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International Examinations Papers

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BIOLOGY-0610/31, 32, 33

TOPIC-ENZYMES

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N-V-1-(9)

For Examiner's Use

0 1 The enzyme lactase digests lactose into simple sugars.

(a) Define the term *enzyme*.

.....

.....

.....

..... [2]

(b) Describe how you could test for the presence of reducing sugars.

State what you would observe if the result was positive.

.....

.....

.....

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.....

.....

..... [3]

(c) Fig. 9.1 shows the results of an investigation into the effect of pH on the activity of the enzyme lactase.

For Examiner's Use

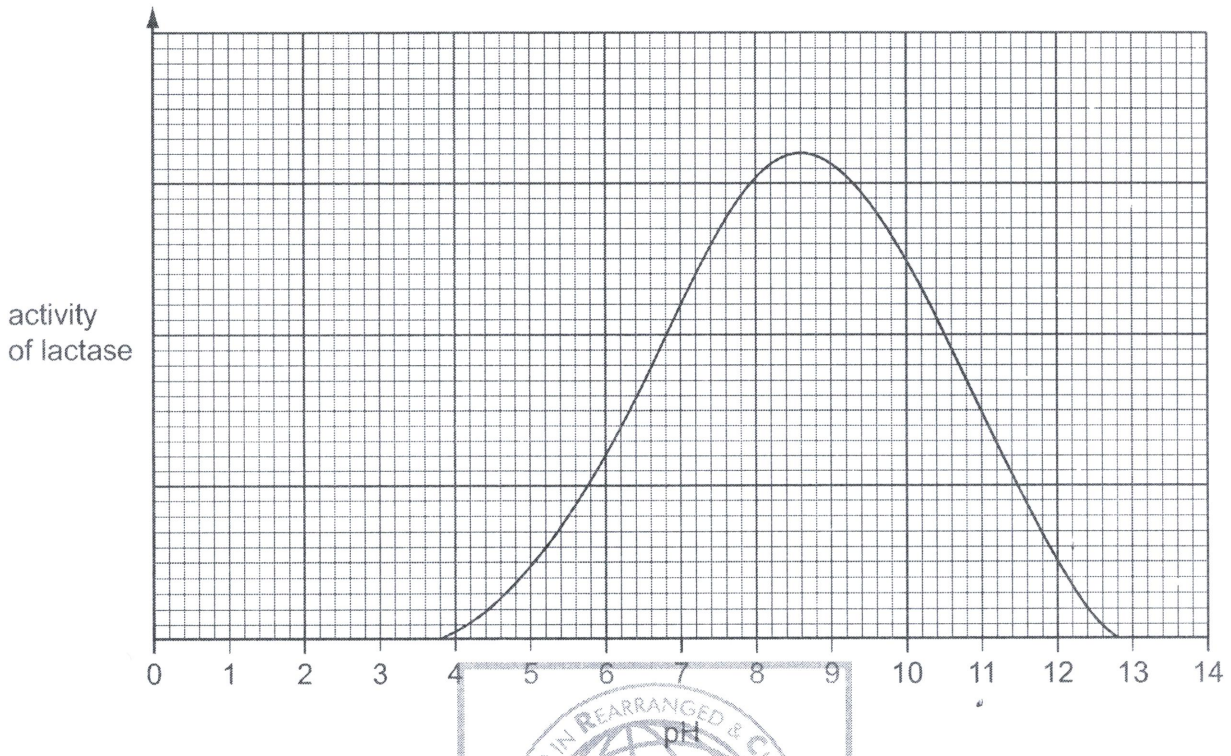


Fig. 9.1

(i) Use Fig. 9.1 to determine the optimum pH of lactase.

.....

[1]

(ii) Describe the effect of the changes in pH on the activity of lactase.

.....

.....

.....

.....

.....

.....

.....

[3]

(d) Enzymes are involved in chemical digestion.

Explain the role of teeth in physical digestion.

.....

.....

.....

.....

..... [2]

[Total: 11]

For Examiner's Use

2 **(a)** Complete the following paragraph about enzymes. Choose words from this list.

Use each word only once or not at all.

I V-2

activators	**catalysts**	**enzymes**
protein	**reactions**	**unusual**

All enzymes are made of ..... molecules. They control the metabolic ..... in living organisms. The enzymes act as ..... as they speed up processes but are not permanently changed. [3]

(b) Enzymes are important in chemical digestion.

Define the term *digestion*.

.....

.....

.....

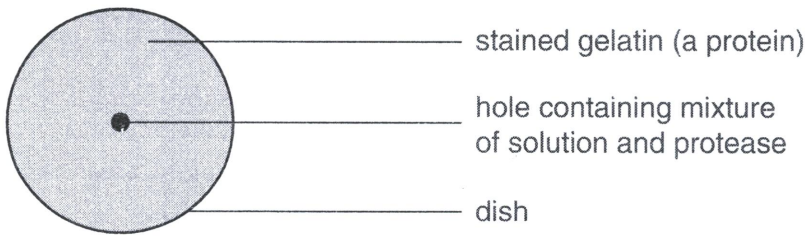
.....

.....[2]

(c) In an investigation to measure the effect of pH on enzyme activity, a protease enzyme was mixed with solutions of different pH values. The mixtures were placed in holes cut in the centre of dishes of gelatin.

Gelatin is a protein which can be stained with a coloured dye. When the protease digests the gelatin a colourless zone forms.

Fig. 2.1 shows a dish at the start of the experiment. Fig. 2.2 shows the dishes after a period of 24 hours.



at the start

Fig. 2.1

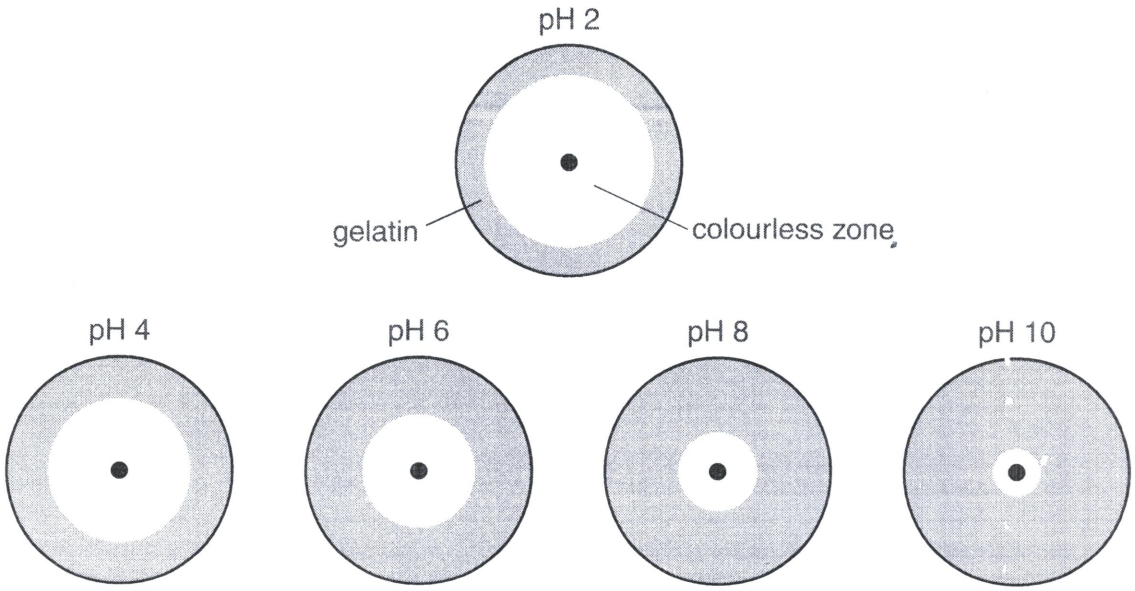


Fig. 2.2

(i) Using Fig. 2.2, state the optimum (best) pH for the activity of this protease. .....[1]

(ii) Suggest the region of the alimentary canal in which this protease carries out its function.

.....[1]

(iii) Complete the equation to explain how the protease caused the colourless zones to appear.

..... $\xrightarrow{\text{protease}}$ ..... [2]

(d) The experiment was carried out at 20° C.

Suggest what would happen if the experiment was carried out at 30° C.

.....

.....

.....[1]

[Total: 10]

3 **(a)** Complete the sentences about enzymes by filling in the gaps.
Use words or phrases from the list.

catalysts **hormones** **not changed**

prevent **protein** **slow down**

speed up **used up**

Enzymes are made of ..... molecules.

They function as ..... which means that they .....

chemical reactions. [3]

(b) Saliva contains an enzyme that digests starch.

A group of students used saliva to investigate the digestion of starch at different pH values.

Their results are shown in Fig. 3.1.

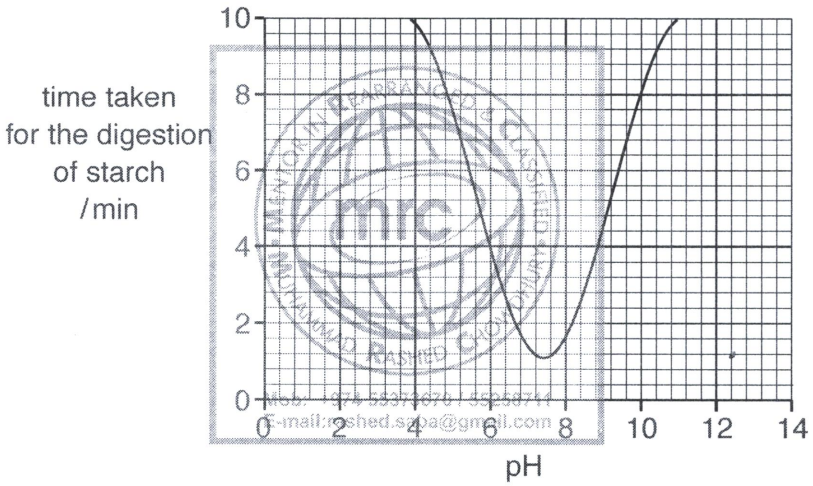


Fig. 3.1

(i) At which pH does the enzyme in saliva work the fastest?

..... [1]

(ii) How long does it take for the starch to be digested at pH 6?

..... min [1]

(iii) The stomach produces hydrochloric acid.

Use the graph to suggest why the enzyme found in saliva does not work inside the stomach.

.....

.....

.....

.....

.....[2]

(iv) Name the enzyme that digests starch and state where this enzyme is produced.

name of enzyme .....

where produced .....

[2]

(c) Name **one** factor, other than pH, which can change the rate of enzyme activity.

.....[1]

[Total: 10]

7-V-1-(8)

04 **(a)** The digestive system produces enzymes.

Define the term *enzyme*.

.....

.....

.....

.....

..... [2]

(b) Fig. 8.1 shows how the reaction rates of two different enzymes, **L** and **M**, vary when the pH changes.

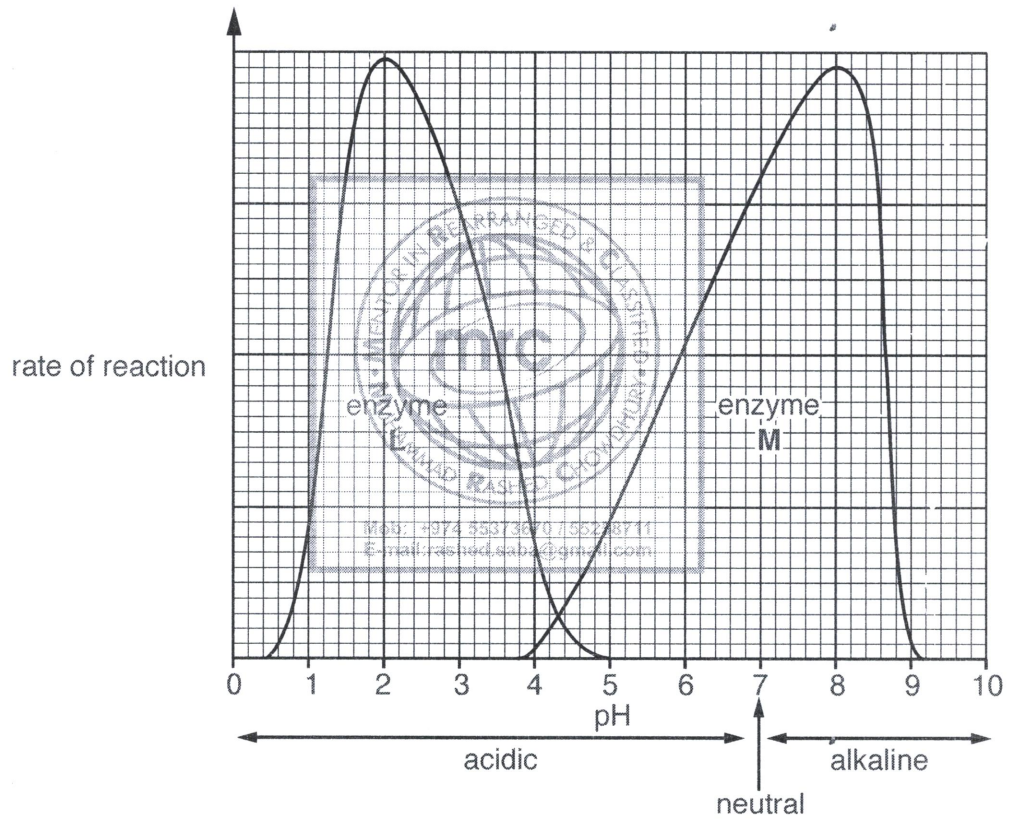


Fig. 8.1

Use Fig. 8.1 to state the pH at which each of these enzymes work the fastest.

pH for enzyme **L**: .....

pH for enzyme **M**: .....

[2]

(c) Table 8.1 lists the names of three enzymes found in the alimentary canal.

Complete Table 8.1 by writing in the names of the substrate and **one** end-product for each enzyme.

Choose your answers from the list.

amino acids	**cellulose**	**fat**	**fatty acids**
glucose	**glycerol**	**maltose**	**protein**
starch	**vitamins**		

Table 8.1

name of enzyme	substrate	one end-product
amylase		
lipase		
protease		

[6]

[Total: 10]

J- V-3

For Examiner's Use

5 **(a)** An investigation was carried out by a student on the effect of temperature on the digestion of fat by an enzyme.

(i) Name an enzyme that digests fats.

.....

[1]

(ii) One product of fat digestion is fatty acids.

Name the other product.

.....

[1]

Six test-tubes containing the same volume of olive oil and the enzyme solution were set up.

One drop of an indicator was added to each test-tube.

The six test-tubes were labelled and placed in separate water baths at different temperatures.

The indicator was blue at the start and changed to yellow when the pH fell to pH 5 or below.

The time for the contents of each test-tube to turn yellow was recorded.

(iii) Suggest why the pH of the mixture would fall as digestion takes place.

.....

.....

[1]

(b) Table 5.1 shows the results of this investigation.

For Examiner's Use

Table 5.1

temperature / °C	time to turn yellow / hours
5	23
15	14
25	8
35	5
45	15
55	29

(i) Plot the results on Fig. 5.1.

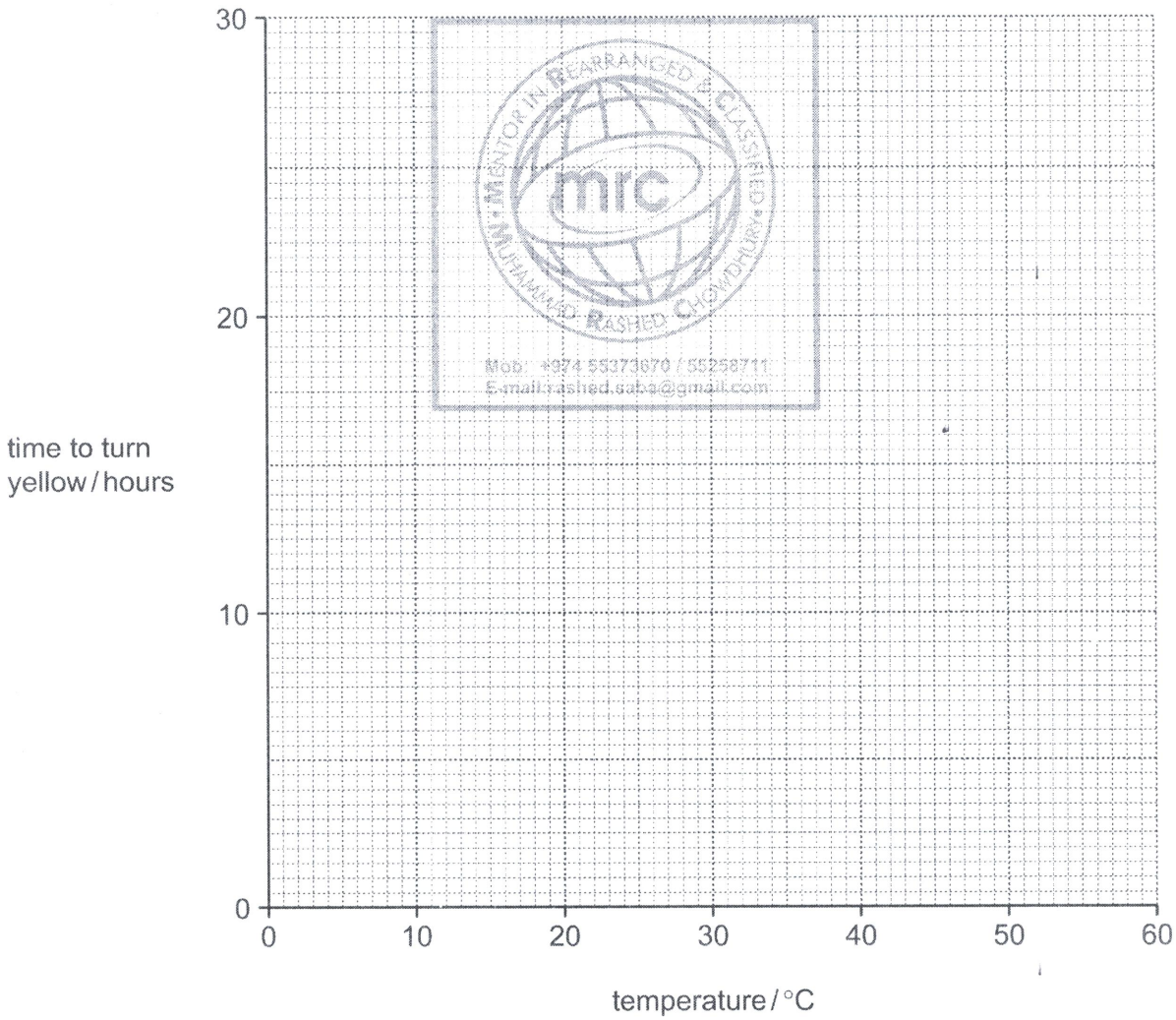


Fig. 5.1

[3]

(ii) State the temperature at which the reaction was fastest (optimum temperature).

For Examiner's Use

.....[1]

(c) Another student repeated the investigation.

This student added bile to each test-tube, as well as the enzyme.

(i) Explain the function of bile in the digestion of fat.

.....

.....

.....

.....

.....

.....[3]

(ii) Predict the results of the second investigation.

Include in your answer a reference to rate of reaction and optimum temperature.

.....

.....

.....

.....[2]

[Total: 12]

J-V-3-(5)

06 Pectinase is an enzyme which is used to extract juice from fruits such as apples.

Fig. 5.1 shows the volume of juice extracted from two equally sized samples of crushed apple over 16 minutes.

Sample **A** contained pectinase and Sample **B** contained the same volume of water.

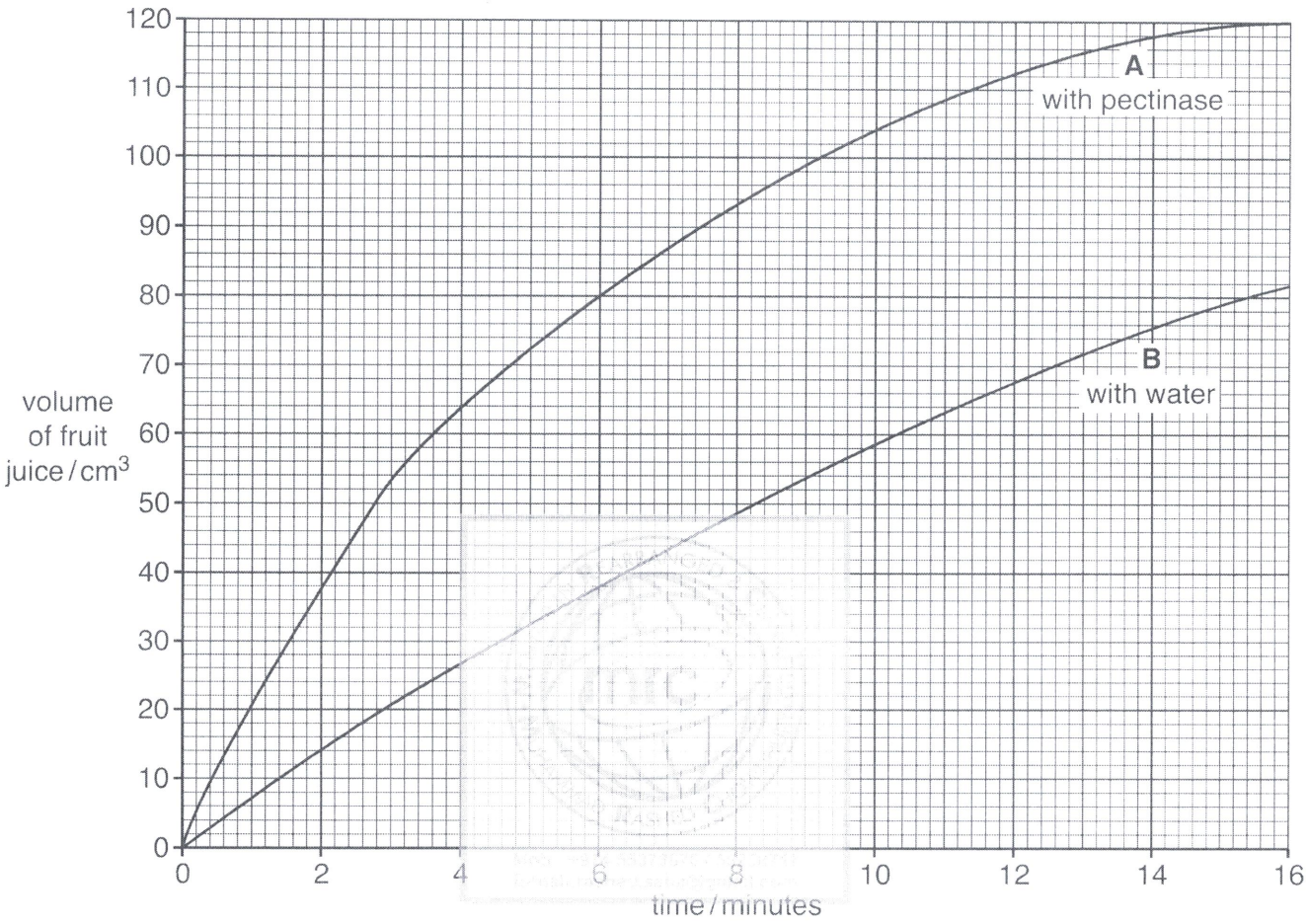


Fig. 5.1

(a) **(i)** How much juice had been extracted from the apples in Sample **A** after 2 minutes?

..... cm^3 [1]

(ii) How much longer does it take for Sample **B** to produce this amount of juice?

Show your working.

..... [1]

(iii) State **two** advantages to the food industry of using pectinase in juice extraction.

1 .....

.....

2 .....

.....

[2]

(b) Yeast can be added to the apple juice to make cider by anaerobic respiration.

(i) Define the term *anaerobic respiration*.

.....

.....

.....[2]

(ii) As well as making alcohol, the anaerobic respiration of yeast can be used to make other useful products.

State the name of **one** of these products.

.....[1]

(iii) Yeast can also respire aerobically.

State **two** ways aerobic respiration differs from anaerobic respiration in yeast.

1 .....

.....

2 .....

.....

[2]

[Total: 9]

7-

For Examiner's Use

7 A student investigated the effect of changing pH on the rate of reaction of a digestive enzyme.

(a) Define the term *enzyme*.

.....

.....

..... [2]

Table 7.1 shows the results of this investigation.

Table 7.1

pH	1	2	3	4	5	6	7
rate of reaction / arbitrary units	10	15	9	6	3	1	0

(b) Plot the results as a line graph on Fig. 7.1. [3]

rate of reaction / arbitrary units

pH

Fig. 7.1

(c) Suggest where in the human digestive system this enzyme would have been most active.

For Examiner's Use

..... [1]

(d) The investigation at pH 3 was repeated but the enzyme was boiled before its use. Suggest how and why the results would have been different.

.....

.....

..... [2]

[Total: 8]

8 **(a)** Describe and explain the importance of iron and vitamin D in the diet. 3

For Examiner's Use

.....

.....

.....

.....

..... [3]

(b) If you do not have a balanced diet you may suffer from malnutrition.

State **two** effects of malnutrition, not including minerals and vitamins.

For each effect explain how it is caused.

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 7]

For Examiner's Use

09 **(a)** Humans need a supply of mineral salts, such as calcium and iron, in their diet.

J-V-2-(12)

(i) State a role of calcium ions in the human body.

.....

[1]

(ii) State a role of iron ions in the human body.

.....

[1]

(b) Fertilisers are used by farmers to increase the growth of crop plants.

The fertilisers contain a mixture of mineral salts.

(i) State a use of magnesium ions in a plant.

.....

[1]

(ii) State a use of nitrate ions in a plant.

.....

[1]

(c) A factory that produces fertilisers is located next to a small river. At the end of each week its machinery is washed out and the contaminated water is released into the river.

Suggest what effects this action could have on the plants and animals living in the river.

.....

.....

.....

.....

.....

.....

[4]

[Total: 8]

10 **(a)** Micronutrients are food materials that are only needed in very small quantities in the human diet.
Draw **one** straight line from each micronutrient to its deficiency symptom.

N-(3)

For Examiner's Use

micronutrient	deficiency symptom
calcium	anaemia
vitamin C	rickets
vitamin D	scurvy
iron	

[4]

(b) Explain how iron, in the diet of humans, is used in the body.

.....

.....

.....

.....

[3]

[Total: 7]

For Examiner's Use

11 **(a)** **(i)** State what is meant by the term *balanced diet*.

.....

.....

.....

.....

.....

..... [3]

(ii) Balanced diets should include fat, fibre, mineral salts and vitamins.

Name **two** other types of nutrients that should be present in a balanced diet.

.....

..... [1]

(b) Suggest and explain the effects on a person of a diet with:

(i) too little fibre,

.....

.....

.....

..... [2]

(ii) too much animal fat.

.....

.....

.....

..... [2]

(c) Calcium, a mineral salt, is needed in the diet.

Explain the role of calcium in the body and the effect of calcium deficiency.

For Examiner's Use

.....

.....

.....

.....

.....

..... [3]

[Total: 11]