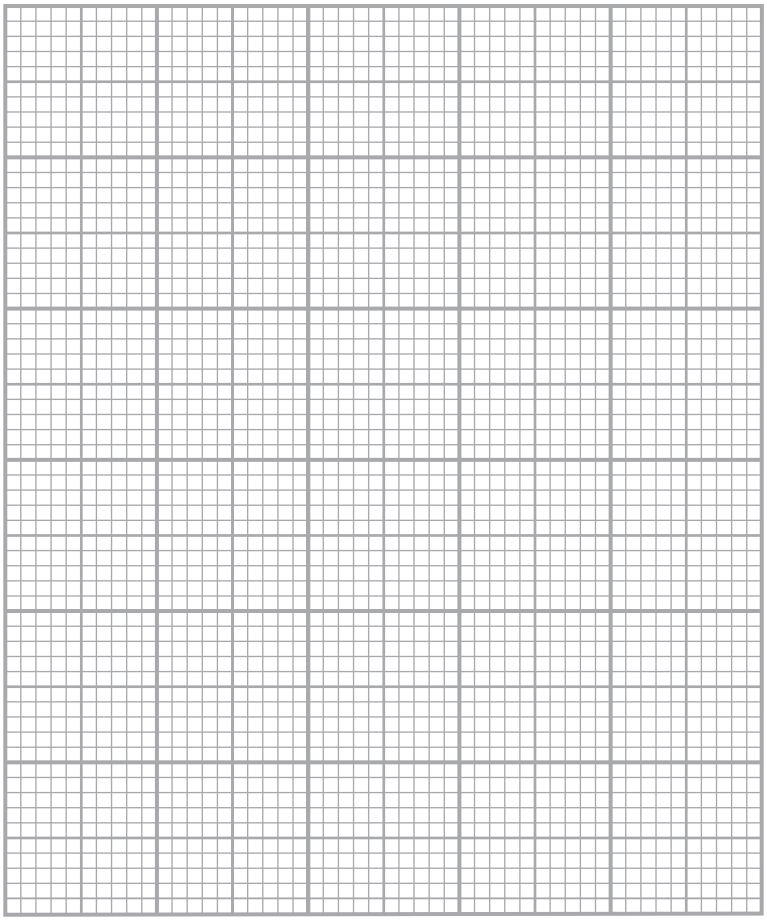
pH	Time taken to digest starch in minutes
2	60
4	45
6	20
8	35
10	55

(i) Plot a graph using the data in the table.

(3)

(ii) Draw a curve of best fit.

(1)



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(iii) Use the graph to determine the optimum pH for the digestion of starch.

(1)

(iv) Describe the trend shown by the graph.

(2)

(v) Explain why the time taken to digest starch is different at pH 2 compared with the time taken at pH 6.

(3)

(vi) Name a part of the body where starch digestion takes place.

(1)

(b) Describe a test for starch in a sample of food.

(2)

(Total for Question 4 = 13 marks)

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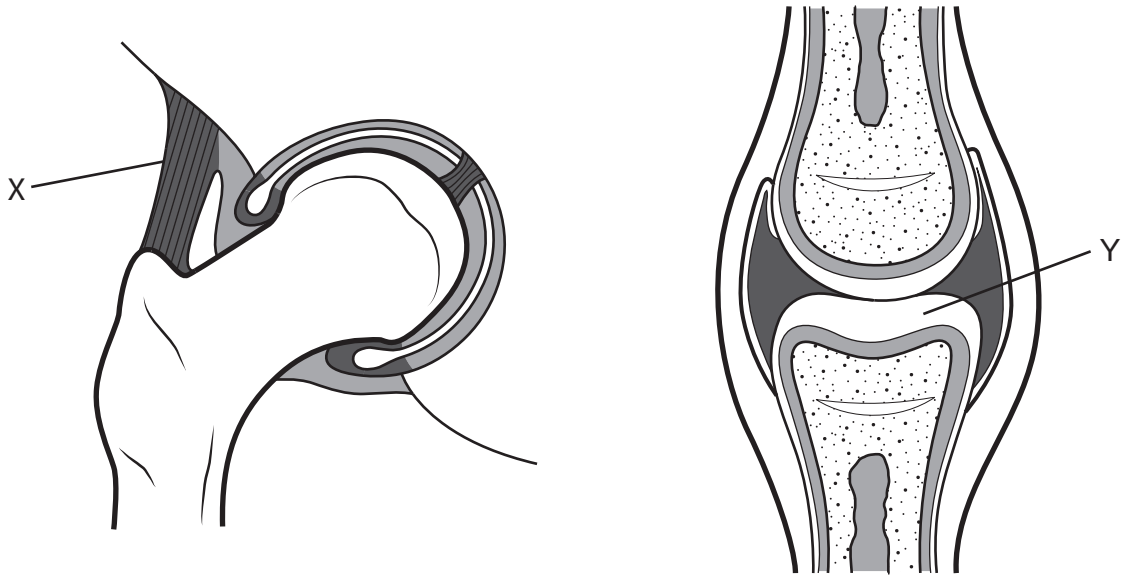
5 The diagram shows two different types of synovial joint in the human body.



Joint A Joint B

(a) (i) Name the type of joint shown by joint A and by joint B.

(2)

joint A

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joint B

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(ii) Describe the range of movement of joint A compared with the range of movement of joint B.

(2)

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(b) Part X and part Y play an important role in the function of the joint.

(i) Give the role of part X.

(1)

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(ii) Give the role of part Y.

(1)

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.....

(Total for Question 5 = 6 marks)

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6 (a) The table gives the names and functions of hormones in the menstrual cycle.

Complete the table by placing one tick (✓) in each row of the table to show the main function of each hormone in the menstrual cycle.

(3)

Hormone	Function of hormone			
	causes ovulation	builds up uterus lining after menstruation	maintains uterus lining during pregnancy	stimulates a follicle to mature
progesterone				
FSH				
oestrogen				

(b) The chance of pregnancy can be decreased by using contraception.

State **one** method of barrier contraception.

(1)

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(c) In-vitro fertilisation (IVF) can be used to increase the chances of pregnancy.

Describe the process of IVF.

(4)

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(d) Many mothers decide to breastfeed their new-born baby.

Describe the advantages of breastfeeding.

(2)

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(Total for Question 6 = 10 marks)

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7 (a) The nervous system sends electrical impulses to parts of the body in response to an external stimulus.

(i) Name the structure in the nervous system that detects an external stimulus.

(1)

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(ii) Name the structure that transmits electrical impulses directly to the central nervous system.

(1)

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(b) Neurones are specialised cells.

(i) Describe what is meant by a specialised cell.

(2)

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(ii) A motor neurone is a specialised cell.

Draw a diagram of a motor neurone.

Your diagram should include these labels.

- nucleus
- cell body
- myelin sheath

(4)

(iii) Describe the function of a motor neurone in the nervous system.

(2)

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(c) Neurotransmitters allow different neurones to communicate with each other.

The distance between two neurones is 100 nm.

Neurotransmitters diffuse across the gap between neurones at a speed of 4.0×10^6 nm/s.

Calculate the time taken, in milliseconds, for a neurotransmitter to cross the gap between two neurones.

Give your answer in standard form.

(4)

time taken = ... ms

(Total for Question 7 = 14 marks)

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8 (a) Cholera is a disease that kills approximately 95 000 people each year worldwide.

(i) Name the type of pathogen that causes cholera.

(1)

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(ii) State how cholera is transmitted from one person to another.

(1)

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(b) Describe a method used to treat a person with cholera.

(3)

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(Total for Question 8 = 5 marks)

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9 Explain the role of ADH in osmoregulation.

(5)

(Total for Question 9 = 5 marks)

TOTAL FOR PAPER = 90 MARKS

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