

Answer ALL questions in the spaces provided.

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1. The table below shows the blood flow in cm^3 per minute to various parts of the human body while at rest, during light exercise and during heavy exercise.

Part of body	Blood flow in cm^3 per minute		
	At rest	During light exercise	During heavy exercise
Heart muscle	250	350	750
Skeletal muscles	1200	4500	12500
Kidneys	1100	900	600
Gut	1400	1100	600
Skin	500	1500	1900
Brain	750	750	750

- (a) Name the blood vessel that takes blood to heart muscle.

.....
(1)

- (b) (i) What is the increase in blood flow to the skin from being at rest to light exercise?

Answer cm^3 per minute
(1)

- (ii) Calculate the percentage increase in blood flow to heart muscle from being at rest to during heavy exercise. Show your working.

Answer
(2)

(c) Explain the change in blood flow to skeletal muscles from being at rest to during heavy exercise.

Leave blank

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(3)

(d) Explain the change in blood flow to the skin from being at rest to during heavy exercise.

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(3)

(e) Suggest why the gut has a lower blood flow during exercise than at rest.

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(2)

(f) (i) How many litres of blood flow to the brain in one hour?

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(1)

(ii) In what way is blood flow to the brain different from blood flow to all the other organs? Suggest why the difference is important.

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(2)

(Total 15 marks)

Q1

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2. The table below shows the relationship between alcohol consumed and blood alcohol level for males and females of different body mass.

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Alcohol consumed per hour	Blood alcohol level in mg per 100 cm ³			
	Male 45 kg	Female 45 kg	Male 90 kg	Female 90 kg
3 units	37	45	19	22
6 units	75	90	37	45
12 units	150	180	70	90
24 units	300	360	150	180

(a) (i) What is the relationship between the amount of alcohol consumed and the blood alcohol level?

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(1)

(ii) With people who consume the same amount of alcohol, what is the relationship between their blood alcohol level and body mass?

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.....
(1)

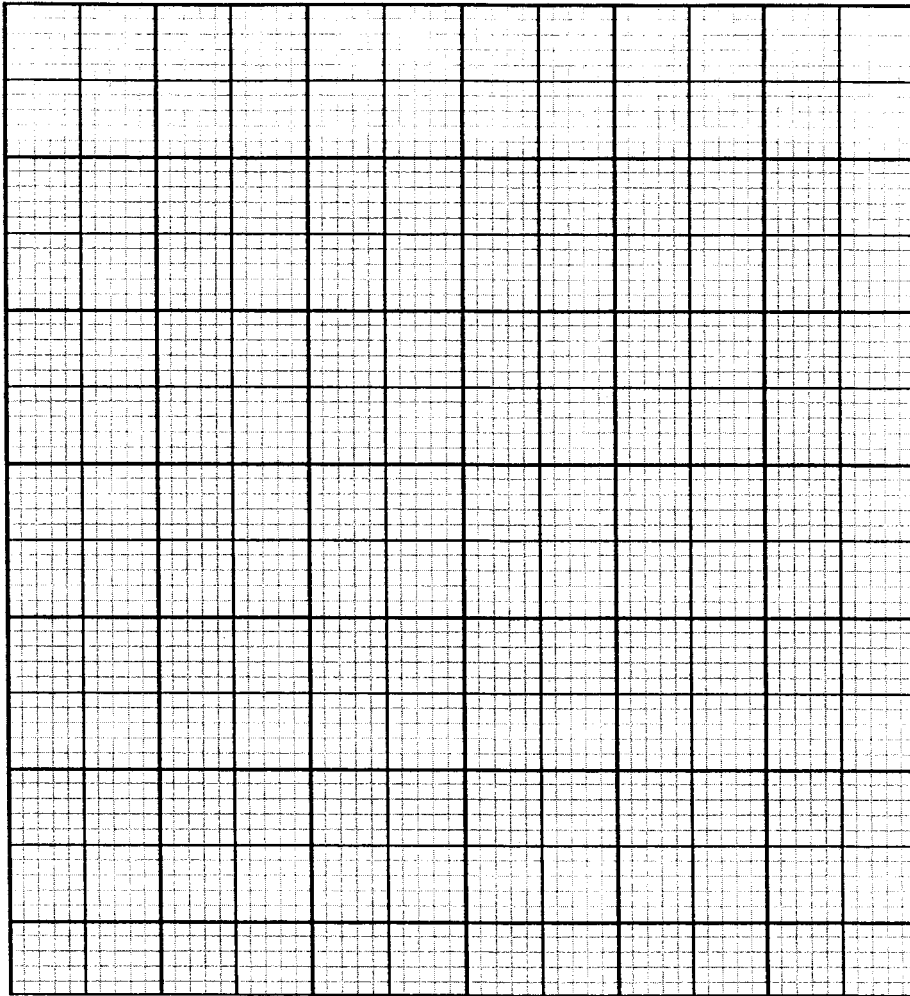
(iii) With people of the same body mass who consume the same amount of alcohol, what is the relationship between their blood alcohol level and their sex?

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

1/2/6

- (b) (i) Plot a graph of the data for the 45 kg male on the grid provided. On the same graph, plot the data for the 90 kg male. Join the points with straight lines.

Leave blank



(5)

- (ii) In certain countries, the legal limit for driving is 80mg of alcohol per 100cm³ of blood. From your graph, how many units of alcohol per hour would a 45 kg male drink to reach the legal limit?

Answer units
(1)

- (iii) What is the difference in the blood alcohol level of the 45 kg male and the 90 kg male after drinking 20 units of alcohol per hour?

Answer mg per 100cm³
(1)

Question 2 continues on the next page

(c) The table below shows how increasing levels of blood alcohol can result in changes in behaviour. Complete the table by naming the part of the brain that would be affected. One box has been completed for you.

Leave blank

Blood alcohol level in mg per 100 cm ³	Behaviour change	Part of brain affected
50	Less able to make decisions	Cerebral hemispheres
100	Loss of balance	
200	Double vision	
400	Respiratory failure	

(3)

Q2

(Total 13 marks)

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3. The passage below describes events that take place in human reproduction. Complete the passage by writing a suitable word or words in each space.

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blank*

At the start of the cycle, FSH is released from the gland. FSH travels in the to the ovary. It stimulates the ovary to release the hormone, This hormone helps repair the lining, and it stimulates the release of luteinising hormone from the pituitary. It is also responsible for the development of sexual characteristics. Luteinising hormone stimulates the production of from the corpus luteum in the ovary. This hormone helps maintain the uterus lining during

Q3

(Total 8 marks)

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4. (a) Bread contains starch.

(i) Name the monosaccharide that starch is made from.

..... (1)

(ii) Give **one** function of carbohydrate.

..... (1)

(b) Butter contains fat.

(i) Name the **two** different molecules that fat is made from.

1

2 (2)

(ii) Give **two** functions of fat.

1

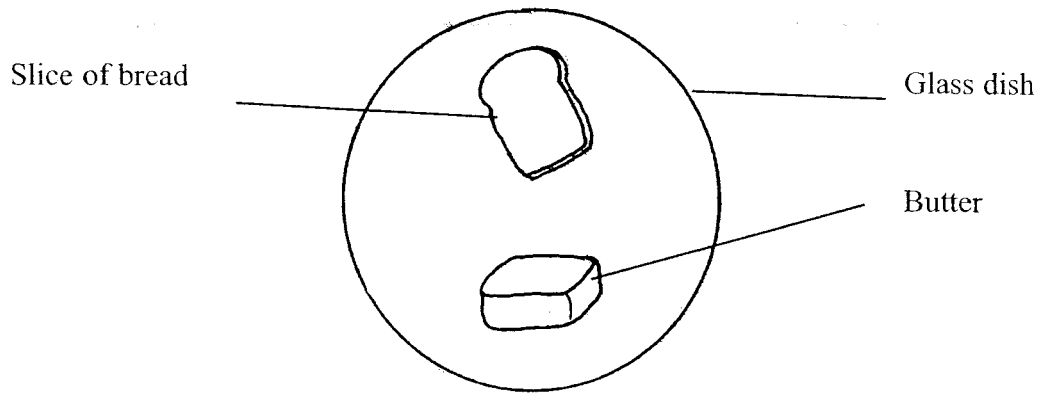
2 (2)

(c) Name the **three** elements found in both starch and fat.

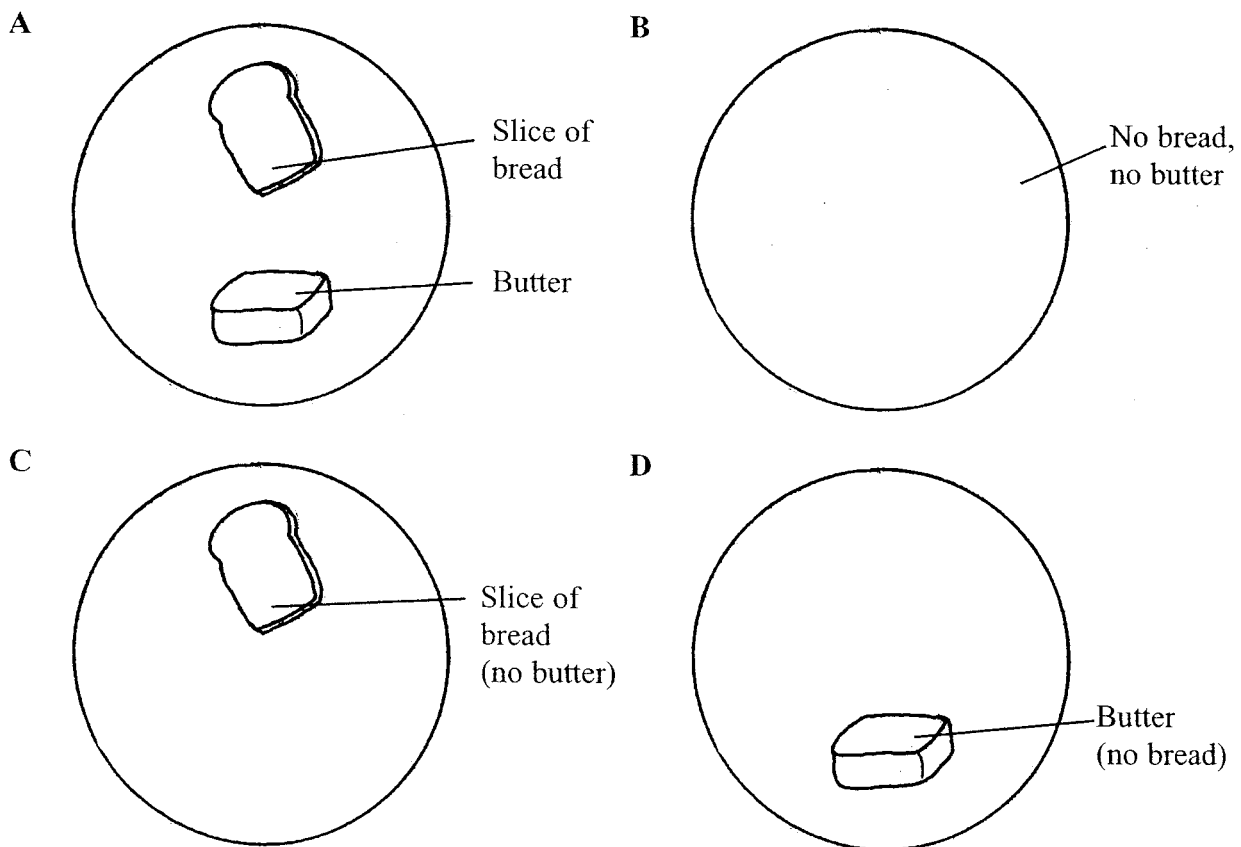
..... (1)

(d) The diagram below shows a glass dish containing a piece of bread and some butter.

Leave blank



Different enzyme solutions were added to identical separate dishes containing samples of the bread and butter. The diagrams A, B, C and D show the appearance of the dishes after 48 hours.



Write the letter of the correct glass dish in each box in the table below. Each letter may be used once, more than once or not at all. The first one has been done for you.

Enzyme solution added	Letter of glass dish
Amylase only	D
Lipase only	
Amylase and lipase	
Boiled amylase and boiled lipase	
Protease only	


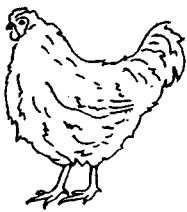
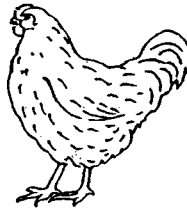
(4)

Q4

(Total 11 marks)

5. In chickens, a gene for feathers has two alleles. There is a dominant allele (**D**) for damaged feathers and a recessive allele (**d**) for normal feathers. Heterozygous chickens have slightly damaged feathers.

(a) (i) Use this information to complete the table below.

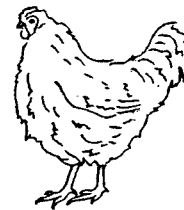
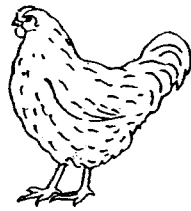
Phenotype of chicken	Genotype of chicken
 <p>Damaged feathers (homozygous)</p>
 <p>Slightly damaged feathers (heterozygous)</p>
 <p>Normal feathers (homozygous)</p>

(3)

- (ii) The diagram below shows part of a cross between a chicken with normal feathers and a chicken with slightly damaged feathers.

Leave blank

Complete the diagram to show the cross.



Chicken with normal feathers

Chicken with slightly damaged feathers

Genotypes
of parents

Gametes

Genotypes
of offspring

(3)

- (iii) In another cross, both parents had slightly damaged feathers. Tick the box that shows the correct phenotype ratio for their offspring.

Phenotype ratio	Tick
1:1	
3:1	
1:2:1	
1:1:1:1	

(1)

- (b) Chickens with damaged feathers usually eat more food and consume more oxygen than chickens with normal feathers of the same size and sex. Suggest reasons for this.

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(3)

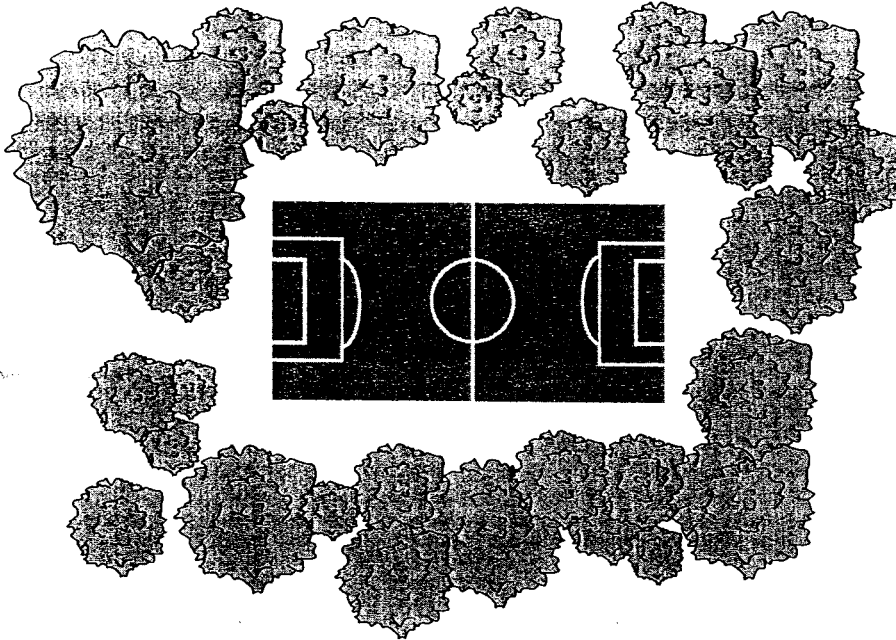
Q5

(Total 10 marks)

6. The following article appeared in a newspaper.

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A Soccer Pitch Every 20 Minutes!



Scientists are worried about the rate at which trees are being cut down in the world. They estimate that trees covering an area the size of a soccer pitch are removed every 20 minutes. This level of deforestation will have serious ecological consequences that should concern us all. Soil quality, the water cycle and rare species are all at risk.

Scientists say that we need our trees to slow global warming and to prevent minerals polluting our rivers and lakes.

(a) Give **two** reasons why trees are cut down.

1

2

(2)

(b) Explain how deforestation may affect each of the following.

(i) Soil quality

.....

.....

.....

(2)

(ii) The water cycle

*Leave
blank*

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.....
.....

(2)

(iii) Rare species

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.....
.....

(2)

(c) Describe how trees may help to slow global warming.

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(2)

(d) Describe what happens in rivers and lakes if they get polluted by minerals.

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(4)

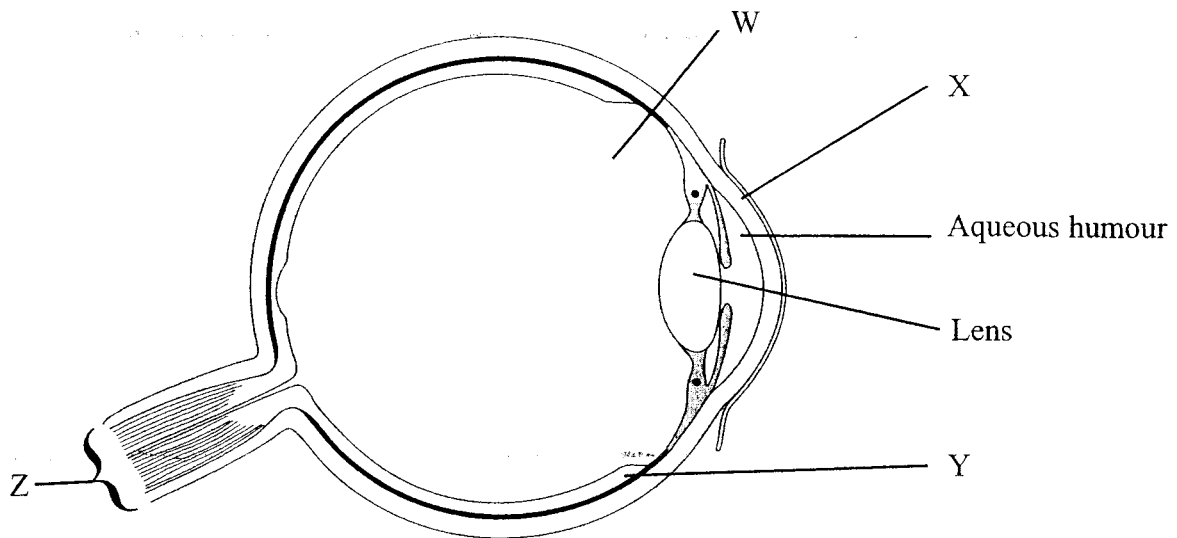
(Total 14 marks)

Q6

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7. The diagram below shows a section through a human eye.

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(a) Name the parts labelled W, X, Y and Z.

W

X

Y

Z

(4)

(b) The lens is made of protein. In some people, part of the lens may become cloudy and this is known as a cataract.

(i) Describe a test for protein.

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.....

(2)

(ii) Suggest how a cataract would affect the function of the lens.

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(2)

(c) People who are unable to produce insulin are at risk of developing cataracts. In these people the concentration of glucose in the aqueous humour is abnormally high. Because of this, glucose enters the lens. The cells in the lens then convert this excess glucose into sorbitol. Sorbitol increases absorption of water into the lens. The lens swells and becomes cloudy.

(i) Name the organ that produces insulin.

..... (1)

(ii) Describe how glucose moves from the aqueous humour into the lens.

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

(iii) Name the process by which water moves into the cells of the lens.

..... (1)

(d) A person with a cataract can have their cloudy lens replaced with one made from a special material.

Suggest **two** properties the material would need to have to be successful as a lens.

1

2

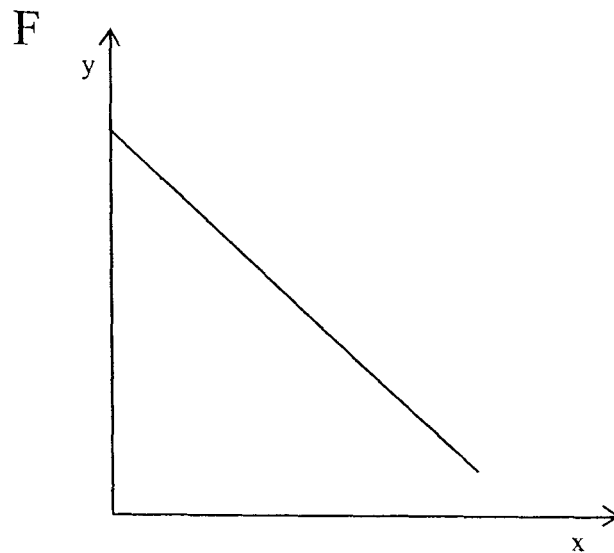
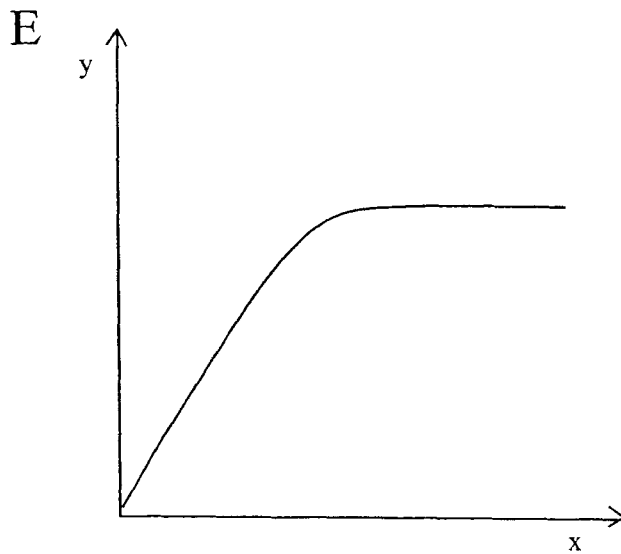
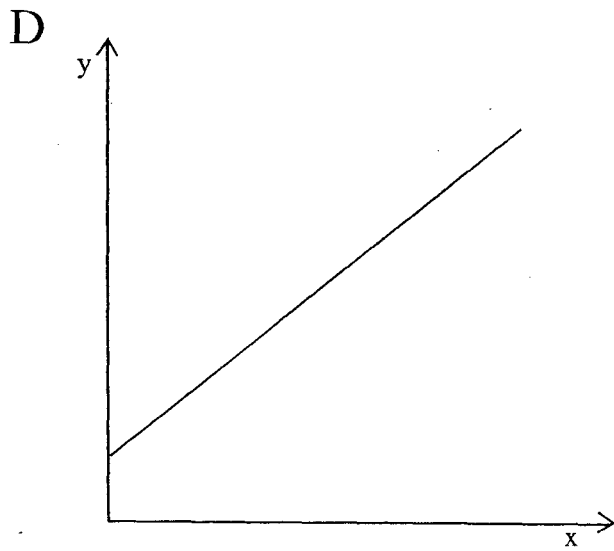
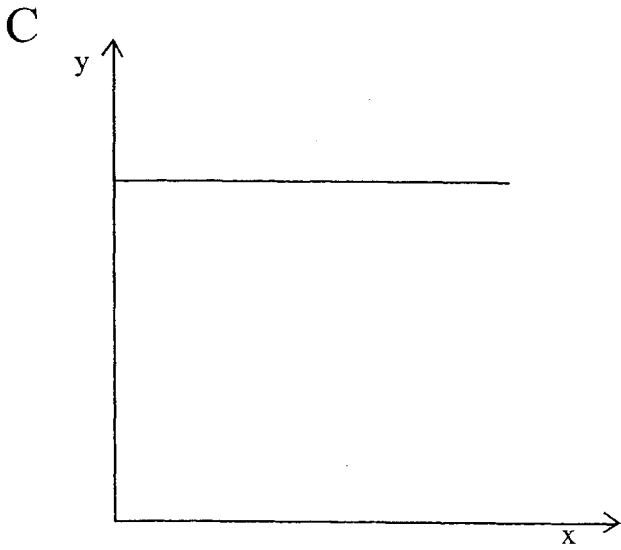
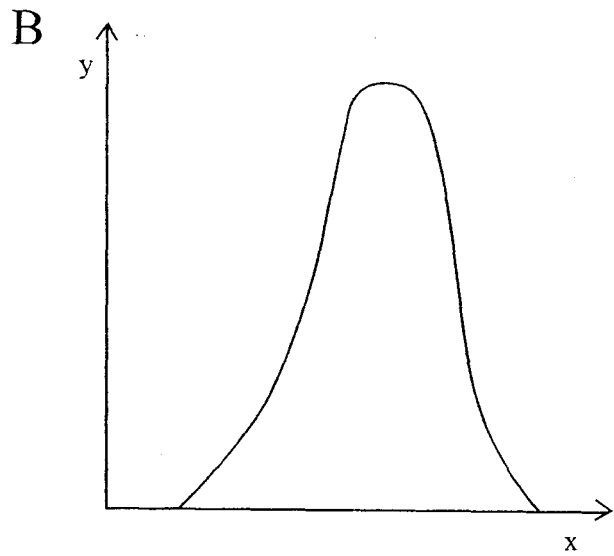
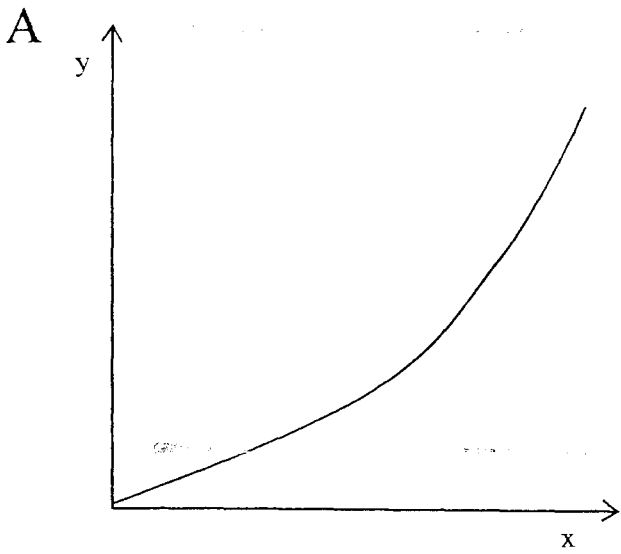
(2)

Q7

(Total 14 marks)

8. Use the graphs (A, B, C, D, E and F) below to fill in the table opposite.

Leave blank



Complete the table by writing the correct letter of each graph in the boxes. The first one has been done for you.

Leave blank

Label on y axis	Label on x axis	Letter of graph
Population size	Time	A
Rate of enzyme controlled reaction	pH	
Rate of photosynthesis	Light intensity	
Rate of transpiration	Wind speed	
Rate of water uptake by roots	Air humidity	
Human body temperature	Air temperature	

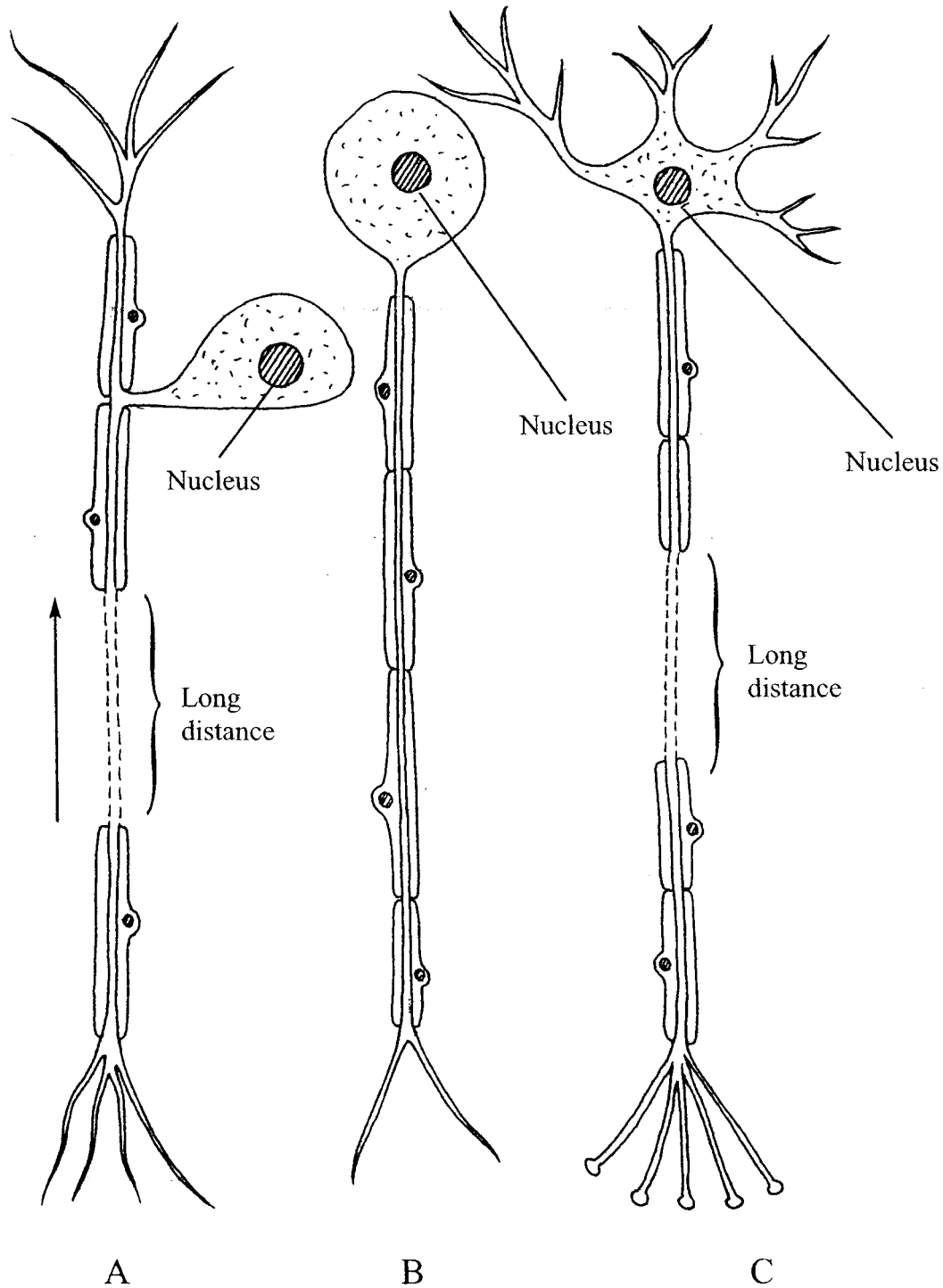
(5)

Q8

(Total 5 marks)

9. The diagram below shows three nerve cells (A, B and C). These nerve cells are an important part of the human nervous system and are found in a reflex arc.

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Leave blank

(a) (i) Name the nerve cells labelled A, B and C.

A

B

C

(3)

(ii) State the location in the nervous system of the cell body of nerve cells A and C.

A

C

(2)

(b) The arrow by nerve cell A shows the direction in which a nerve impulse travels.

Draw an arrow next to each of nerve cells B and C to show the direction in which a nerve impulse travels.

(2)

(c) Explain **one** way in which the structure of nerve cell C helps it carry out its function.

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(2)

(d) Name **one** example of a reflex arc.

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(1)

Q9

(Total 10 marks)

TOTAL FOR PAPER: 100 MARKS

END