

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

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General Certificate of Secondary Education
June 2004



**HUMAN PHYSIOLOGY AND HEALTH
FOUNDATION TIER**

3417/F

F

Thursday 24 June 2004 9.00 am to 11.00 am

In addition to this paper you will require:
a ruler.
You may use a calculator.

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

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

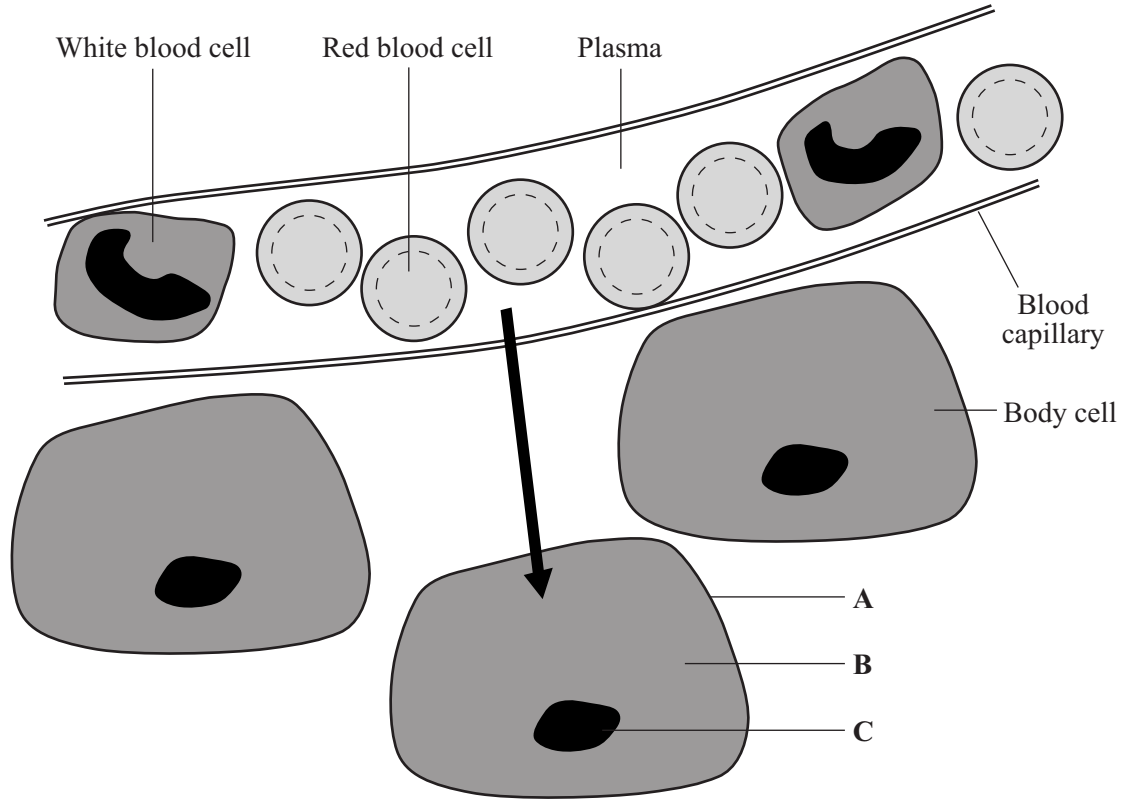
- The maximum mark for this paper is 120.
- Mark allocations are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

Advice

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

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

1 The diagram shows a blood capillary and several body cells.



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

A

B

C

(3 marks)

(b) Name **one** substance that moves in the direction shown by the arrow.

.....

(1 mark)

(c) The body cells produce carbon dioxide which passes into the blood.

(i) Which process produces carbon dioxide?

.....

(1 mark)

(ii) Into which part of the blood does most carbon dioxide pass?

.....
(1 mark)

(iii) Explain how carbon dioxide passes into the blood.

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

8

TURN OVER FOR THE NEXT QUESTION

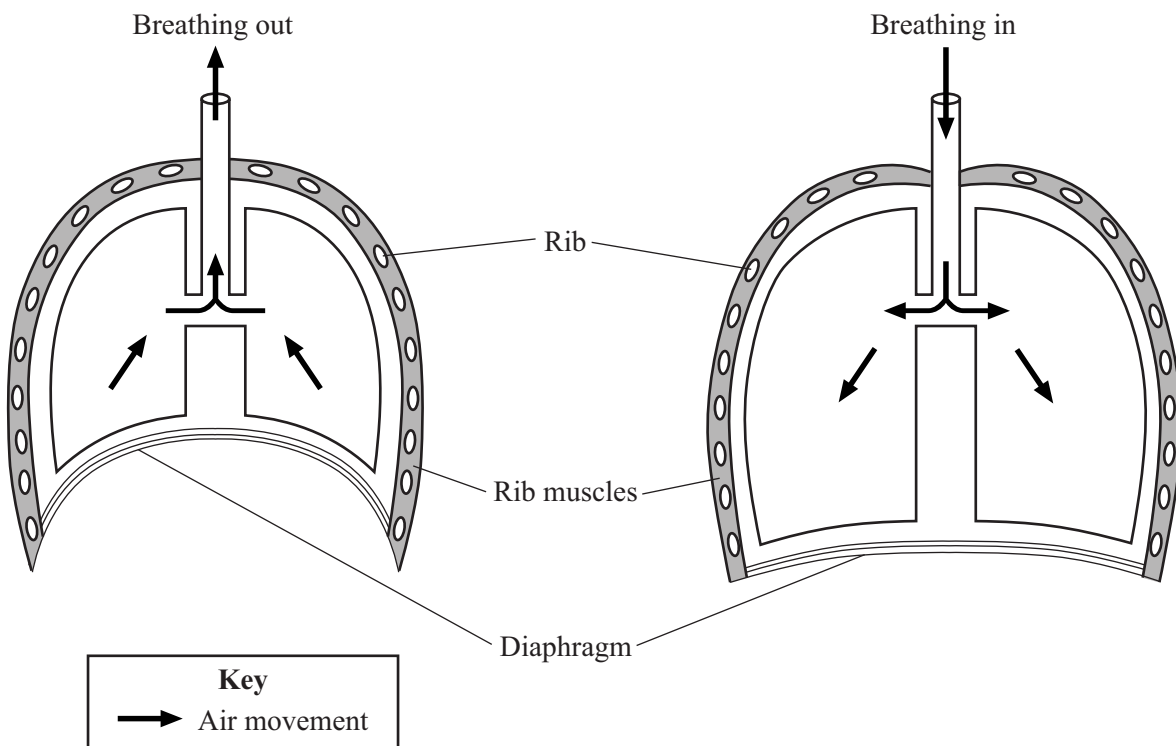
Turn over ►

- 2 (a) Complete the sentences below, using words from the list.

bronchioles oesophagus stomach trachea

When breathing in, air enters the nose and passes through the nasal cavity. Air then enters the and passes into the bronchus. The bronchus divides into smaller branches called that end in tiny sacs called alveoli. (2 marks)

- (b) The diagrams show the breathing system when breathing out and when breathing in.



Use the information in the diagrams on the opposite page and your own knowledge to explain how air is made to enter the lungs when we breathe in.

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)

- (c) Gaseous exchange takes place in the alveoli. Oxygen passes from the alveoli to the blood. Carbon dioxide passes from the blood to the alveoli.

Describe **two** ways in which the alveoli are adapted for gaseous exchange.

1

.....

2

.....

(2 marks)



Turn over ►

- 3 (a) These are structures in the body.

arteries nerves skin spinal cord

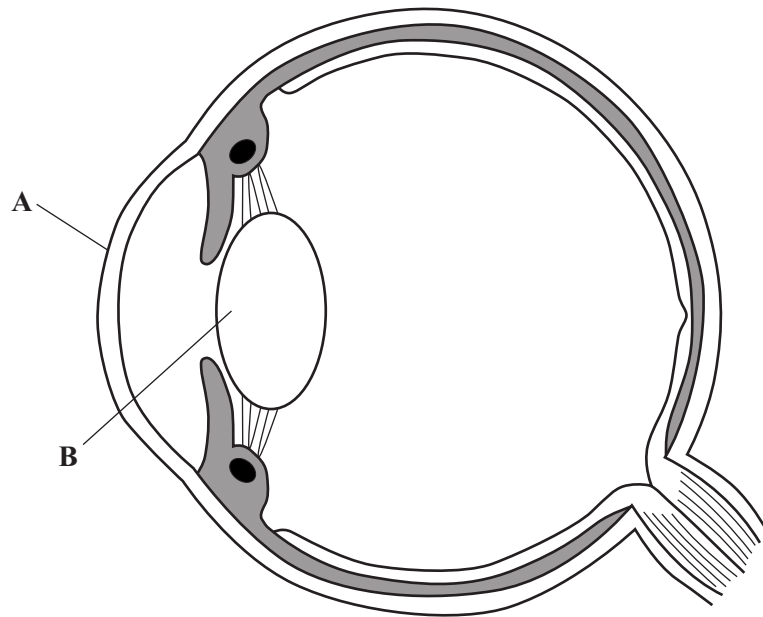
Which **two** of these structures are part of the nervous system?

1

2

(2 marks)

- (b) The diagram shows a section through the eye.



- (i) Name the structures **A** and **B**. Choose from the list below.

ciliary muscles cornea iris lens

A

B

(2 marks)

(ii) A person's optic nerve is cut in an accident. Other parts of the eye are undamaged. Explain why the person would not be able to see with that eye.

.....
.....
.....
.....

(2 marks)

(c) In bright light, the iris muscles decrease the size of the pupil to reduce the amount of light entering the eye. This automatic response helps to prevent damage to the retina.

(i) What is the name of this type of automatic response?

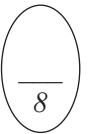
.....

(1 mark)

(ii) What stimulus causes this response?

.....
.....

(1 mark)



TURN OVER FOR THE NEXT QUESTION

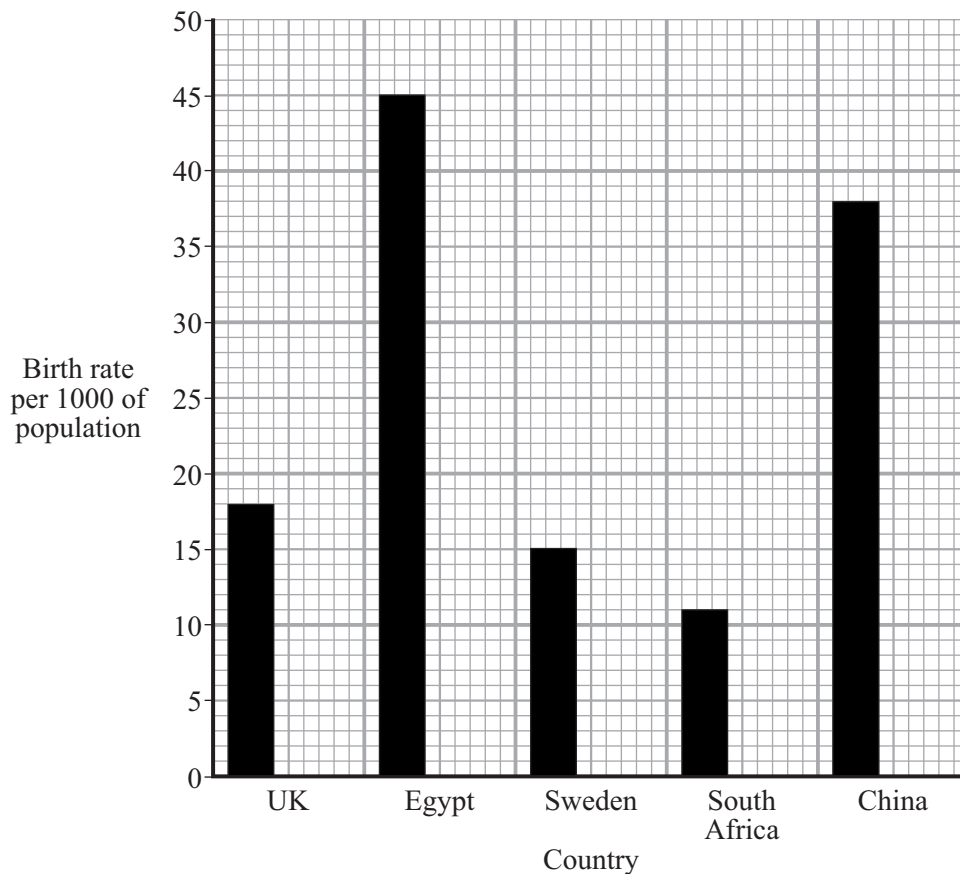
Turn over ►

- 4 (a) The table gives some information about the populations of five countries in 1950 and 2000.

Country	Birth rate per 1000 of population		Death rate per 1000 of population	
	1950	2000	1950	2000
UK	18	12	12	10
Egypt	45	26	20	7
Sweden	15	10	10	11
South Africa	11	28	17	10
China	38	16	17	7

- (i) The figures for the birth rate for the year 1950 have been plotted on the bar chart.

Plot the figures for the birth rate in 2000.



Key: 1950

(2 marks)

- (ii) Complete the key on the bar chart.

(1 mark)

(iii) Which country had the largest fall in its birth rate between 1950 and 2000?

.....
(1 mark)

(iv) What was the birth rate in South Africa in 2000?

.....per 1000 of the population.

What was the death rate in South Africa in 2000?

.....per 1000 of the population.

What happened to the total population in South Africa during 2000?

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

(b) Suggest how vaccination may affect the size of a population and give a reason for this.

Effect on the size of the population.

.....
.....

Reason.

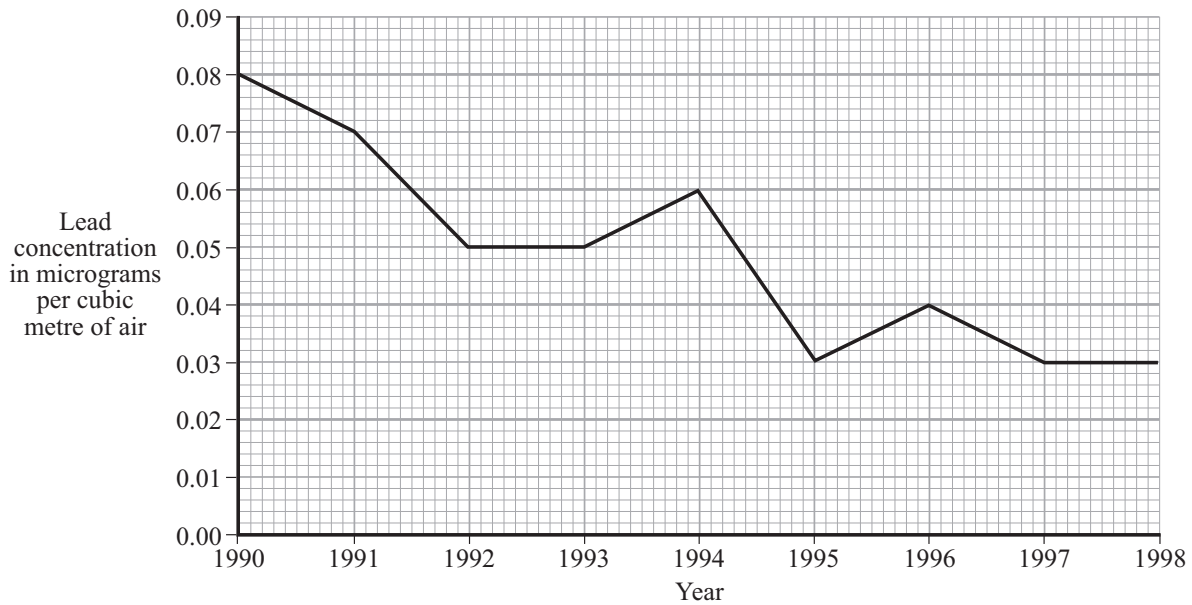
.....
.....
.....
.....

(3 marks)

9

Turn over ►

- 5 (a) The graph shows the levels of lead in the air from 1990 to 1998.



- (i) In which year did the lead concentration fall by the greatest amount?

.....
(1 mark)

- (ii) What is the overall trend in the level of lead in the air?

.....
(1 mark)

(b) Read the passage.

Lead pollution of the air can come from factories and from car exhausts.

Young children living close to roads and motorways have higher lead concentrations in their blood than other people.

Lead is a poisonous metal. Lead can affect intelligence and personality. Lead combines with haemoglobin.

Lead is able to cross the placenta and may have serious effects on the fetus.

(i) Suggest **two** ways by which lead may enter the body.

- 1
- 2 (2 marks)

(ii) Name **two** parts of the body affected by lead.

- 1
- 2 (2 marks)

(iii) Haemoglobin is a protein. What is the effect of lead combining with haemoglobin?

-
-
-
- (2 marks)

(c) Name **two** air pollutants other than lead.

- 1
- 2 (2 marks)

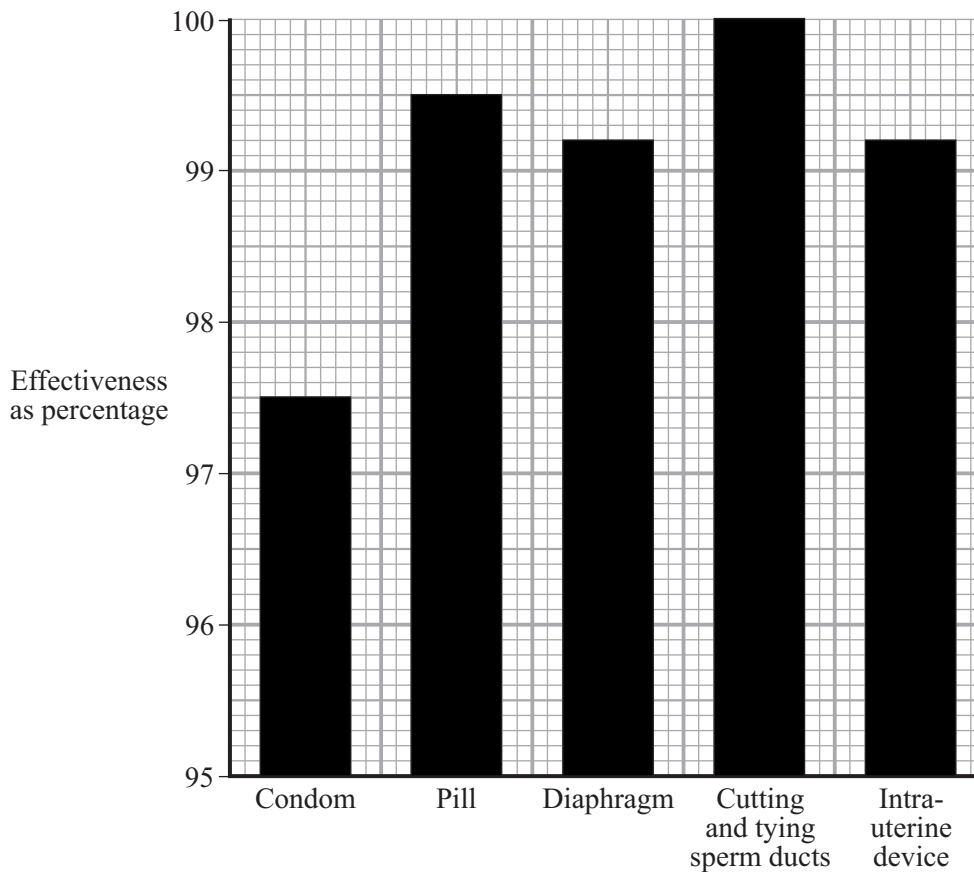
6 (a) Complete each of the following statements, using words from the box.

ovary
oviduct
ovulation
testes

urethra
uterus
vagina

- 1 Sperm enter the female body through the
 - 2 Eggs are made in the
 - 3 Sperm are made in the
 - 4 Sperm are carried out of the male body through the
 - 5 Fertilisation takes place in the
- (5 marks)*

(b) The bar chart shows the effectiveness of four methods of contraception.



(i) What is the effectiveness of the condom?

.....%
(1 mark)

(ii) Which **two** methods are equally effective?

.....and
(1 mark)

(iii) Which method is most effective?

.....

Explain why.

.....

.....

(2 marks)

9

TURN OVER FOR THE NEXT QUESTION

Turn over ►

7 (a) The table shows the volume of water gained and lost by a person in a day.

Water gained in cm ³		Water lost in cm ³	
Food	1005	Urine	1050
Drink	575	Air breathed out	245
Made in body	270	Faeces	185
		Sweat	370

(i) Calculate the total amount of water lost in a day.

.....cm³
(1 mark)

(ii) Use the formula to calculate the percentage of water lost in faeces.

$$\text{Percentage of water lost in faeces} = \frac{\text{volume of water lost in faeces}}{\text{total volume of water lost}} \times 100$$

Answer%
(2 marks)

(iii) Name **two** organs that lose water from the body.

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

(b) (i) On a hot day, what would happen to the volume of water lost in sweat?

.....
(1 mark)

(ii) Why is sweating important?

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

8 (a) The table lists some diseases.

Disease	Caused by
Athlete's foot	
Cholera	
AIDS	
Malaria	

(i) Complete the table by writing the name of the type of organism causing each disease. (4 marks)

(ii) Which of the diseases in the table is caused by an organism that is spread by a vector?
..... (1 mark)

(b) Describe how the stomach and respiratory passages prevent pathogens from entering the body.

Stomach

.....

.....

.....

Respiratory passages

.....

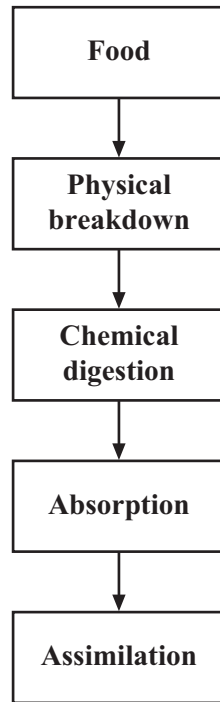
.....

.....

(4 marks)

9

9 The flow chart shows some of the stages in making food available to the body.



(a) Name **one** structure involved in the physical breakdown of food.

.....
(1 mark)

(b) How is food moved along the alimentary canal?

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

(c) What happens during chemical digestion?

.....
.....
.....
.....
.....
.....
(3 marks)

(d) (i) Where does absorption of digested food take place?

.....
(1 mark)

(ii) Describe what happens during absorption.

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

(e) Name the blood vessel that carries the products of digestion to the liver.

.....
(1 mark)

(f) How does the body use

(i) sugars;
.....
(1 mark)

(ii) amino acids?
.....
(1 mark)

TURN OVER FOR THE NEXT QUESTION

Turn over ►

10 (a) What is a cancerous growth (tumour)?

.....

.....

.....

.....

(2 marks)

(b) State **two** causes of cancer.

1

2

(2 marks)

(c) A cancer in one organ may spread to other organs. Explain how.

.....

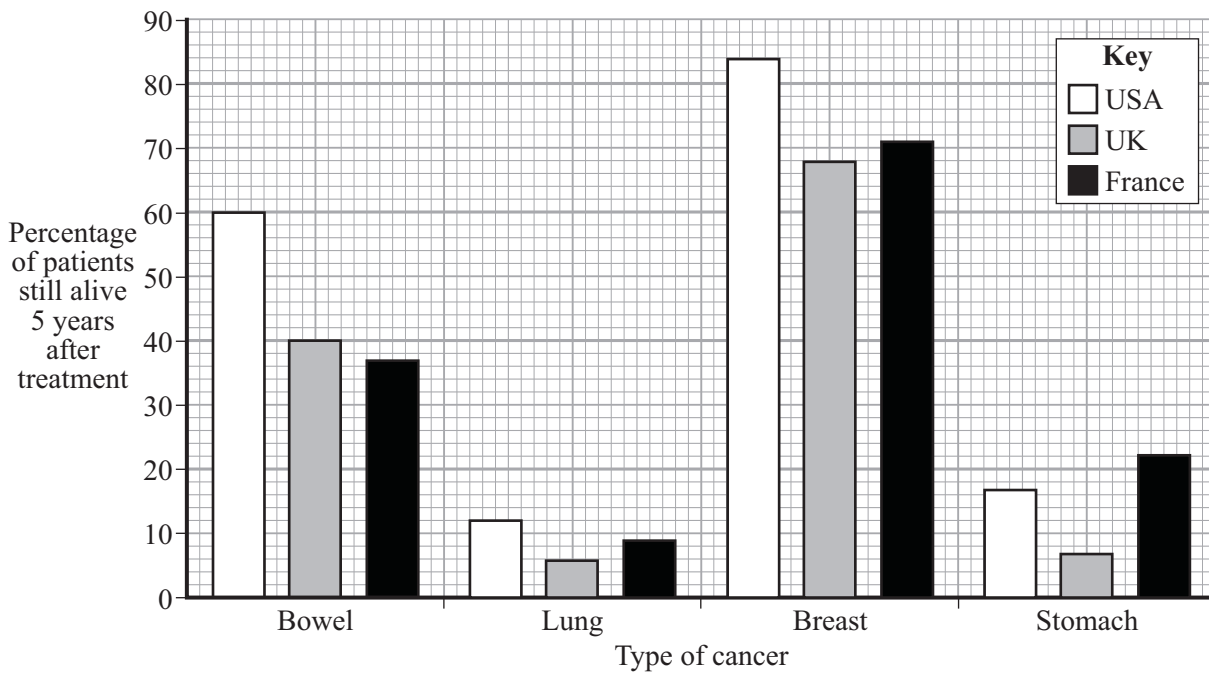
.....

.....

.....

(2 marks)

(d) The bar chart shows the survival rates of cancer patients in three countries.



(i) Which cancer patients had the lowest survival rate in France?

.....
(1 mark)

(ii) For which type of cancer was the survival rate in the USA more than twice that in the UK?

.....
(1 mark)

(iii) What percentage of patients did **not** survive five years after treatment for stomach cancer in France?

.....
(1 mark)

(iv) Suggest **two** reasons why breast cancer patients had the greatest survival rate in all three countries.

1.....

.....

2.....

.....

(2 marks)

(v) How can the risk of bowel cancer be reduced?

.....

.....

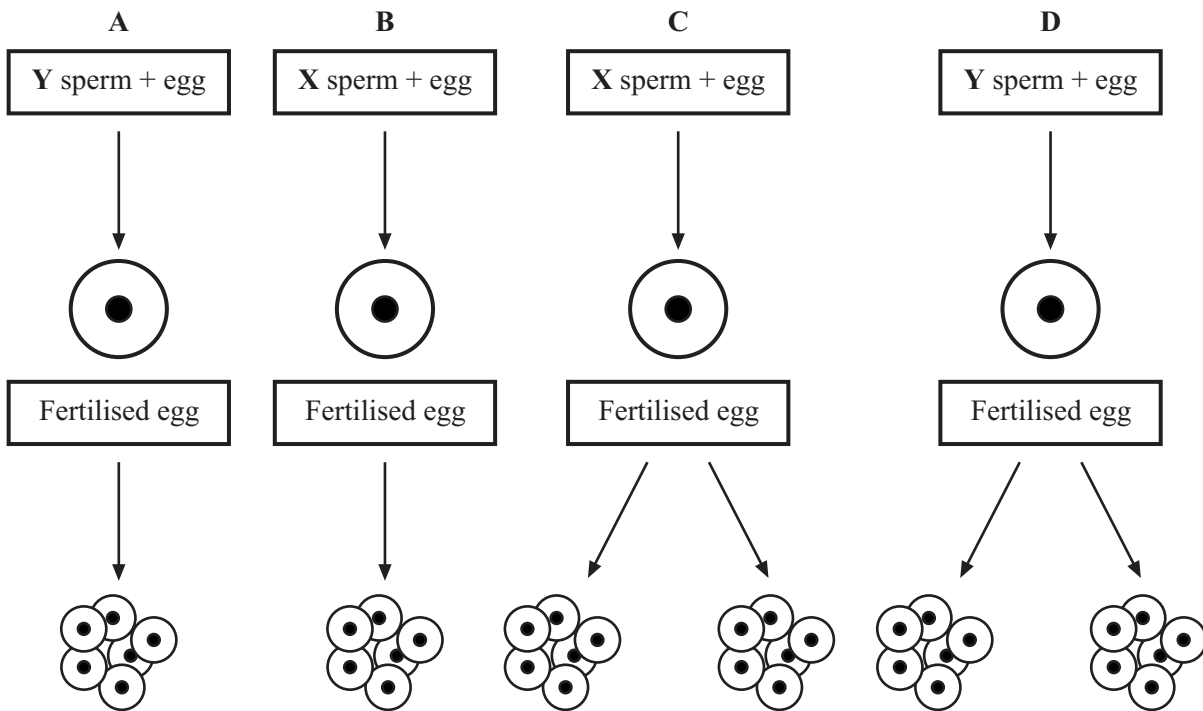
(1 mark)

12

TURN OVER FOR THE NEXT QUESTION

Turn over ►

11 (a) The diagrams represent four possible types of fertilisation and development.

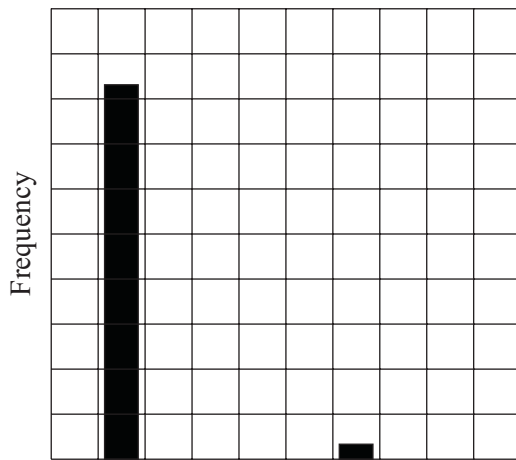


Which type of fertilisation and development (A, B, C or D,) would produce:

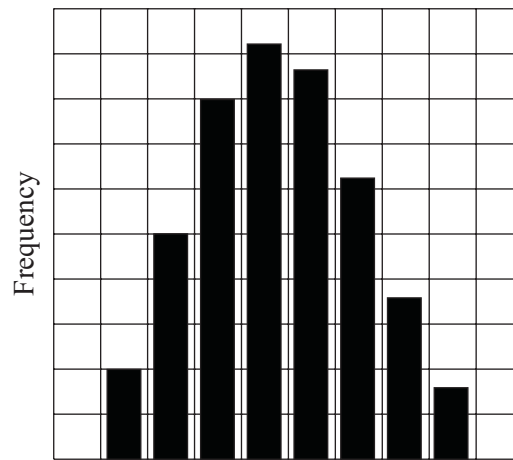
(i) one female baby;
(1 mark)

(ii) identical male twins?
(1 mark)

- (b) The frequency distribution of two characteristics in a population was measured. The graphs show the results.



Characteristic

Graph 1

Characteristic

Graph 2

Which graph represents discontinuous variation?

.....

Give a reason for your answer.

.....

.....

(1 mark)

QUESTION 11 CONTINUES ON THE NEXT PAGE

Turn over ►

(c) Cystic fibrosis is an inherited disease. The disease is caused by the inheritance of recessive alleles (**f**). People with the dominant allele (**F**) are not affected with the disease.

(i) What is an allele?

.....
.....

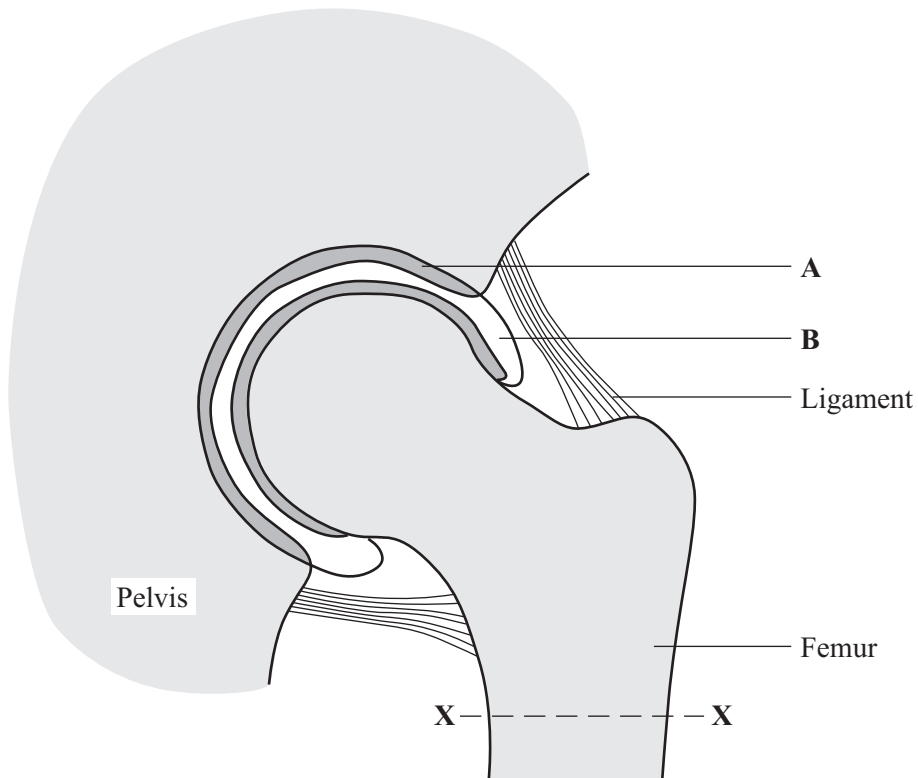
(1 mark)

(ii) Draw a genetic diagram to show how two people, who are not affected by cystic fibrosis, may produce a child with cystic fibrosis.

(4 marks)

○
—
8

13 The diagram shows a section through a hip joint.



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

A

B

(2 marks)

(b) Why is it important for ligaments to be strong and slightly elastic?

Strong

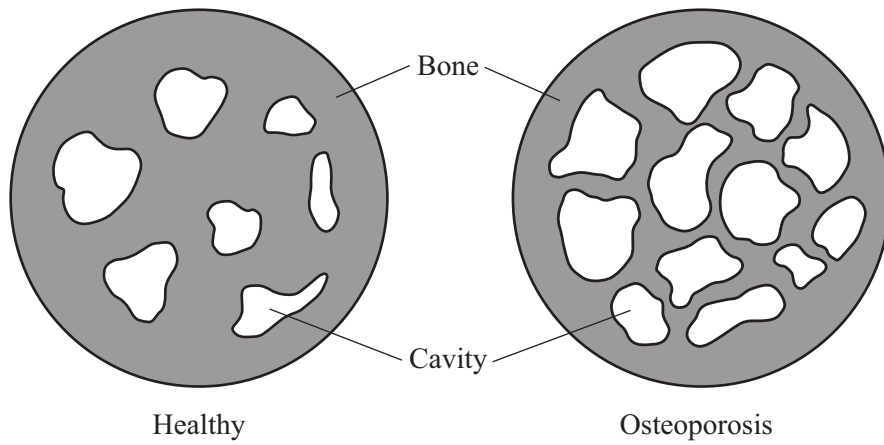
.....

Slightly elastic

.....

(2 marks)

- (c) The diagrams show sections of bone taken at X - - X on the diagram. One is from a healthy person and one is from a person suffering from osteoporosis.



- (i) Give **two** visible differences between the bone showing osteoporosis and the healthy bone.

1.....
.....
2.....
.....

(2 marks)

- (ii) What is the likely effect of osteoporosis on the femur?

.....
.....

(1 mark)

QUESTION 13 CONTINUES ON THE NEXT PAGE

Turn over ►

(d) Read the passage.

Joints may be damaged by injuries or disease. Many joint conditions and injuries may be examined and treated using a technique known as ‘keyhole’ surgery. A fibre optic cable with a tiny lens is inserted into a joint through a small hole. The cable is attached to a camera. Images from inside the joint are displayed on a monitor.

The surgeon can see inside the joint and can assess any damage. Miniature instruments are passed down a flexible tube inserted into the joint. These are used to operate on and to repair damage to the joint.

‘Keyhole’ surgery has many advantages over conventional surgery.

(i) Explain why the tube used in keyhole surgery needs to be flexible.

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

(ii) The tube and instruments used in ‘keyhole’ surgery must be sterilised before use. Explain why.

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

(iii) Suggest **two** advantages of ‘keyhole’ surgery compared with conventional surgery.

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

- (e) In cases of severely damaged or diseased hip joints, a replacement artificial joint may be needed. This consists of a metal 'ball' secured to the femur and a metal and plastic 'cup' into which the ball fits. The 'cup' is secured to the pelvis using special bone glue.

Suggest **three** properties that the metal and plastic need to have to make them suitable for use in an artificial joint.

1

.....

2

.....

3

.....

(3 marks)

END OF QUESTIONS



THERE ARE NO QUESTIONS PRINTED ON THIS PAGE