Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel International GCSE (9–1)

Centre Number | Candidate Number

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.

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Answer ALL questions.

1 The table lists four features of blood. It also shows four main components of blood.

Put a tick (✓) in a box if the component shows the feature.

(4)

Feature	Components			
	Red blood cell	**Plasma**	**Platelet**	**Phagocyte**
transports oxygen				
has a nucleus				
consists of 90% water				
involved in blood clotting				

(Total for Question 1 = 4 marks)

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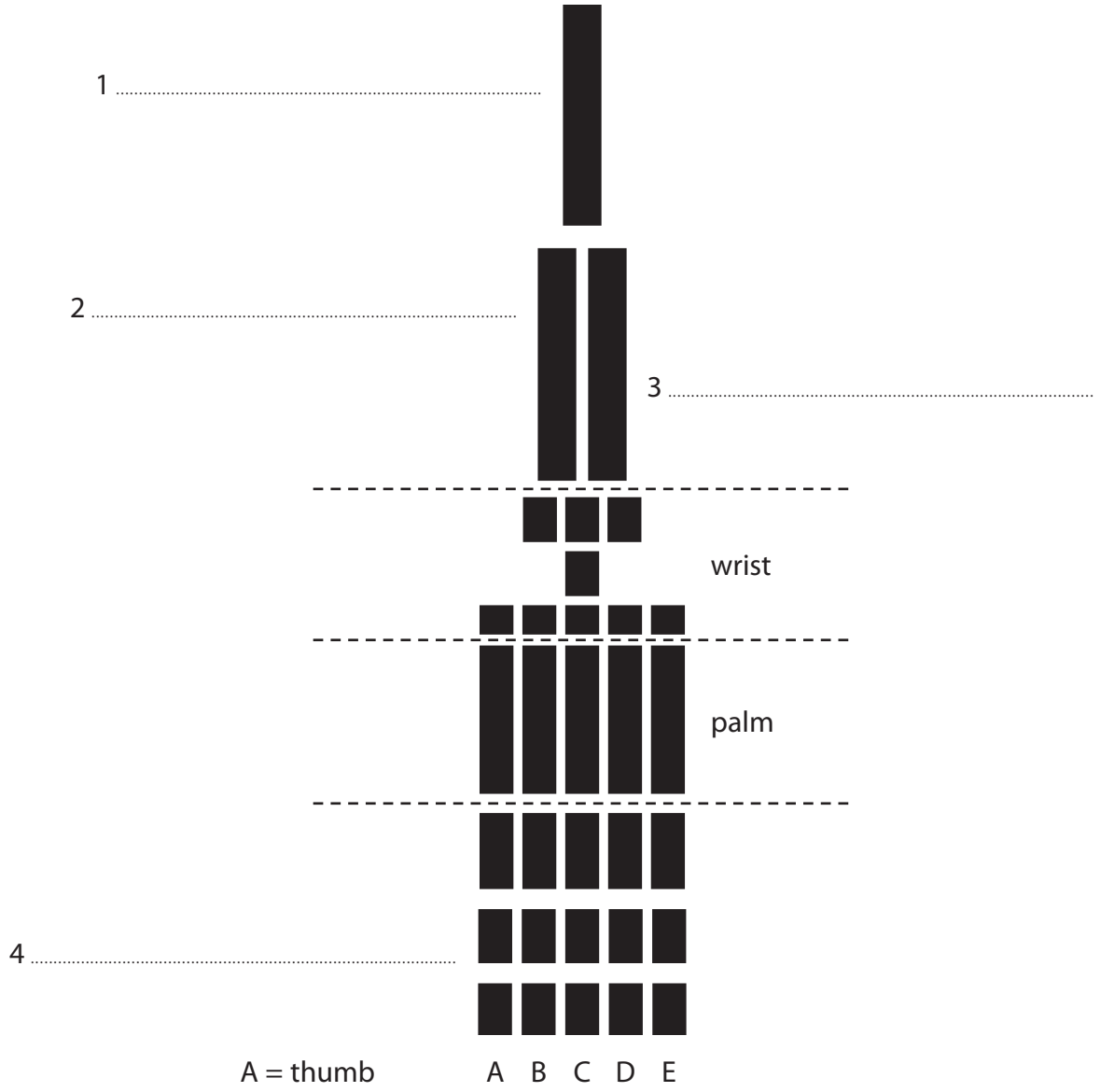
2 The diagram shows a model representing the arrangement of bones in the arm.



(a) (i) Name the bones labelled 1, 2, 3 and 4 on the diagram.

(4)

(ii) A hinge joint is a synovial joint.

Draw a circle on the diagram to show where a hinge joint is found.

(1)

(iii) Name two other types of synovial joint found in the skeleton.

(2)

1 .....

2 .....

(b) Vitamin D is important for the growth and development of healthy bones.

Explain how vitamin D helps the growth and development of bones.

(3)

(Total for Question 2 = 10 marks)

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3 Enzymes are protein molecules.

(a) (i) Which sub-units form enzymes?

(1)

- ☒ **A** amino acids
- ☒ **B** fatty acids
- ☒ **C** glucose
- ☒ **D** glycerol

(ii) Describe how a solution can be tested to see if it contains protein.

(3)

(b) A scientist investigates the effect of temperature on two different enzymes, A and B.

Enzyme A and enzyme B both digest proteins.

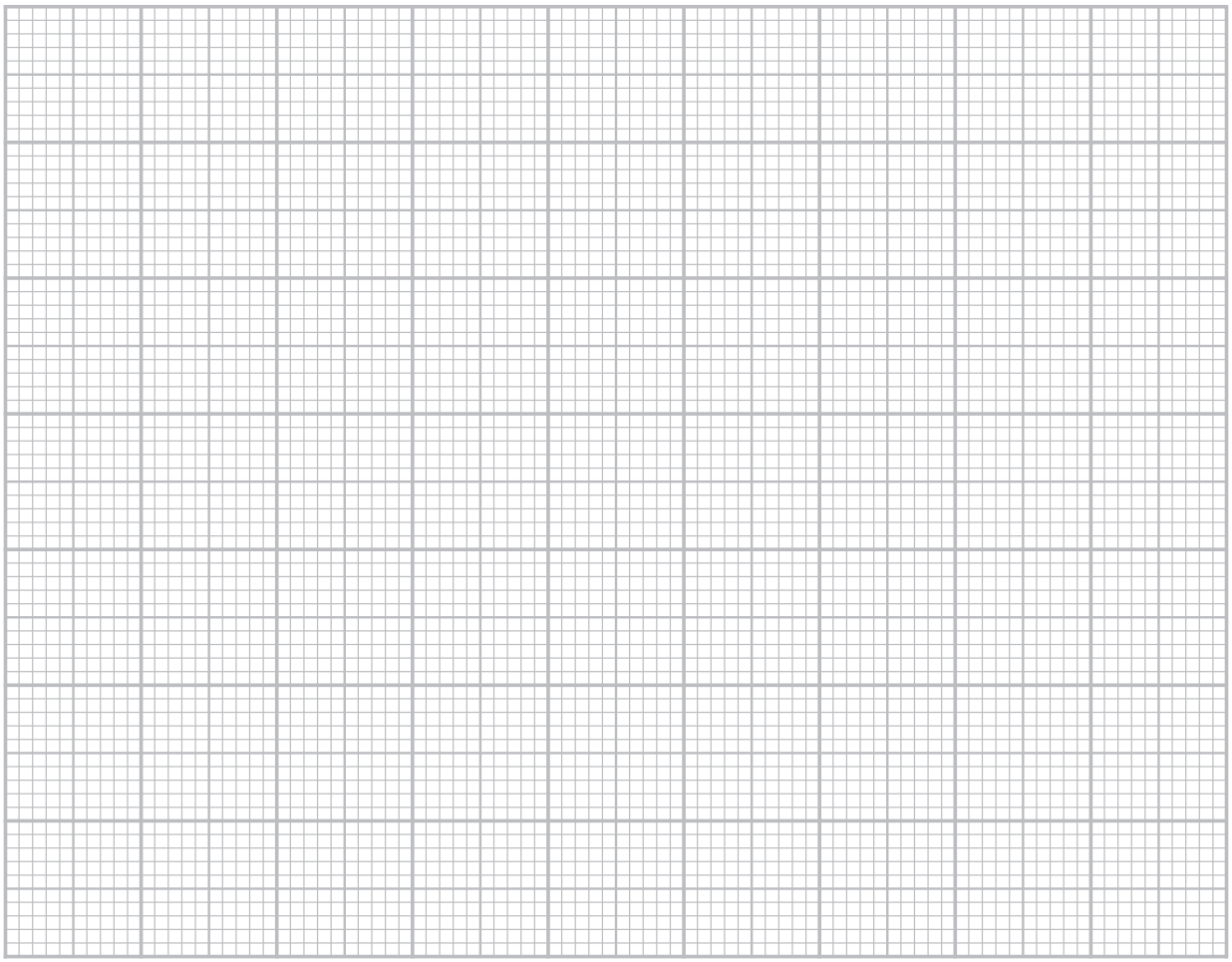
The results of the scientist's investigation are shown in the table.

Temperature in °C	Rate of protein digestion in arbitrary units	
	Enzyme A	Enzyme B
10	0	0
20	5	10
30	5	40
40	20	80
50	60	140
60	80	200
70	20	280
80	0	320
90	0	80

(i) Plot the scientist's results on the grid.

Draw the best fit curve for each enzyme.

(5)



(ii) Describe the effects on enzyme B of increasing the temperature from 80°C to 90°C.

(3)

(iii) Describe the differences between the rate of protein digestion shown by enzyme A and enzyme B.

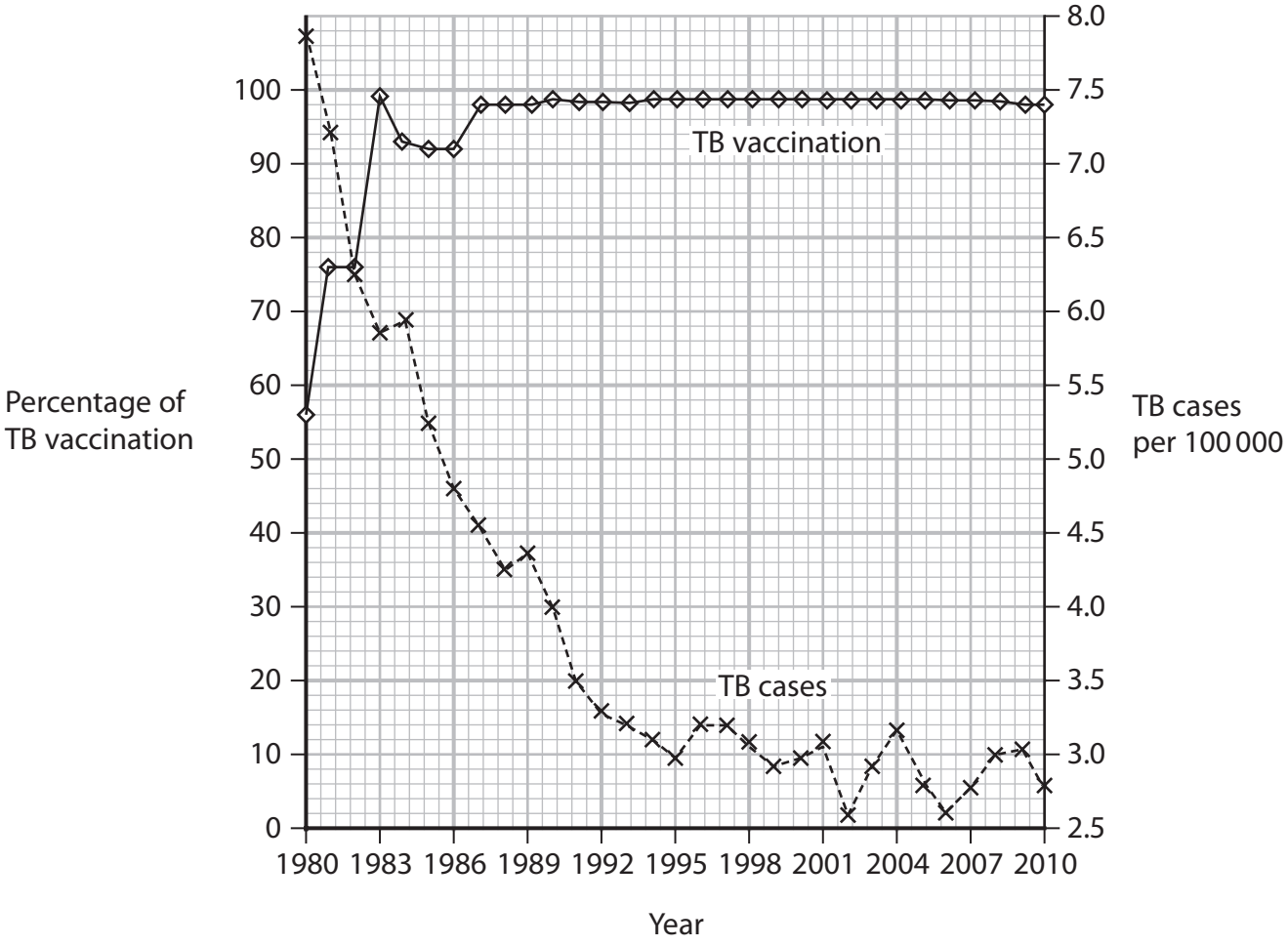
Refer to the graph in your answer.

(3)

(Total for Question 3 = 15 marks)

4 The graph shows the percentage of people vaccinated against tuberculosis (TB) in a country between 1980 and 2010.

It also shows the number of cases of tuberculosis in that country.



(a) (i) Tuberculosis is caused by the same type of organism as typhoid.

What is the type of organism?

(1)

- ☒ **A** bacterium
- ☒ **B** fungus
- ☒ **C** protozoan
- ☒ **D** virus

(ii) Describe the relationship between the percentage vaccination and the number of cases of TB.

(4)

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(b) The population of this country in 2010 was 3.45 million.

Calculate the number of cases of tuberculosis in this country in 2010.

(3)

number of cases = ...

(c) Explain how vaccination can give a person immunity to a disease.

(5)

(Total for Question 4 = 13 marks)

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5 The diagram shows a sperm.

(a) (i) Describe the function of a sperm.

(2)

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(ii) State two other structures, apart from mitochondria, that can be seen in the sperm if it is viewed using an electron microscope.

(2)

1 .....

2 .....

(b) Explain why there are a large number of mitochondria found in a sperm.

(3)

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(c) The actual length of the sperm between X and Y on the diagram is 3 µm.

Calculate the magnification of the sperm shown in the diagram.

[1000 µm = 1 mm]

(4)

magnification = × .....

(Total for Question 5 = 11 marks)

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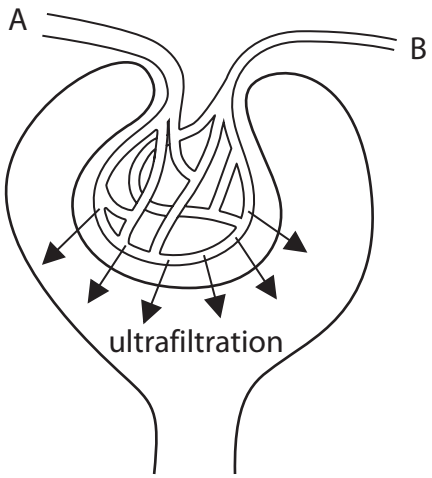
6 (a) The diagram shows a Bowman's capsule and its associated blood supply.



(i) Describe what is meant by the term **ultrafiltration**.

(2)

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(ii) State three differences between the composition of blood in vessel A and the composition of blood in vessel B.

(3)

1 .....

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2 .....

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3 .....

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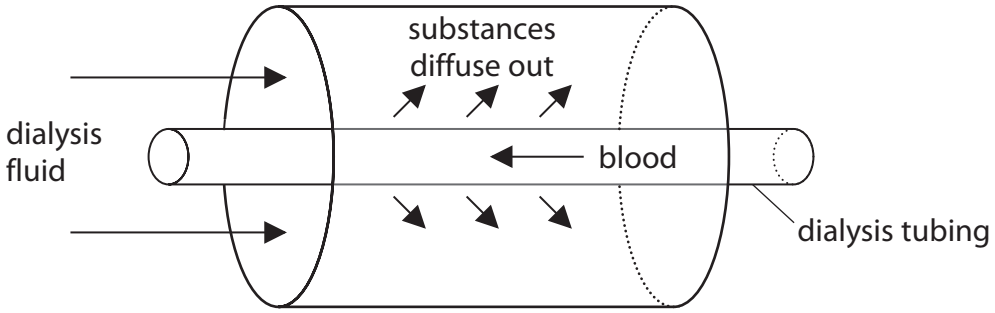
(iii) Explain how blood vessel A and blood vessel B help the process of ultrafiltration.

(4)

(b) The diagram shows part of a kidney dialysis machine.



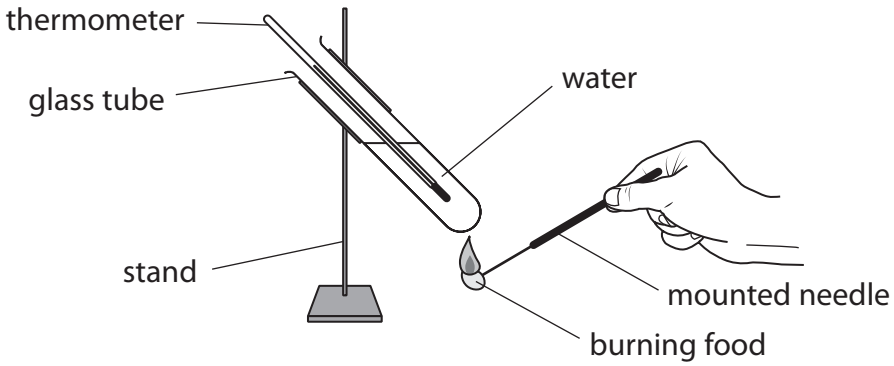
The dialysis fluid contains glucose at the same concentration as in the blood flowing through the dialysis tubing.

Suggest the effect on a person undergoing dialysis if the concentration of glucose was below that of the blood flowing through the dialysis tubing.

(3)

(Total for Question 6 = 12 marks)

7 A student uses this apparatus to investigate the energy content of different foods.



This is the student's method.

- add water to the glass tube
- measure the temperature of the water
- place a piece of food onto the mounted needle
- set the food alight by placing it into a Bunsen flame
- place the burning food under the glass tube
- measure the temperature of the water when the food stops burning

Repeat the method using different foods.

(a) (i) State three safety precautions that the student should take.

(3)

1 .....

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2 .....

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3 .....

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(ii) State three factors that should be controlled during the investigation.

(3)

1 .....

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2 .....

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3 .....

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(iii) Explain why the energy content of a sample of food is likely to be higher than the energy of the same sample measured by this method.

(5)

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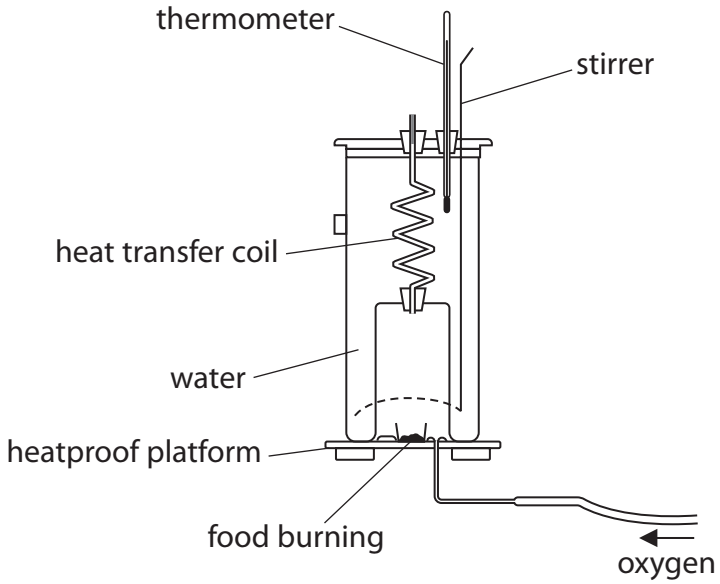
(b) The diagram shows a calorimeter. This is a piece of apparatus that is used to measure the energy content of a sample of food accurately.

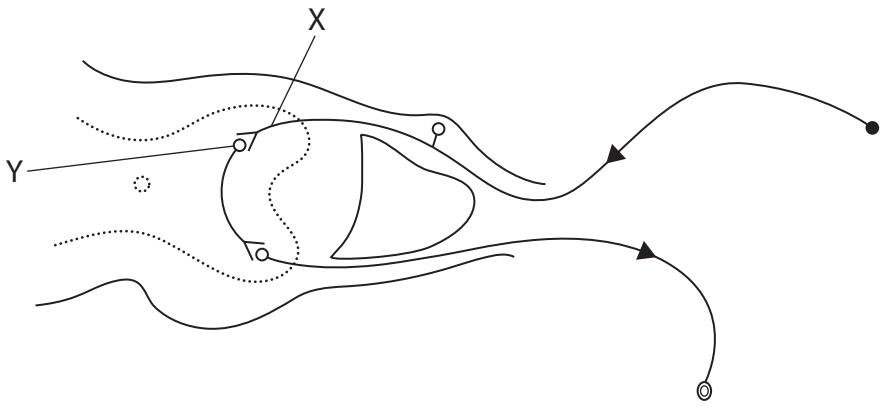


Discuss the features of this calorimeter that will give a more accurate measurement of the energy in a sample of food than the method used by the student.

(4)

(Total for Question 7 = 15 marks)

8 The diagram shows a reflex arc involved in a reflex action.



(a) Describe the function of a reflex action.

(3)

(b) Using a line labelled Z, show on the diagram which part of the reflex arc would be connected to a receptor.

(1)

(c) Describe how the nerve impulse passes from position X to position Y in the reflex arc.

(6)

(Total for Question 8 = 10 marks)

TOTAL FOR PAPER = 90 MARKS

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