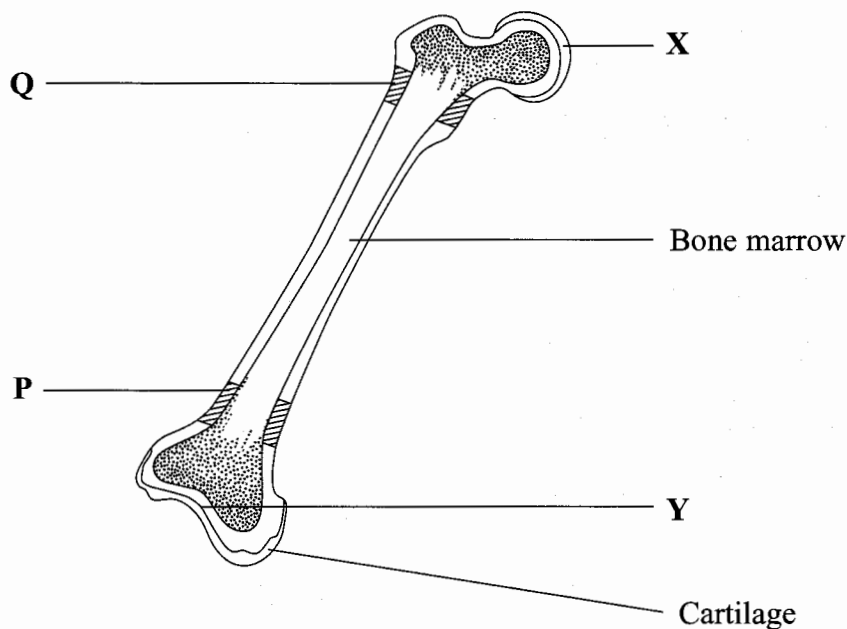


Answer ALL the questions.

1. The diagram below shows a section through the femur.



(a) Name the bones that are joined to the femur at **X** and at **Y**.

X

Y

(2)

(b) The cavity of the femur contains bone marrow.

(i) What is formed in the bone marrow?

.....

(1)

(ii) Suggest and explain an advantage, apart from containing marrow, of a bone (such as the femur) being hollow rather than solid.

.....

.....

.....

.....

(2)



(c) The outer surface of the bone at **X** and at **Y** is covered by cartilage.

(i) State the function of this cartilage.

.....
.....

(1)

(ii) Complete the table below to show **three** differences between bone and cartilage.

Difference	Bone	Cartilage
1		
2		
3		

(3)

(iii) In the bones of children, areas of cartilage are found at **P** and at **Q** within the bone. Suggest a function for this cartilage.

.....
.....

(1)

(iv) Name **two** places in the body of adults where cartilage is found other than at the ends of bone.

1

2

(2)

(Total 12 marks)

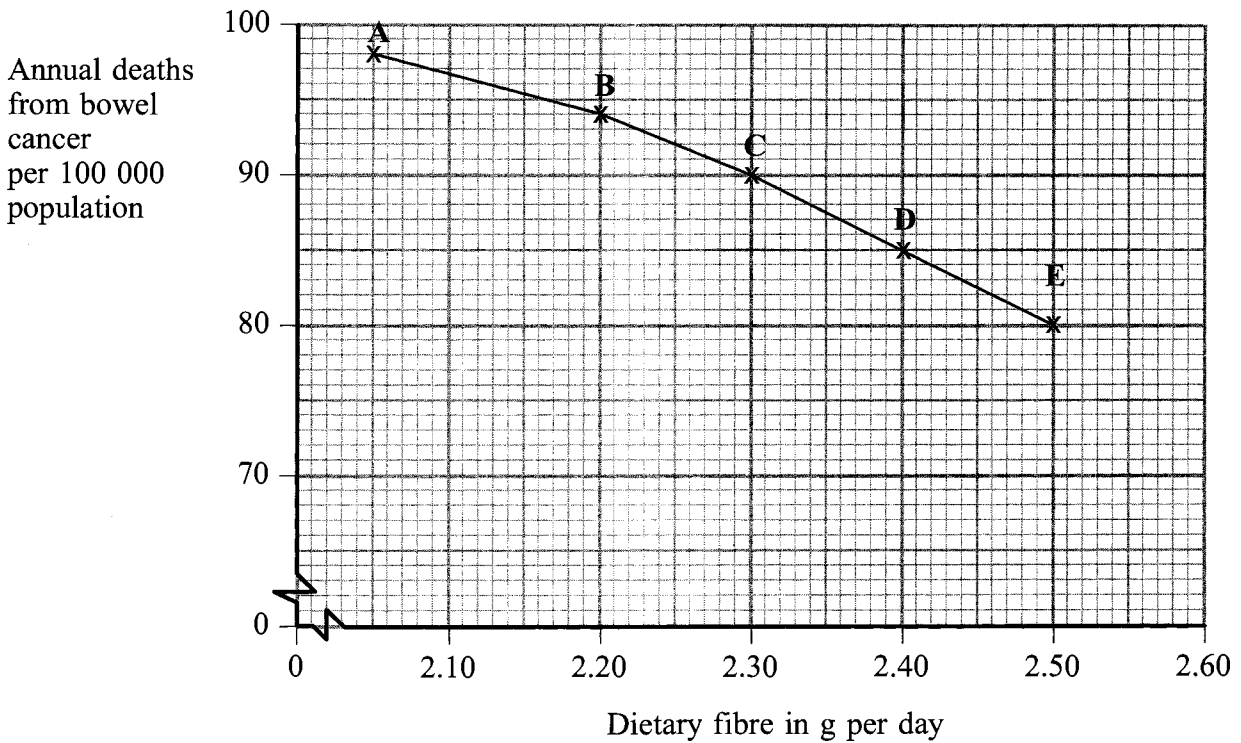
Q1

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2. A study was made of deaths from cancer of the bowel (colon). Data were collected and analysed.

The graph shows the numbers of deaths from bowel cancer and the average amount of fibre in their diet in each of five regions (A to E) of the UK.



(a) (i) Describe the relationship between deaths from bowel cancer and the amount of fibre in the diet.

.....

 (1)

(ii) Use the information shown in the graph to predict the annual death rate from bowel cancer in a region in which people consume 2.35 g of fibre per day.

.....
 (1)

(iii) If a region has an annual death rate from bowel cancer of 80 per 100 000 people, what would be the average daily fibre consumption?

.....
 (1)



(iv) The average consumption of fibre in the diet of people in region **B** increased from 2.22 g per day to 2.50 g per day.

How much might the annual death rate from bowel cancer change? Show your working.

Change in the annual death rate (2)

(b) (i) Name **two** foods likely to have a high fibre content.

1

2 (2)

(ii) Explain the value of a high fibre content in the diet to the functioning of the digestive system.

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

(Total 9 marks)

Q2



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3. The table below shows some of the processes that take place during cell division.

Complete the table by marking the box (☒) to show if each process takes place during mitosis or meiosis. If the process takes place during both mitosis and meiosis, mark both boxes.

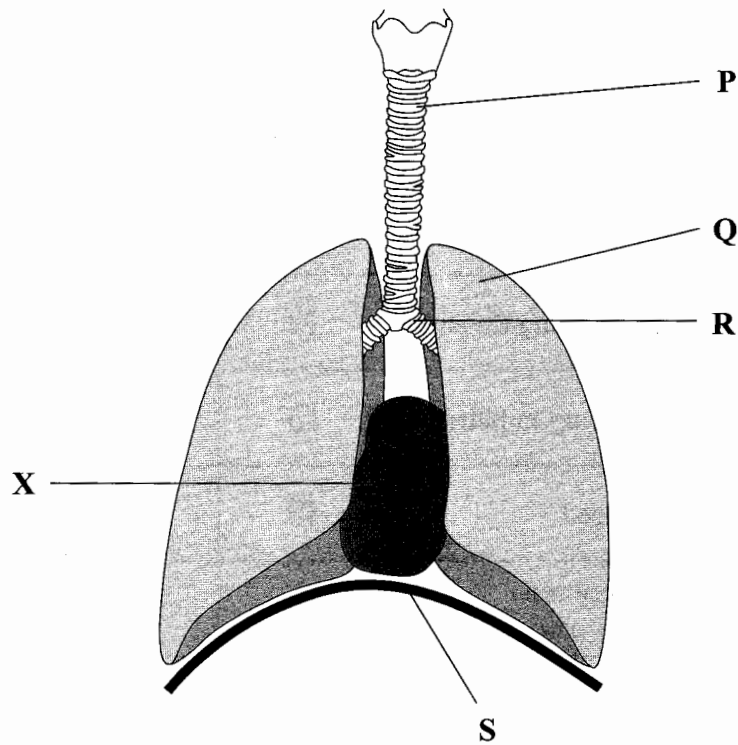
Process	Mitosis	Meiosis
Results in the formation of haploid cells	☒	☒
Nuclear membrane disappears during division	☒	☒
Homologous chromosomes line up in pairs	☒	☒
Only two daughter cells produced	☒	☒
Genetic material exchanged between chromosomes of a homologous pair	☒	☒
Daughter cells identical to parent	☒	☒
Nuclear spindle forms during division	☒	☒
DNA content doubled before next division	☒	☒
Occurs only during gamete formation	☒	☒

(Total 9 marks)

Q3



4. (a) The diagram below shows organs in the thorax.



(i) State which letter on the diagram indicates each of the following:

The trachea

A bronchus

The diaphragm

(3)

(ii) Name structure X.

.....

(1)

(iii) Explain the difference between **breathing** and **respiration**.

.....

.....

.....

.....

.....

(2)



(b) Air is forced into the lungs when the pressure in the thoracic cavity falls below the pressure of the air outside the body.

How is this fall in pressure brought about?

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4)

(c) Describe and explain the changes that occur to the air as it passes along the trachea.

.....

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.....

.....

(4)

(Total 14 marks)

Q4

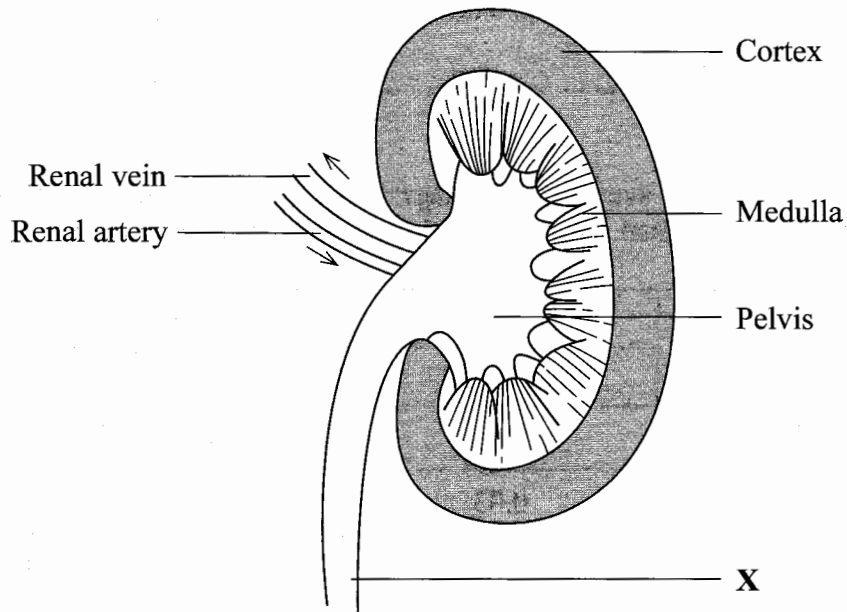
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5. (a) The diagram below shows a section through a kidney.



(i) Name the tube labelled X.

..... (1)

(ii) Name the liquid found in the pelvis of the kidney.

..... (1)

(iii) State the main processes occurring in the cortex and medulla of the kidney.

Cortex

Medulla

(2)



(b) Suggest why the glucose content of the blood in the renal vein is lower than that in the blood in the renal artery.

.....
.....

(1)

(c) The table below shows the average percentage concentration of some substances present in the blood of the renal artery and in the urine of a healthy person.

Substance	Percentage concentration	
	In blood	In urine
water	91	95
urea	0.03	3
glucose	0.1	0
sodium	0.3	0.6

(i) Explain the difference in the concentration of urea in the blood and in the urine.

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

(2)

(ii) Why is glucose present in the blood but not in the urine?

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

(2)



(d) On a very hot day, the volume of the urine is likely to decrease.

(i) Explain the mechanism that brings about this change.

.....

.....

.....

.....

.....

.....

.....

.....

.....

(3)

(ii) What effect is this change likely to have on the concentration of urea in the urine?

.....

.....

(1)

(Total 13 marks)

Q5

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6. Haemophilia is a rare sex-linked condition carried on the X chromosome. The normal allele is represented by X^H and the haemophiliac allele by X^h .

(a) (i) Which sex is most likely to show this sex linked condition in their phenotype? Explain your answer.

Sex

Explanation

.....

.....

.....

.....

.....

.....

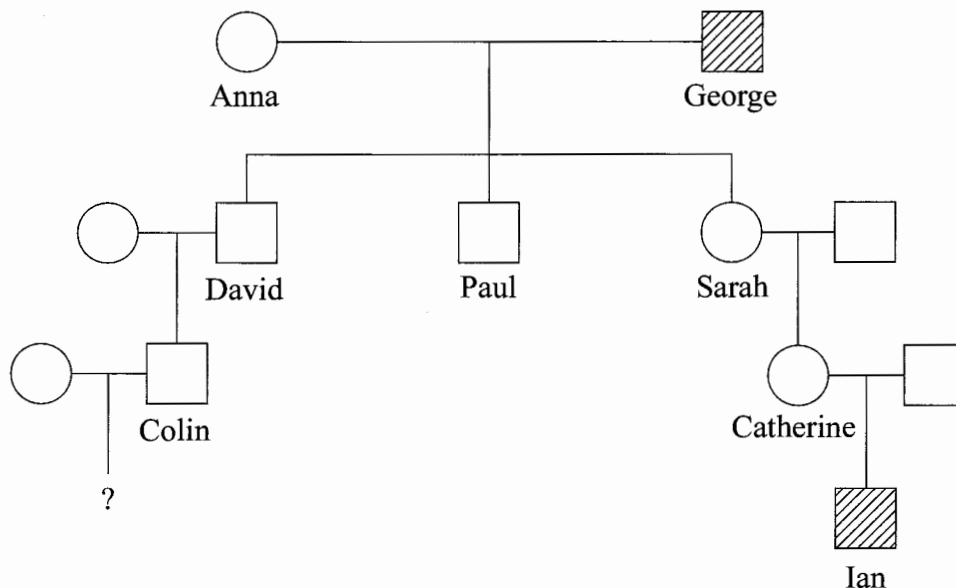
(4)

(ii) Write down the genotype for a male haemophiliac.

.....

(1)

(b) The diagram below shows four generations of a family in which haemophilia occurred.



Key (for phenotypes)



Normal male



Normal female



Haemophiliac male



(i) Explain how Ian could have inherited haemophilia from George, his great grandfather.

.....

.....

.....

.....

.....

.....

.....

.....

(3)

(ii) Colin's wife is expecting her first child. If this child is a girl explain why it is unlikely that she will have haemophilia.

.....

.....

.....

.....

.....

(2)

(Total 10 marks)

Q6

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7. Describe and explain why damage may result from each of the following actions.

(a) A mother smoking heavily throughout the whole of her pregnancy.

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

(3)

(b) People being overexposed to ultraviolet light from the sun.

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

(4)



(c) A person working for many hours every day in a very noisy environment, such as near a runway of a busy airport.

.....

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.....

.....

.....

.....

(3)

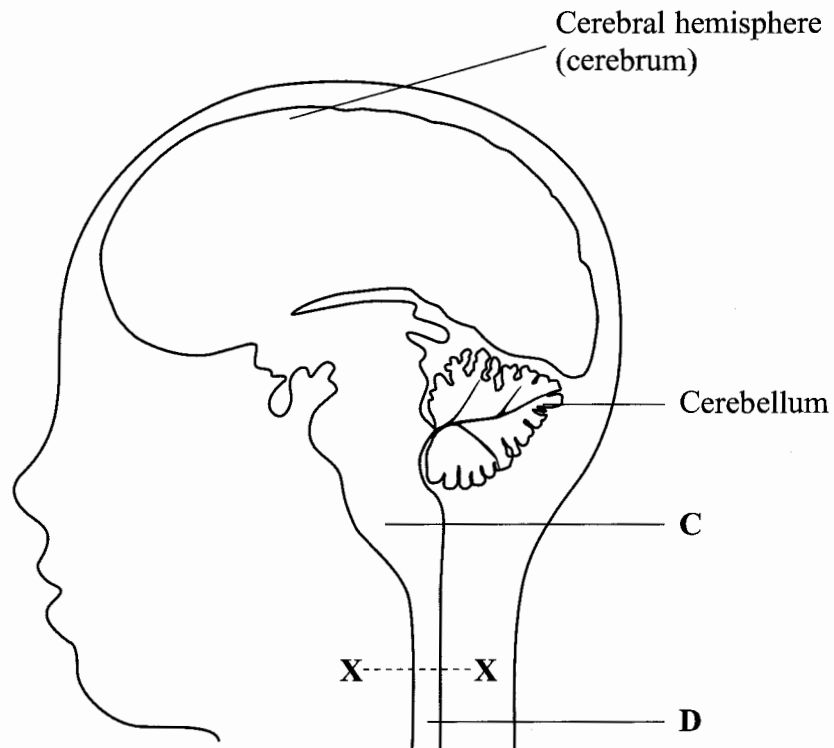
Q7

(Total 10 marks)

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8. The diagram below shows part of the central nervous system.



(a) State **one** function of the cerebral hemisphere and **one** function of the cerebellum.

Cerebral hemisphere

.....

Cerebellum

.....

(2)

(b) If part **C** is destroyed during an accident, what is the likely result? Give a reason for your answer.

.....

.....

.....

.....

.....

(2)



Leave blank

(c) Name structure **D** and explain what will occur if it is cut at the position shown by **X-X** during an accident.

Structure D

Explanation

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

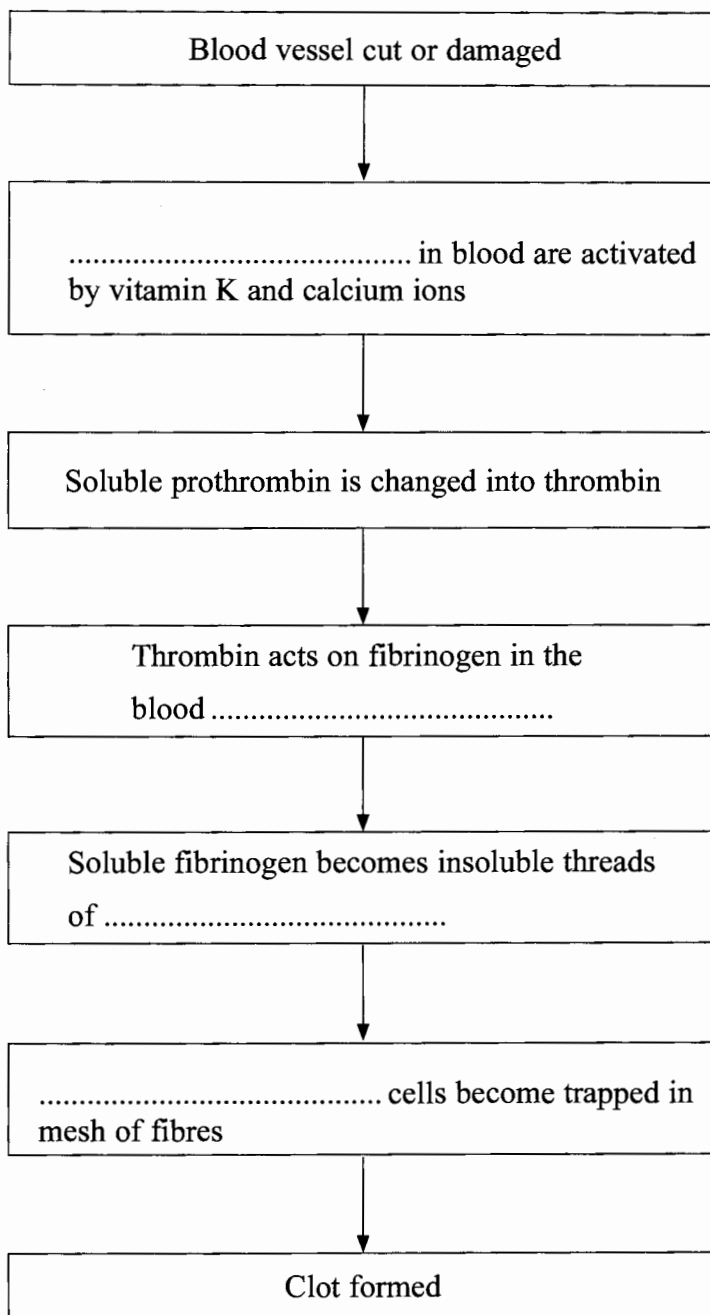
(3)

Q8

(Total 7 marks)



9. (a) The flow chart below shows events leading to the formation of a blood clot. Complete the flow chart by filling in the four blanks.



(4)



(b) (i) State **two** ways in which the formation of a clot is important to a person when the skin is broken.

1

.....

2

.....

(2)

(ii) Why is it important that clotting occurs only when a blood vessel is cut or damaged?

.....

.....

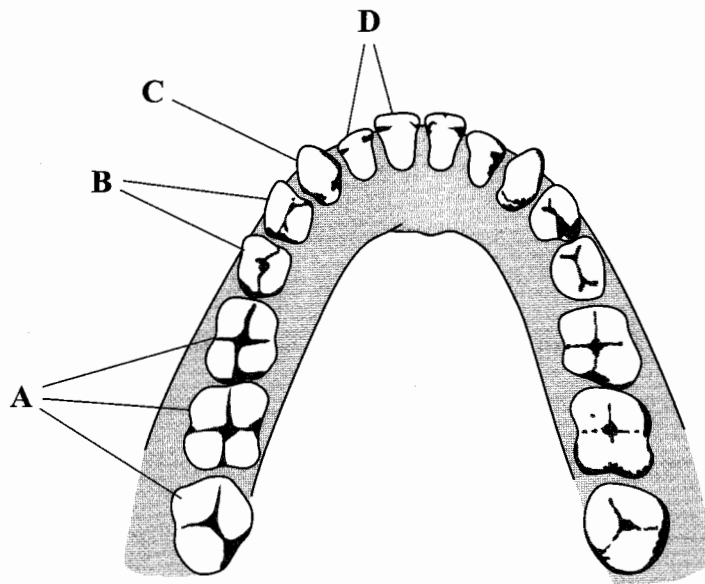
(1)

Q9

(Total 7 marks)



10. The diagram below shows the teeth in the upper jaw of an adult human.



(a) (i) What is the main function of the teeth labelled A?

..... (1)

(ii) Young children have a set of milk (deciduous) teeth. These are replaced in late childhood by a set of permanent teeth. Which type of tooth is **not** present in the milk (deciduous) teeth?

..... (1)

(iii) Why is it important to brush around the base of the teeth and to clean between them, rather than just cleaning the outer surface of the teeth?

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



(b) Write on each dotted line below the most suitable word or words to complete the paragraph.

Teeth are covered in a layer of, the hardest material in the skeleton. The main part of the tooth is a tissue called, which is formed mainly from phosphate. Tooth decay begins when in the mouth use sugars and release that the outer layer of the tooth. This allows the inner softer tissues of the tooth to become infected, eventually causing pain.

(6)

Q10

(Total 9 marks)

TOTAL FOR PAPER: 100 MARKS

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