Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

For Examiner's Use

General Certificate of Secondary Education
June 2008

HUMAN PHYSIOLOGY AND HEALTH **3417/H**
Written Paper
Higher Tier

H

Thursday 19 June 2008 9.00 am to 11.00 am

For this paper you must have:
- a pencil and a ruler

You may use a calculator.

Time allowed: 2 hours

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The maximum mark for this paper is 120.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- 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			
Question	Mark	Question	Mark
1		7	
2		8	
3		9	
4		10	
5		11	
6		12	
		13	
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

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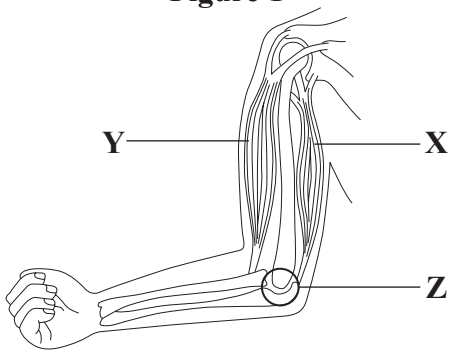
Answer **all** questions in the spaces provided.

1 **Figure 1** shows the bones and muscles of the arm.

Figure 1



1 (a) (i) Name the muscles **X** and **Y**.

X .....

Y .....

(2 marks)

1 (a) (ii) Explain how the muscles **X** and **Y** bend the arm at the elbow.

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(2 marks)

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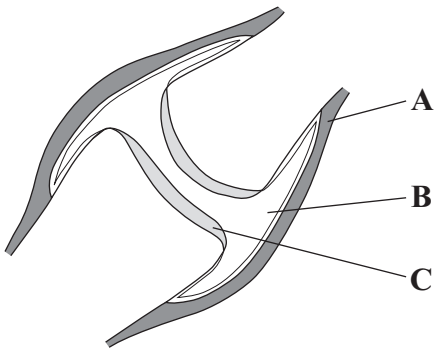
1 (a) (iii) **Figure 2** is an enlarged diagram of the part labelled **Z** on **Figure 1**.

Figure 2



Give the name and function of the parts labelled **A**, **B** and **C**.

Part **A**

Name .....

Function .....

.....

.....

Part **B**

Name .....

Function .....

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Part **C**

Name .....

Function .....

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(6 marks)

10

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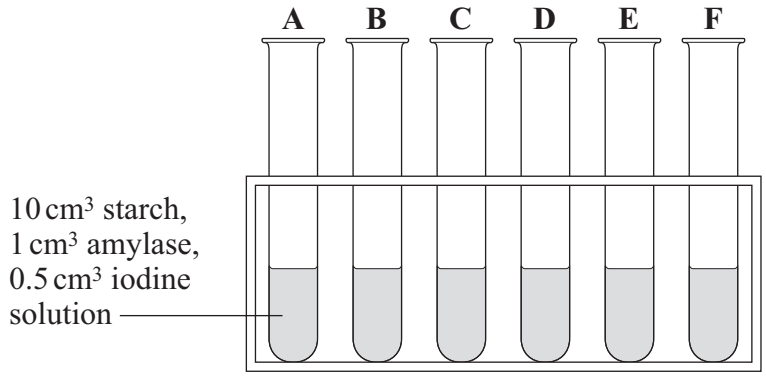
2 A student investigated the effect of pH on the reaction between the enzyme amylase and starch.

Six test tubes were set up, each containing the same volume of iodine solution.
Drops of acid were added to tubes **A**, **B** and **C** to produce a range of pH values.
Drops of alkali were added to tubes **E** and **F** to produce a range of pH values.
Amylase was added to all of the test tubes.
Starch was added to all of the test tubes.

All the test tubes were kept at the same temperature.
The time taken for the mixture in each test tube to change from blue to colourless was recorded.

The diagram shows the experimental set-up and the results.



pH of contents	4	5	6	7	8	9
Time for contents to become colourless in minutes	75	55	25	5	20	80

2 (a) Give **two** factors that were kept constant in the investigation.

1 .....

2 .....

(2 marks)

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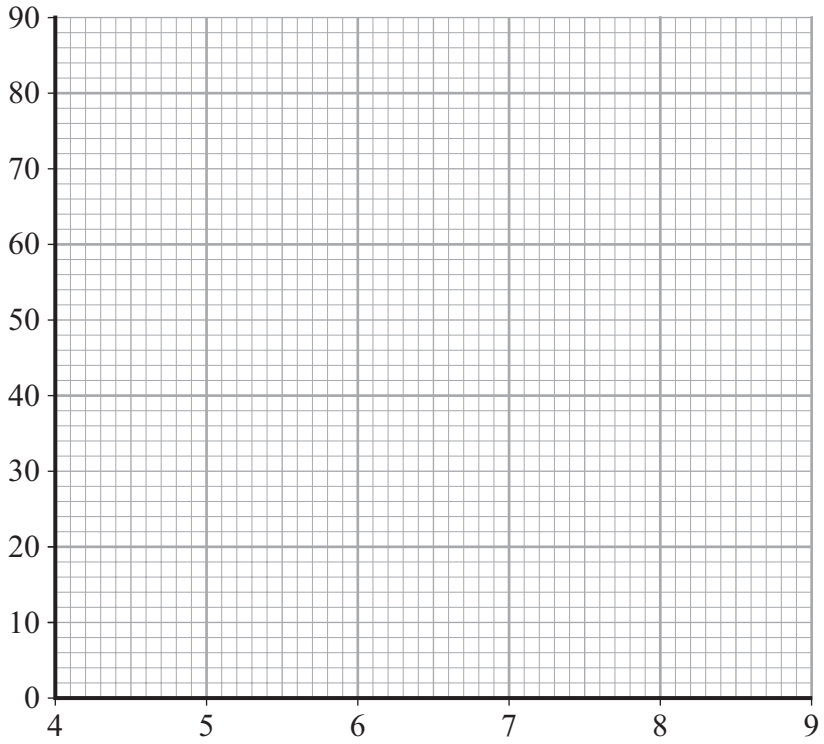
2 (b) On the graph paper below, draw a line graph of the results.

(4 marks)



2 (c) Explain why the mixture changed from blue to colourless.

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(4 marks)

Question 2 continues on the next page

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2 (d) Describe and explain the pattern shown by the results.

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(4 marks)

14

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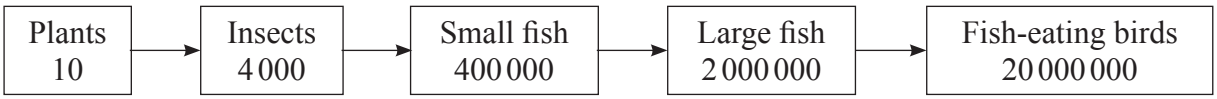
3 DDT is a chemical that was used as an insecticide to kill insect pests on crops.
The flow diagram shows the concentrations of DDT in arbitrary units in a food chain in a river.



3 (a) (i) Suggest how DDT got into the river water.

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(2 marks)

3 (a) (ii) How many more times more concentrated was the DDT in the fish-eating birds than in the insects?

..... times

(1 mark)

3 (a) (iii) The plants are not harmed by the DDT but the birds may be killed by it.

Explain why.

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(3 marks)

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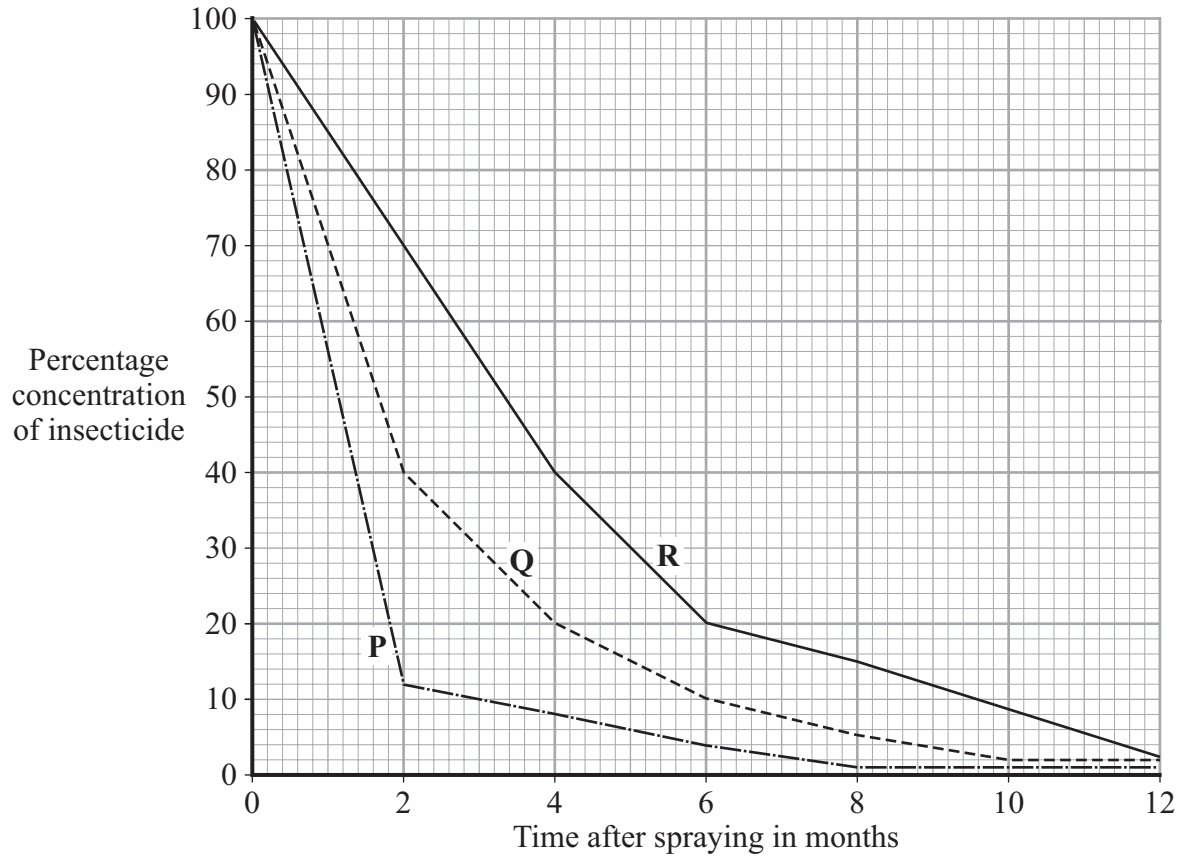
3 (b) The graph shows the percentage concentrations in the soil of three different insecticides **P**, **Q** and **R**.



3 (b) (i) What is the difference in the concentration of insecticides **P** and **Q** 2 months after spraying?

..... %

(1 mark)

3 (b) (ii) By how much did the concentration of insecticide **R** fall between the time of spraying and month 4?

..... %

(1 mark)

3 (b) (iii) Each insecticide is poisonous to other animals in the soil when the concentration is above 80%.
Suggest which of the three insecticides a farmer should choose to do the least harm to other animals in the soil.

Give a reason for your answer.

Insecticide .....

Reason .....

.....

(2 marks)

10

Areas outside the box will not be scanned for marking

4 (a) Humans pass through **four** stages between birth and death.

Complete the list to show the four stages in the correct sequence.

1 .....

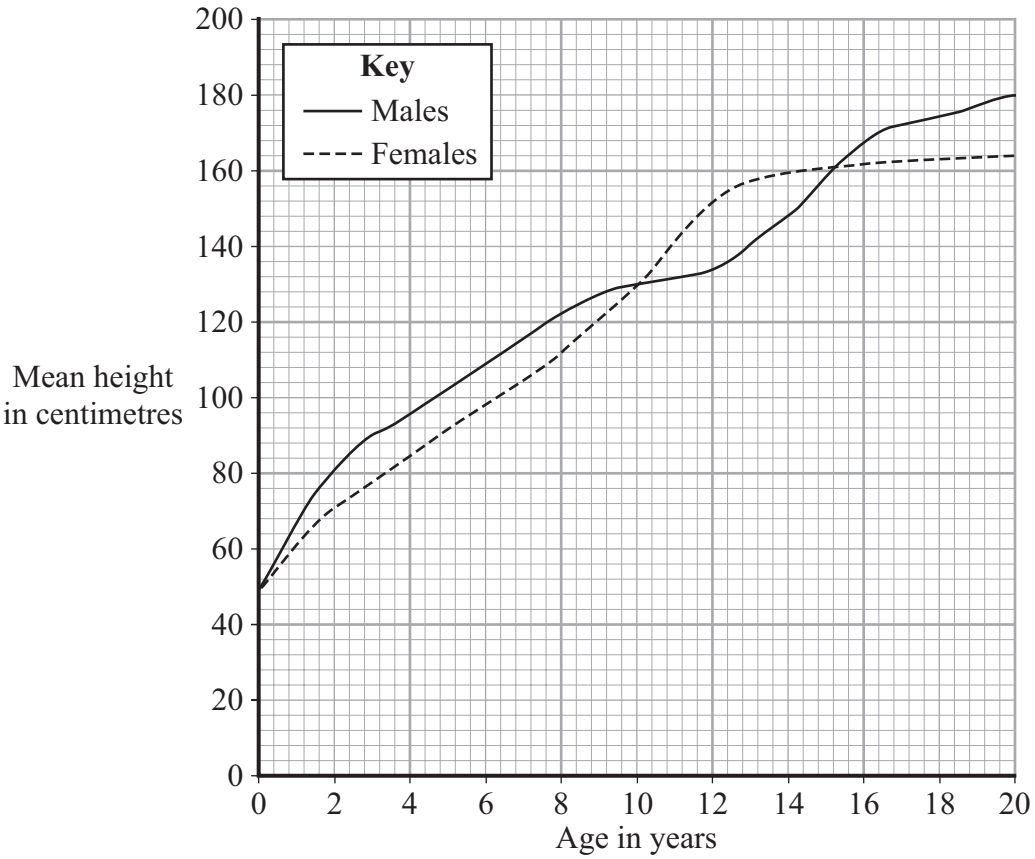
2 Adolescence

3 .....

4 Senescence

(2 marks)

4 (b) The graph shows the mean heights for males and females from birth to age 20.



4 (b) (i) What is the mean height of females at four years of age?

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(1 mark)

4 (b) (ii) During which two-year period is the rate of growth in males the fastest?

Ages ..... to .....

(1 mark)

Areas outside the box will not be scanned for marking

4 (b) (iii) During which four-year period do males show the slowest rate of growth?

Ages ..... to .....

(1 mark)

4 (b) (iv) Puberty is a time of rapid growth.

During which two-year period does puberty take place in:

males

Ages ..... to .....

females?

Ages ..... to .....

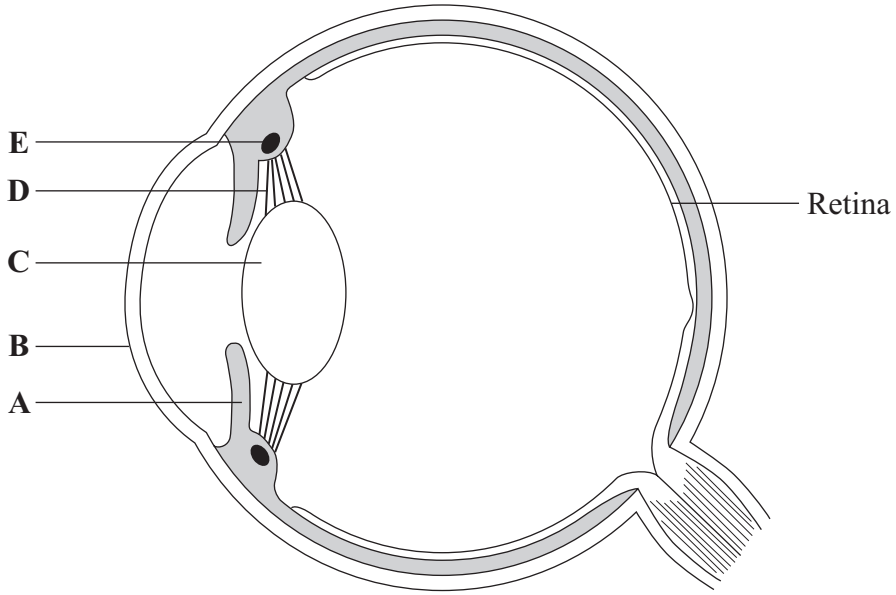
(2 marks)

7

Turn over for the next question

Areas outside the box will not be scanned for marking

5 (a) The diagram shows a section through the eye.



5 (a) (i) Name the parts labelled **A**, **C** and **D**.

A .....

C .....

D .....

(3 marks)

5 (a) (ii) Which **two** parts of the eye focus light onto the retina?

1 .....

2 .....

(2 marks)

5 (a) (iii) Explain how the eye focuses on near objects.

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(3 marks)

Areas outside the box will not be scanned for marking

5 (b) Describe the changes that take place in the eye when a bright light is shone into the eye.

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(3 marks)

11

Turn over for the next question

Areas outside the box will not be scanned for marking

6 (a) What is a drug?

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(3 marks)

6 (b) Describe the effects of alcohol on the body.

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)

8

Areas outside the box will not be scanned for marking

7 Aerobic respiration releases energy in the body.

7 (a) Complete the equation for aerobic respiration.

Oxygen	+		→		+		+	Energy

(1 mark)

7 (b) Give **two** ways in which the body makes use of this energy.

1 .....

2 .....

(2 marks)

7 (c) Oxygen moves from the air in the lungs to a muscle cell.

Describe how this happens.

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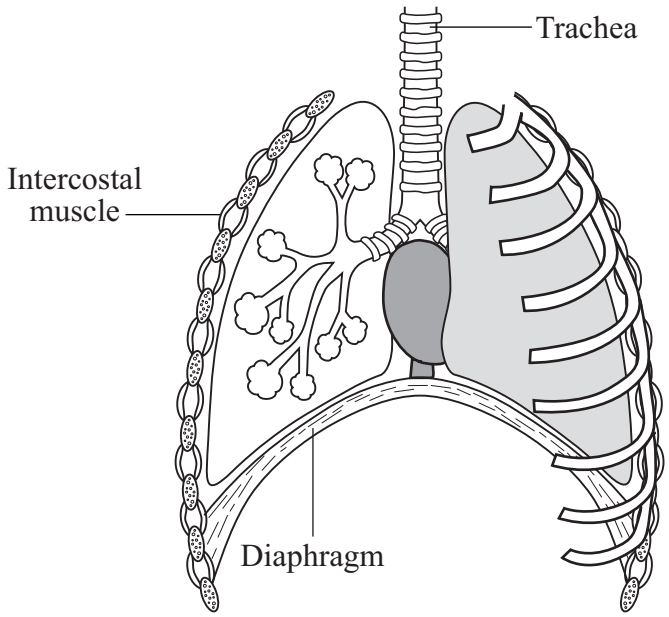
(5 marks)

8

Areas outside the box will not be scanned for marking

8 The diagram shows the breathing system.



8 (a) Describe and explain what causes air to enter the lungs.
Use words from the list in your answer.

diaphragm **intercostal muscles** **pressure** **volume**

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(4 marks)

Areas outside the box will not be scanned for marking

8 (b) (i) The wall of the trachea has rings of cartilage in it.

Suggest a function of these rings of cartilage.

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(1 mark)

8 (b) (ii) The lining of the trachea contains ciliated cells and a layer of mucus.

Describe the function of these.

Ciliated cells .....

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Mucus .....

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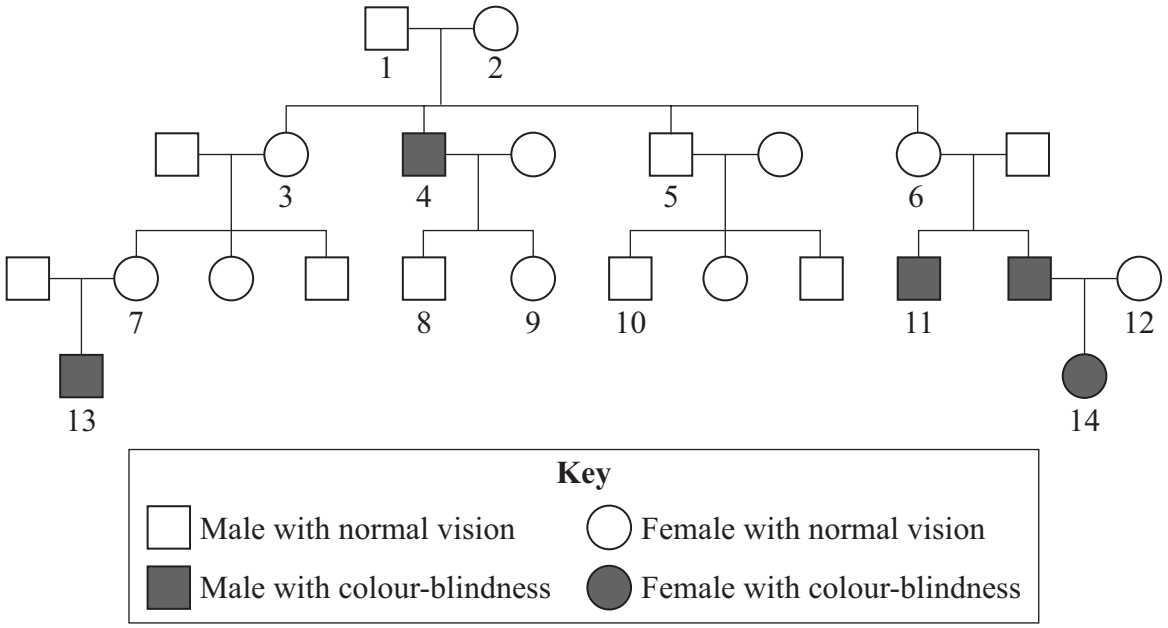
(2 marks)

7

Turn over for the next question

Areas outside the box will not be scanned for marking

9 Colour-blindness is a sex-linked condition.
Colour-blindness is caused by a recessive allele, **b**, found on the X chromosome.
The allele for normal vision is **B**.
The diagram shows a family tree in which there are people with colour-blindness.



9 (a) (i) What is the ratio of colour-blind men to colour-blind women?

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(1 mark)

9 (a) (ii) Give the genotypes of individuals:

1 .....

12 .....

14 .....

(3 marks)

9 (a) (iii) Explain why more males than females are colour-blind.

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(1 mark)

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9 (b) Cousins 9 and 10 marry and have children.

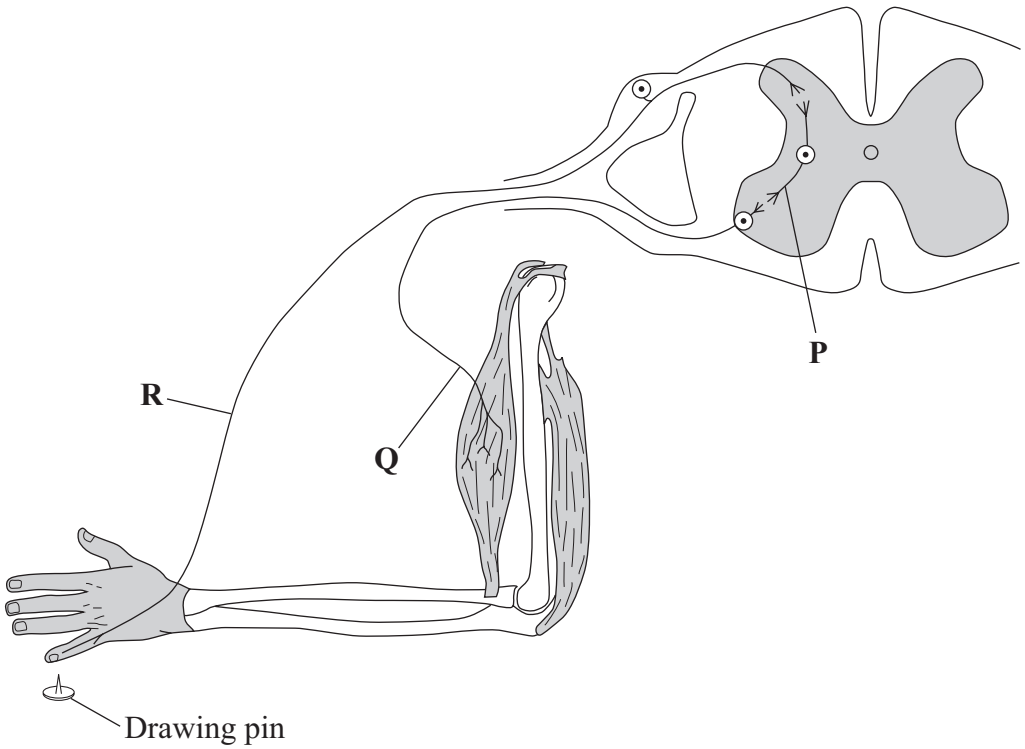
Draw a genetic diagram to show the possible genotypes and phenotypes of any offspring.

(5 marks)

10

Areas outside the box will not be scanned for marking

10 The diagram shows a reflex pathway.



10 (a) Name parts **P**, **Q** and **R**.

P .....

Q .....

R .....

(3 marks)

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10 (b) Touching the drawing pin causes the arm to be pulled away quickly.

Describe and explain how this reflex action is brought about.

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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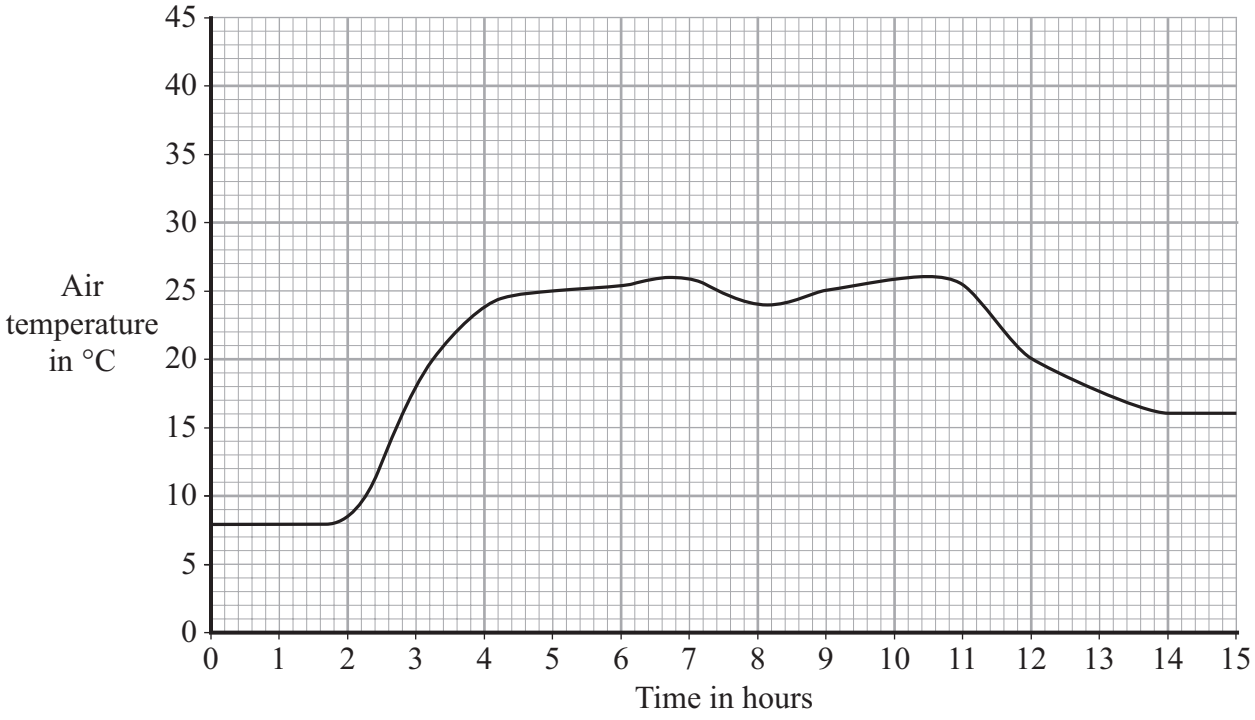
(5 marks)

8

Turn over for the next question

Areas outside the box will not be scanned for marking

11 During an investigation, a person's core body temperature was monitored.
The person was exposed to different air temperatures.
The graph shows the variation in the temperature of the air over a period of 15 hours.



11 (a) (i) What was the maximum variation in the air temperature?

.....

(1 mark)

11 (a) (ii) On the graph, draw a line to show the person's core body temperature over the 15 hours.

(1 mark)

Areas outside the box will not be scanned for marking

11 (b) Explain how a person could reduce heat loss during the period 0 to 2 hours.

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(5 marks)

7

Turn over for the next question

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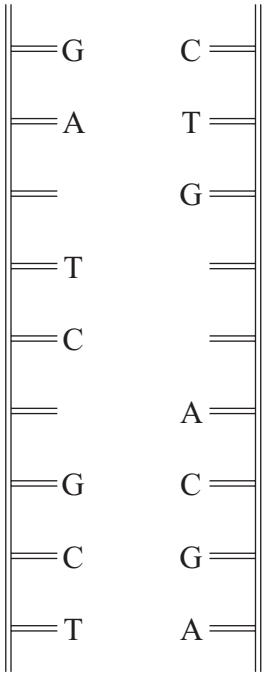
12 The diagram shows part of a DNA molecule.



Key to bases
A = Adenine
C = Cytosine
G = Guanine
T = Thymine

12 (a) Use the information in the diagram to fill in the letters of the bases that are missing from the diagram.

(1 mark)

12 (b) What is the significance of the order of bases in a DNA molecule?

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(2 marks)

12 (c) Describe how new molecules of DNA are made.

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(3 marks)

6

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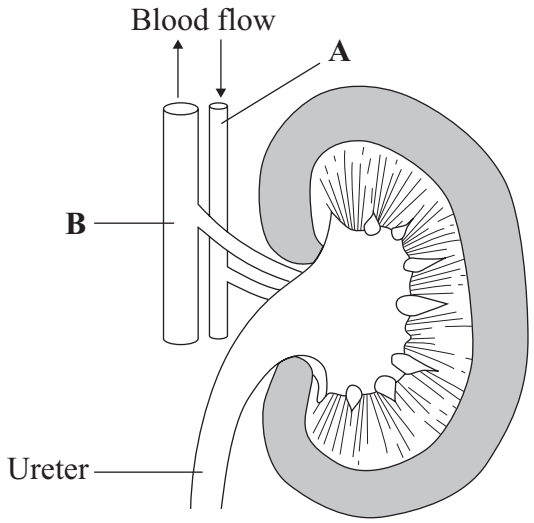
13 **Figure 3** shows a section through a kidney and two blood vessels.

Figure 3



13 (a) Name the blood vessels **A** and **B**.

A .....

B .....

(2 marks)

13 (b) Complete the table to show the presence or absence of glucose, protein and urea in each structure listed.

Use a tick (✓) to indicate presence of the substance.
Use a cross (×) to indicate the absence of the substance.

Structure	Glucose	Protein	Urea
Blood vessel A			
Blood vessel B			
Ureter			

(3 marks)

Question 13 continues on the next page

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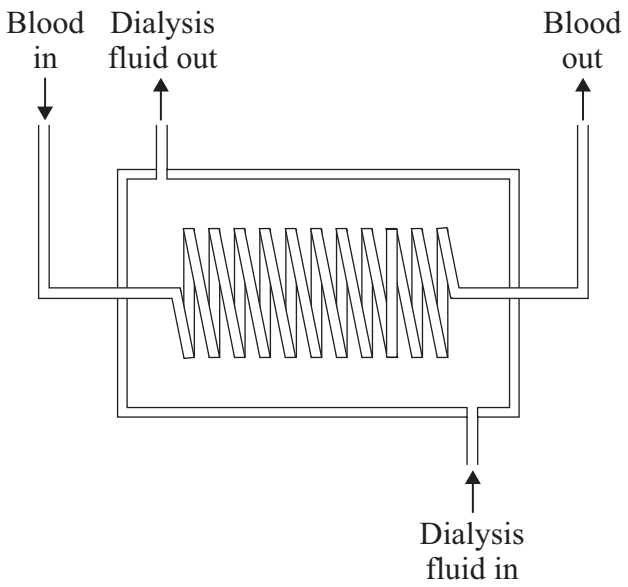
13 (c) **Figure 4** shows a part of a kidney dialysis machine.

Figure 4



Describe the process of dialysis in a dialysis machine.

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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(6 marks)

Areas outside the box will not be scanned for marking

13 (d) Evaluate the advantages of kidney transplants compared with dialysis.

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(3 marks)

14

END OF QUESTIONS

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