

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

Leave blank

General Certificate of Secondary Education
June 2005

HUMAN PHYSIOLOGY AND HEALTH FOUNDATION TIER

3417/F



Friday 24 June 2005 9.00 am to 11.00 am

F

In addition to this paper you will require:

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 in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

Information

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

Advice

- In all calculations, show clearly how you work out your answer.

For Examiner's Use			
Number	Mark	Number	Mark
1		9	
2		10	
3		11	
4		12	
5		13	
6		14	
7		15	
8			
Total (Column 1)			
Total (Column 2)			
TOTAL			
Examiner's Initials			

1 Complete the table by choosing the words from the list.

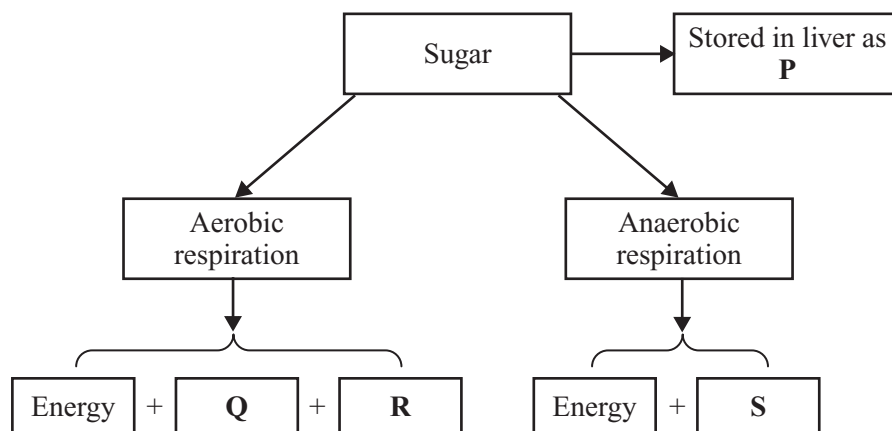
bladder brain cytoplasm eye heart
kidney lung nucleus skin stomach

Structure	What it does
The	is sensitive to light.
The	produces urine.
The	pumps blood.
The	produces sweat.
The	controls activities of the cell.

(5 marks)

5

- 2 (a) The body gets sugar from food. The diagram shows some of the ways in which the body uses sugar.



Name the substances **P**, **Q**, **R** and **S**.

P

Q

R

S

(4 marks)

- (b) State **one** way in which the body uses the energy released in respiration.

.....

(1 mark)

TURN OVER FOR THE NEXT QUESTION

Turn over ►

3 Cystic fibrosis is an inherited disease. It is caused by a recessive allele.

N represents the normal allele.

n represents the cystic fibrosis allele.

(a) A family consists of a mother, a father and two children, Susan and Peter.

(i) Complete the table to show whether Susan and Peter have cystic fibrosis or not.

Family member	Type of alleles	Do they have cystic fibrosis?
Mother	Nn	No
Father	Nn	No
Susan	NN	
Peter	nn	

(1 mark)

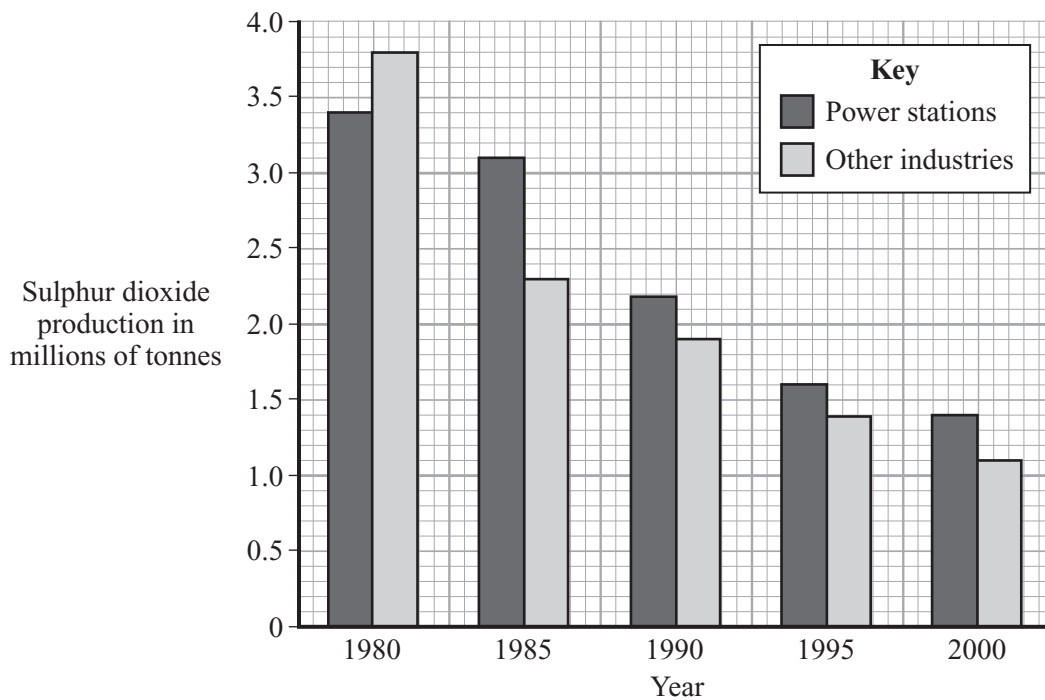
(ii) Which **two** members of the family are heterozygous?

..... and
(1 mark)

(b) Give **two** reasons why Susan and Peter cannot be identical twins.

1
.....
2
.....
(2 marks)

- 4 The chart shows the amount of sulphur dioxide produced by power stations and other forms of industry at five year intervals from 1980 to 2000.



- (a) How much sulphur dioxide was produced by power stations in 1985?

..... million tonnes
(1 mark)

- (b) What was the total amount of sulphur dioxide produced in 1990?

..... million tonnes
(1 mark)

- (c) Between which years did the amount of sulphur dioxide produced by other industries fall by the least amount?

between and
(1 mark)

- (d) Sulphur dioxide is a pollutant of the air.

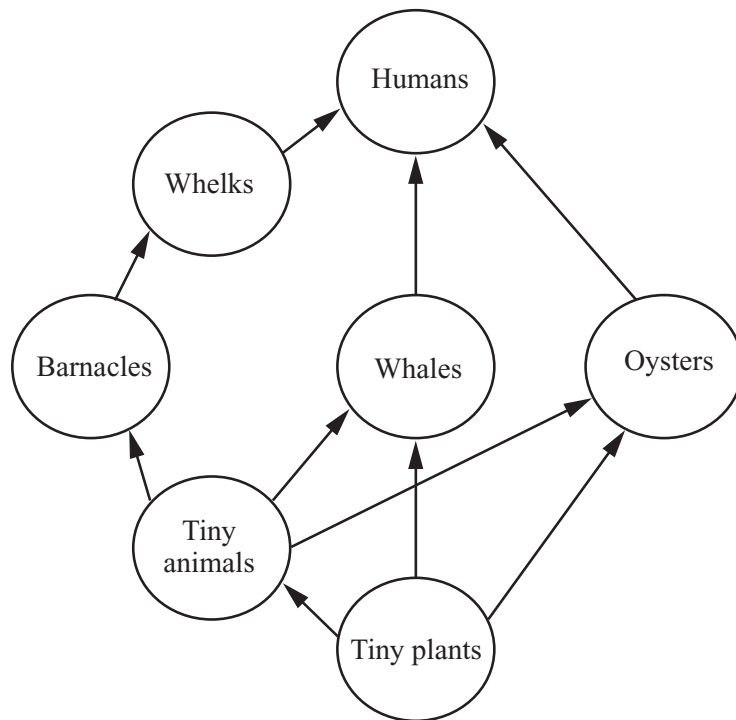
Name **one** other air pollutant.

.....
(1 mark)

4

Turn over ►

5 The diagram shows a food web.



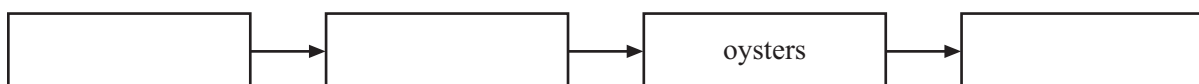
(a) What is the source of energy for this food web?

.....

.....

(1 mark)

(b) Use the information in the food web to complete this food chain.



(2 marks)

(c) From the food web, name:

(i) an omnivore;

(1 mark)

(ii) a herbivore.

(1 mark)

- (d) Which animal feeds on barnacles?

.....
(1 mark)

- (e) Humans eat mussels which are herbivores. Add this information to the food web diagram.
(2 marks)

- (f) The energy present in the organisms in the food web is eventually lost to the environment.
In what form is it lost?

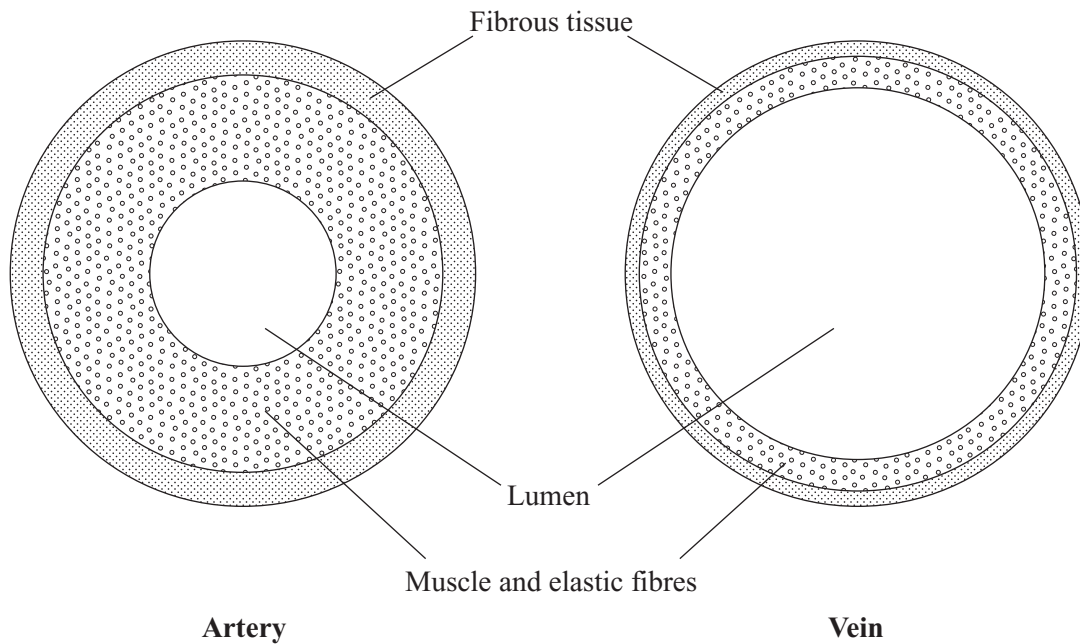
.....
(1 mark)

9

TURN OVER FOR THE NEXT QUESTION

Turn over ►

6 The diagram shows an artery and a vein in cross-section. Both are drawn to the same scale.



(a) Give **three** differences between the artery and the vein that can be seen from the diagram.

- 1
 -
 - 2
 -
 - 3
 -
- (3 marks)

(b) Give **one** other difference between an artery and a vein.

-
-
- (1 mark)

(c) Read the passage.

Coronary heart disease occurs when deposits of fat and cholesterol build up on the inner walls of the coronary arteries. These arteries supply blood to the heart muscle. The deposits are called atheromas.

An atheroma reduces blood flow to the heart muscle. Often the first sign of coronary heart disease is a heart attack. This occurs when the blood supply to part of the heart muscle is cut off.

(i) What is an atheroma?

.....
.....
(1 mark)

(ii) The heart muscle needs energy to keep beating. Two substances are supplied to the heart so that the muscle can release energy.

Name the **two** substances.

1.....
2.....
(2 marks)

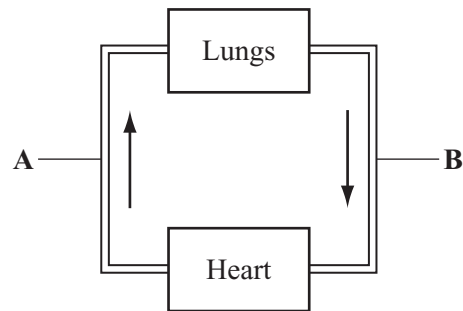
(iii) What is the effect of cutting off the blood supply to the heart muscle?

.....
.....
(1 mark)

QUESTION 6 CONTINUES ON THE NEXT PAGE

Turn over ►

- (d) The diagram shows the circulation of the blood between the lungs and the heart.



- (i) Name the blood vessel labelled **A**.

.....
(1 mark)

- (ii) How is the blood in vessel **B** different from that in vessel **A**?

.....
.....
(1 mark)

- 7 (a) Complete the table to show how each disease is caused. Choose your answers from the list.

	bacteria	fungi	protocistans	viruses
Disease	Caused by			
Gonorrhoea				
Thrush				
Malaria				

(3 marks)

- (b) How do microorganisms cause disease?

.....

.....

.....

.....

(2 marks)

- (c) Microorganisms such as Salmonella can contaminate food and cause food poisoning. Staff in a restaurant kitchen should take hygiene precautions when they store and prepare food. Describe **six** of these precautions.

1

.....

2

.....

3

.....

4

.....

5

.....

6

.....

(6 marks)

Turn over ►

8 (a) State the function of:

(i) the ovary;

.....
(1 mark)

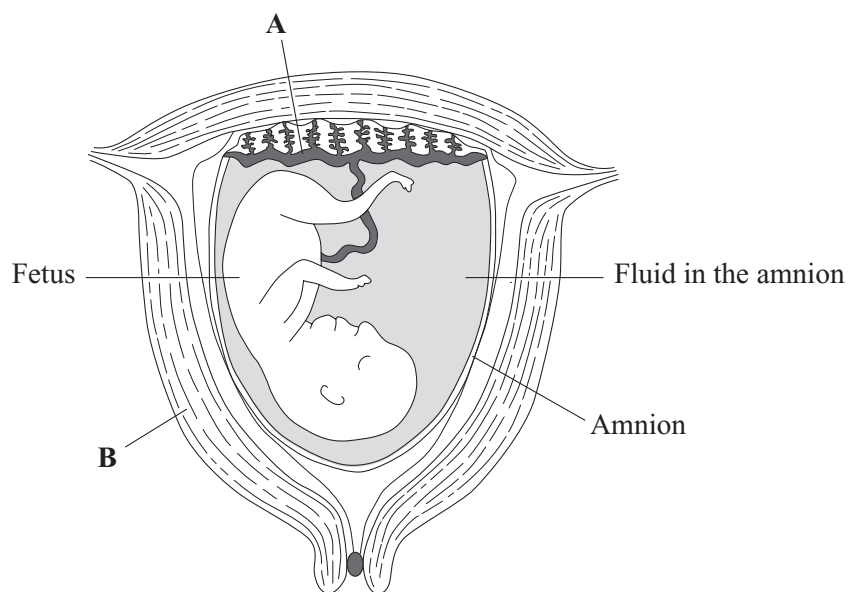
(ii) the testis.

.....
(1 mark)

(b) What happens during fertilisation?

.....
.....
.....
.....
(2 marks)

(c) The diagram shows a fetus in the womb.



Name parts **A** and **B**.

A

B

(2 marks)

- (d) State **one** function of the fluid in the amnion.

.....

.....

(1 mark)

- (e) During pregnancy, the fetus in the womb needs protein to grow. To make proteins, the fetus needs amino acids which are obtained from the mother. Explain how amino acids are produced in the mother's digestive system and how they get to the fetus.

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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(5 marks)

TURN OVER FOR THE NEXT QUESTION

Turn over ►

- 9 (a) The table shows information about some foods.

Food	Energy in kilojoules	Carbohydrate in portions	Fat
Hamburgers (large)	1696	3.5	**
Hamburgers (small)	1058	3	*
Cheeseburgers (large)	2083	4	***
Cheeseburgers (small)	1260	3	*
Fries	1209	3.5	**
Chicken nuggets	1134	1.5	*
Pancakes	1213	5	*
Apple pie	1050	3	**
Coke	403	2.5	—
Diet coke	4	—	—
Coffee (with milk)	168	—	—
Carbohydrate is shown as portions. Each portion = 10 g			
Fat is shown as *. Each * = 10 g			

- (i) How many grams of carbohydrate are present in a large hamburger?

..... grams
(1 mark)

- (ii) Which substance has been removed from diet coke?

.....
(1 mark)

- (iii) Milk contains some fat. Suggest why coffee (with milk) in the table is shown as having no fat.

.....
.....
(1 mark)

- (b) Which substance is the largest component of coke and coffee?

.....
(1 mark)

- (c) Vitamins and minerals are needed in a balanced diet.
How does the body make use of:

(i) vitamin D;
.....
(1 mark)

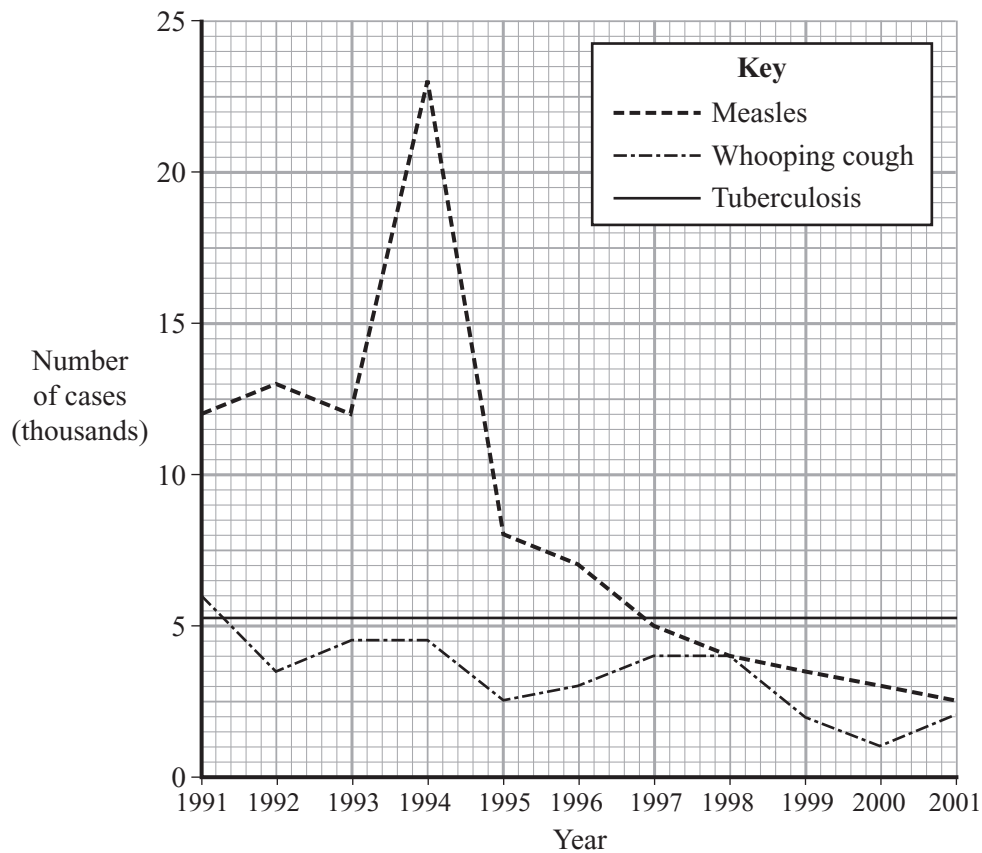
(ii) iron?
.....
(1 mark)

6

TURN OVER FOR THE NEXT QUESTION

Turn over ►

10 The graph shows the number of cases of three diseases between 1991 and 2001.



- (a) (i) What was the fall in the number of cases of whooping cough between 1997 and 2000?

..... thousand
(1 mark)

- (ii) Describe the change in the number of cases of measles between 1993 and 1994.
Suggest a reason for this change.

Change:

.....

Reason:

.....

(2 marks)

- (b) The vaccine for tuberculosis contains a dead form of the tuberculosis bacterium. How does the body respond to the vaccine?

.....

.....

.....

.....

.....

.....

(3 marks)

- (c) (i) How is passive immunity brought about?

.....

.....

(1 mark)

- (ii) When is passive immunity needed?

.....

.....

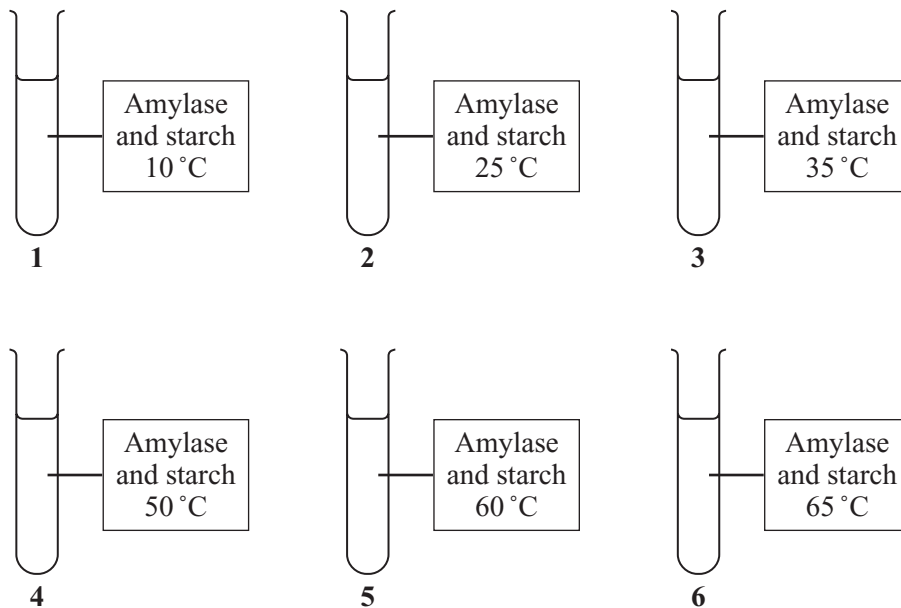
(1 mark)



TURN OVER FOR THE NEXT QUESTION

Turn over ►

- 11** A student set up the following investigation. Amylase and starch were kept in separate test tubes for two hours at the temperature shown in the diagram. The starch and amylase were then mixed and left for one hour. Each tube was then tested to see if digestion had taken place.



- (a) In which tube would starch be digested the fastest?

.....
(1 mark)

- (b) Explain why the starch would **not** be digested in tube **6**.

.....
.....
(1 mark)

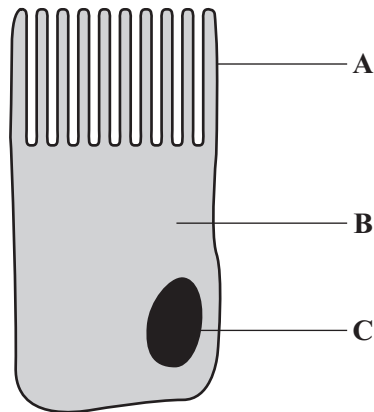
- (c) (i) What is the product of starch digestion?

.....
(1 mark)

- (ii) How would you test for this product?

.....
.....
.....
.....
(2 marks)

- (d) The diagram shows a cell from the lining of the small intestine.



- (i) State the functions of the structures labelled **B** and **C**.

B

.....

C

.....

(2 marks)

- (ii) In the small intestine, digested food materials pass into the blood.
What is this process called?

.....

(1 mark)

- (iii) How do the structures labelled **A** help this process?

.....

.....

(1 mark)

12 Read the passage.

In 1928, a doctor named Alexander Fleming was working with a bacterium called *Staphylococcus*. He grew the bacteria on agar in glass dishes. Normally, the dishes were sealed with a glass lid. Some of the dishes were left without lids and became contaminated with a mould from the air. Fleming noticed that there were no bacteria growing near the mould.

Fleming thought that the mould was producing a substance that either killed the bacteria or inhibited their growth. To test his idea, Fleming produced a pure culture of the mould. He grew the mould in a broth. He added the broth to various types of bacterial cultures. The broth killed the bacteria even when diluted thousands of times. Fleming named the active substance produced by the mould, penicillin.

Penicillin was found to be effective against many human diseases.

- (a) What was Fleming's first observation?

.....
.....
(1 mark)

- (b) What was Fleming's theory to explain his observation?

.....
.....
.....
.....
(2 marks)

- (c) How did he test his theory?

.....
.....
.....
.....
(2 marks)

- (d) What was the result of his test?

.....

.....

(1 mark)

- (e) Before penicillin was used as a treatment for human diseases, it was tested on animals.
Explain why.

.....

.....

(1 mark)



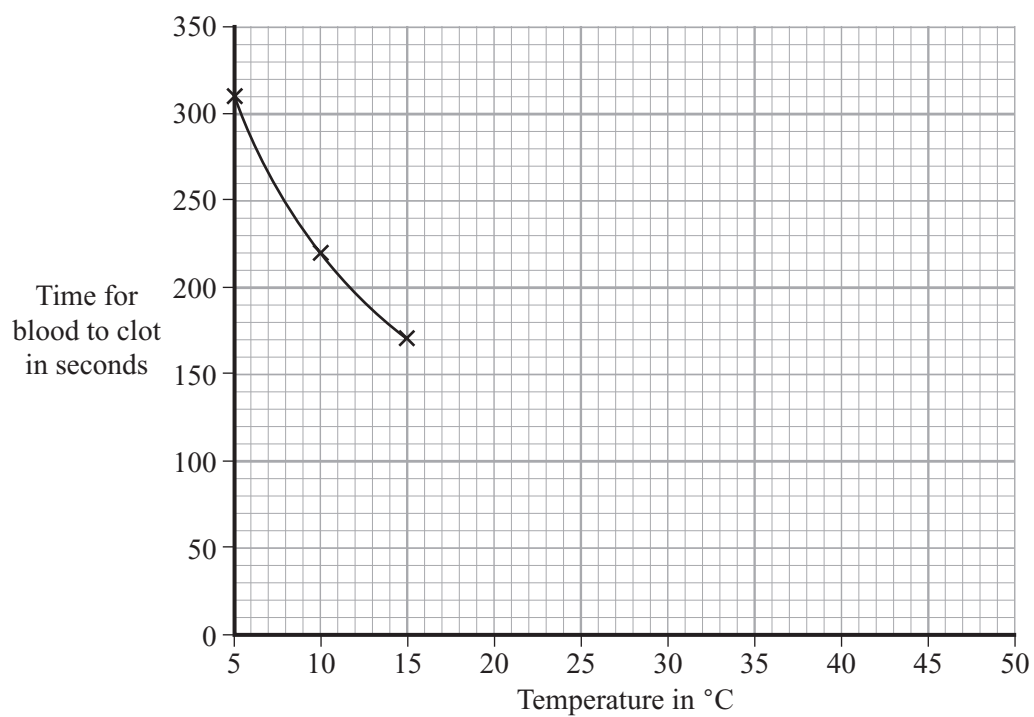
TURN OVER FOR THE NEXT QUESTION

Turn over ►

13 The table shows the times taken for blood to clot at different temperatures.

Temperature in °C	Time for blood to clot in seconds
5	310
10	220
15	170
20	130
25	90
30	60
35	50
40	60
45	90
50	300

(a) (i) Complete the graph.



(4 marks)

(ii) At what temperature does the blood clot the quickest?

.....
(1 mark)

(iii) Suggest a reason for this.

.....
.....
(1 mark)

(iv) What are the relationships between blood clotting and temperature as shown on the graph?

.....
.....
.....
.....
(2 marks)

(b) How does blood clotting help to prevent disease?

.....
.....
(1 mark)

9

TURN OVER FOR THE NEXT QUESTION

Turn over ►

14 (a) Give **two** functions of the skeleton.

1

.....

2

.....

(2 marks)

(b) Name the structures in a joint which:

(i) cover the ends of the bones and prevent friction;

.....

(1 mark)

(ii) hold the bones together;

.....

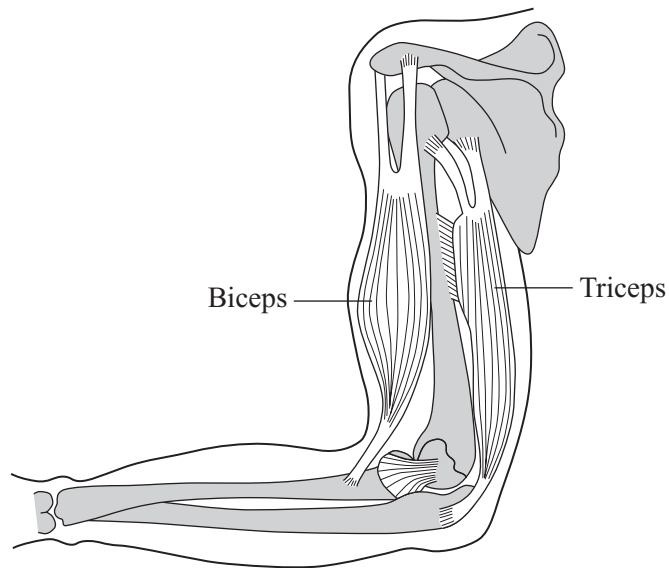
(1 mark)

(iii) attach a muscle to a bone.

.....

(1 mark)

(c) The diagram shows some of the muscles in the arm.



Explain how the biceps and triceps move the arm at the elbow.

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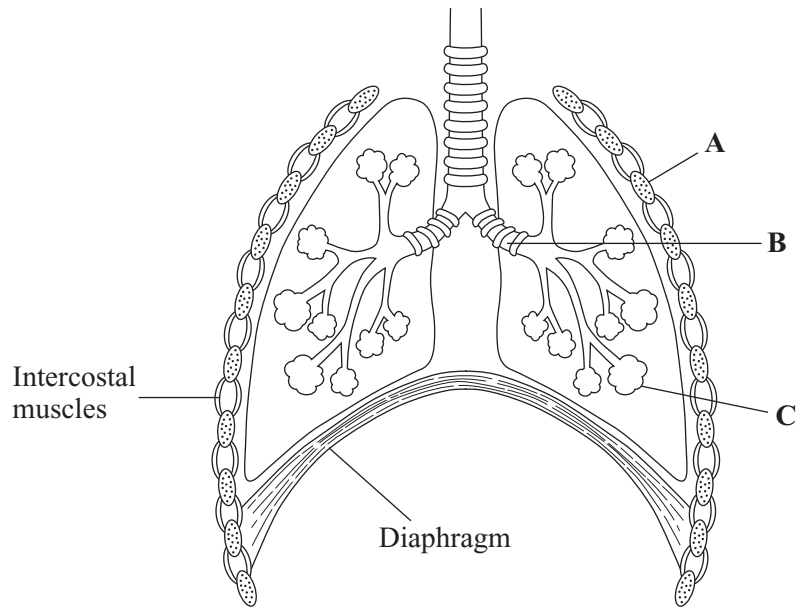
.....

.....

.....

(5 marks)

15 The diagram shows the breathing system.



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

A

B

C

(3 marks)

(b) Explain how the diaphragm and the intercostal muscles cause air to enter the lungs.

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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(5 marks)

- (c) The lining of the trachea has cells that make mucus and cells that have cilia. How do the mucus and cilia help to stop dust and microorganisms entering the lungs?

.....

.....

.....

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.....

.....

(2 marks)

- (d) During an asthma attack people have difficulty in breathing. A chemical can be inhaled to widen the air passages. Suggest how this helps the person to breathe more easily.

.....

.....

(1 mark)

END OF QUESTIONS

THERE ARE NO QUESTIONS PRINTED ON THIS PAGE