Version 1.1

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

Leave blank

General Certificate of Secondary Education
June 2003

HUMAN PHYSIOLOGY AND HEALTH FOUNDATION TIER

3417/F

F

Thursday 19 June 2003 9.00 am to 11.00 a m

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 the question paper. 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 all 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			
8			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

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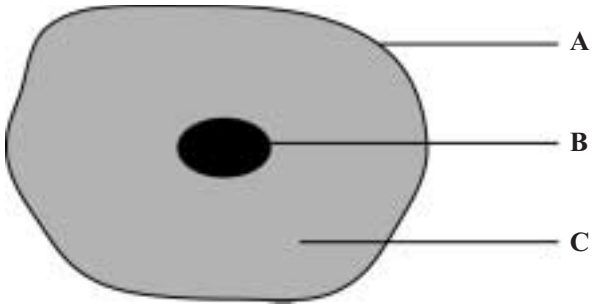
Answer **all** questions in the spaces provided.

1 (a) The diagram shows a human cell.



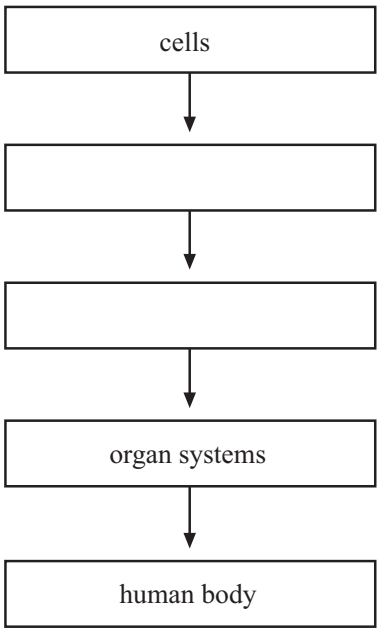
Give the letter of the structure which:

controls the entry of glucose; .....

contains chromosomes. .....

(2 marks)

(b) Complete the diagram to show how cells are organised to form the human body.



(2 marks)

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(c) Complete the table by writing the organ system to which each organ belongs. Choose from the list.

breathing system **digestive system** **nervous system**

reproductive system **skeletal system**

Organ	**Organ system**
Stomach	
Brain	
Lung	

(3 marks)

7

TURN OVER FOR THE NEXT QUESTION

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2 (a) Here is a list of diseases.

haemophilia **lung cancer** **obesity** **poliomyelitis** **rickets**

Which disease is caused by cigarette smoking? .....

Which disease is caused by lack of a vitamin? .....

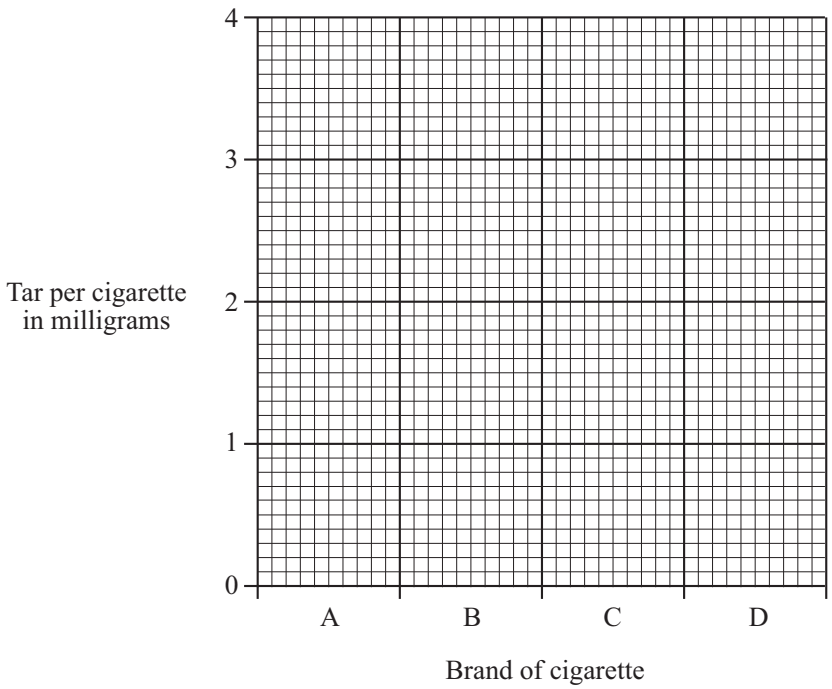
Which disease is caused by a microorganism? .....

(3 marks)

(b) The table shows the amount of tar in four brands of cigarette.

Brand	Tar per cigarette in milligrams
A	1.0
B	3.6
C	3.2
D	2.0

(i) Draw a bar chart of these figures.



(2 marks)

LEAVE MARGIN BLANK

(ii) Which brand of cigarette contains most tar? .....

(1 mark)

(iii) Name **one** other substance present in cigarette smoke.

.....

(1 mark)

(iv) Give **two** reasons why many people find it very difficult to stop smoking.

1 .....

.....

2 .....

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(2 marks)

9

TURN OVER FOR THE NEXT QUESTION

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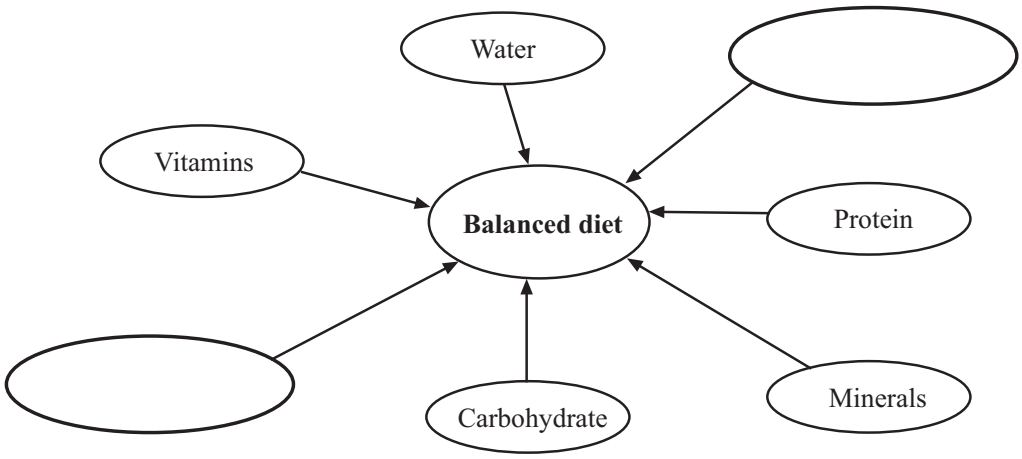
3 (a) The diagram shows some of the substances needed for a balanced diet.



Complete the diagram to show the missing substances.

(2 marks)

(b) The diagram shows a label from a pack of biscuits.

Chocolate Biscuits

Nutritional Information

Each 100 g of biscuit gives

ENERGY		1895 kJ
PROTEIN		7.3 g
CARBOHYDRATE		39.4 g
of which	STARCH	26.5 g
	SUGAR	12.9 g
FAT		23.5 g

(i) Which **two** substances together make up 50% of the weight of the biscuit?

..... and .....

(1 mark)

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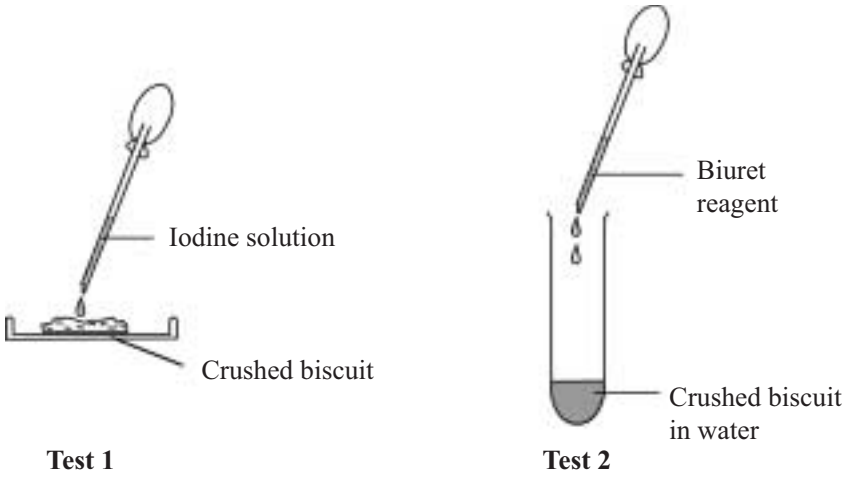
(ii) A student did the following tests on the biscuits.



What was the student testing for in **Test 1**; .....

Test 2? .....

(2 marks)

(iii) Describe how you would test the biscuit for reducing sugar. State the positive result of this test.

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 terms.

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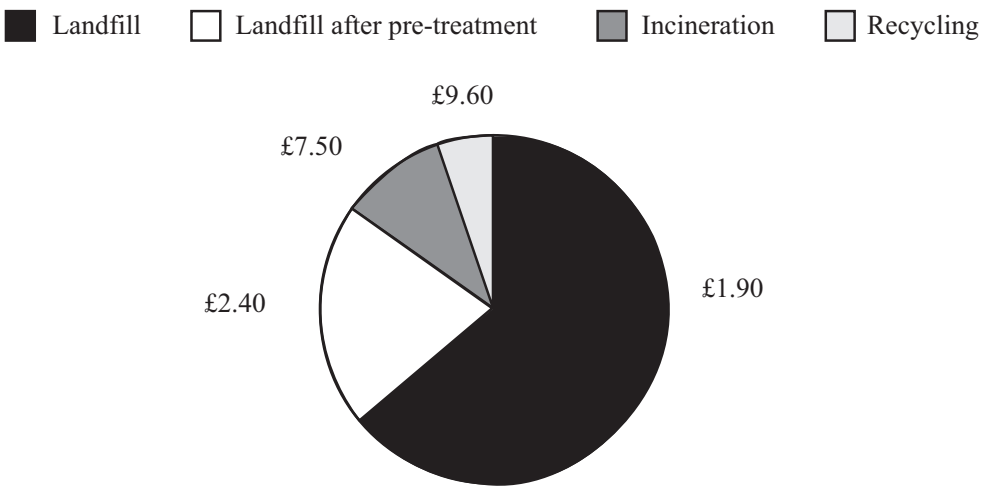
(4 marks)

9

Turn over ▶

LEAVE MARGIN BLANK

4 (a) The pie chart shows the proportions of domestic refuse disposed of by different methods and the cost per tonne of each method.



(i) What is the difference in the cost per tonne between incineration and recycling?

.....

(1 mark)

(ii) Not much domestic refuse is recycled. Use the information in the pie chart to explain why.

.....

(1 mark)

(iii) Calculate the cost of incinerating 2 million tonnes of refuse. Show your working.

£ .....

(2 marks)

(b) Name **two** materials found in domestic refuse that can be recycled.

1 .....

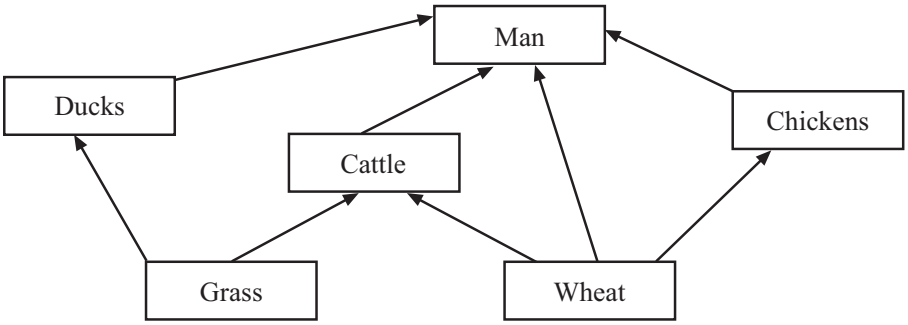
2 .....

(2 marks)

6

LEAVE MARGIN BLANK

5 The diagram shows a food web.



(a) Name the source of energy for this food web.

.....

(1 mark)

(b) The grass and the wheat are both producers. Explain why.

.....

.....

(1 mark)

(c) Man is described as an omnivore. Explain why.

.....

.....

(1 mark)

(d) From the food web, name an animal that feeds on both grass and wheat.

.....

(1 mark)

(e) From the food web, name **two** organisms that are eaten by man.

1 .....

2 .....

(2 marks)

(f) Man also eats potatoes. Add a box and an arrow on the food web to show this.

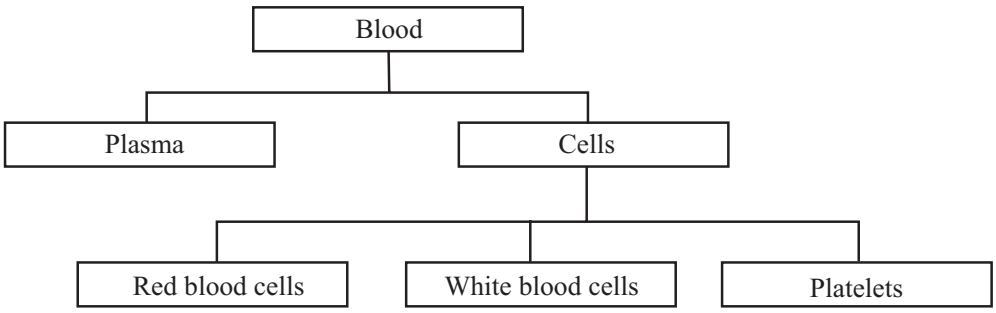
(1 mark)

7

Turn over ▶

LEAVE MARGIN BLANK

6 (a) The diagram shows the parts of the blood.



Which part of the blood

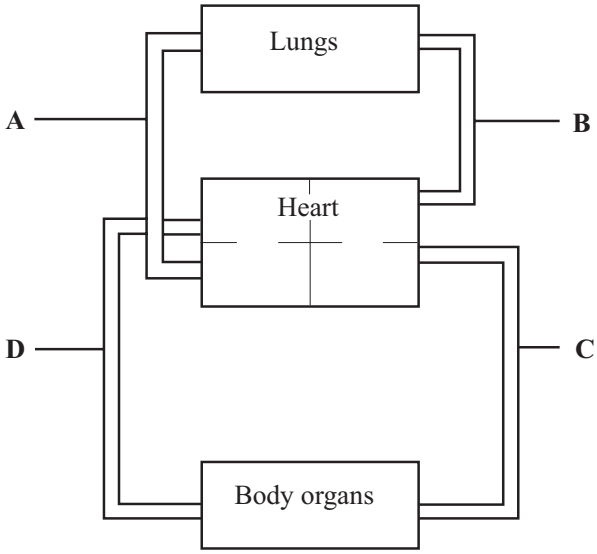
carries most oxygen; .....

ingests pathogens; .....

carries digested foods? .....

(3 marks)

(b) The diagram shows part of the circulation.



(i) Name the type of blood vessel labelled **D**. Choose from this list.

artery **capillary** **vein**

.....

(1 mark)

LEAVE MARGIN BLANK

(ii) What happens to the concentration of oxygen in the blood as it passes through the body organs?

.....

(1 mark)

(iii) Explain why this change occurs.

.....

.....

(1 mark)

(iv) Describe the route taken by the blood as it passes from the lungs to the body organs.

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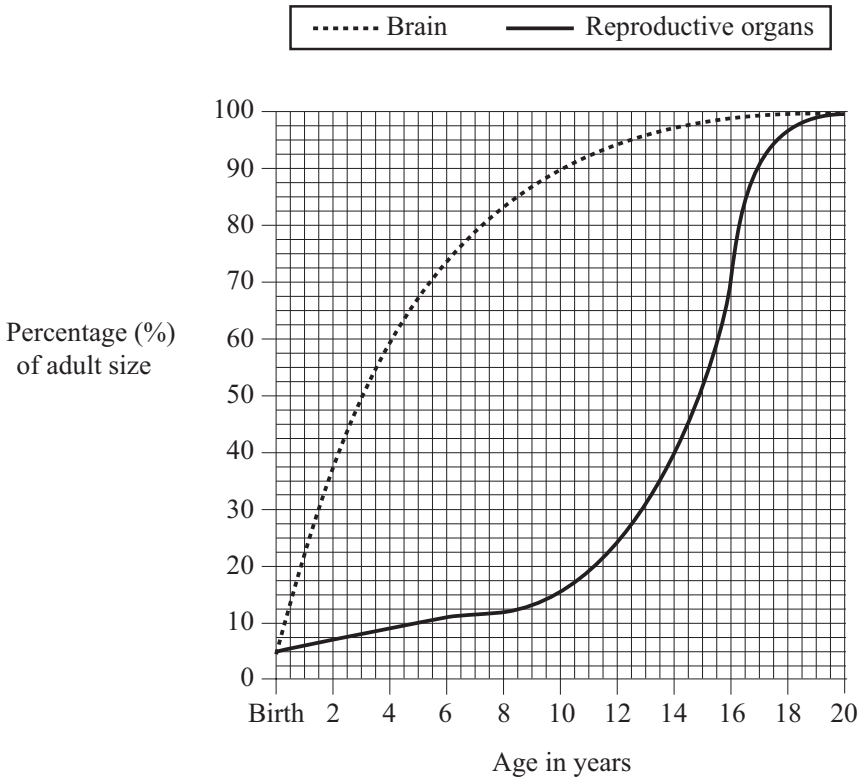
(3 marks)

9

TURN OVER FOR THE NEXT QUESTION

LEAVE MARGIN BLANK

7 (a) The graph shows the growth of the brain and reproductive organs from birth to age 20.



(i) At what age does the brain reach 90% of its adult size? ..... years
(1 mark)

(ii) What is the percentage increase in the size of the reproductive organs between the ages of 14 and 16?

..... %
(1 mark)

(iii) Between the ages of 12 and 16, the body goes through puberty. Compare the growth of the brain and reproductive organs between these ages.

.....

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.....

.....
(3 marks)

LEAVE MARGIN BLANK

(b) The table shows some of the changes that occur during adolescence. Tick (✓) the box opposite the **three** changes that occur in both males and females.

Change	Occurs in both males and females
Production of gametes	
Start of menstrual cycle	
Growth of pubic hair	
Voice breaks	
Growth of facial hair	
Increase in rate of growth	
Start of ovulation	

(3 marks)

8

TURN OVER FOR THE NEXT QUESTION

LEAVE MARGIN BLANK

8 (a) Choose **one** word from the list to match each of these definitions.

dominant **heterozygous** **homozygous** **recessive**

(i) An inherited characteristic that may be hidden in one generation.

.....

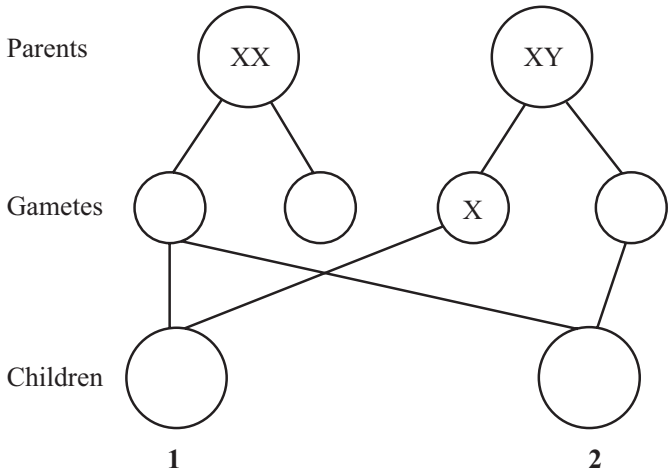
(1 mark)

(ii) Having a pair of alleles which are identical.

.....

(1 mark)

(b) (i) Complete the diagram showing the inheritance of sex.



(2 marks)

(ii) What is the sex of child **2**?

.....

(1 mark)

5

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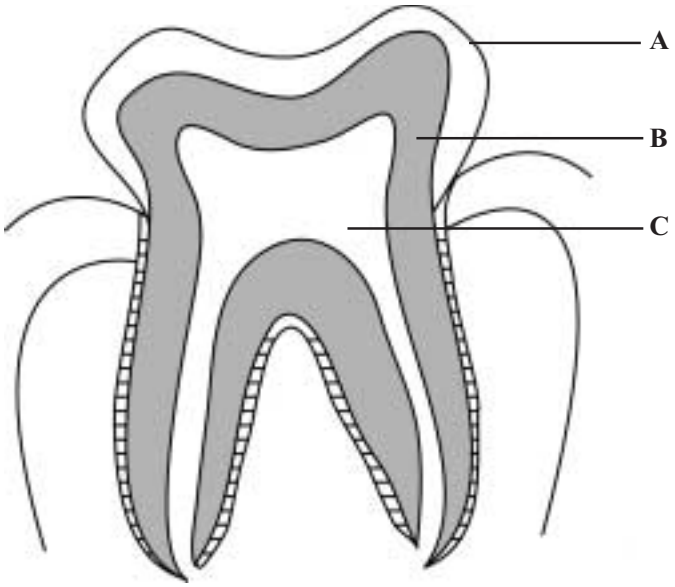
9 The diagram shows a vertical section of a tooth.



(a) Match **one** of the letters, **A**, **B** or **C**, from the diagram with each description.

It contains nerves and blood vessels. .....

It contains enamel. .....

(2 marks)

(b) State the function of this tooth. Explain how this tooth is adapted for this function.

Function: .....

.....

How it is adapted: .....

.....

(2 marks)

(c) Describe how tooth decay occurs.

.....

.....

.....

.....

.....

(3 marks)

7

Turn over ▶

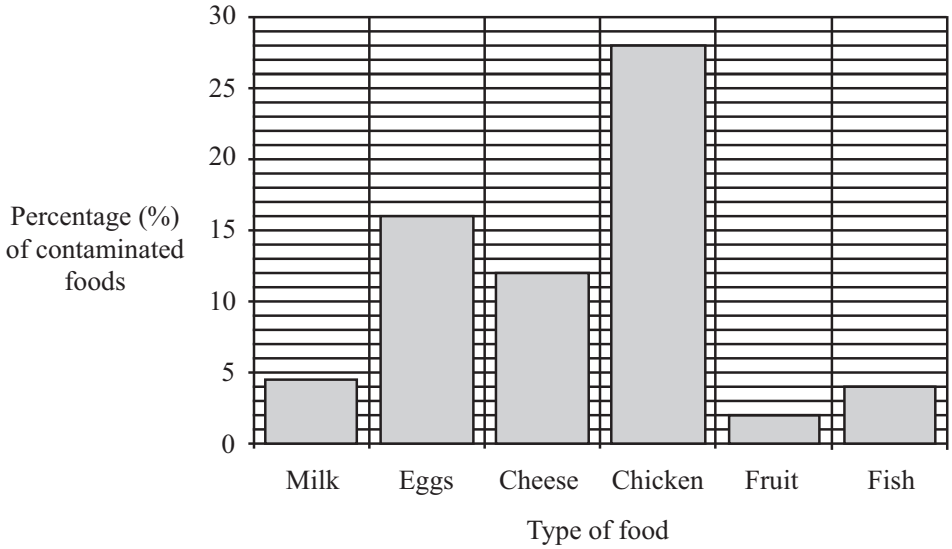
LEAVE MARGIN BLANK

10 (a) Name the type of organism which causes food poisoning.

.....

(1 mark)

(b) Fifty samples of each of six fresh foods were tested for the presence of organisms that cause food poisoning. The chart shows the percentage of foods that were contaminated.



(i) Which type of food is most likely to cause food poisoning?

.....

(1 mark)

(ii) Calculate the number of samples of eggs that were contaminated. Show your working.

.....

(2 marks)

LEAVE MARGIN BLANK

(c) Pasteurisation is one method used to preserve milk.

(i) Describe how this process is carried out.

.....

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.....

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.....

(4 marks)

(ii) Name **one** other method used to preserve milk.

.....

(1 mark)

9

TURN OVER FOR THE NEXT QUESTION

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11 (a) There are two types of respiration that occur in the body, aerobic respiration and anaerobic respiration.

(i) State **two** ways in which they are similar.

1 .....

2 .....

(2 marks)

(ii) State **one** way in which they are different.

.....

(1 mark)

(b) Give **two** ways in which the body uses energy released during respiration.

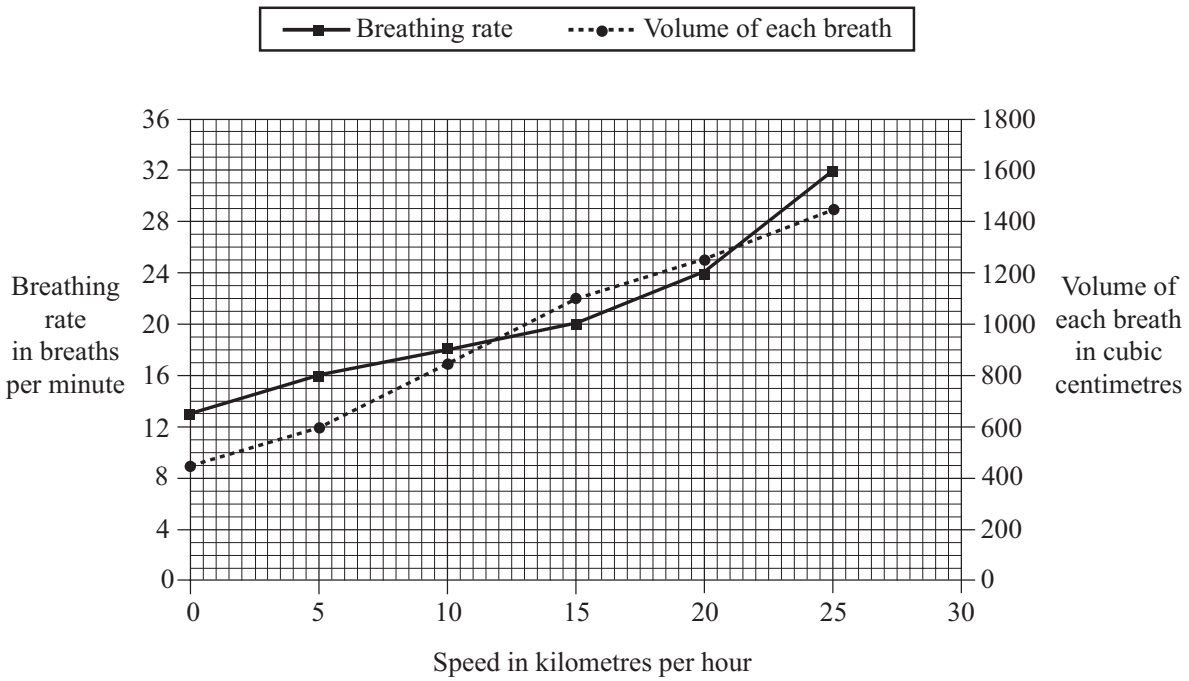
.....

.....

.....

(2 marks)

(c) When a person runs faster, they breathe faster and the volume of each breath increases. The graph shows these changes.



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(i) How many breaths per minute were taken when the person was running at 10 kilometres per hour?

..... breaths per minute
(1 mark)

(ii) What was the volume of each breath when the person was running at 15 kilometres per hour?

..... cubic centimetres
(1 mark)

(iii) Calculate the volume of air entering the lungs each minute when the person was running at 20 kilometres per hour. Show your working.

..... cubic centimetres
(2 marks)

(iv) Describe the benefits of increasing the breathing rate and the volume of each breath when the level of activity increases.

.....

.....

.....

.....
(2 marks)

11

TURN OVER FOR THE NEXT QUESTION

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12 (a) What is meant by excretion?

.....

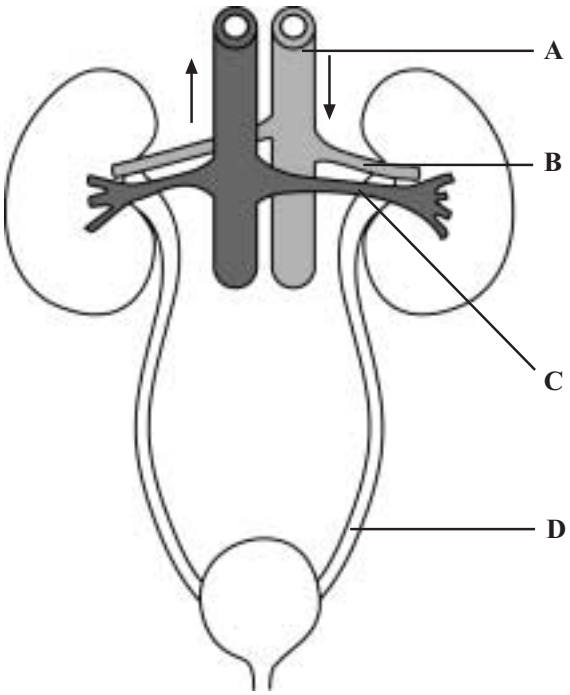
.....

.....

.....

(2 marks)

(b) The diagram shows the kidneys and associated blood vessels.



(i) Which blood vessel, **A**, **B** or **C**, takes blood into the kidneys? .....

(1 mark)

(ii) What is the function of structure **D**?

.....

.....

(1 mark)

LEAVE MARGIN BLANK

(c) The table shows the percentage of various substances in structures **A** and **D**.

Substance	Percentage concentration	
	A	**D**
Urea	0.03	2.00
Glucose	0.10	0.00
Amino acids	0.05	0.00
Protein	8.00	0.00
Salts	0.72	1.50

(i) Using only the information in the table, give **one** function of the kidneys.

.....

.....

(1 mark)

(ii) Eating a meal containing a large amount of meat changes the percentage concentration of urea in **D**. Explain how this happens.

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 terms.

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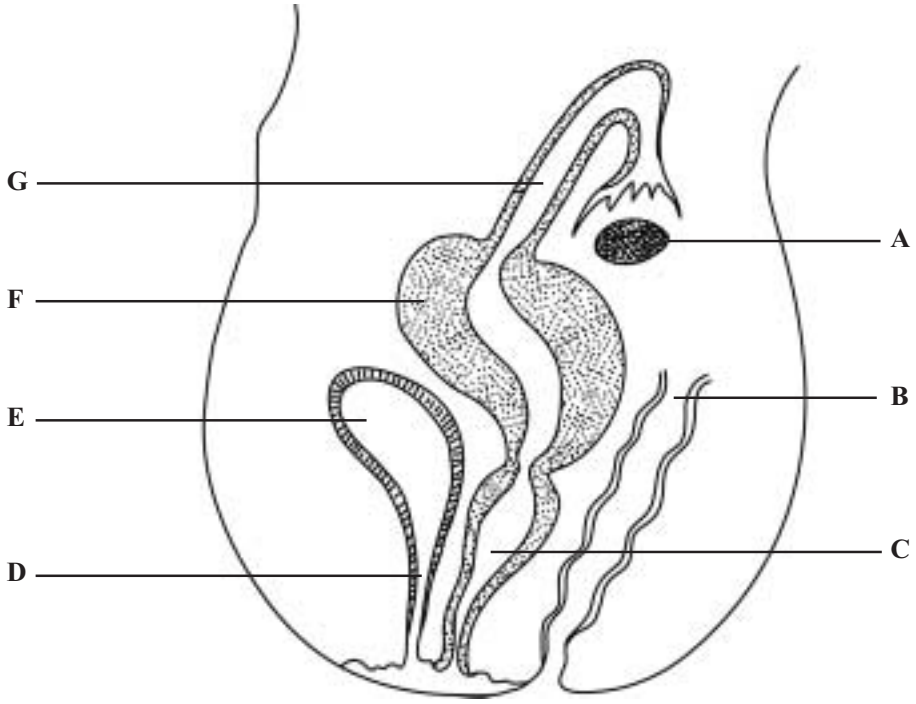
(5 marks)

10

Turn over ▶

LEAVE MARGIN BLANK

13 (a) The diagram shows the female reproductive system.



Match **one** of the letters, **A**, **B**, **C**, **D**, **E**, **F** or **G**, from the diagram with each of the following:

receives sperm during intercourse; .....

contracts during childbirth; .....

produces eggs. .....

(3 marks)

(b) (i) Name the organ that makes sperm.

.....

(1 mark)

LEAVE MARGIN BLANK

(ii) After being released into the female body, a sperm fertilises the egg. Describe how sperm reach the egg and how fertilisation takes place.

.....

.....

.....

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.....

(4 marks)

(c) Describe how non-identical twins are formed.

.....

.....

.....

.....

(2 marks)

QUESTION 13 CONTINUES ON THE NEXT PAGE

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(d) Read the passage.

> Ovranette is a combined oral contraceptive, commonly called the 'pill'. It is taken for 21 days of the menstrual cycle. The 'pill' contains two naturally occurring female hormones, oestrogen and progesterone. These hormones stop the release of eggs. They also thicken the mucus in the cervix and alter the lining of the uterus.
>
> Experience has shown that, taken correctly, the 'pill' is an extremely effective method of contraception.
>
> Women who take the 'pill' have a slightly increased risk of developing a blood clot inside an artery or vein (thrombosis). Breast cancer has been found more often in women taking the 'pill'.

(i) The 'pill' is a female form of contraception. Name a male form of contraception.

.....

.....

(1 mark)

(ii) Name the female organ that produces oestrogen and progesterone.

.....

(1 mark)

(iii) How do the following prevent pregnancy?

Stopping the release of eggs .....

.....

.....

Thickening the mucus in the cervix .....

.....

.....

Altering the lining of the uterus .....

.....

.....

(3 marks)

(iv) Suggest why some women get pregnant even when taking the 'pill'.

.....

.....

(1 mark)

16

LEAVE MARGIN BLANK

14 (a) Read the following passage.

> In England, in the early 18th century, smallpox was a very common viral disease that was often fatal. In 1717, attempts were made to protect people by injecting them with small amounts of matter from the sores of smallpox victims. Some of these attempts were successful but the majority resulted in death.
>
> In 1796, Edward Jenner noticed that many dairy maids suffered from cowpox, a viral disease of cows. These dairy maids did not catch smallpox. Jenner became convinced that infection with cowpox could protect people from developing smallpox.
>
> Jenner tested his idea in the following way: he removed some infected matter from a sore of a dairy maid suffering from cowpox. This matter was injected into the blood of a healthy, young boy whose family were infected with smallpox. Seven weeks later, the boy had not developed smallpox despite close contact with his family.
>
> Jenner decided to confirm his idea by injecting the boy with smallpox. The boy did not develop the disease.
>
> Jenner carried out several further experiments and published his work, but his ideas were not accepted by other scientists for several years.

(i) What observation did Jenner make?

.....

.....

(1 mark)

(ii) What theory did Jenner develop?

.....

.....

.....

.....

(2 marks)

(iii) What was the result of Jenner's test on the boy?

.....

.....

(1 mark)

LEAVE MARGIN BLANK

(iv) Suggest **one** other possible explanation for Jenner's results.

.....

.....

(1 mark)

(v) What reasons could other scientists have for not accepting Jenner's ideas?

.....

.....

(1 mark)

(b) Suggest **one** reason why modern vaccines are usually tested on animals before being used on humans.

.....

.....

(1 mark)

7

END OF QUESTIONS