Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

Leave blank

General Certificate of Secondary Education
June 2006

AQA
ASSESSMENT and QUALIFICATIONS ALLIANCE

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

F

Friday 23 June 2006 9.00 am to 11.00 am

For this paper you must have:
- a ruler

You may use a calculator.

Time allowed: 2 hours

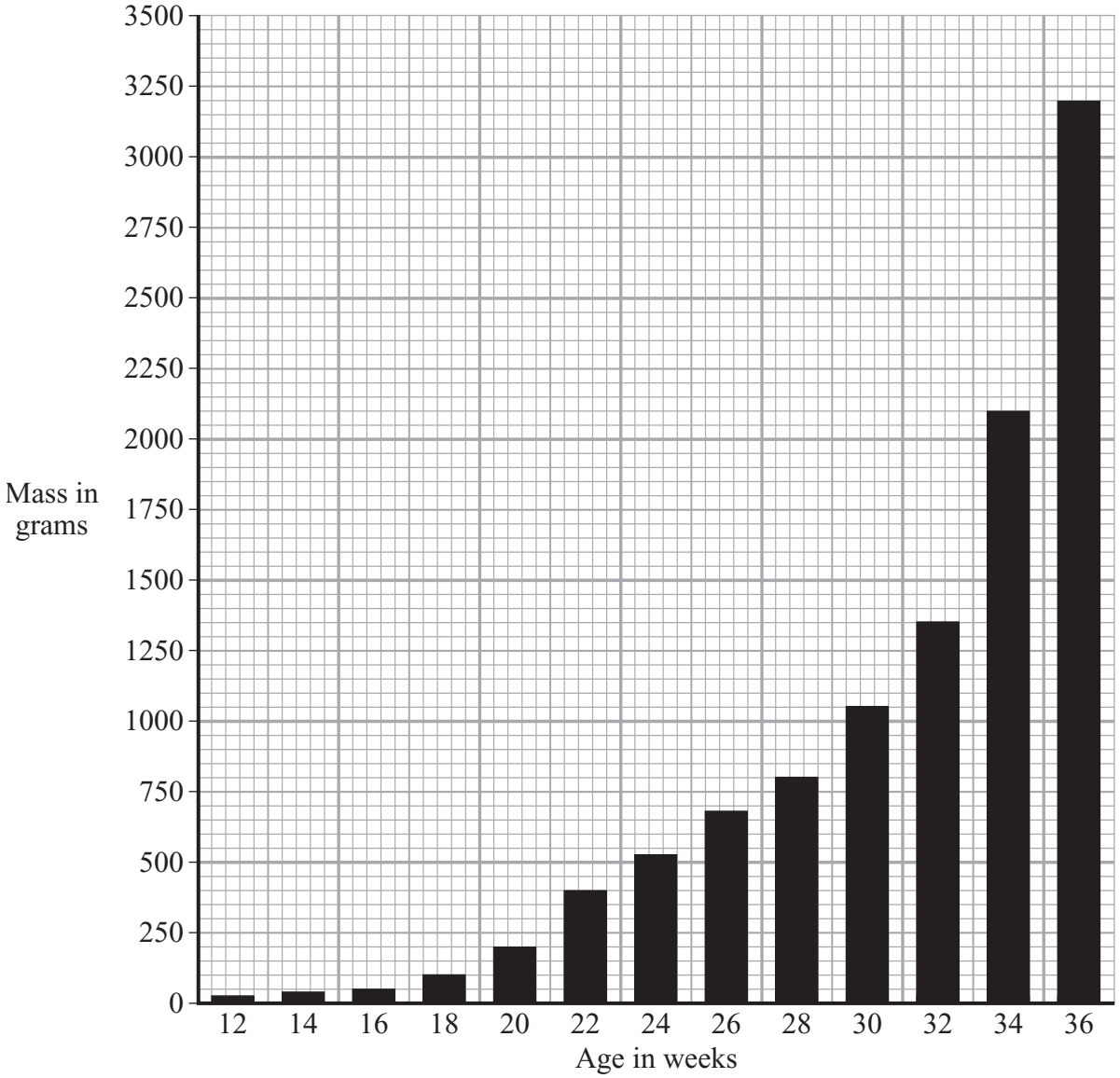
Instructions
- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

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

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

1 (a) The chart shows the change in mass of a fetus between 12 weeks and 36 weeks.



What was the age of the fetus when its mass was 800 grams?

.....

(1 mark)

(b) The rate of growth of the fetus varies.
The rate of growth per week between 18 and 28 weeks can be calculated using the formula:

$$\frac{\text{mass at 28 weeks} - \text{mass at 18 weeks}}{\text{10 weeks}}$$

Use the formula to work out the rate of growth between 18 and 28 weeks.

rate of growth = ... grams per week
(2 marks)

(c) During its development, the fetus receives soluble food substances from the mother.

(i) Name **two** soluble food substances that pass from the mother to the fetus.

1.....

2.....
(2 marks)

(ii) Name a waste product that passes from the fetus to the mother.

.....
(1 mark)

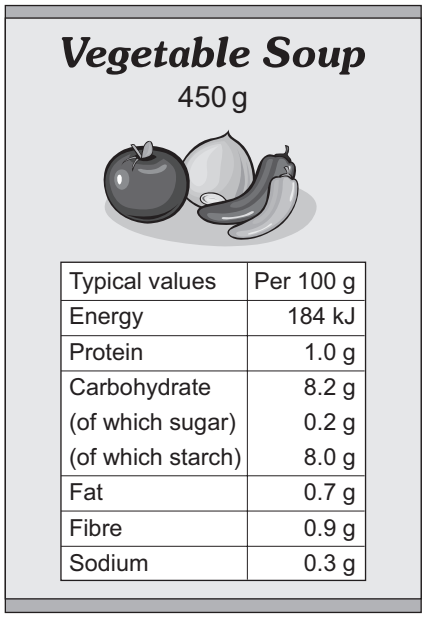
(iii) Which process transfers substances from the mother to the fetus?

.....
(1 mark)

7

Turn over for the next question

2 (a) The diagram shows the nutrients in a can of soup.



Typical values	Per 100 g
Energy	184 kJ
Protein	1.0 g
Carbohydrate	8.2 g
(of which sugar)	0.2 g
(of which starch)	8.0 g
Fat	0.7 g
Fibre	0.9 g
Sodium	0.3 g

(i) Which of the nutrients in the soup is the main source of energy?

.....

.....

(1 mark)

(ii) Calculate the amount of fat in a full can of soup.
Show your working.

..... grams

(2 marks)

(b) (i) Describe how you would test for reducing sugar in the soup.

.....

.....

.....

.....

.....

(2 marks)

(ii) Give the result if the test was positive.

.....

(1 mark)

(c) Name the substances formed when starch and fats are digested.

(i) Starch .....

(1 mark)

(ii) Fats ..... and .....

(2 marks)

(d) (i) Explain why food needs to be digested.

.....

.....

.....

.....

.....

.....

(3 marks)

(ii) What is the function of fibre in the diet?

.....

.....

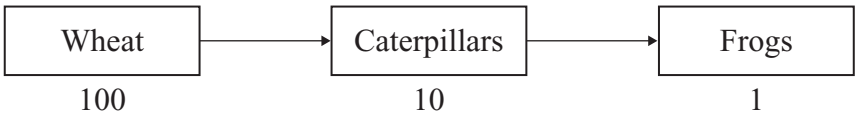
(1 mark)

13

Turn over for the next question

3 The diagram shows a food chain.

The numbers represent the amount of energy at each stage in the food chain.



(a) (i) Which organism in this food chain is a producer?

.....

(1 mark)

(ii) What is the importance of the producer in a food chain?

.....

.....

.....

.....

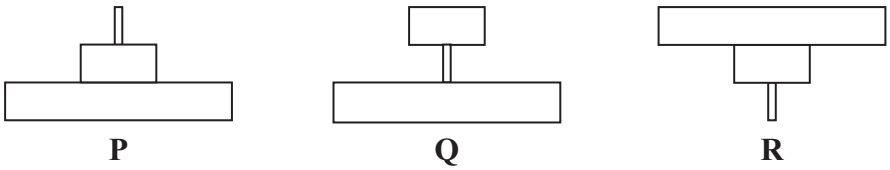
(2 marks)

(iii) Which organism in this food chain is a carnivore?

.....

(1 mark)

(b) Which of the following diagrams represents the pyramid of energy for this food chain?



.....

(1 mark)

(c) Explain why the amount of energy in the organisms decreases as it passes along the food chain.

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

(d) When frogs die, what happens to their bodies?

Explain your answer.

.....

.....

.....

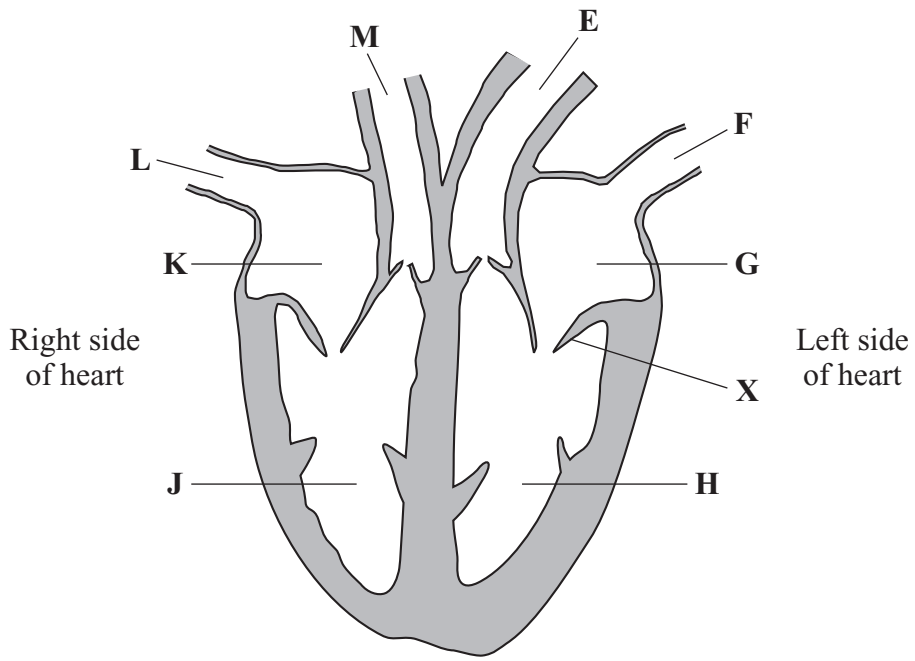
.....

(2 marks)

11

Turn over for the next question

4 (a) The diagram shows a section of the heart.

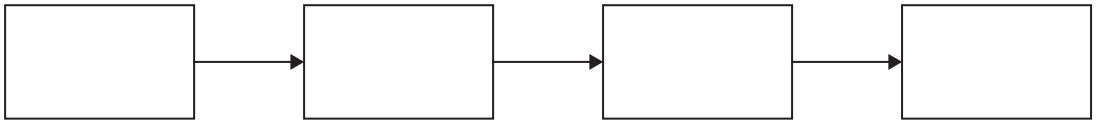


(i) What is the function of the structure labelled **X**?

.....

(1 mark)

(ii) Use letters from the diagram to show the path taken by the blood as it passes through the right side of the heart.



(3 marks)

(b) Complete the table by writing in the name of the blood vessels which carry out the functions given in the table.

Choose from the list.

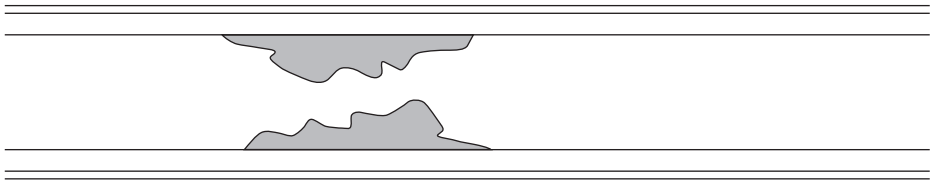
coronary artery **hepatic portal vein** **pulmonary artery**

pulmonary vein **renal artery** **renal vein**

Function	Blood vessel
Carries blood from the lungs to the heart	
Carries blood into the kidney	
Carries blood to the heart muscle	

(3 marks)

(c) The diagram shows a section of an artery which carries blood to the heart muscle.



Explain how the condition shown in the diagram may develop and lead to a heart attack.

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.

.....

.....

.....

.....

.....

.....

.....

.....

.....

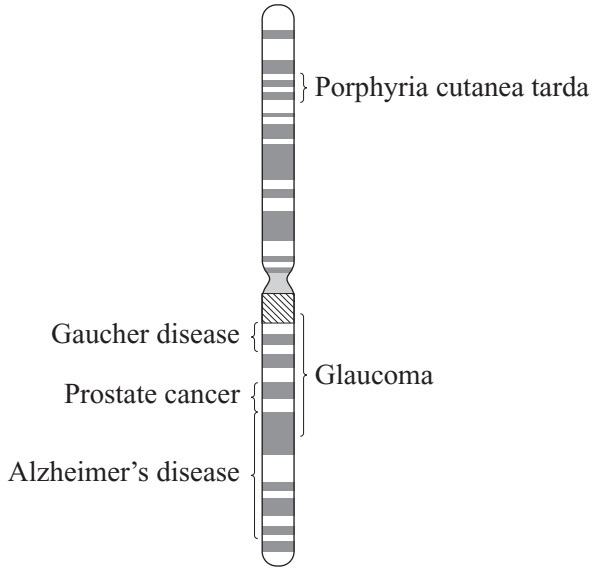
.....

(5 marks)

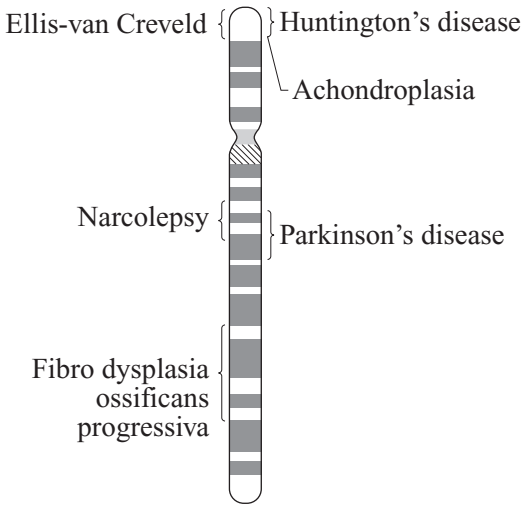
12

5 (a) The diagrams show chromosome maps for six human chromosomes and the diseases associated with them.

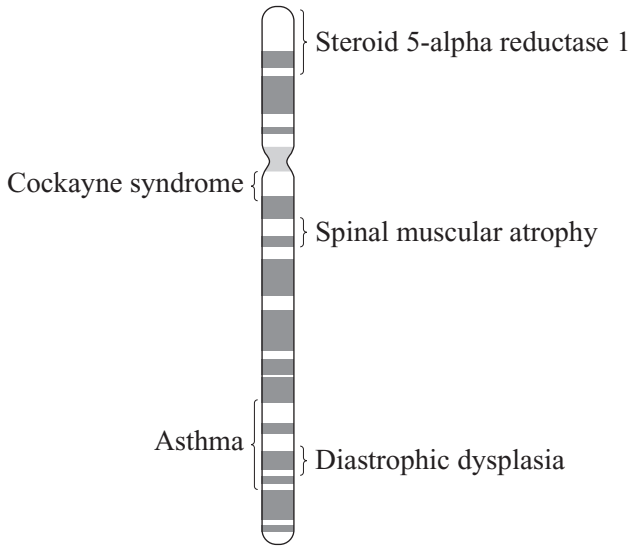
Chromosome 1 (3000 genes)



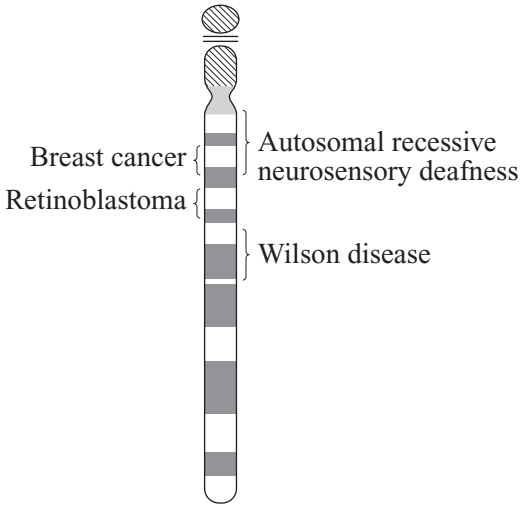
Chromosome 4 (1600 genes)



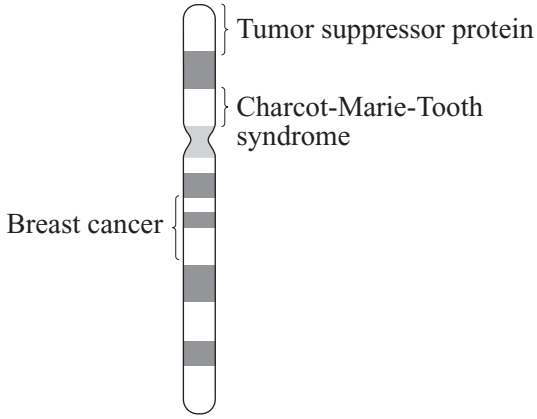
Chromosome 5 (1700 genes)



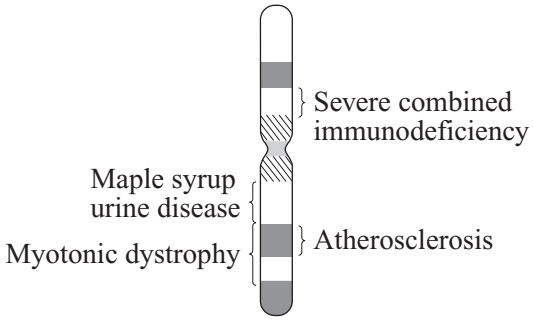
Chromosome 13 (800 genes)



Chromosome 17 (1600 genes)



Chromosome 19 (1700 genes)



(i) Which chromosome has the most genes?

.....

(1 mark)

(ii) Which chromosome has the gene for retinoblastoma?

.....

(1 mark)

(iii) Which chromosome has the most diseases associated with it?

.....

(1 mark)

(b) Complete the table using words from the list.

allele **genotype** **heterozygous** **homozygous** **phenotype**

Description	Name
The genetic make-up of a person	
A form of a gene	
The expression of a gene	

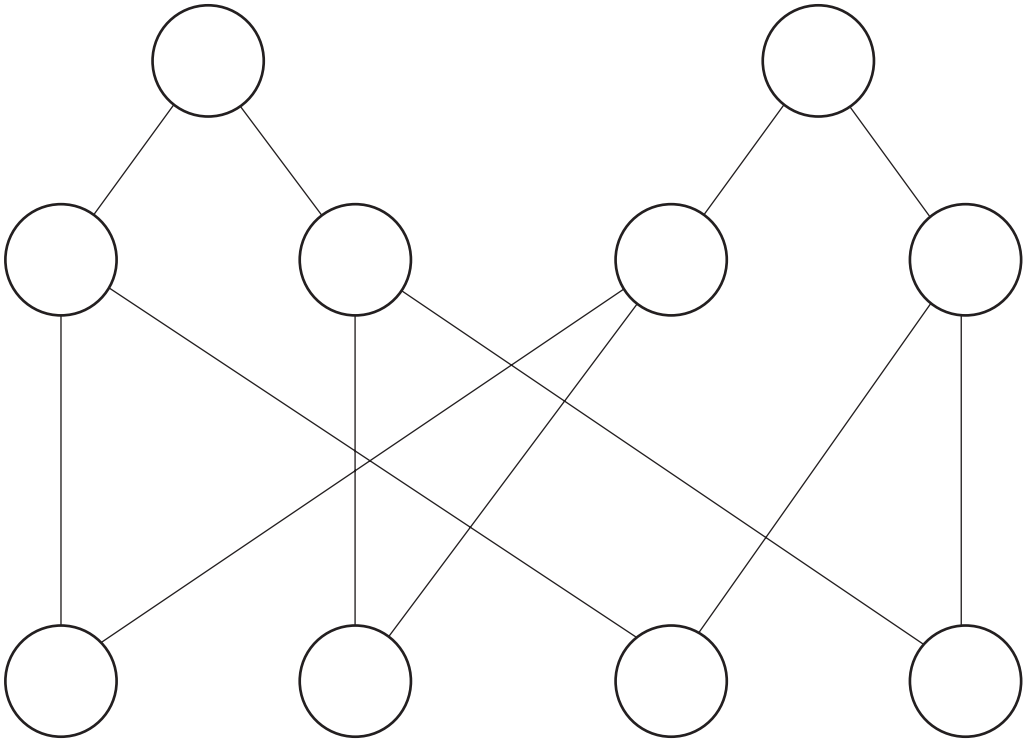
(3 marks)

Question 5 continues on the next page

(c) Ellis-van Creveld syndrome is a genetic condition which leads to dwarfism and polydactyly (additional fingers or toes).
The condition is caused by the recessive allele, **e**.

Complete the diagram to show how a couple who do not have the condition may have a child who does have the condition.

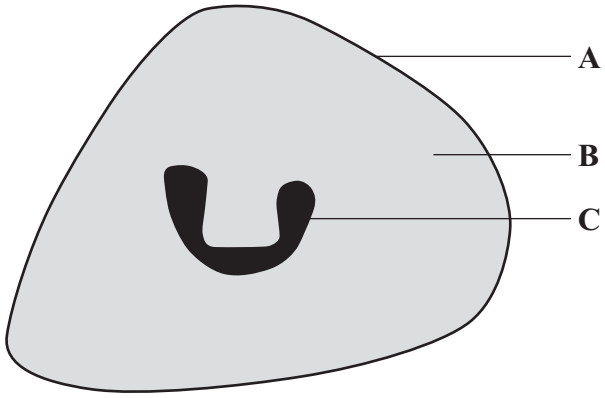
Use the symbols:
E for **not** having the condition;
e for having the condition.



(4 marks)

10

6 The diagram shows a human cell.



(a) Match a letter from the diagram with each of the following:

(i) nucleus; .....
(1 mark)

(ii) cytoplasm; .....
(1 mark)

(iii) cell membrane. .....
(1 mark)

(b) In which part, **A**, **B** or **C**, are chromosomes found? .....
(1 mark)

(c) Complete the sentences by naming the organs in which the following structures can be found.

Semi-lunar valves are found in the ..... .

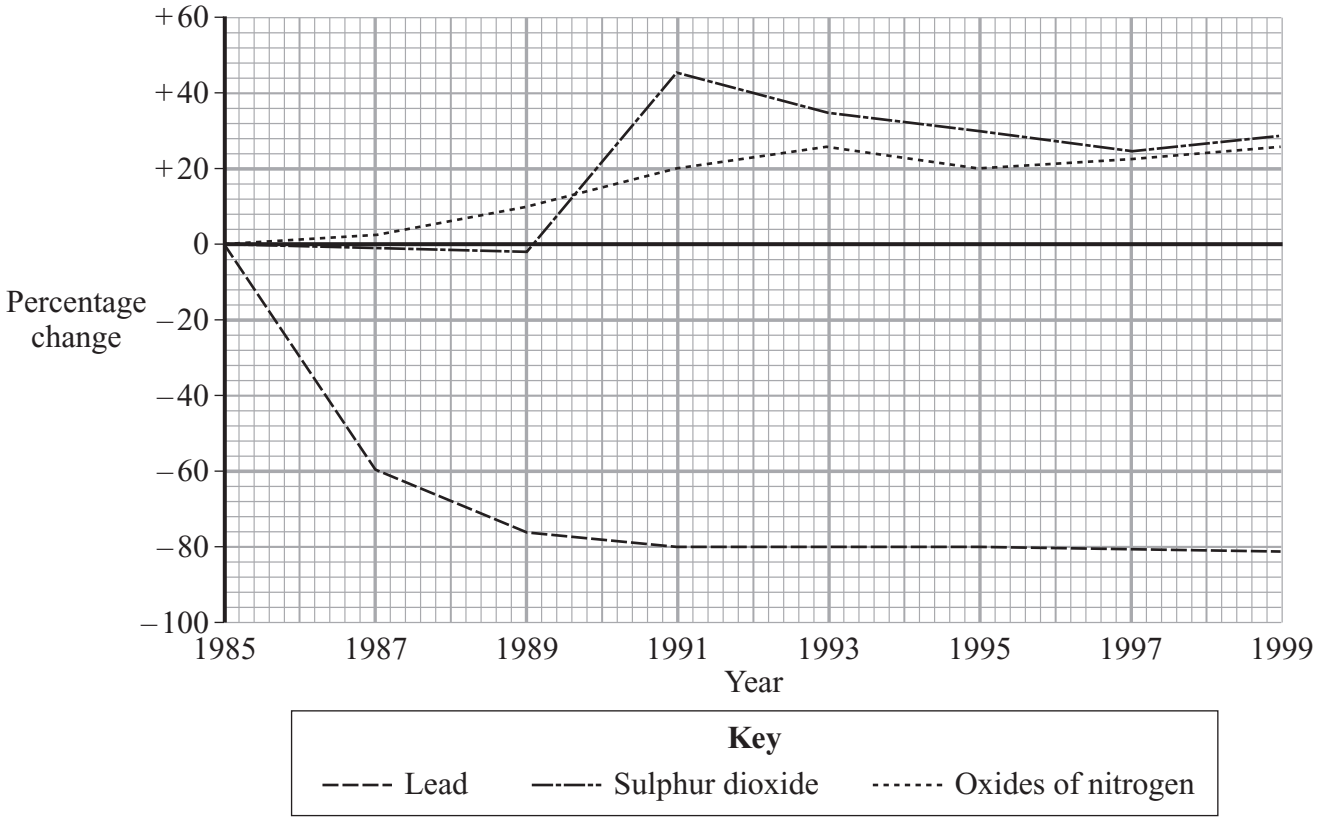
Renal capsules are found in the ..... .

Alveoli are found in the ..... .
(3 marks)

7

Turn over for the next question

7 (a) The graph shows the changes in the amounts of some pollutants released into the atmosphere between 1985 and 1999.



(i) By how much did the amount of lead released change between 1985 and 1989?

.....

(1 mark)

(ii) Over which **two** year period did the amount of sulphur dioxide released decrease by 10 %?

between ..... and .....

(1 mark)

(iii) The graph does **not** give a completely accurate picture of air pollution.

Suggest **two** reasons for this.

1.....

.....

2.....

.....

(2 marks)

(iv) Between 1985 and 1993 there was a continuous increase in energy use.

Suggest **two** reasons for this increase.

1.....

.....

2.....

.....

(2 marks)

(b) Name **two** gases that may contribute to global warming.

1 .....

2 .....

(2 marks)

(c) Explain how chlorofluorocarbons (CFCs) can increase the chance of getting skin cancer.

.....

.....

.....

.....

.....

(2 marks)

10

Turn over for the next question

8 (a) The table shows how bacteria are affected by temperature.

Temperature in ºC	Effect on bacteria
– 30 to – 5 Temperature of freezer	Bacteria alive but unable to reproduce
0 to 5 Temperature of refrigerator	Bacteria reproduce very slowly
10 to 18	Bacteria reproduce slowly
20 to 45	Bacteria grow and reproduce rapidly
60 to 110	Most bacteria killed
111 to 140	Bacterial spores killed

(i) Pasteurised milk is made by heating the milk to 72 ºC for 15 seconds and then immediately cooling it to 10 ºC.
Sterilised milk is made by heating the milk to 133 ºC.

Explain why pasteurised milk does not stay fresh as long as sterilised milk.

.....

.....

.....

.....

.....

.....

(3 marks)

(ii) A piece of frozen meat is defrosted at room temperature for 12 hours.

Explain why it is important to cook this meat thoroughly.

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.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(5 marks)

(b) A careless chef prepared cooked chicken on a work surface where raw chicken had also been prepared.

Explain why contamination of the cooked chicken is more dangerous than contamination of the raw chicken.

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

12

9 (a) What is cancer?

.....

.....

(1 mark)

(b) Give **two** possible causes, other than cigarette smoking, of cancer.

1 .....

2 .....

(2 marks)

(c) Read the following account of a study of the relationship between smoking and lung cancer.

> The study took place between 1951 and 2001 and involved 34 439 male British doctors. Information about their smoking habits was obtained in 1951 and at intervals after that.
> The study revealed the following:
>
> Men born between 1900 and 1930 who smoked only cigarettes and continued smoking died on average about 10 years earlier than lifelong non-smokers.
>
> Stopping smoking increased life expectancy.
>
> Stopping at age 30 increased life expectancy by 10 years.
>
> Stopping at age 40 increased life expectancy by 9 years.
>
> Stopping at age 50 increased life expectancy by 6 years.
>
> Stopping at age 60 increased life expectancy by 3 years.
>
> For men born between 1900 and 1909, the probability of dying in middle age (35 – 69) was 42 %. For men born in the 1920s, the probability of dying in middle age was 43 %.

(i) How many people took part in the study?

.....

(1 mark)

(ii) Of the men born between 1900 and 1930, how did the life expectancy of those who smoked only cigarettes and continued smoking compare with lifelong non-smokers?

.....

.....

(1 mark)

(iii) By how much did life expectancy increase if a man gave up smoking:

aged 30; .....

aged 50? .....

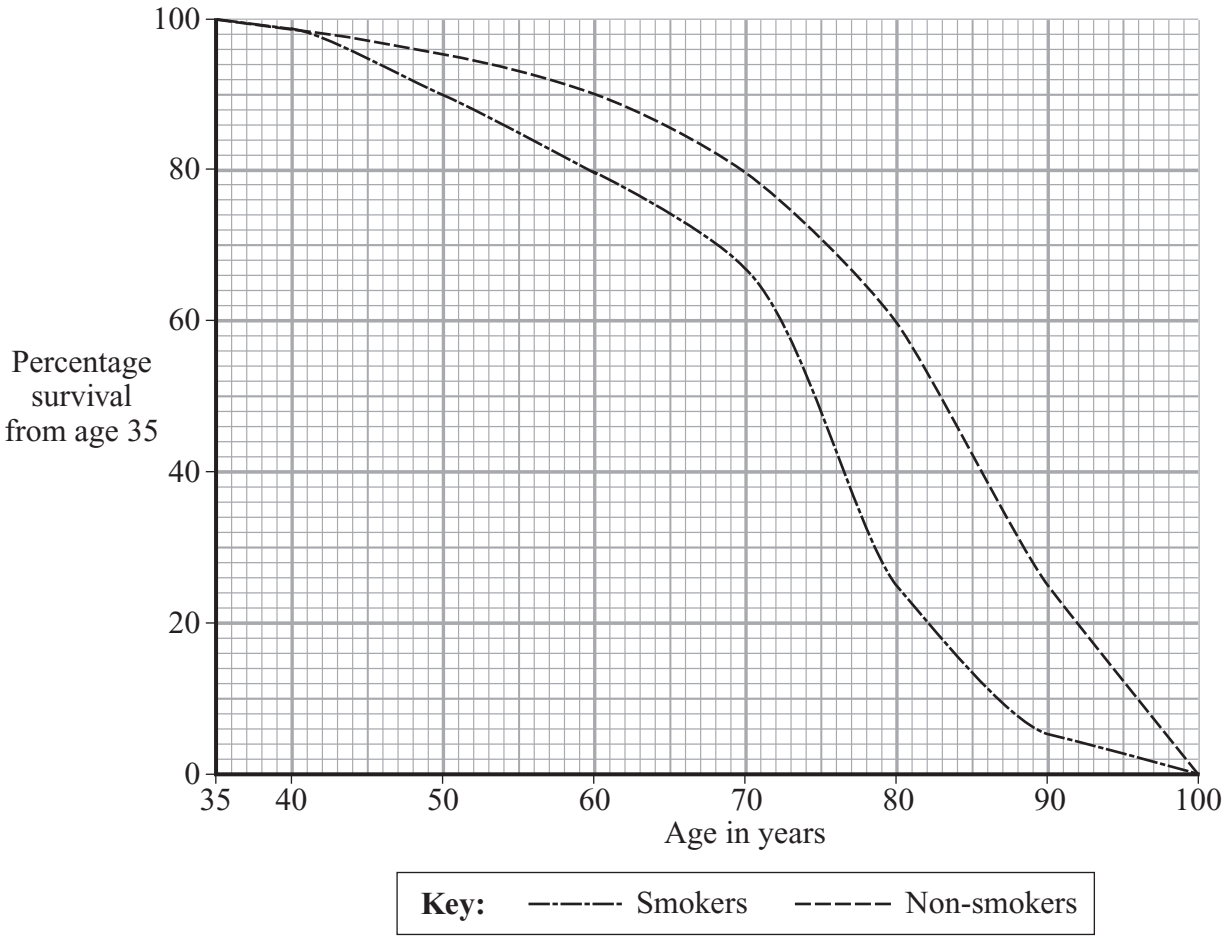
(2 marks)

(iv) What was the probability of a cigarette smoker, born in 1906, dying in middle age (35 – 69)?

.....

(1 mark)

(d) The graph shows some of the data from the study.



(i) What was the difference in the percentage of smokers and non-smokers aged 35 who survived to reach 80 years of age?

.....

(1 mark)

(ii) To what age did 90 % of smokers aged 35 survive?

.....

(1 mark)

10

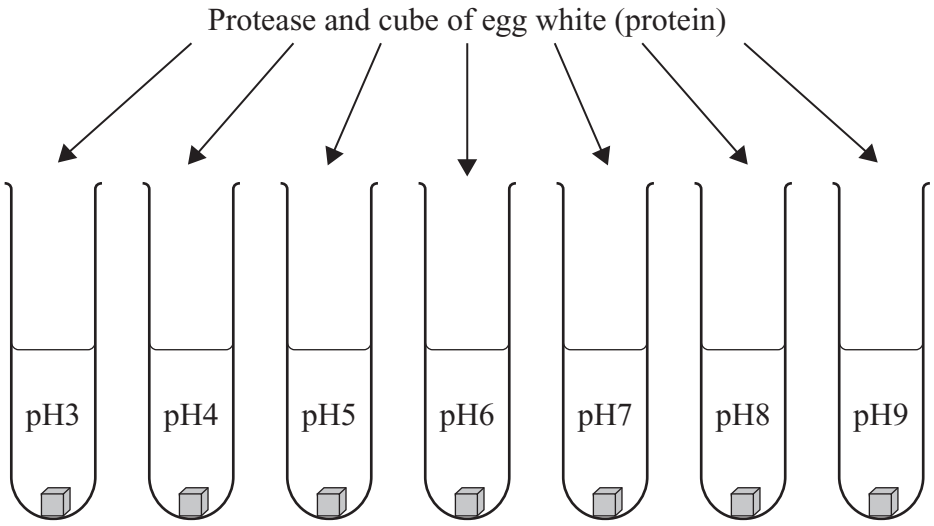
10 (a) Name **two** parts of the digestive system where protease enzymes act.

1 .....

2 .....

(2 marks)

(b) A student carried out an investigation to find the effect of pH on the activity of a protease enzyme.
The following apparatus was set up.



The table shows the results.

pH	3	4	5	6	7	8	9
Time for cube to dissolve in minutes	78	65	84	95	115	did not dissolve	did not dissolve

(i) What would be the most suitable temperature for this investigation?

.....

(1 mark)

(ii) At what pH was the enzyme most active?

.....

(1 mark)

(iii) Explain why the cube of egg white dissolved.

.....

.....

.....

.....

(2 marks)

6

Turn over for the next question

11 (a) Give **two** ways in which the body makes use of energy.

1 .....

.....

2 .....

.....

(2 marks)

(b) (i) Energy is released by the process of respiration.

Complete this equation for respiration.

Oxygen	+		→	Carbon dioxide	+		+	Energy

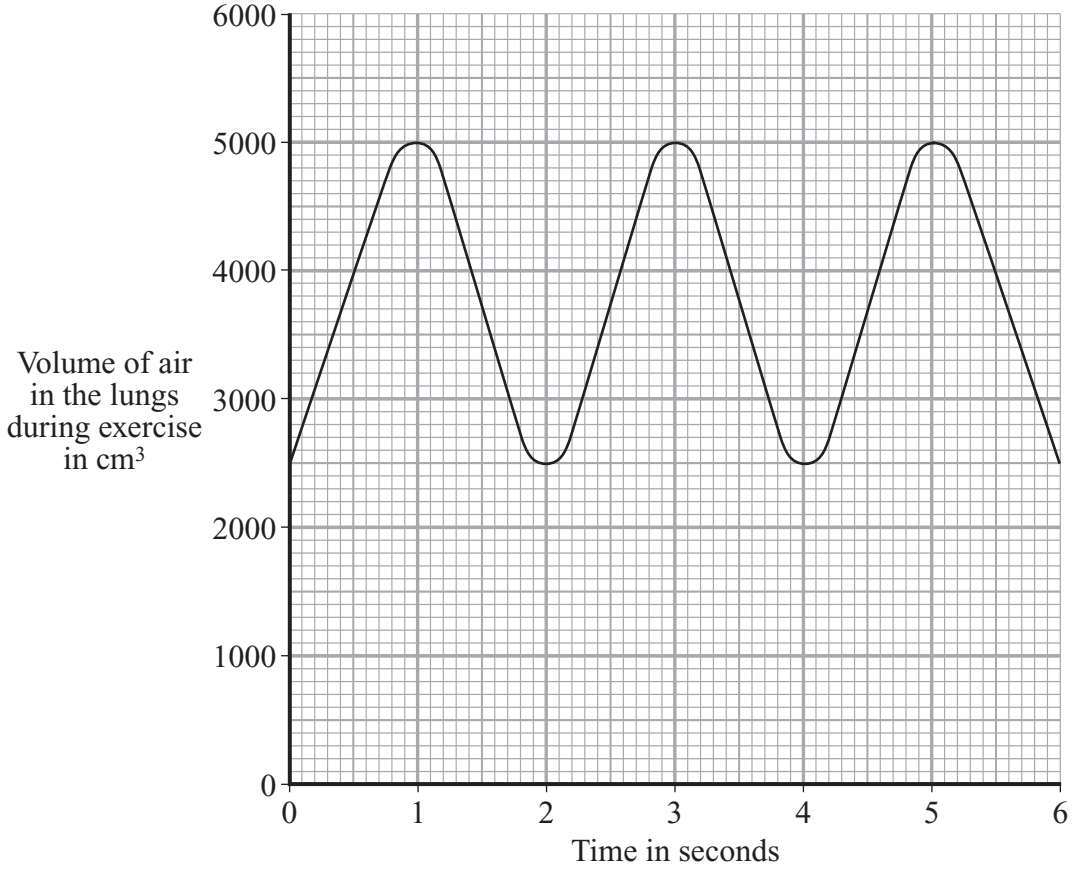
(2 marks)

(ii) In which part of the blood is carbon dioxide carried?

.....

(1 mark)

(c) The graph shows how the volume of air in the lungs changes during exercise.



(i) What is the maximum change in the volume of air in the lungs during exercise?

.....

(1 mark)

(ii) Between which **two** times during the first **two** seconds is the person breathing in?

.....

(1 mark)

(iii) How many breaths per minute is the person taking?

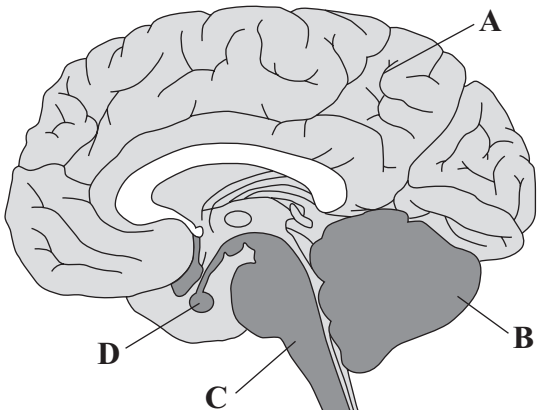
.....

(1 mark)

8

Turn over for the next question

12 (a) The diagram shows a section of the brain.



(i) Name the parts labelled **A**, **B** and **D**.

A .....

B .....

D .....

(3 marks)

(ii) State the function of the part labelled **C**.

.....

.....

(1 mark)

(b) What is a reflex action?

.....

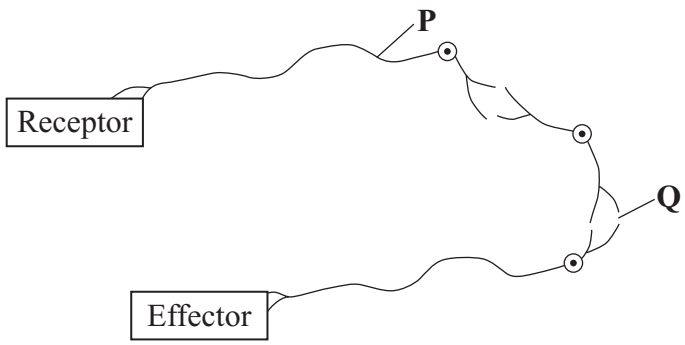
.....

.....

.....

(2 marks)

(c) The diagram shows the neurones involved in a reflex action.



(i) What type of neurone is labelled **P**?

.....

(1 mark)

(ii) What is the name of the gap labelled **Q**?

.....

(1 mark)

(iii) Name **one** type of effector.

.....

(1 mark)

9

Turn over for the next question

13 (a) In which parts of the body are eggs and sperm produced?

Eggs .....

Sperm .....

(2 marks)

(b) The table shows some of the stages in the production of *in vitro* (test tube) babies.

	In vitro
Stage 1	Parents produce eggs and sperm
Stage 2	Eggs and sperm collected from parents
Stage 3	Fertilisation takes place in a culture medium
Stage 4	Zygote forms in culture medium
Stage 5	Embryo removed from culture medium
Stage 6	Embryo implanted in uterus

(i) Suggest **two** features that the culture medium must have if the production of test tube babies is to be successful.

1 .....

.....

2 .....

.....

(2 marks)

(ii) An essential part of **Stage 1** is stimulating the mother to produce several eggs.

Suggest a reason for this.

.....

.....

(1 mark)

5

END OF QUESTIONS

There are no questions printed on this page

There are no questions printed on this page

ACKNOWLEDGEMENT OF COPYRIGHT-HOLDERS AND PUBLISHERS

Question 9 Source: adapted from R DOLL et al, British Medical Journal, June 2004