

BLANK PAGE



Answer ALL questions in the spaces provided.

1. The table below refers to some features of mammalian hormones. Complete the table by writing the most appropriate word, or words, in the empty boxes.

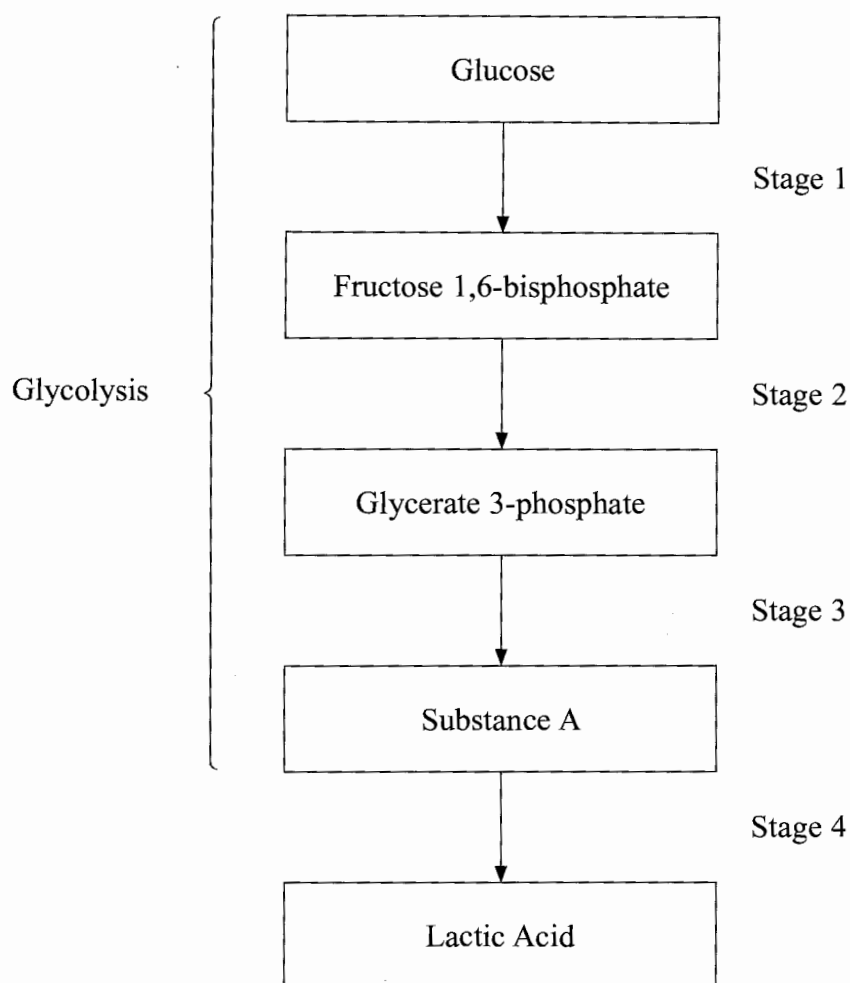
Hormone	Site of secretion	One function
	Pancreas	Raises blood glucose concentration
	Posterior pituitary gland	Contraction of uterine muscle
Luteinising hormone		Release of secondary oocyte
Adrenaline	Adrenal gland	

Q1

(Total 4 marks)



2. (a) The diagram below shows some of the stages of anaerobic respiration in a muscle cell.



(i) Name substance A.

..... (1)

(ii) State which of the stages shown in the diagram:

Uses ATP

Produces ATP

(2)



(b) The Krebs cycle occurs during aerobic respiration and is an example of a metabolic pathway.

(i) Explain why the Krebs cycle is described as a metabolic pathway.

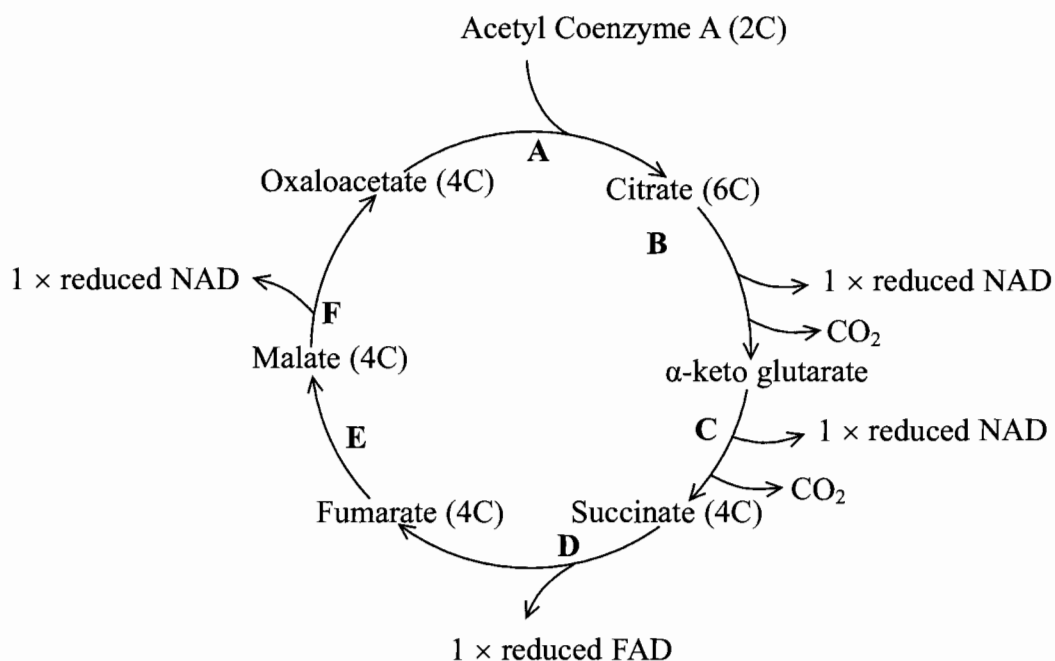
.....

 (1)

(ii) State precisely where in the cell the Krebs cycle occurs.

.....
 (1)

(c) The diagram below shows some of the stages that occur in the Krebs cycle.



Oxidoreductase enzymes are involved in some of the reactions in the Krebs cycle. Using the letters A to F and the information given in the diagram, list **all** the stages that involve an oxidoreductase enzyme.

.....
 (1)

(Total 6 marks)

Q2



3. Detection of light occurs in both mammals and flowering plants.

- (a) In humans, the central region of the retina has very few rod cells. However, in a dog about 80–90% of the photoreceptors in the central region of the retina are rod cells. Suggest **one** advantage to a dog of having more rod cells in this region of the retina.

.....

.....

.....

.....

.....

.....

(3)

- (b) Humans have three types of cone cell. However, dogs only have two types of cone cell. **Graph 1** below shows the percentage of light, of different wavelengths, absorbed by the pigments in the two types of cone cell in a dog's retina. **Graph 2** shows the percentage of light, of different wavelengths, absorbed by the pigments in the three types of cone cell in a human's retina. Table 1 shows the colour of light of different wavelengths.

Graph 1

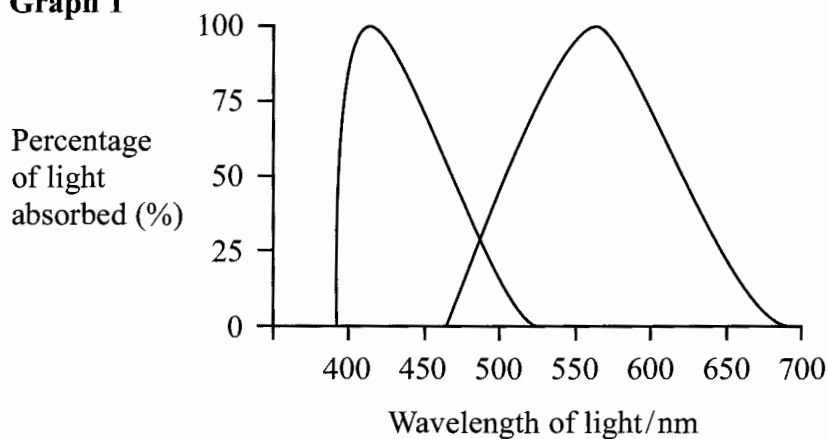
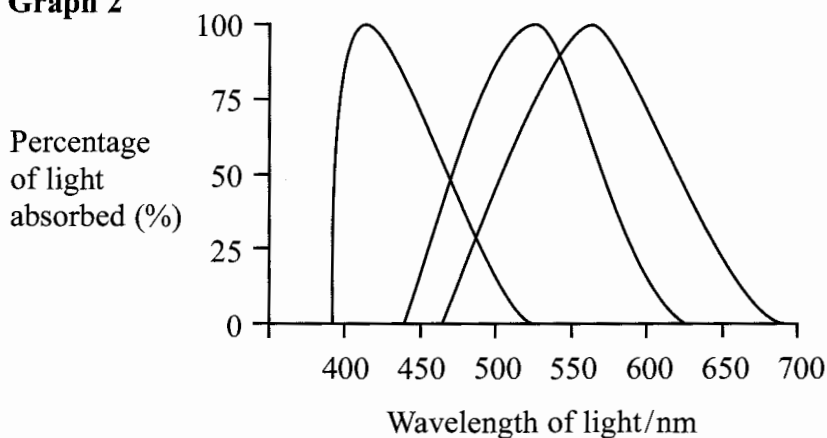


Table 1

Wavelength/nm	Colour
400	Violet
475	Blue
510	Green
570	Yellow
590	Orange
650	Red

Graph 2



Three balls, that differed only in their colour, were placed in front of a dog and a human. One ball was red, one yellow and one orange. Using this data, explain why only the human would be able to detect a difference between the colour of the three balls.

.....

.....

.....

.....

.....

.....

(2)

(c) Describe the detection of light in flowering plants.

.....

.....

.....

.....

.....

.....

.....

.....

(3)

(Total 8 marks)

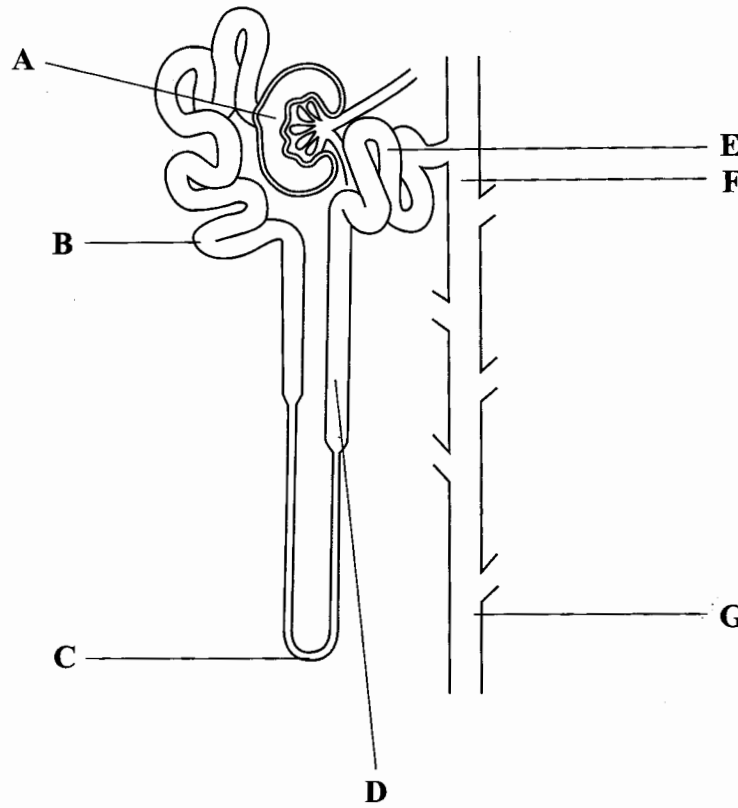
Q3



BLANK PAGE



4. (a) The diagram below represents a nephron (kidney tubule).



(i) Name the parts labelled A and B.

A

B

(1)

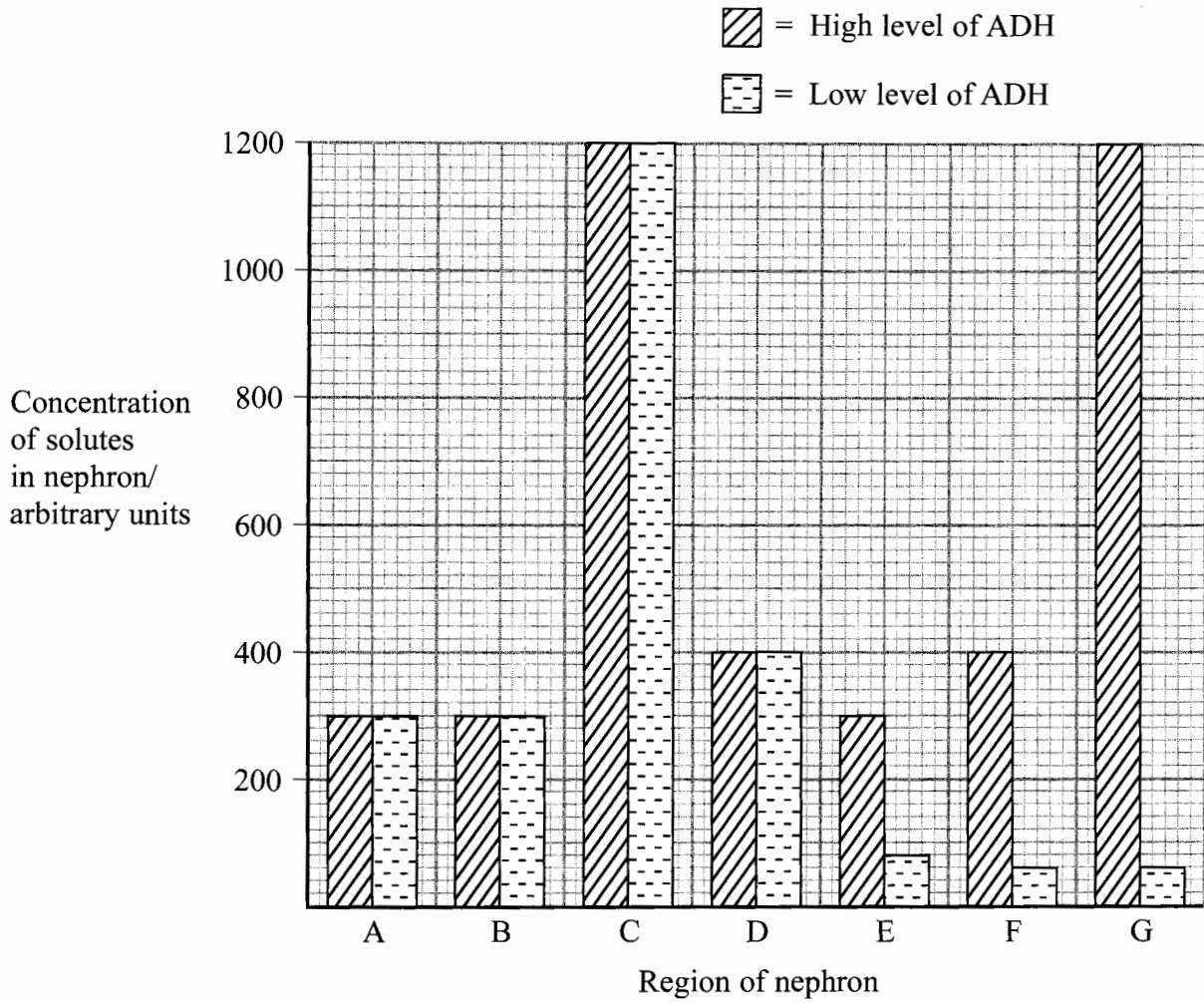
(ii) All the glucose in region A is reabsorbed back into the bloodstream as the fluid in the nephron passes from region A to region B. Explain how this glucose reabsorption occurs.

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

(2)



(b) The graph below shows the concentration of solutes in the fluid in the nephron in each of the labelled regions shown in the diagram. The graph shows the concentration of solutes when there is a high level of ADH (antidiuretic hormone) in the blood and when there is a low level of ADH in the blood.



(i) Calculate the percentage decrease in the concentration of solutes between regions A and G when there is a **low** level of ADH in the blood. Show your working.

..... %
 (3)



(ii) The concentration of solutes in the fluid changes as it passes from region A to region G. Compare the changes that occur when the level of ADH in the blood is high with changes that occur when the level of ADH is low.

.....

.....

.....

.....

.....

.....

.....

.....

.....

(3)

(iii) Use the information in the graph to explain how a rise in the level of ADH results in the production of a more concentrated urine.

.....

.....

.....

.....

.....

.....

.....

.....

.....

(3)

(Total 12 marks)

Q4

--	--



Leave
blank

Area with horizontal dotted lines for writing.

Q5

--	--

(Total 10 marks)



BLANK PAGE



Option B: Food Science

6. The table below refers to some deficiency diseases that may occur if an individual does not eat enough of a particular mineral ion or vitamin in their diet. Complete the table by inserting the name of the appropriate mineral ion or vitamin in the empty boxes.

Deficiency disease	Name of mineral ion or vitamin that is lacking in the diet
Night blindness	
Poor skeletal growth	
Scurvy	
Anaemia	

(Total 4 marks)

Q6



7. An investigation was carried out into the effect of modified atmosphere storage on the decay of raspberries during a seven-day period. The experimental atmosphere in which the raspberries were to be stored had air with an oxygen level of 3%. A second set of identical raspberries was stored in air with an oxygen level of 20%.

The degree of decay was assessed by measuring the percentage of raspberries with visible defects. A large number of visible defects makes the fruits unfit for sale. It was decided that raspberries showing above 20% visible defects were not acceptable for sale.

The results of this experiment are given in the table below.

Storage time / days	Percentage of fruit with visible defects stored in air (%)	
	With an oxygen level of 3%	With an oxygen level of 20%
0	0.0	0.0
3	0.0	15.3
5	15.0	27.0
7	20.5	35.2

- (a) State **one** type of visible defect that could be observed on the raspberries during storage.

.....
(1)

- (b) (i) Describe the effects of oxygen level on the fitness for sale of the raspberries during the seven-day period.

.....

(3)



(ii) Explain why the decay of the raspberries differed when stored at an oxygen level of 3% compared with those stored at an oxygen level of 20%.

.....

.....

.....

.....

.....

(2)

(Total 6 marks)

Q7



8. (a) Describe and explain the processes that occur during the ripening of apples and tomatoes.

.....

.....

.....

.....

.....

.....

.....

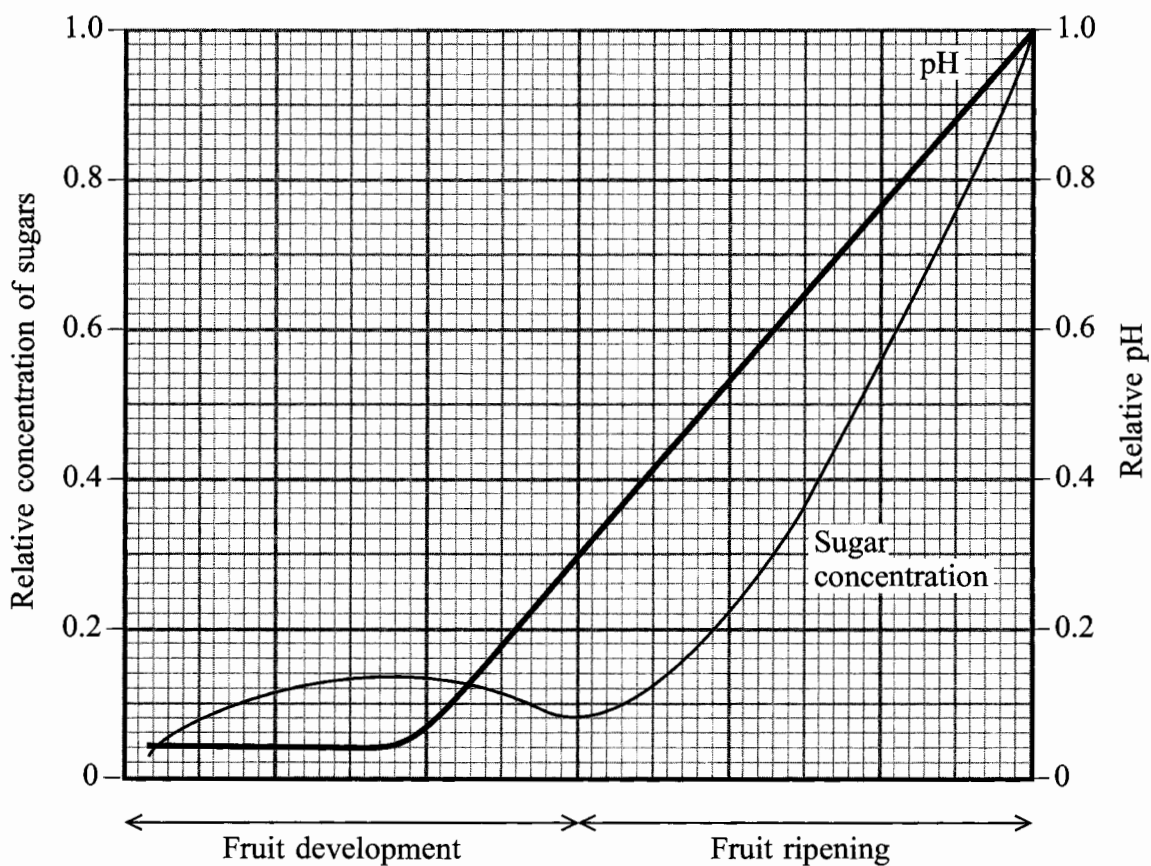
.....

.....

.....

(4)

(b) The pH and concentration of sugars in apples were measured at the start of their development. The relative changes in these, during further development and ripening of the apples, are shown in the graph below.



Describe the changes in the concentration of sugars and the pH that occur during the development and ripening of apples.

.....

.....

.....

.....

.....

.....

.....

.....

(3)

(c) Describe an investigation that could be carried out to determine the relative sweetness of apples during development and ripening.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4)

(Total 11 marks)

Q8

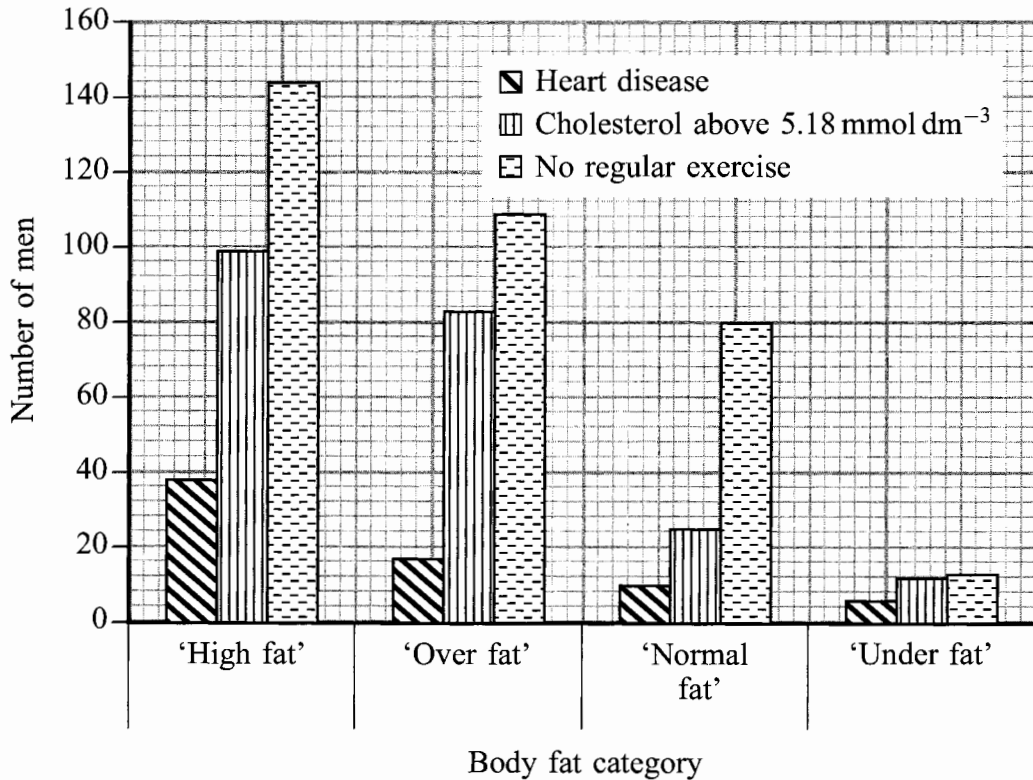
--	--



9. (a) An investigation was carried out to examine the relationship between percentage body fat, heart disease and lifestyle. Body fat is the mass of fat expressed as a percentage of the total body mass.

Four categories of body fat were defined: 'high fat' where body fat is above 25%; 'over fat' where body fat is between 20% and 25%; 'normal fat' where body fat is between 10% and 20% and 'under fat' where body fat is below 10%.

In each of these four categories of body fat, 200 men of a similar age were surveyed. The graph below shows the number of men in each category that have been diagnosed with heart disease, have a high blood cholesterol level (above $5.18 \text{ mmol dm}^{-3}$) and do not take regular exercise.



(i) Calculate the percentage increase in the occurrence of heart disease between men in the 'normal fat' category compared with men in the 'high fat' category. Show your working.

Answer%
(3)



BLANK PAGE



BLANK PAGE



N 2 9 2 4 8 A 0 2 3 2 4

BLANK PAGE

