Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

For Examiner's Use

General Certificate of Secondary Education
June 2007

HUMAN PHYSIOLOGY AND HEALTH **3417/F**
Written Paper
Foundation Tier

F

Friday 22 June 2007 9.00 am to 11.00 am

For this paper you must have:
- a pencil and a ruler.

You may use a calculator.

Time allowed: 2 hours

Instructions
- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The maximum mark for this paper is 120.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use			
Question	Mark	Question	Mark
1		7	
2		8	
3		9	
4		10	
5		11	
6		12	
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

Answer **all** questions in the spaces provided.

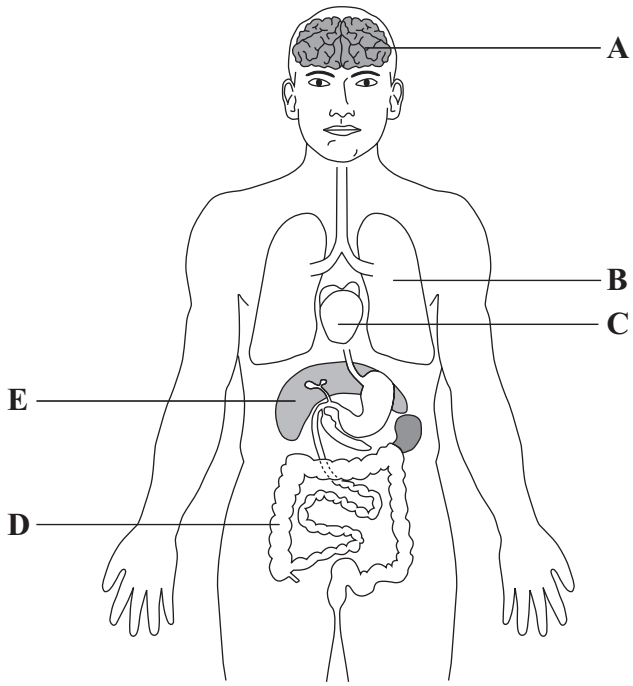
1 The diagram shows some organs in the body.

(a) Name the organs labelled **A**, **B**, **C**, **D** and **E**.

Choose words from the list.

brain **heart** **large intestine** **liver**

lung **pancreas** **small intestine** **stomach**



A .....

B .....

C .....

D .....

E .....

(5 marks)

(b) From the diagram, give the letters of the organs that:

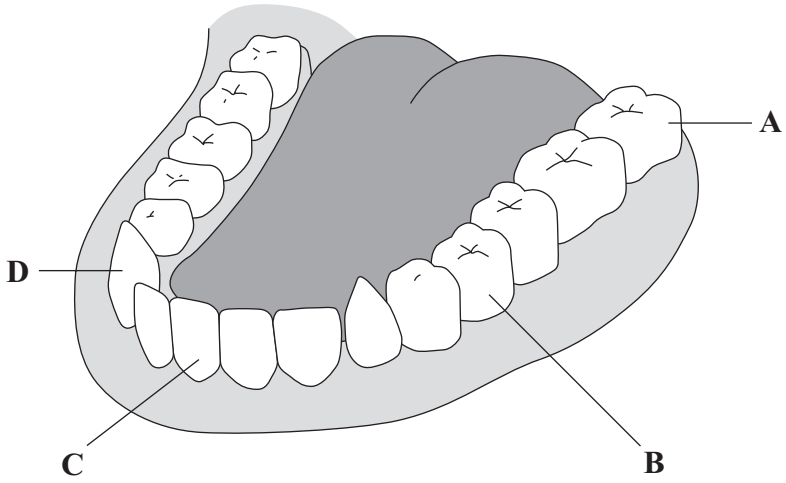
(i) may be damaged by alcohol; ..... and .....
(1 mark)

(ii) may be damaged by smoking; ..... and .....
(1 mark)

(iii) may be affected by painkillers. ..... and .....
(1 mark)

8

2 The diagram shows the teeth in the lower jaw of a person.



(a) Name the teeth labelled **A**, **B**, **C** and **D**.

A .....

B.....

C .....

D .....
(4 marks)

(b) Give the letter of the tooth that is used:

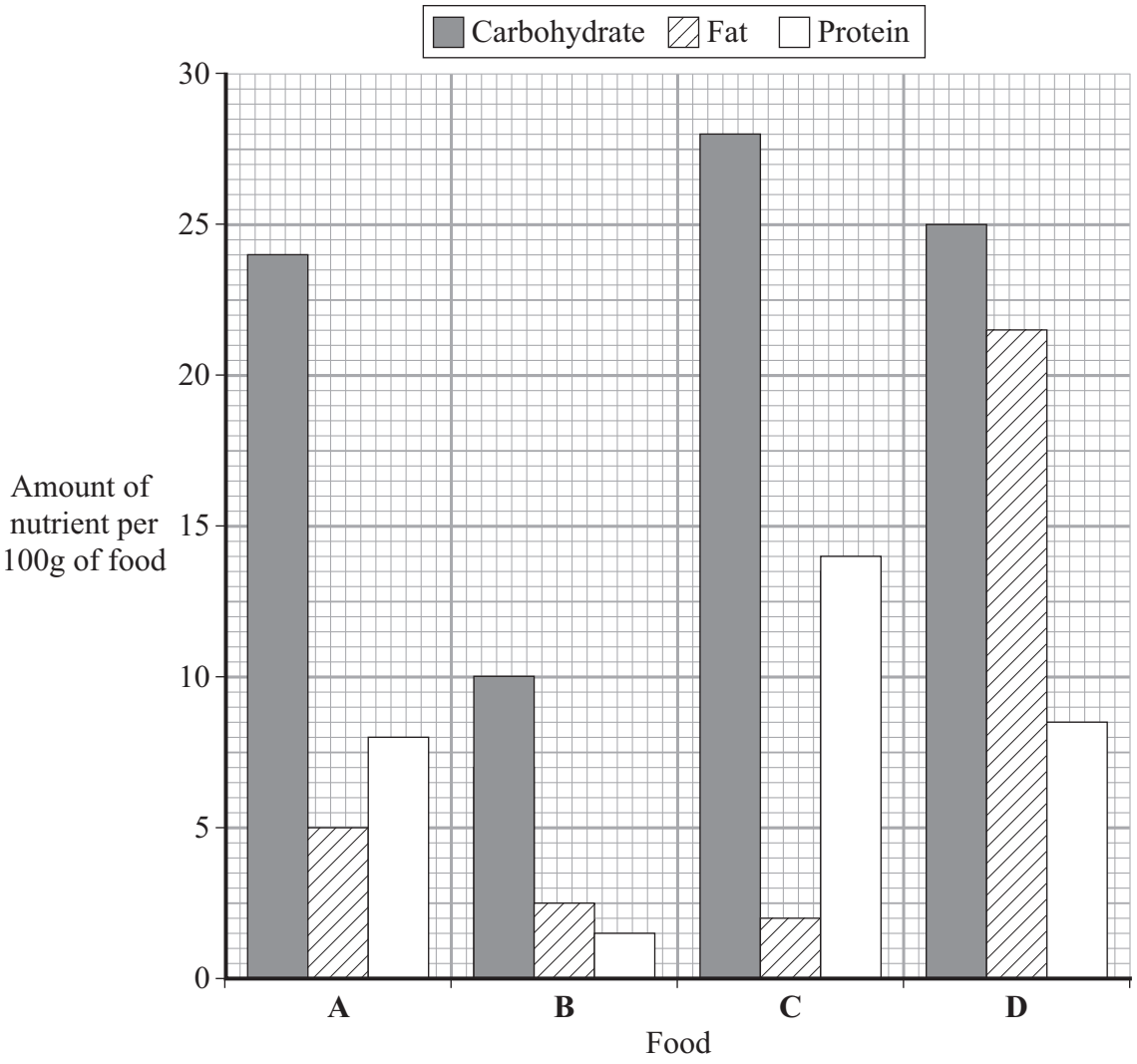
(i) to tear food; .....
(1 mark)

(ii) to grind food;.....
(1 mark)

(iii) to cut food. .....
(1 mark)

7

3 The bar chart shows the amounts of three nutrients in 100 g of four foods, **A**, **B**, **C** and **D**.



(a) Use the information in the bar chart to complete **Table 1**.

Table 1

Food (100 g)	Carbohydrate (g)	Fat (g)	Protein (g)
A	24.0	5.0	8.0
B		2.5	1.5
C	28.0	2.0	
D	25.0		8.5

(3 marks)

(b) Carbohydrate contains 17 kJ of energy per gram.

Calculate the amount of energy provided by the carbohydrate in 100 g of Food **D**.

Answer ..... kJ

(2 marks)

(c) **Table 2** lists some problems that may be caused by an unhealthy diet.

Complete **Table 2** by choosing phrases from the list.

not enough calcium **not enough fibre** **not enough iron**

not enough vitamin C **too much fat** **too much protein**

Table 2

Problem	**Cause**
Heart disease	
Anaemia	
Constipation	
Rickets	

(4 marks)

(d) (i) Describe how to test a food for protein.

.....

.....

(1 mark)

(ii) Describe the colour change if the result is positive.

.....

.....

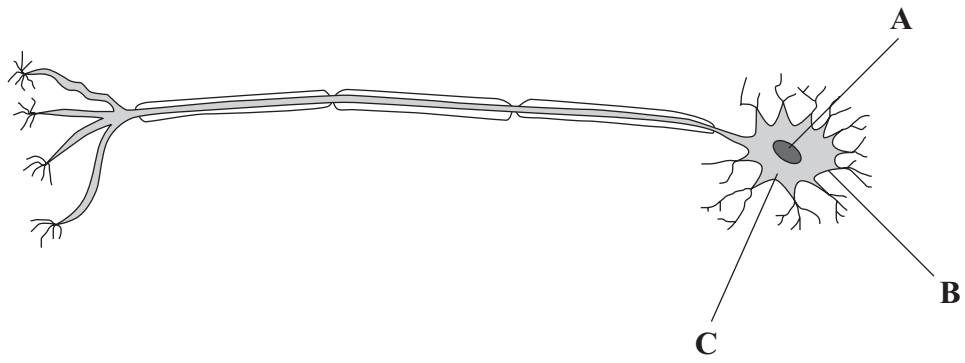
.....

.....

(2 marks)

12

4 (a) The diagram shows a neuron.



Give the name and function of the parts of the cell labelled **A**, **B** and **C**.

A Name .....

Function.....

.....

(2 marks)

B Name .....

Function.....

.....

(2 marks)

C Name .....

Function.....

.....

(2 marks)

(b) (i) What is a tissue?

.....

.....

.....

.....

(2 marks)

(ii) Name a type of tissue found in:

the wall of the heart; .....

the brain. .....

(2 marks)

10

Turn over for the next question

5 (a) Describe **three** methods that are used to preserve food and explain how each stops food from spoiling.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

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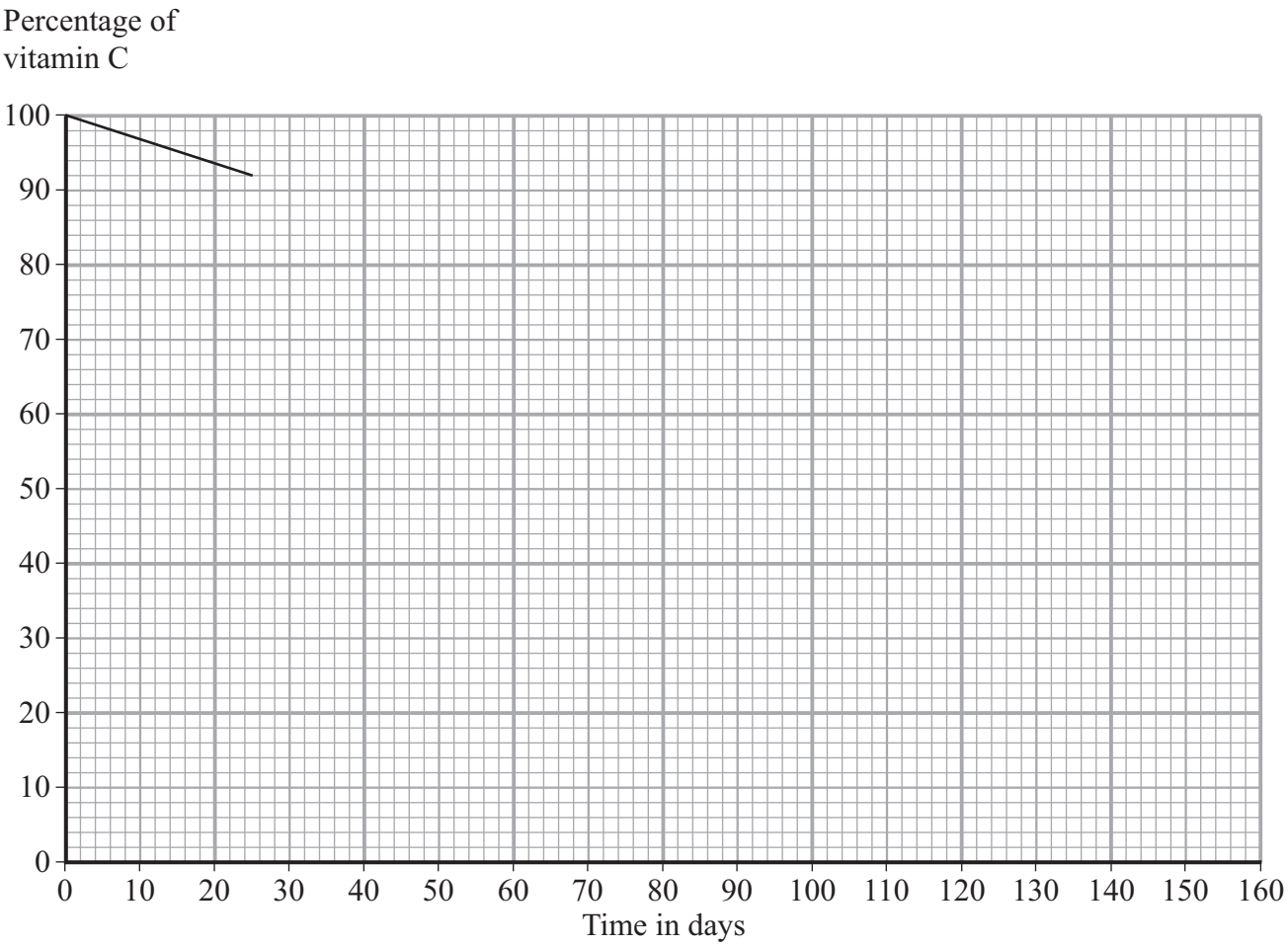
(6 marks)

(b) The table shows how the percentage of vitamin C in a fruit drink changes when the drink is stored at different temperatures for 150 days.

	Percentage of vitamin C		
Time in days	**0 °C**	**–10 °C**	**–20 °C**
0	100	100	100
25	20	62	92
50	0	30	84
75	0	10	76
100	0	0	68
125	0	0	60
150	0	0	52

(i) Complete the graph to show how the percentage of vitamin C changes when the drink is stored at **–20 °C**.



(3 marks)

(ii) Use your graph to estimate the percentage of vitamin C left in the drink when it is stored at **–20°C** for 160 days.

..... % of vitamin C

(1 mark)

(iii) What is the effect of storage temperature on the percentage of vitamin C left in the fruit drink?

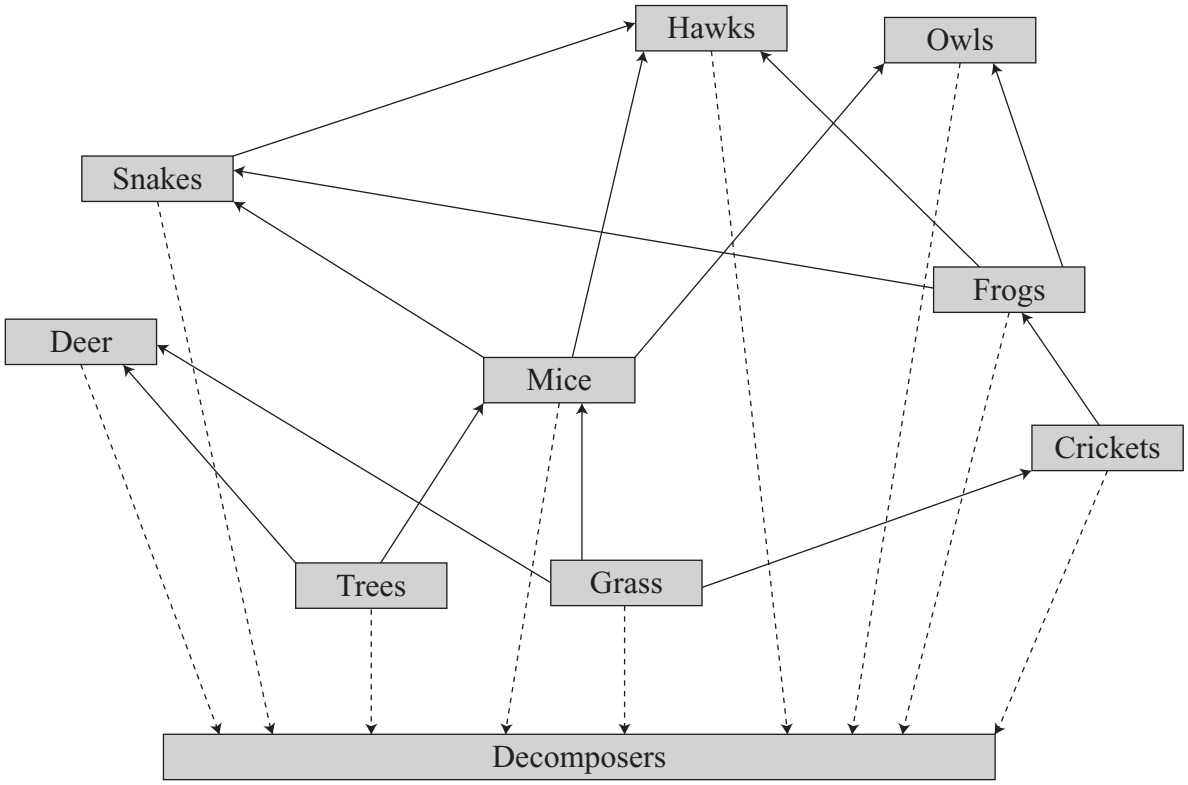
.....

.....

(1 mark)

11

6 The diagram shows a food web.



(a) (i) Which **two** organisms in the food web are producers?

1 .....

2 .....

(2 marks)

(ii) What do producers do in the food web?

.....

.....

(1 mark)

(b) Which **two** animals in the food web are the prey of the owls?

.....

.....

(1 mark)

(c) Explain what the solid arrow (→) between grass and crickets means.

.....

.....

(1 mark)

(d) State **two** ways by which energy is lost from the food web.

1 .....

.....

2 .....

.....

(2 marks)

(e) Farmers spray insecticides to kill the crickets.

Describe and explain **two** possible effects of spraying insecticides on the other organisms in the food web.

1 .....

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(2 marks)

2 .....

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(2 marks)

(f) Describe and explain the part played by decomposers in the food web.

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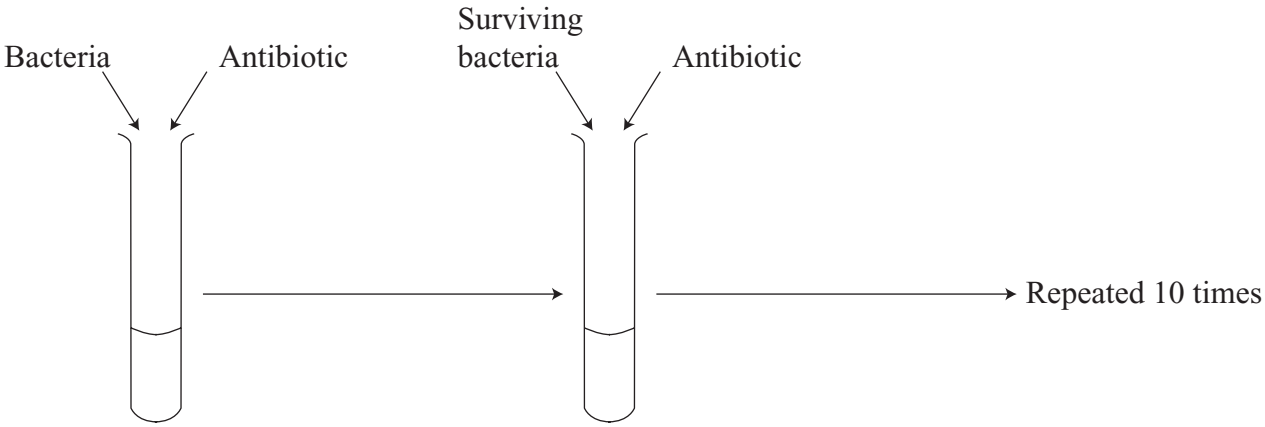
(2 marks)

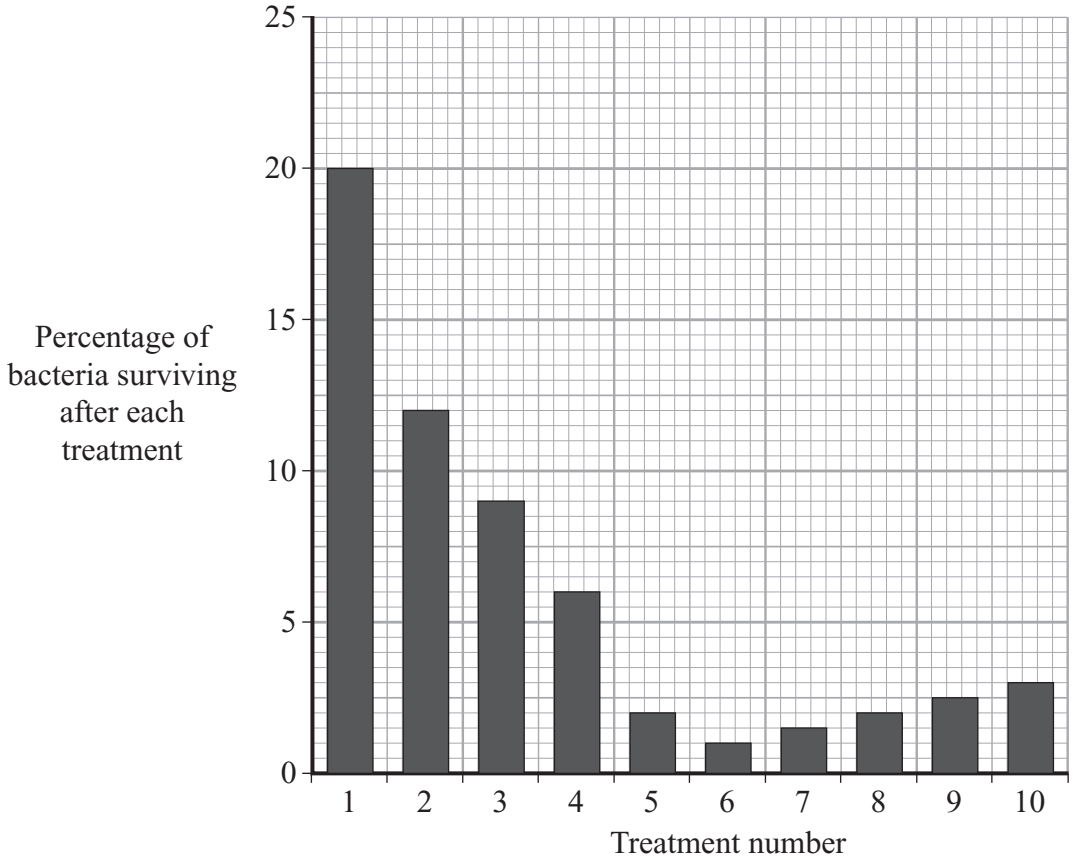
13

7 In an investigation, a culture of bacteria was grown and then treated with an antibiotic. The bacteria that survived this treatment were allowed to grow and were then treated again with the same antibiotic.

This process was repeated 10 times.



The graph shows the percentage of bacteria that survived after each treatment.



(a) (i) The original culture contained 200 million bacteria.

How many remained after the first treatment?

.....

(2 marks)

(ii) Describe the change in the percentage of bacteria that survived between treatment **1** and treatment **5**.

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(2 marks)

(b) Explain why there is a rise in the percentage of bacteria that survived after treatment **6**.

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(3 marks)

Question 7 continues on the next page

(c) Describe the discovery of the antibiotic Penicillin.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

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(7 marks)

14

8 The table shows some features of six members of a family.

Feature	Mother	Father	Debra	Ann	Robert	Nigel
Age	46	45	16	16	13	11
Sex	F	M	F	F	M	M
Freckles	No	Yes	Yes	Yes	No	No
Height in cm	157	175	125	124	128	122
Mass in kg	64	90	58	57	49	43
Blood group	O	AB	A	A	B	A

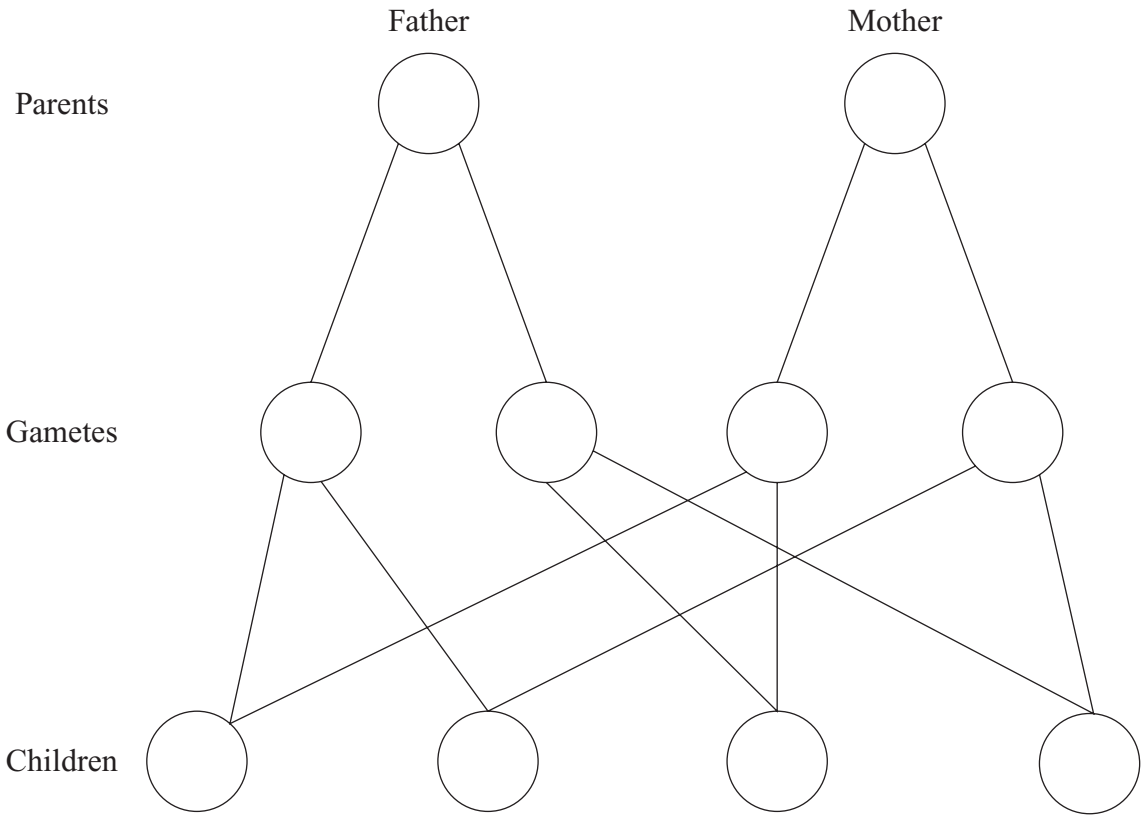
(a) Give **two** features in the table that are examples of discontinuous variation.

1 .....

2 .....

(2 marks)

(b) Complete the diagram to show how sex is inherited in this family.

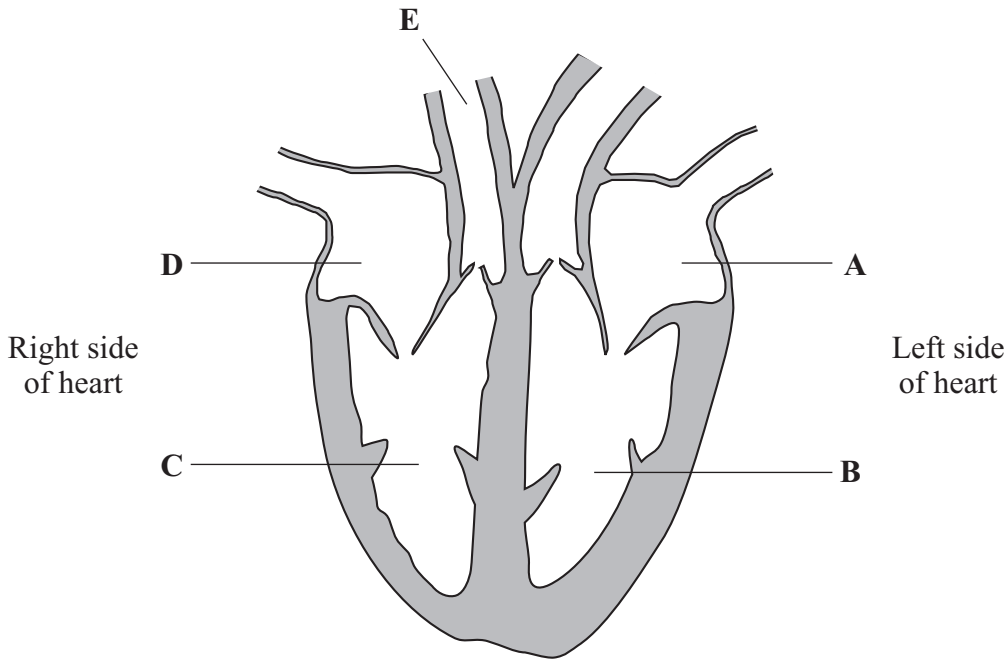


Names ....

(5 marks)

7

9 The diagram shows a section through the heart.



(a) Name the parts labelled **B**, **D** and **E**.

B.....

D .....

E.....

(3 marks)

(b) Describe and explain how blood in the part labelled **C** passes to the part labelled **A**.

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(5 marks)

(c) Complete the table to show the relative amounts of oxygen and carbon dioxide in the blood.

Use the words **high** and **low**.

	Blood in vena cava	**Blood in renal artery**	**Blood in capillaries leaving the muscle cells**
Oxygen	low		
Carbon dioxide	high		

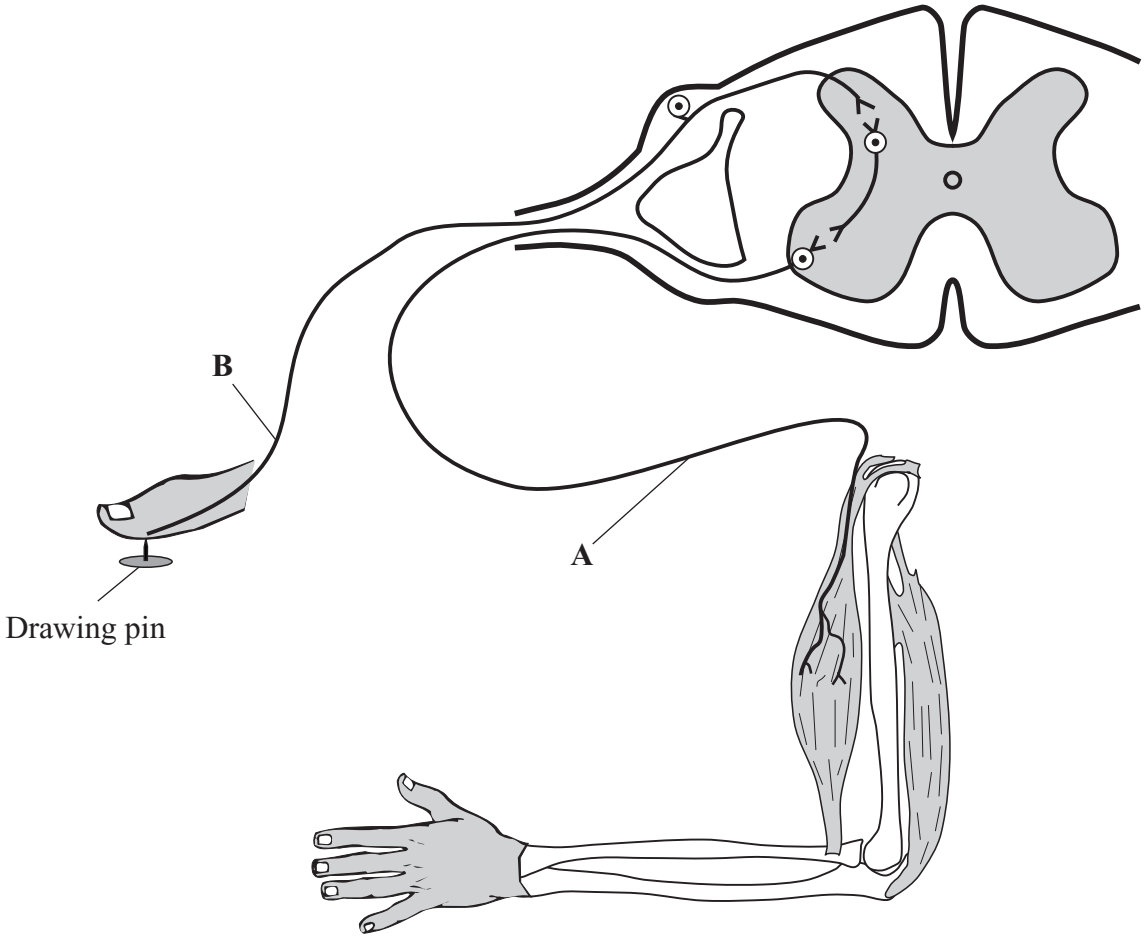
(3 marks)

11

Turn over for the next question

10 (a) A person accidentally puts his thumb on a drawing pin.
Without thinking he rapidly pulls away his arm.

The diagram shows some of the structures involved in this action.



(i) What is this type of action called?

.....

(1 mark)

(ii) What is the stimulus for this action?

.....

.....

(1 mark)

(iii) Where is the receptor found?

.....

.....

(1 mark)

(iv) Which structure brings about the response in this action?

.....

.....

(1 mark)

(b) Name the parts labelled **A** and **B**.

A .....

B.....

(2 marks)

(c) Draw arrows on the diagram to show the path taken by nerve impulses as they pass from the receptor to the effector.

(1 mark)

(d) In an investigation, people of different ages were asked to respond to a flashing light by pressing a button.

The mean time taken to respond was recorded for each age group and is shown in the table.

Age group in years	**10–19**	**20–29**	**30–39**	**40–49**	**50–59**	**60–69**	**70+**
Mean response time in seconds	0.18	0.18	0.22	0.32	0.38	0.72	0.88

(i) What was the difference between the mean response time of the **20–29** age group and the **60–69** age group?

.....

(1 mark)

(ii) Suggest **two** reasons for the large increase in the response time after the age of **59**.

1.....

.....

2.....

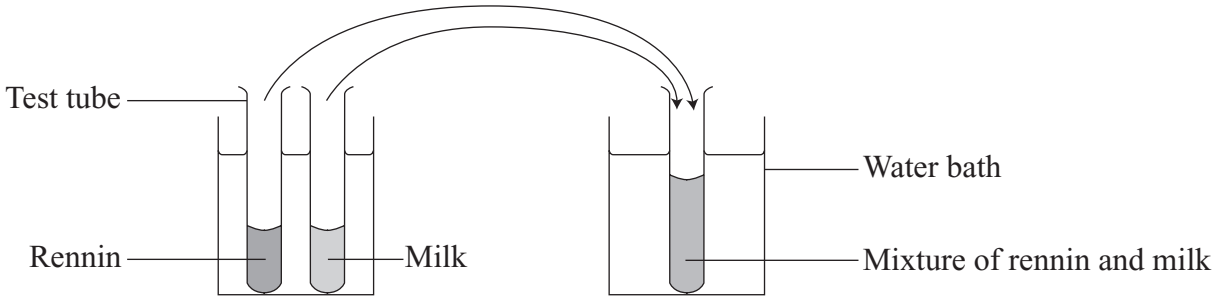
.....

(2 marks)

10

11 Rennin is an enzyme that causes milk to clot.
An experiment was carried out to investigate the effect of temperature on the time taken for milk to clot.

Six pairs of test tubes were set up.
One of each pair of test tubes contained milk and the other contained rennin.
Each pair of test tubes was placed in a water bath at a different temperature.
After 10 minutes the milk and rennin were mixed together.



The time taken for the milk to clot was recorded for each sample of milk.

The results are shown in the table.

Temperature of water bath in °C	Time for milk to clot in seconds
10	Did not clot
20	380
30	185
40	80
50	275
60	Did not clot

(a) (i) Why were the rennin and milk kept separate for 10 minutes?

.....

.....

(1 mark)

(ii) What was the difference between the clotting time at 20 °C and at 30 °C?

.....

(1 mark)

(iii) At which temperature was the reaction quickest?

.....

(1 mark)

(b) (i) The mixture originally tested at 60 °C was cooled to 40 °C and left for 400 seconds. What would be the result?

Explain your answer.

Result.....

Explanation .....

.....

.....

(2 marks)

(ii) The mixture originally tested at 10 °C was warmed to 40 °C and left for 400 seconds. What would be the result?

Explain your answer.

Result.....

Explanation .....

.....

.....

(2 marks)

(c) State **one** other factor that affects enzyme action.

.....

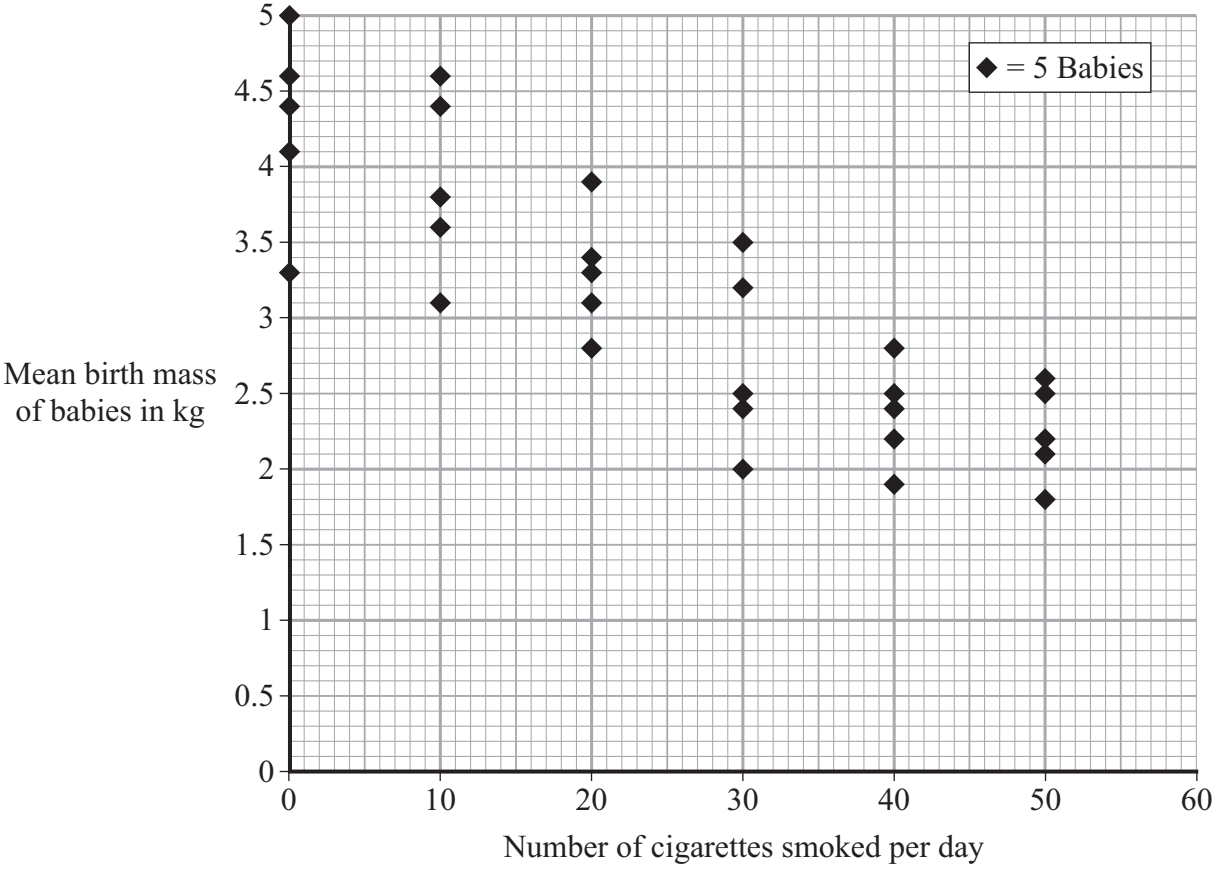
(1 mark)

8

Turn over for the next question

12 The birth masses of babies born to women who smoked during pregnancy were recorded.

The results are shown in the graph.



(a) How many babies were studied?

.....

(1 mark)

(b) How many babies with a birth mass of less than 3.5 kg were born to women who smoked:

(i) 10 cigarettes per day; .....

(1 mark)

(ii) 20 cigarettes per day?.....

(1 mark)

(c) What is the relationship between the number of cigarettes smoked per day and the birth mass of babies?

.....

.....

(1 mark)

(d) Explain how smoking cigarettes during pregnancy may lead to a change in the birth mass of babies.

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(5 marks)

9

END OF QUESTIONS

There are no questions printed on this page