

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 4HB1/01				
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)

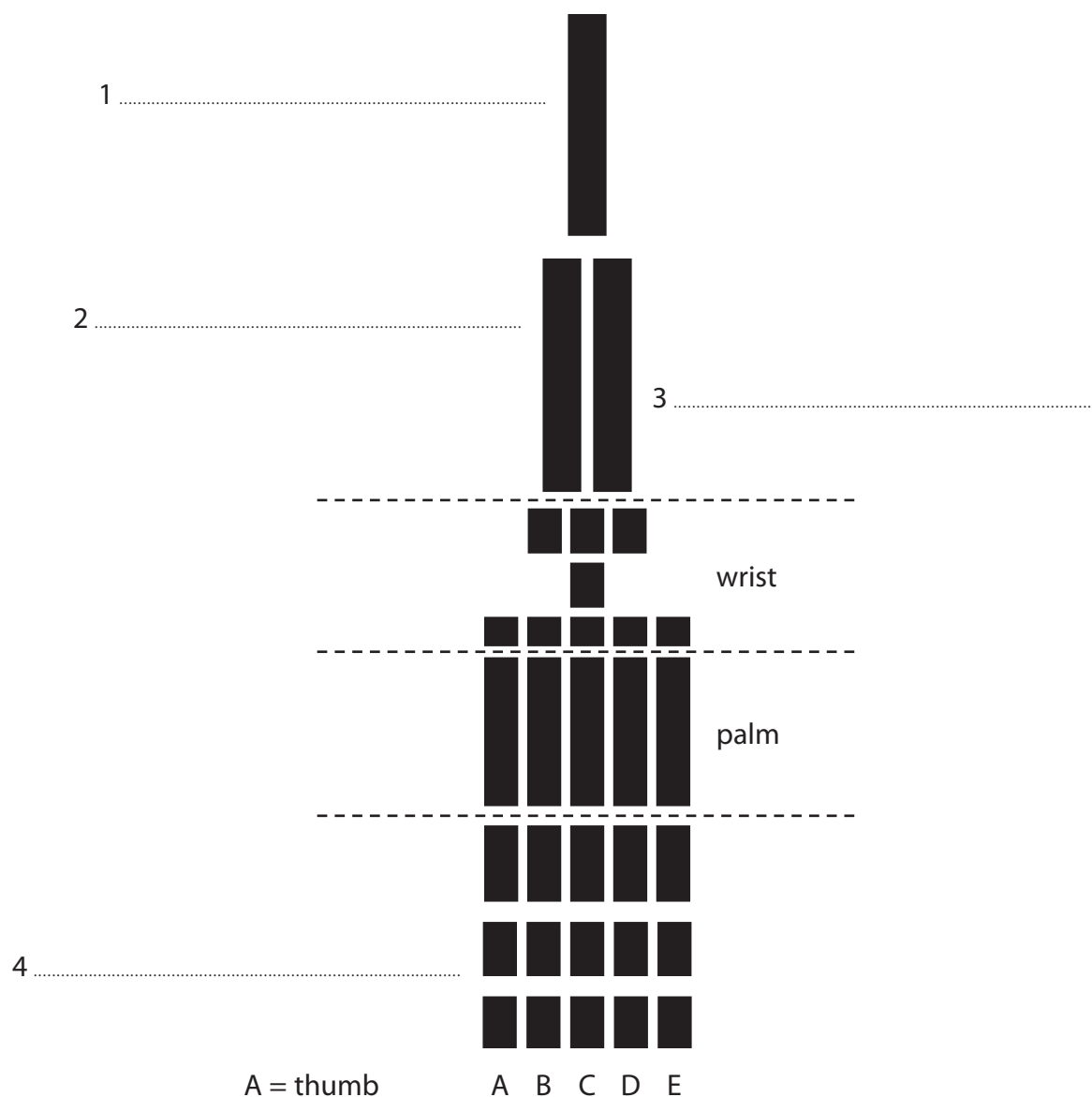
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2 The diagram shows a model representing the arrangement of bones in the arm.



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(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)

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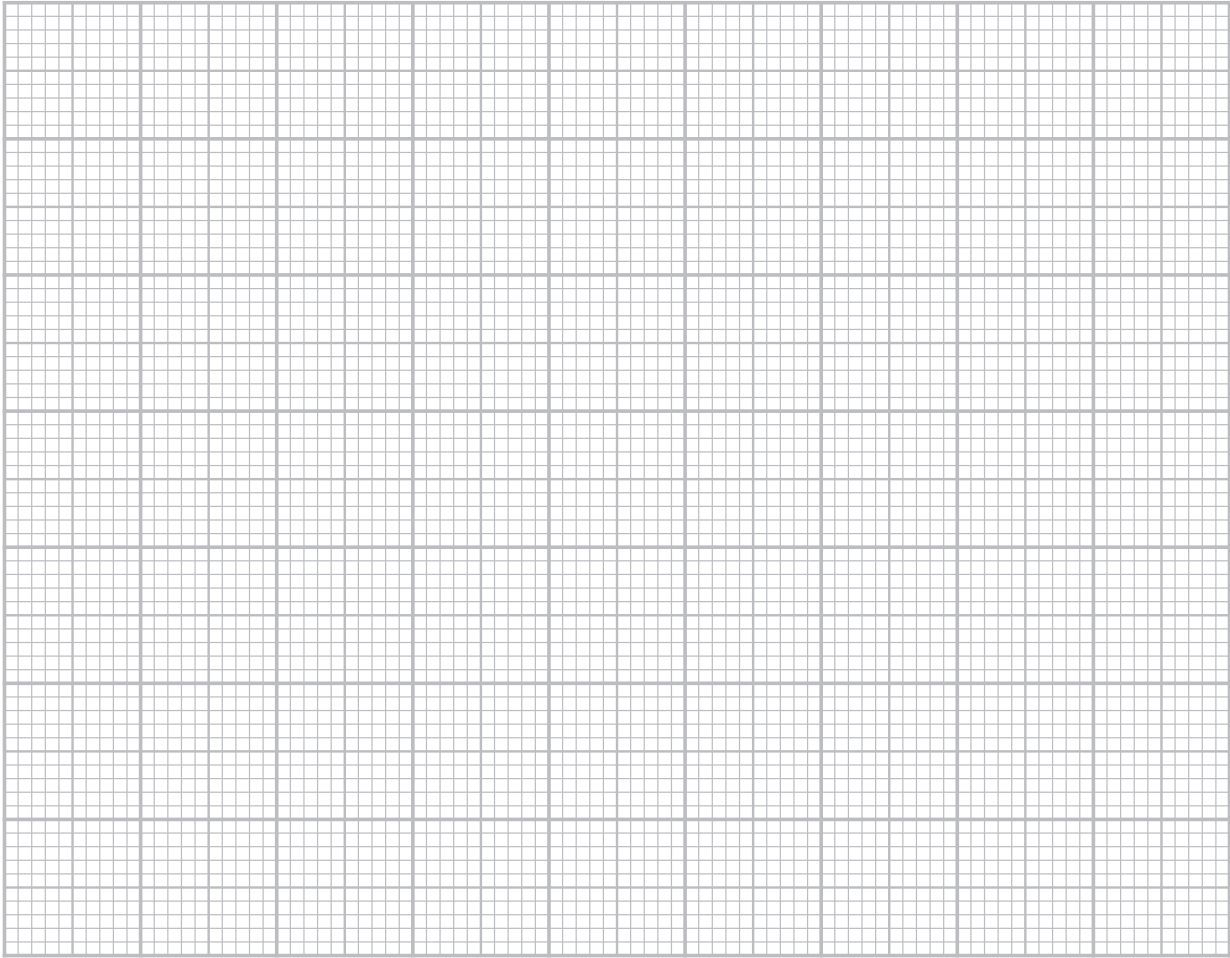


(b) A scientist investigates the effect of temperature on two different enzymes, A and B.
 Enzyme A and enzyme B both digest proteins.
 The results of the scientist's investigation are shown in the table.

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.

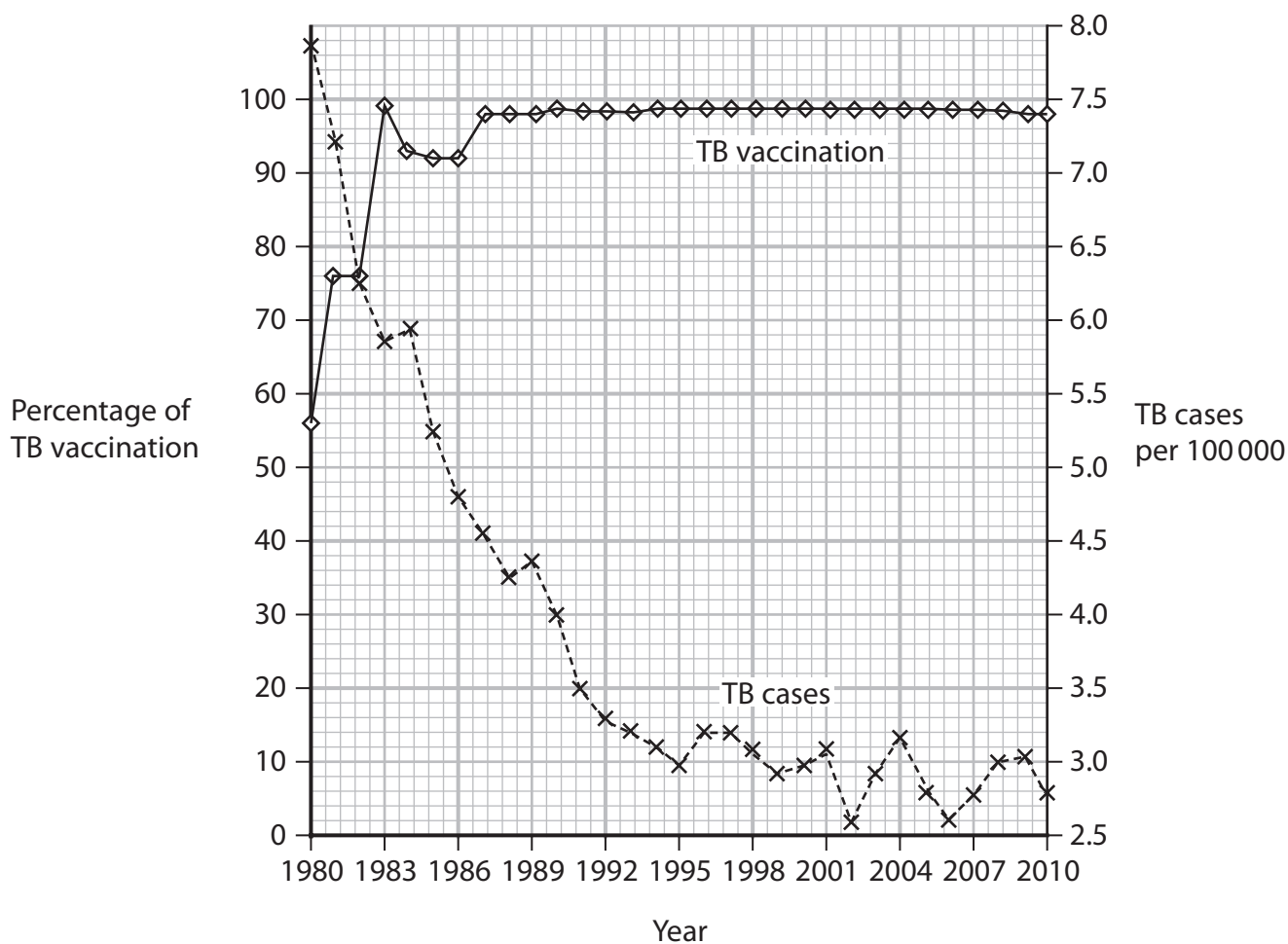
(3)

(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)

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(Total for Question 4 = 13 marks)

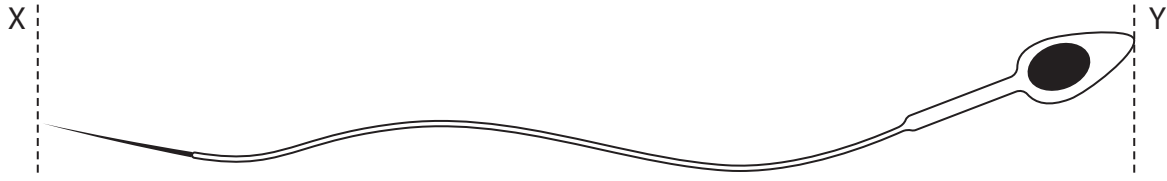


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5 The diagram shows a sperm.



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

(2)

(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 $3\text{ }\mu\text{m}$.

Calculate the magnification of the sperm shown in the diagram.

[$1000\text{ }\mu\text{m} = 1\text{ mm}$]

(4)

magnification = $\times$

(Total for Question 5 = 11 marks)

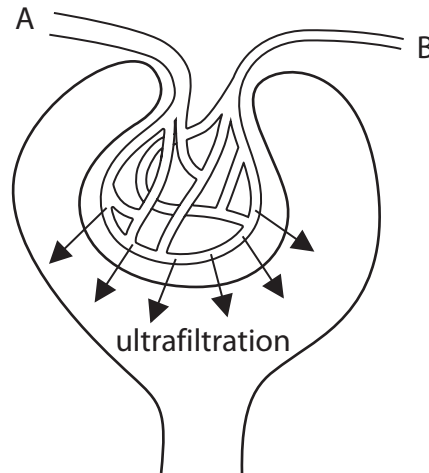
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- 6 (a) The diagram shows a Bowman's capsule and its associated blood supply.



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

(2)

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

(3)

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

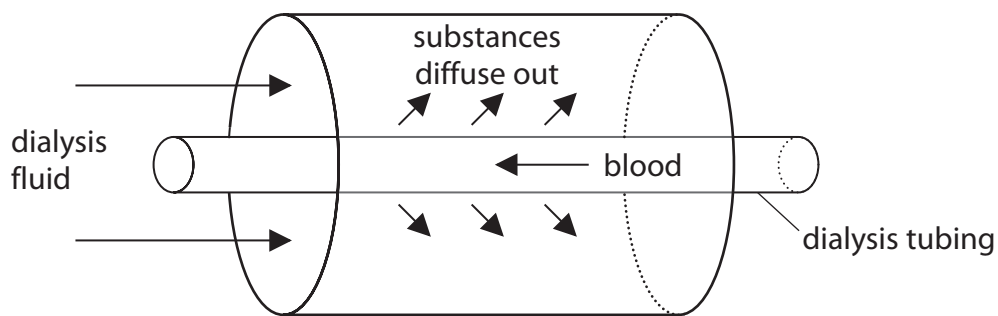
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(b) The diagram shows part of a kidney dialysis machine.



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

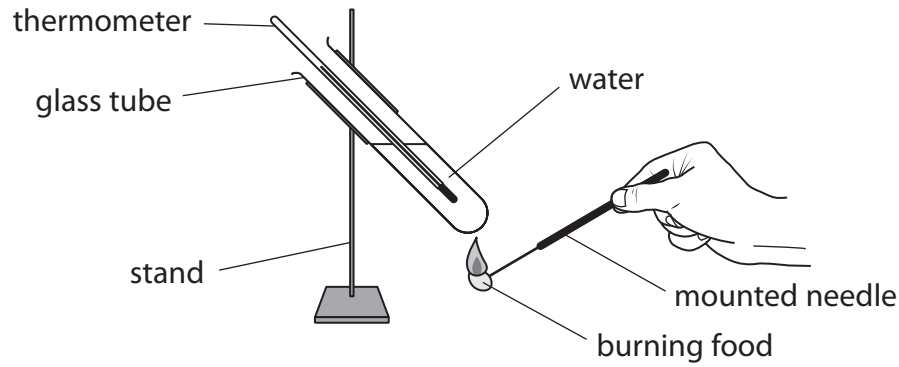
Suggest the effect on a person undergoing dialysis if the concentration of glucose was below that of the blood flowing through the dialysis tubing.

(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)

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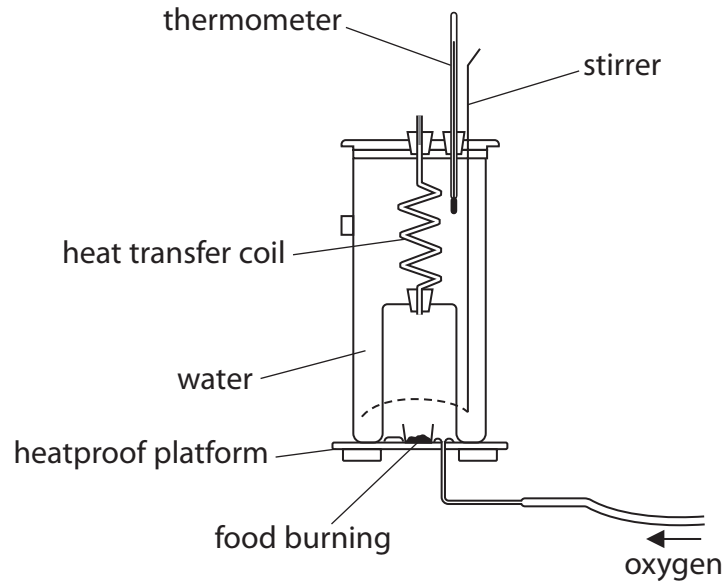
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- (b) The diagram shows a calorimeter. This is a piece of apparatus that is used to measure the energy content of a sample of food accurately.

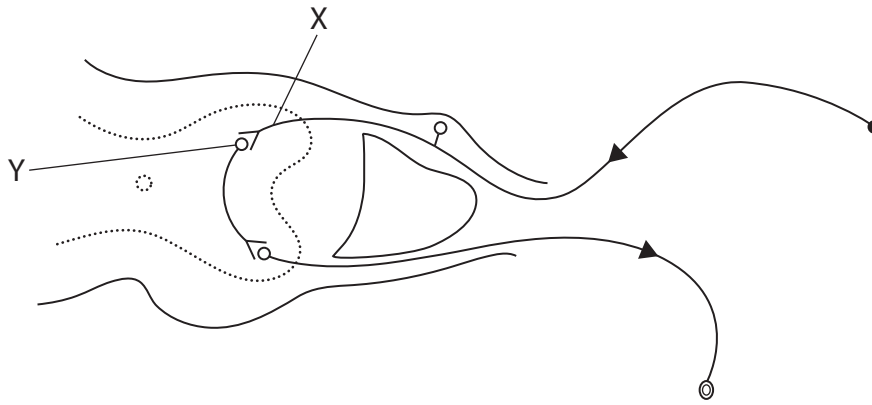


Discuss the features of this calorimeter that will give a more accurate measurement of the energy in a sample of food than the method used by the student.

(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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