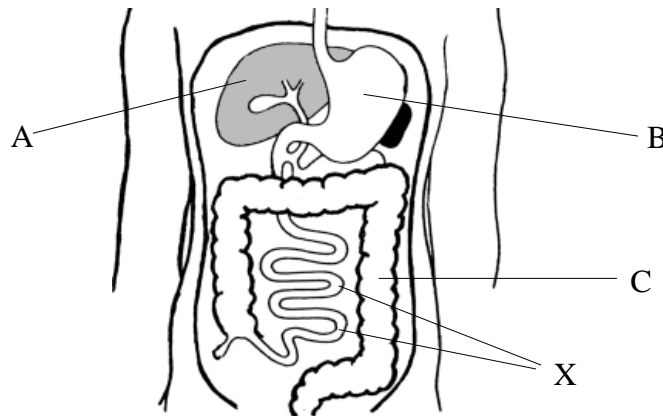


The diagram below shows part of the digestive system of a human.



(a) Name parts A, B and C.

A: ..... [1]

B: ..... [1]

C: ..... [1]

(b)(i) What is the main function of region X?

..... [2]

(ii) List two structural features of X which adapt it to this function.

1: .....

2: ..... [2]

(c) Name two secretions which contain enzymes involved in carbohydrate digestion.

1: .....

2: ..... [2]

(d) Name the regions of the digestive system where most of the following substances are absorbed.

(i) Glucose and amino acids.

..... [1]

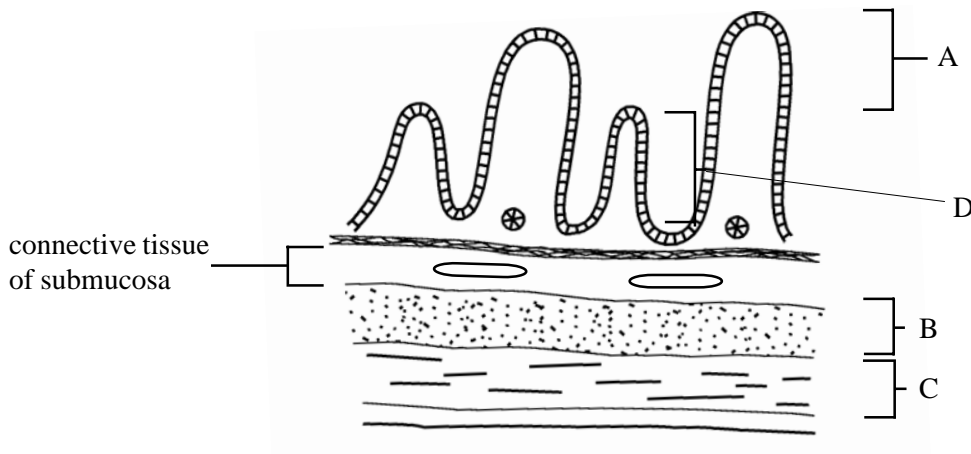
(ii) Alcohol.

..... [1]

(iii) Water.

..... [1]

The diagram below shows part of the small intestine wall cut in vertical section.



(a) Name parts A, B, C and D.

- A: ..... [1]  
 B: ..... [1]  
 C: ..... [1]  
 D: ..... [1]

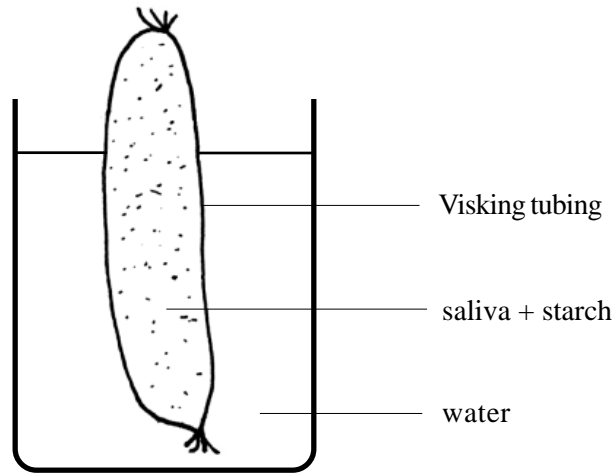
(b)(i) Give four structural features of part A which suit it for its function.

- 1: .....  
 2: .....  
 3: .....  
 4: ..... [4]

(ii) Name four enzymes secreted by part D and state their actions.

1. Name: ..... Action: .....  
 2. Name: ..... Action: .....  
 3. Name: ..... Action: .....  
 4. Name: ..... Action: ..... [4]

The diagram below shows a model gut made of Visking tubing which contains a mixture of saliva and starch.



(a) Suggest a suitable temperature for this experiment. Give a reason for your answer.

.....  
..... [2]

(b) What is the water meant to represent?

..... [1]

(c) Why is starch unable to pass through the Visking tubing?

..... [1]

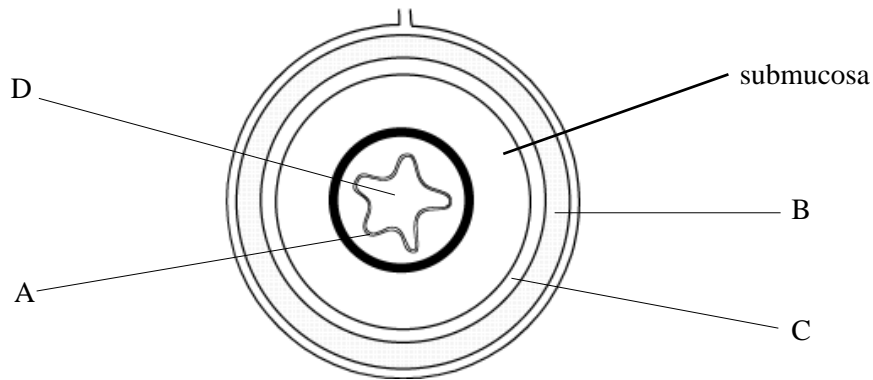
(d) What substance would you find dissolved in the water after 1 hour?

..... [1]

(e) How would you test for this substance?

.....  
.....  
..... [3]

The diagram below shows a transverse section through the gut of a mammal.



(a) Name the structures A to D.

A: ..... B: .....

C: ..... D: .....

[4]

(b) Which region of the gut corresponds to the following statements?

(i) Crypts of Lieberkühn present: .....

[1]

(ii) Oxyntic and peptic cells present: .....

[1]

(iii) Microvilli line the columnar epithelium: .....

[1]

(iv) Ducts from the pancreas and liver enter into here: .....

[1]

(c) What type of epithelium lines the oesophagus ? Explain why.

Type: .....

Why: .....

.....

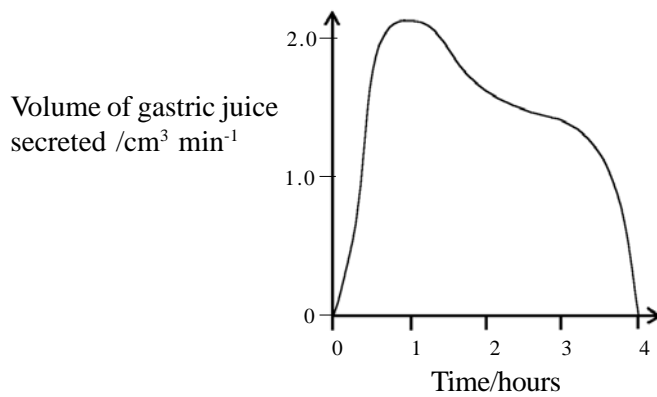
[3]

(a) Saliva secretion is controlled by a reflex action. Complete the table below to show the components of this reflex.

Stimulus	
Receptor	
Effector	
Response	secretion of saliva

[3]

The graph shows the volume of gastric juice produced in the 4 hours following a meal.



(b) Gastric juice secretion is controlled partly by reflex action and partly by a hormone, gastrin. Which of these two would you expect to be mainly responsible for controlling gastric secretion

(i) immediately after a meal has been eaten?

..... [1]

(ii) 1 hour after a meal?

..... [1]

(iii) Give a reason for your answers.

..... [2]

(c) What are the advantages of having both the nervous and endocrine systems controlling gastric juice secretion?

..... [3]

QUESTIONSHEET 6

The table below shows the results of an investigation into the effects of injecting secretin on the production and composition of pancreatic juice.

Time/mins	Total volume of pancreatic juice /cm <sup>3</sup>	Concentration of hydrogencarbonate ions /m mols dm <sup>-3</sup>	Concentration of amylase/ international units cm <sup>-3</sup>
0	0.3	78	17
10	0.2	73	15
20	17.7	146	3
30	15.2	130	2
40	5.1	98	8
50	0.6	77	10

(a) Using the results from the table suggest what evidence there is to show that the hormone was injected somewhere between 10 and 20 minutes after the start of the investigation.

.....  
 .....  
 [2]

(b) What kind of control would be suitable to use in this investigation?

.....  
 .....  
 .....  
 [3]

(c) Calculate the actual quantity of amylase in international units that is present in the pancreatic juice at 0 minutes and 20 minutes. Show your working.

0 minutes:

Answer .....

20 minutes:

Answer .....

[2]

(d) Using the information in the table only, describe the action of secretin on the production of pancreatic juice.

.....  
 .....  
 .....  
 [3]

QUESTIONSHEET 7

(a) (i) What is meant by the term 'balanced diet'?

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

[3]

(ii) Sometimes the balanced diet requirements of an organism may alter. State three examples of this and in each case state an adjustment that should be made to the diet.

1: .....

..... [2]

2: .....

..... [2]

3: .....

..... [2]

(b) (i) Distinguish between essential and non-essential amino acids.

.....  
.....

[2]

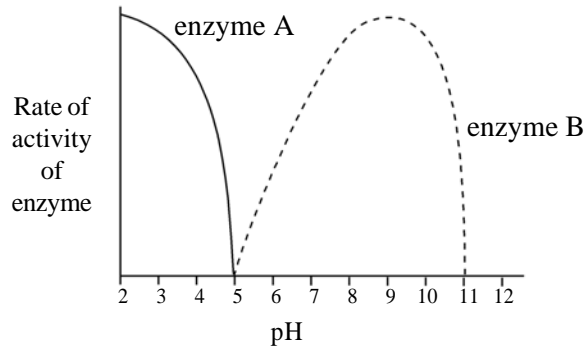
(ii) Comment on the value of fibre in the human diet.

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

[3]

QUESTIONSHEET 8

The graph below shows the rate of activities of two protein digesting enzymes, A and B.



(a) (i) At which pH do the two digestive enzymes work best?

Enzyme A: ..... [1]

Enzyme B: ..... [1]

(ii) Suggest an identity for the two digestive enzymes.

Enzyme A: ..... [1]

Enzyme B: ..... [1]

(iii) Give reasons for your choice in (ii) above.

.....  
..... [2]

(b) (i) State two functions of hydrochloric acid in the stomach.

1: .....

2: ..... [2]

(ii) State two functions of hydrogen carbonate ions in the duodenum.

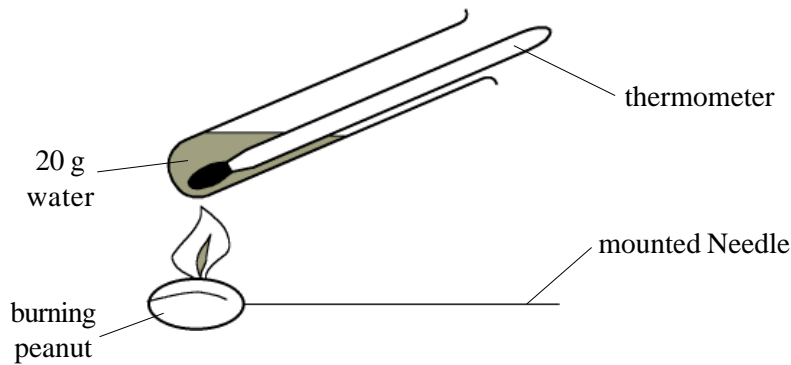
1: .....

2: ..... [2]



QUESTIONSHEET 9

The diagram shows a simplified version of an experiment to measure the energy content of a food.



The results of the experiment are shown in the table below:

	Mass of food completely burnt	Temp. of water before heating	Temp. of water after heating
Peanut	1g	17°C	95°C
Bread	1g	19°C	40°C

(a) It is possible to find out the amount of heat absorbed by the water using the following formula:

$$4.18 \times \text{mass of water} \times \text{temperature rise} = \text{heat absorbed in Joules.}$$

Calculate the amount of heat absorbed for the peanut and the bread. Show your working.

Answers : Peanut: ..... Bread: ..... [4]

(b) Which food contains the most energy? Suggest why.

Food: .....  
 .....  
 ..... [3]

(c) What is present in the peanut that makes it burn readily?

..... [1]

(d) What is left at the end of the experiment when the two foods are completely burnt?

..... [1]

(e) Suggest two main sources of error in the above experiment.

.....  
 ..... [2]

(a) The following passage refers to the digestive system. Complete the passage by inserting the most appropriate word or words in the spaces.

When food is swallowed it is moved along the..... by a muscular action called ..... and through the .....into the stomach. In the stomach any bacteria in the food are killed by the..... and protein digestion is started using the enzyme ..... . After about two hours the contents of the stomach are of a creamy consistency and are called ..... Small squirts of this are allowed through the ..... into the duodenum where they cause the release of the hormones ..... and ..... . These stimulate the flow of bile, pancreatic juice and intestinal fluid into the duodenum. Bile salts ..... fats into smaller droplets. Inactive ..... from the pancreatic juice is activated to trypsin by ..... from the intestinal juice. The trypsin continues ..... digestion. In the ileum glucose is absorbed into the ..... and carried to the liver in the ..... vein.

[15]

(b)(i) Name three substances that are absorbed into the blood system.

1: ..... 2: ..... 3: ..... [3]

(ii) What is absorbed into the lymphatic system?

..... [1]

(c) What is meant by the term 'assimilation'?

..... [3]

QUESTIONSHEET 11

Children receiving an inadequate supply of Vitamin D develop rickets, a disease which was once very common in Great Britain. A lack of vitamin D results in a failure to absorb adequate quantities of calcium and phosphate from the diet.

(a) (i) State two sources of vitamin D.

1 .....

2 ..... [2]

(ii) Describe two symptoms of rickets.

1 .....

.....

2 .....

..... [2]

(iii) Suggest two reasons why rickets only rarely occurs in Great Britain now.

.....

.....

..... [2]

(iv) Pregnant and breastfeeding mothers require a high daily intake of vitamin D. Suggest why this is so.

.....

.....

..... [2]

QUESTIONSHEET 11 CONTINUED

Vitamin A is retinol and can be obtained as retinol from some fatty animal foods. It can also be manufactured in the body from carotene, a yellow pigment found in plants such as carrots, spinach and apricots. Carrots contain around 12000  $\mu\text{g}$  of carotene per 100 g of carrot. ( $\mu\text{g}$  = microgrammes)

6  $\mu\text{g}$  of carotene can yield 1  $\mu\text{g}$  of retinol when converted in the body.

- (b) (i) The daily recommended requirement for retinol is 750  $\mu\text{g}$  in healthy adults. Assuming that an adult's only source of vitamin A is carrots, calculate the mass of carrots that must be eaten to satisfy the daily need for vitamin A. Show your working.

Answer ..... [3]

- (ii) State two effects of prolonged vitamin A deficiency.

1 .....

2 .....

[2]

- (iii) Name a food of animal origin that contains a good supply of retinol.

.....

[1]

- (iv) Why does margarine, which is made from vegetable oils, contain a lot of retinol?

.....

[1]

Of the twenty amino acids commonly found in proteins eight are essential. The table indicates the essential amino acid content of a hypothetical perfect protein, of bread and of cheese.

Amino acid	mg of amino acid per g of protein		
	perfect protein	bread	cheese
Isoleucine	43	41	65
Leucine	48	68	98
Lysine	43	20	80
Phenylalanine	30	48	46
Methionine	42	31	33
Threonine	31	27	45
Tryptophan	15	10	14
Valine	43	40	70

(a) Distinguish between the terms 'essential' and 'non-essential' amino acids.

.....  
 ..... [2]

(b) (i) Plot the data in the table in suitable bar chart form.

[4]

(ii) Comment on the relative values of eating cheese alone, bread alone and bread and cheese together.

Cheese: ..... [2]  
 .....

Bread: ..... [2]  
 .....

Bread and cheese: ..... [2]  
 .....

(iii) Briefly explain why it is advisable to eat a wide range of different foods.

.....  
 ..... [2]  
 .....

(c) Name a disease caused by continual severe protein deficiency.

..... [1]

QUESTIONSHEET 13

(a) The following terms refer to specific types of heterotrophic nutrition. Briefly describe each type and state one example of each.

(i) mutualism.

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

example: .....

[3]

(ii) parasitism.

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

example: .....

[3]

(b) The following passage refers to one type of heterotrophic nutrition. Complete the passage by inserting the most appropriate word or words into these spaces.

Organisms which feed on dead or decaying matter are called ..... . Many  
.....for example .....and bacteria feed in this way.  
These organisms secrete ..... on to potential food and digest it. The soluble  
end-products of this .....digestion are then.....and assimilated  
by the organism.

[6]

Comment on the special modes of nutrition of the following organisms:

(a) Insectivorous plants.

.....

.....

.....

.....

.....

[4]

(b) Ruminants.

.....

.....

.....

.....

.....

[4]

(c) Fungi.

.....

.....

.....

.....

.....

[4]

QUESTIONSHEET 15

(a) What are vitamins?

.....  
..... [2]

(b) For each of the following vitamins, give one source and one function of the vitamin in a mammal.

(i) Vitamin C.

Source. .... [1]

Function. ....  
..... [1]

(ii) Vitamin A.

Source. .... [1]

Function. ....  
..... [1]

(iii) Vitamin D.

Source. .... [1]

Function. ....  
..... [1]

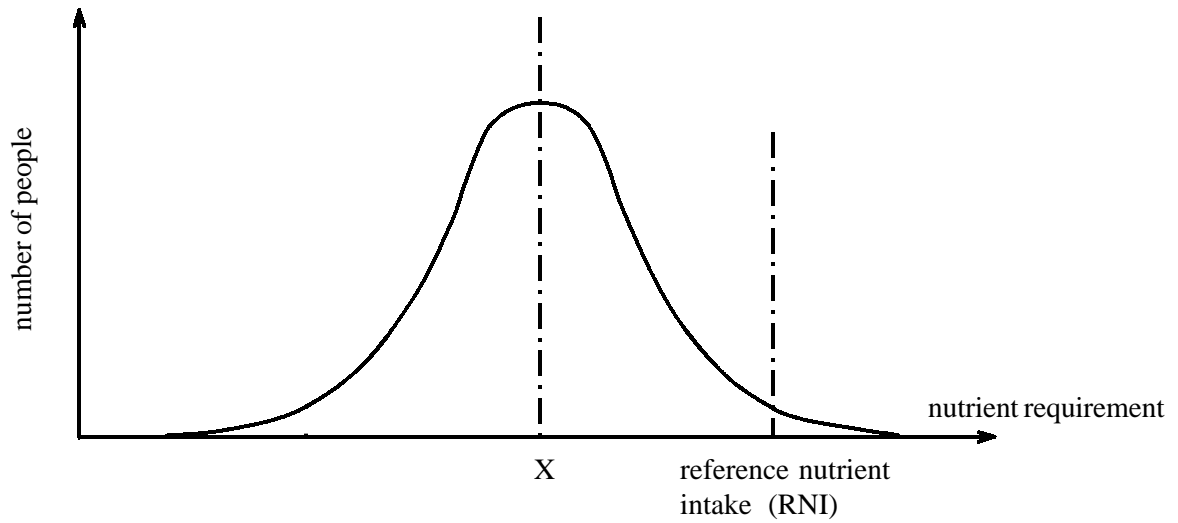
(c) Distinguish between kwashiorkor and marasmus.

.....  
.....  
..... [2]



QUESTIONSHEET 16

The graph below shows dietary reference values for nutrients.



(a) State what the line labelled X represents.

..... [1]

(b) What does the Reference Nutrient Intake line mean?

..... [1]

(c) Outline the possible harmful effects of continued excess intake of energy.

.....  
.....  
.....  
.....  
..... [4]

(a) Define the term basal metabolic state (BMR).

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

[2]

(b) Explain why:

(i) males have a higher BMR than females.

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

[2]

(ii) the recommended total fat intake (dietary reference value) is only 33 - 35% of total energy intake.

.....  
.....

[2]

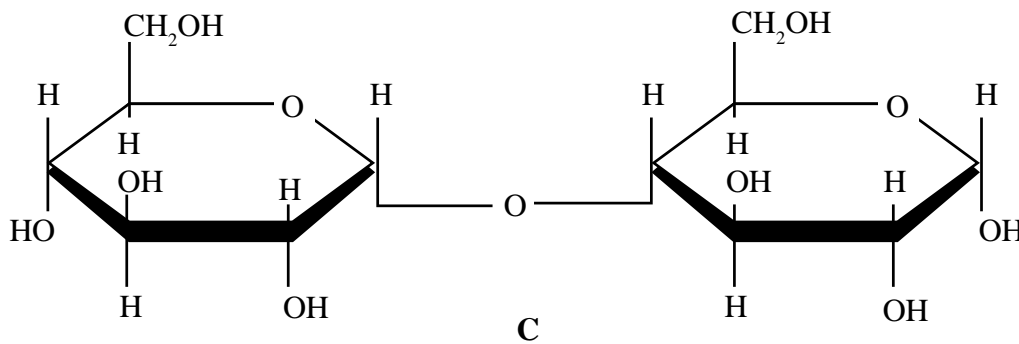
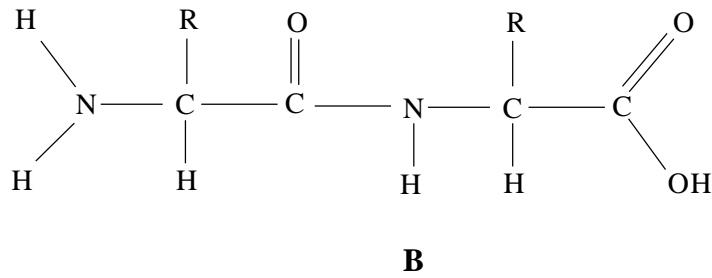
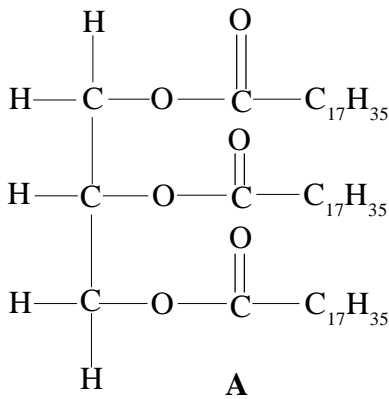
(c) Outline the dietary implications of pregnancy.

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

[4]

QUESTIONSHEET 18

The diagram below shows 3 types of molecule which are capable of further digestion in the alimentary canal.



(a) Identify A, B and C, for each state what the product(s) of digestion would be and name the enzymes in the human who digests them.

A: .....

Product: .....

Enzymes: ..... [4]

B: .....

Product: .....

Enzymes: ..... [4]

C: .....

Product: .....

Enzyme: ..... [3]

(b) Outline the symptoms of anorexia nervosa.

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

QUESTIONSHEET 19

(a) Outline what is meant by the term 'balanced diet'.

.....

.....

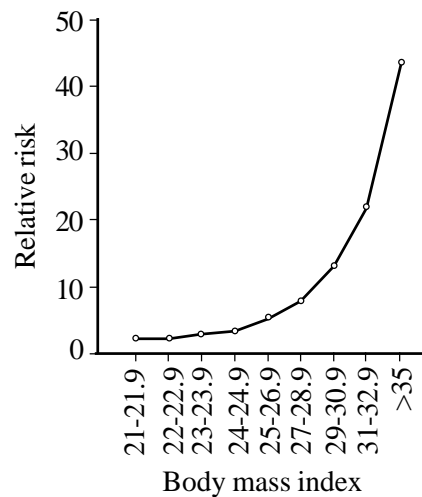
..... [2]

Body mass index (BMI) can be used in the identification of obese individuals. The formula below can be used to calculate the BMI of an individual.

$$\text{BMI} = \frac{\text{weight (kg)}}{\text{height}^2 (\text{m}^2)}$$

The table below shows the BMI values. The graph shows the relationship between body mass index and the relative risk of developing Type II (non insulin dependent) diabetes.

BMI	Classification
<20	underweight
20-25	ideal
25-30	overweight
>30	clinically obese
>40	extremely obese



(b) (i) Calculate the body mass index of individuals A and B. Show your working.

	Height (m)	Weight (kg)
Individual A	1.8	105
Individual B	1.64	70

A: ..... B: ..... [4]

(ii) State giving a reason, which of the individuals appears to be most at risk of developing non-insulin dependent diabetes.

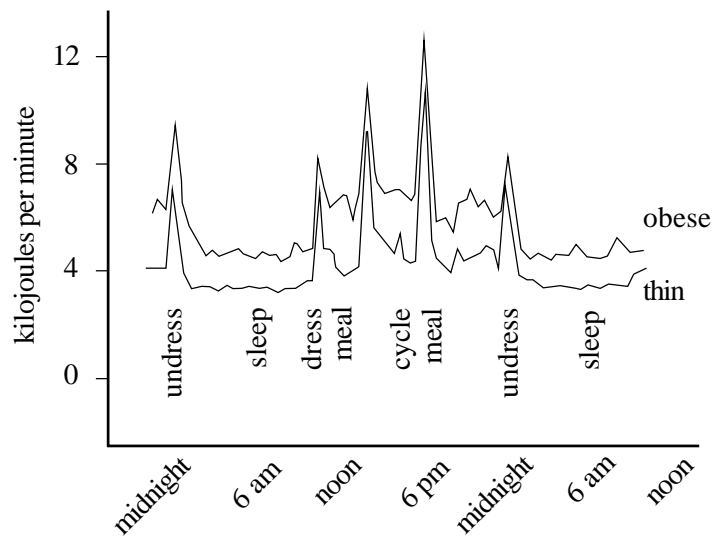
.....

.....

..... [2]

QUESTIONSHEET 19 CONTINUED

The graph shows the results of an investigation of the basal metabolic rates of obese and thin individuals.



(c) With reference to the graph comment on the suggestion that obese individuals suffer from a 'super-efficient' metabolism, which needs little energy to keep it going.

.....

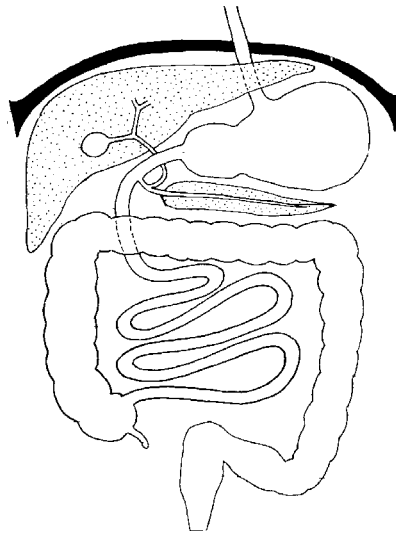
.....

.....

.....

[2]

The diagram shows the main abdominal components of the human digestive system.



(a) (i) State one location where each of the following substances are released:

1. alpha amylase: ..... [1]

2. bile salts: ..... [1]

3. mucus: ..... [1]

4. pepsinogen: ..... [1]

(ii) Label the position of four named valves (sphincters) in the diagram.

[4]

(b) What is the function of fibre in the diet?

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

[3]

QUESTIONSHEET 21

(a) Define the term parasite.

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

[3]

(b) The tapeworm shown below is a parasite.



Describe two features shown in the diagram which represent adaptations to this way of life.

- 1. ....
- 2. ....

[2]

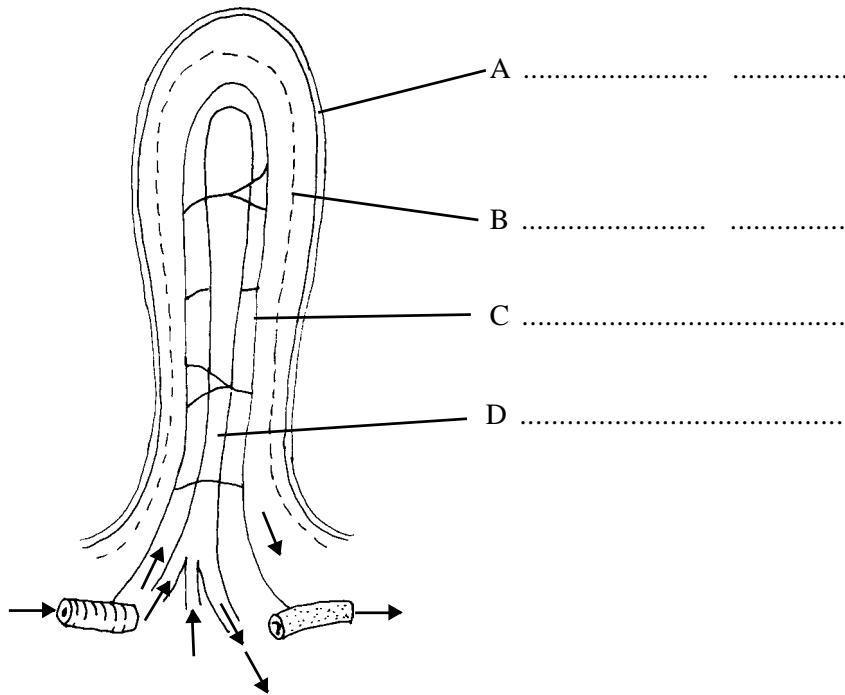
(c) (i) State three advantages of parasitism to the parasite.

- 1. ....
- 2. ....
- 3. .... [3]

(ii) State a disadvantage of parasitism to the parasite.

.....  
..... [1]

The diagram shows the structure of a villus in the small intestine.



- A .....
- B .....
- C .....
- D .....

(a) (i) Label A, B, C and D on the diagram. [6]

(ii) Explain how the structure of a villus aids absorption of the products of digestion.

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

[3]

(b) Outline the process of carbohydrate digestion and absorption.

(i) digestion: .....

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

[4]

(ii) absorption: .....

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

[3]



(a) What is meant by the term 'digestion'?

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

[2]

(b) Describe three ways in which the small intestine is efficiently adapted for absorption.

- 1. ....
- 2. ....
- 3. ....

[3]

(c) Explain how soil fungi obtain their energy requirements.

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

[3]