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)

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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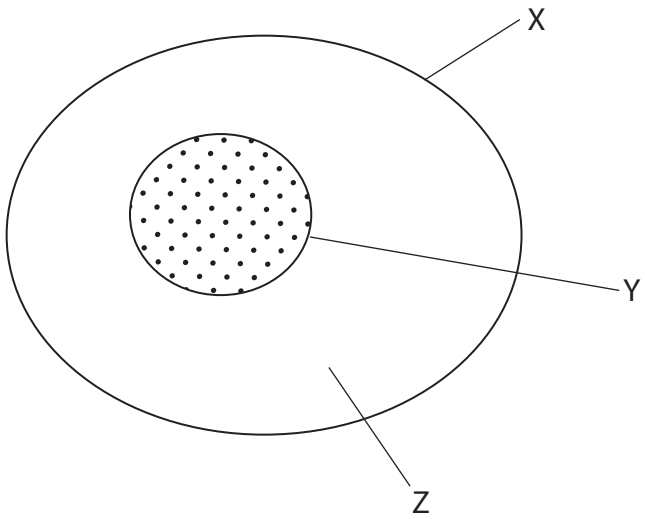
Q:1/1/1/

P 7 0 9 4 9 A 0 1 2 4

Pearson

Answer ALL questions.

1 (a) The diagram shows a human body cell.



(i) Name the parts X, Y and Z.

(3)

X .....

Y .....

Z .....

(ii) Name one structure in the cell that is not shown in the diagram.

(1)

.....

(iii) Explain how body cells are organised to form organs.

(2)

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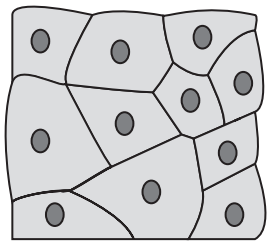
(b) The boxes list three processes that transport substances in and out of cells.

Complete the diagram by drawing one straight line from each process to its correct definition.

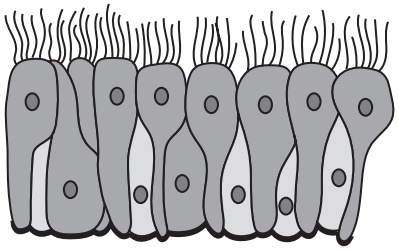
(3)

Process	Definition
osmosis	requires energy to move molecules against a concentration gradient
diffusion	water moves from a high water potential to a low water potential
active transport	water moves from a low water potential to a high water potential
	molecules move down a concentration gradient

(c) (i) The diagram shows two types of epithelial tissue, A and B.



Tissue A



Tissue B

(Source: © Timonina/Shutterstock)

Give the name of each type of epithelial tissue.

(2)

A .....

B .....

(ii) An epithelial cell has an actual width of 60 micrometres (μm).

The cell is magnified 40 times.

Calculate the image width of this cell in mm.

[1 mm = 1000 μm]

(3)

image width = ... mm

(Total for Question 1 = 14 marks)

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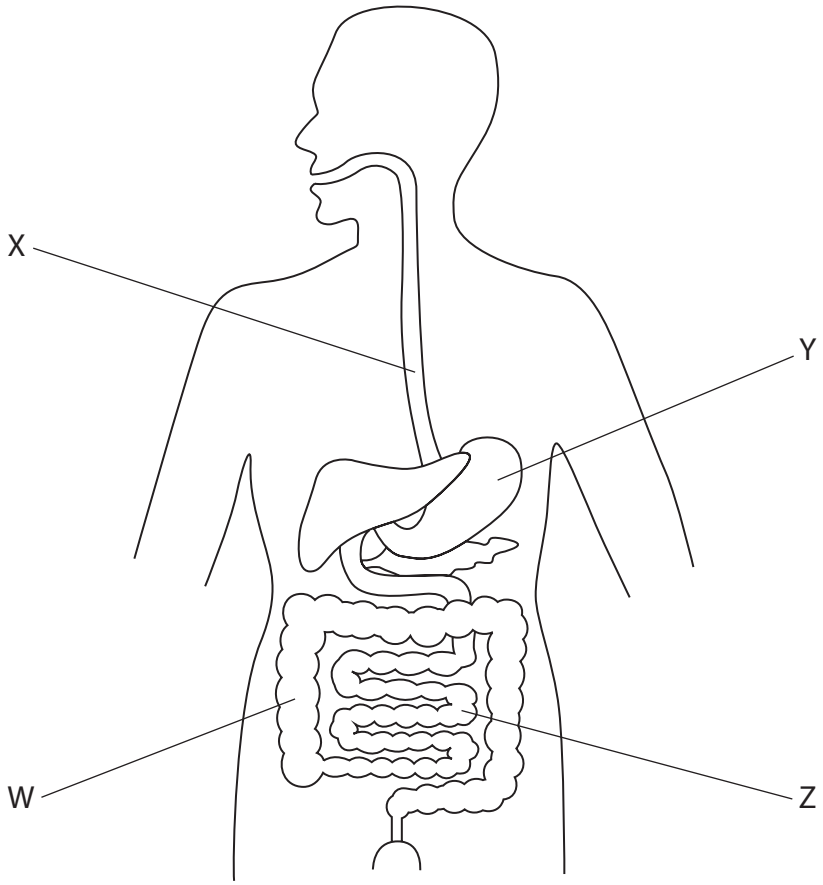
2 (a) The diagram shows the human digestive system.



(i) Name the structures labelled W, X, Y and Z.

(4)

W .....

X .....

Y .....

Z .....

(ii) The box gives words used to describe how food is moved through structure X towards structure Y.

relax	coordination	contract	liquid
peristalsis	muscles	enzymes	bolus

Use words from the box to complete the passage.

(4)

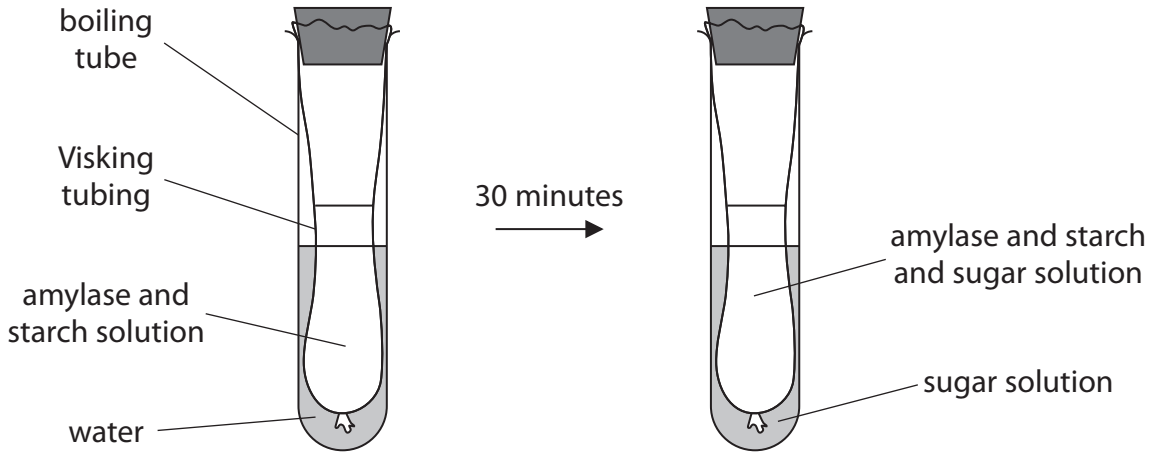
Food forms a ..... at the back of the mouth.

The food is swallowed and passes into structure X. The walls of structure X contain .....

which ..... to push the food towards structure Y.

This process is known as ..... .

(b) The diagram shows some apparatus used to investigate the effect of an enzyme called amylase on starch.



(i) Name one area in the digestion system where amylase is produced.

(1)

.....

(ii) Name the structure in the digestive system that the Visking tubing represents.

(1)

.....

(iii) Explain the results of the investigation after 30 minutes.

(2)

.....

.....

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.....

(iv) Name the chemical used to test for sugar in the water surrounding the Visking tubing after 30 minutes.

(1)

.....

(v) After 30 minutes iodine solution is added to the contents of the Visking tubing.

Explain what the results of this test would show.

(2)

.....

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.....

(Total for Question 2 = 15 marks)

3 (a) In England, 3 319 266 people have diabetes.

(i) Give this value to 3 significant figures.

(1)

people with diabetes = ...

(ii) In the rest of the United Kingdom, 600 239 people have diabetes.

Give this value in standard form.

(2)

people with diabetes = ...

(iii) Diabetes can be caused by the inability of an organ to produce insulin.

Name the organ that produces insulin.

(1)

.....

(b) The body mass index (BMI) is a measure that uses height and body mass to work out if the body mass is healthy.

The table shows the BMI values and the categories into which a person can be placed.

BMI	BMI category
less than 18.5	underweight
18.5 to 24.9	healthy weight
25.0 to 29.9	overweight
30.0 to 39.9	obese
40.0 and over	morbidly obese

(i) Calculate the BMI of a person with a body mass of 120 kg and a height of 1.95 m.

Use the equation

$$\text{BMI} = \frac{\text{body mass}}{\text{height}^2}$$

(2)

BMI = ...

(ii) Determine the BMI category that this person belongs to.

(1)

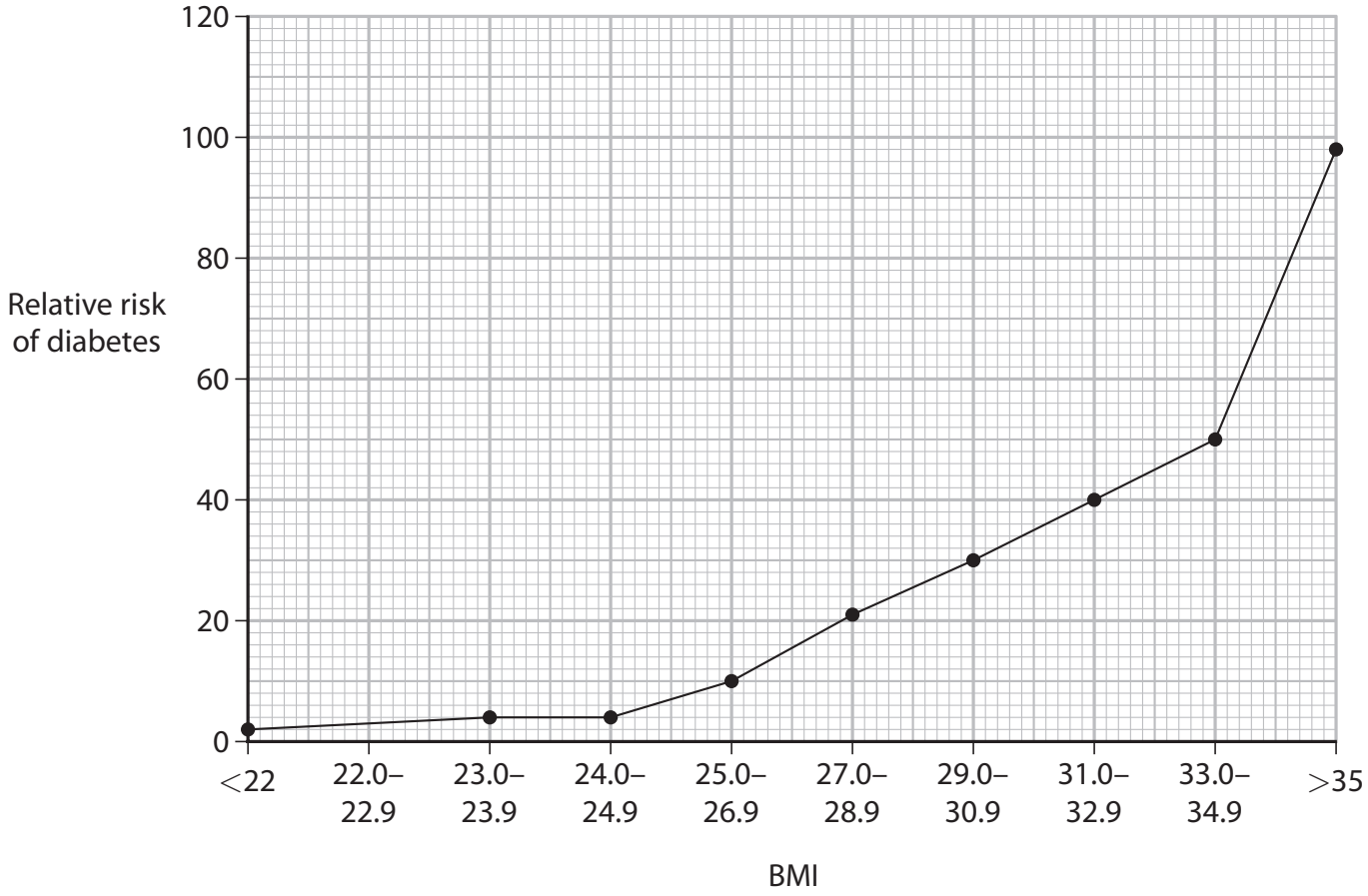
.....

.....

.....

.....

(c) The graph shows the relative risk of developing a form of diabetes called type 2 for different BMI values.



(Source: adapted from Colditz GA, et al., *Ann Intern Med*., 1995; 122:481–486)

(i) Describe the trend shown by the graph.

(2)

.....

.....

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.....

(ii) Give some dietary advice that could help an obese person lower their BMI.

(2)

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.....

(Total for Question 3 = 11 marks)

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4 (a) Lipids are digested in the small intestine.

(i) Describe a test for lipids in food.

(3)

(ii) Name the enzyme that digests lipids.

(1)

(iii) Name the products of lipid digestion.

(2)

(b) A student investigates how the pH of a lipid solution, containing an enzyme that digests lipids, changes over 10 minutes at two different temperatures.

The tables show the student's results.

Temperature at 37 °C

Time in minutes	1	2	3	4	5	6	7	8	9	10
pH	8.5	8.0	7.5	7.2	7.0	6.8	6.2	5.8	5.5	5.5

Temperature at 80 °C

Time in minutes	1	2	3	4	5	6	7	8	9	10
pH	9.2	9.0	8.8	8.8		8.6	8.6	8.4	8.4	8.4

(i) Estimate a pH value for the lipid solution at 80 °C at 5 minutes.

(1)

(ii) Give the independent variable and the dependent variable for this investigation.

(2)

independent

dependent

(iii) Explain the differences in the results of the student's investigation at the two different temperatures.

(4)

(Total for Question 4 = 13 marks)

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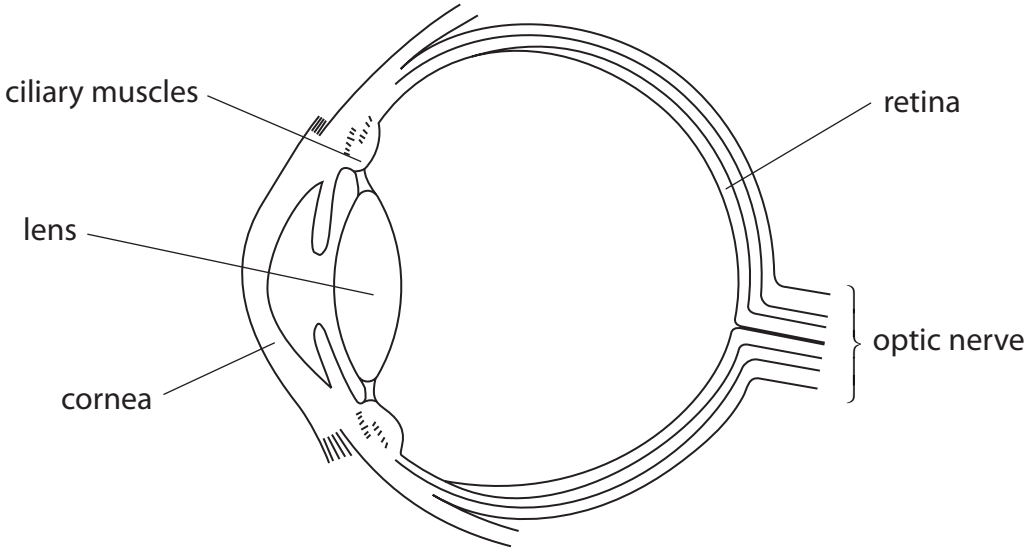
5 The table gives information about two methods of contraception.

Method	Percentage effectiveness (%)	Information
male condom	82	• worn during sexual intercourse • may slip off or tear during sexual intercourse
sterilisation	99	• surgery required • permanent method

Evaluate these two methods of contraception using information from the table and your own knowledge.

(Total for Question 5 = 5 marks)

6 The diagram shows a section through the human eye.



Describe the role of the labelled structures in seeing a clear image of an object.

(Total for Question 6 = 7 marks)

7 Cholera is a disease that causes chronic water loss from the body.

(a) Name the type of microorganism that causes cholera.

(1)

(b) Describe how cholera is transmitted from one person to another.

(2)

(c) Explain how a person with cholera can be treated for the disease.

(4)

(Total for Question 7 = 7 marks)

8 The kidneys play an important role in the excretion of toxic waste.

Some people have kidney disease which reduces the effectiveness of the kidneys.

Kidney disease can be treated by dialysis or by a transplant.

Discuss the advantages and disadvantages of each of these treatments.

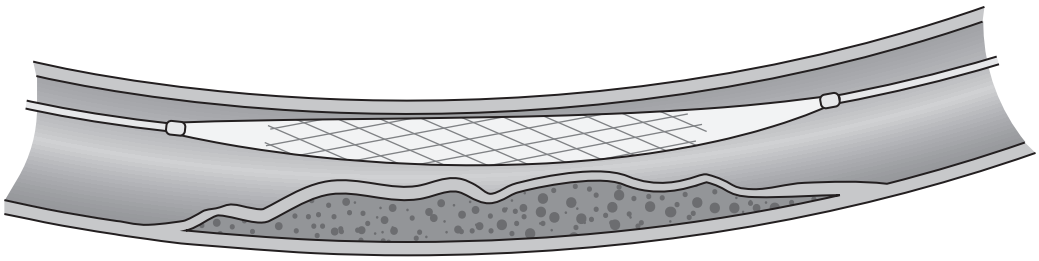
(Total for Question 8 = 5 marks)

9 (a) Statins can be used to treat people with circulatory disorders.

Design a method that can be used to test the effectiveness of statins in treating circulatory disorders.

(3)

(b) The diagram shows a stent being used in the treatment of heart disease.



(Source: © DesignPrax/Shutterstock)

Explain how a stent can be used to treat heart disease.

(4)

(Total for Question 9 = 7 marks)

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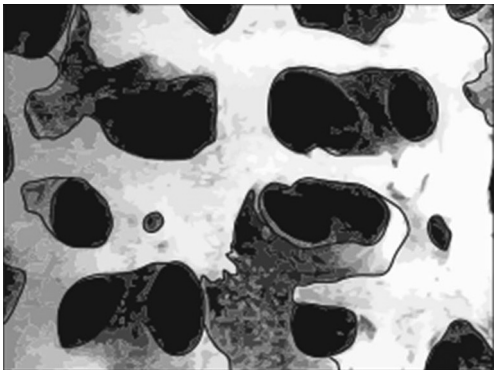
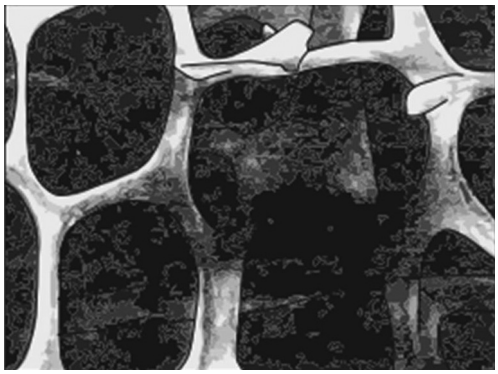
10 (a) The photographs show the structure of healthy bone and bone that is damaged by osteoporosis.



healthy bone



bone damaged by osteoporosis

Describe how osteoporosis might affect an individual.

(3)

(b) Explain how voluntary muscles and bones bring about movement in the elbow joint.

(3)

(Total for Question 10 = 6 marks)

TOTAL FOR PAPER = 90 MARKS

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