

Enzymes

Question Paper

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|-------------------|--|
| Level | International A Level |
| Subject | Biology |
| Exam Board | Edexcel |
| Topic | Membranes, Proteins, DNA and Gene expression |
| Sub-Topic | Enzymes |
| Booklet | Question paper |

Time Allowed: 76 minutes

Score: /63

Percentage: /100

Grade Boundaries:

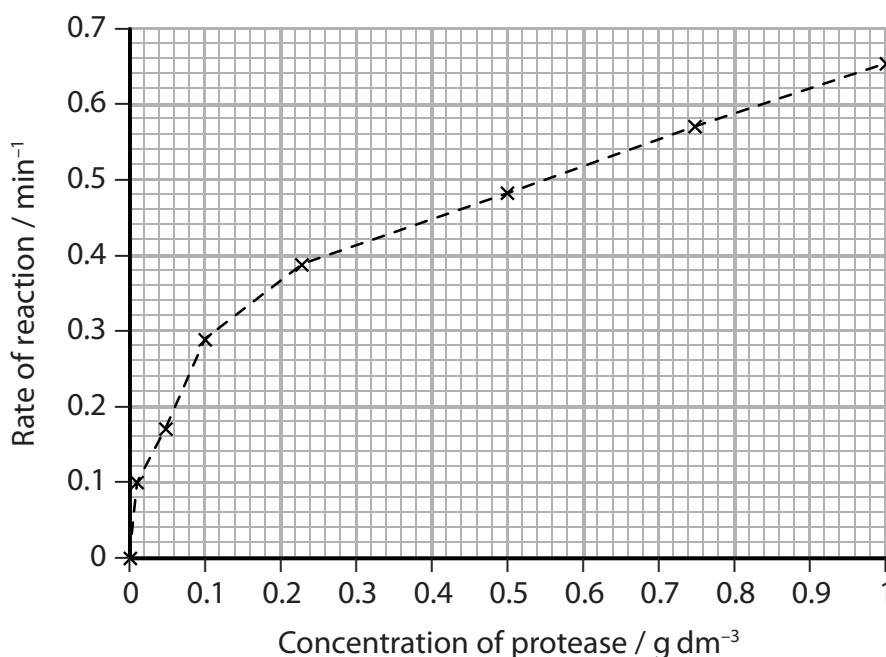
| A* | A | B | C | D | E | U |
|------|-------|-----|-------|-------|-----|------|
| >85% | 77.5% | 70% | 62.5% | 57.5% | 45% | <45% |

- 1 (a) Blood stains are often difficult to remove from clothes. The protein haemoglobin causes coloured stains. When blood dries on cloth material, the protein binds to the material fibres.

Biological washing powders contain proteases which are enzymes that hydrolyse proteins.

Simone investigated the effect of changing the concentration of a protease on the time it took to remove large blood stains from pieces of cloth.

The graph below shows the results of her investigation.



- (i) Using information in the graph, describe the effect of changing protease concentration on the rate of reaction.

(2)

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- (ii) Name the type of molecule produced from the complete digestion of a protein.

(1)

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(b) Stains on clothes often include lipids. Biological washing powders contain detergents and may also include lipase, which hydrolyses lipids.

Detergents break up the lipids into smaller lipid droplets in the water.

(i) Suggest why the detergents help to increase the rate of hydrolysis of the lipids by lipase.

(2)

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(ii) Name **two** products of hydrolysis of the lipids.

(2)

1

2

(Total for Question 1 = 12 marks)

(c) In this investigation the pH was controlled. Further experiments were carried out to find the optimum temperature for the activity of lipase S.

(i) Place a cross in the box next to the correct term that completes the following sentence.

(1)

The pH was controlled to make this investigation

- A** accurate
- B** precise
- C** reliable
- D** valid

(ii) Place a cross in the box next to the temperatures that should be used in further experiments.

(1)

- A** 30°C to 80°C
- B** 60°C to 80°C
- C** 70°C to 80°C
- D** 70°C to 100°C

(Total for Question 2 = 8 marks)

3 (a) The diagram below shows part of a template (antisense) DNA strand.

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|---|---|---|---|---|---|---|---|---|
| A | G | C | G | C | T | T | G | C |
|---|---|---|---|---|---|---|---|---|

DNA replication and transcription will produce different molecules from this DNA strand. Compare the molecules that will be produced, from this strand of DNA, by DNA replication and by transcription.

(3)

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*(b) Translation follows transcription.

Describe how translation produces a polypeptide chain, using the code from this template strand of DNA.

(6)

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(Total for Question 3 = 9 marks)

- 4 Cystic fibrosis and glycogen storage disease type (II) are examples of recessive genetic disorders.

Glycogen storage disease type (II) is caused by mutations in the GAA gene. This results in a deficiency of an enzyme called acid alpha-glucosidase.

(a) Explain the meaning of each of the following terms.

(i) Recessive allele

(1)

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(ii) Gene mutation

(2)

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(c) The enzyme acid alpha-glucosidase breaks the glycosidic bonds in glycogen.

Suggest why a deficiency in acid alpha-glucosidase results in a lack of energy for muscle contraction.

(2)

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(d) The incidence of glycogen storage disease type (II) is about 1 in 40 000 of the population.

(i) Name a test that could be used to find out if an unborn child has this disease.

(1)

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(ii) Suggest why testing for glycogen storage disease type (II) is not offered to all pregnant women.

(1)

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(iii) Give **one** disadvantage of carrying out genetic tests on unborn children.

(1)

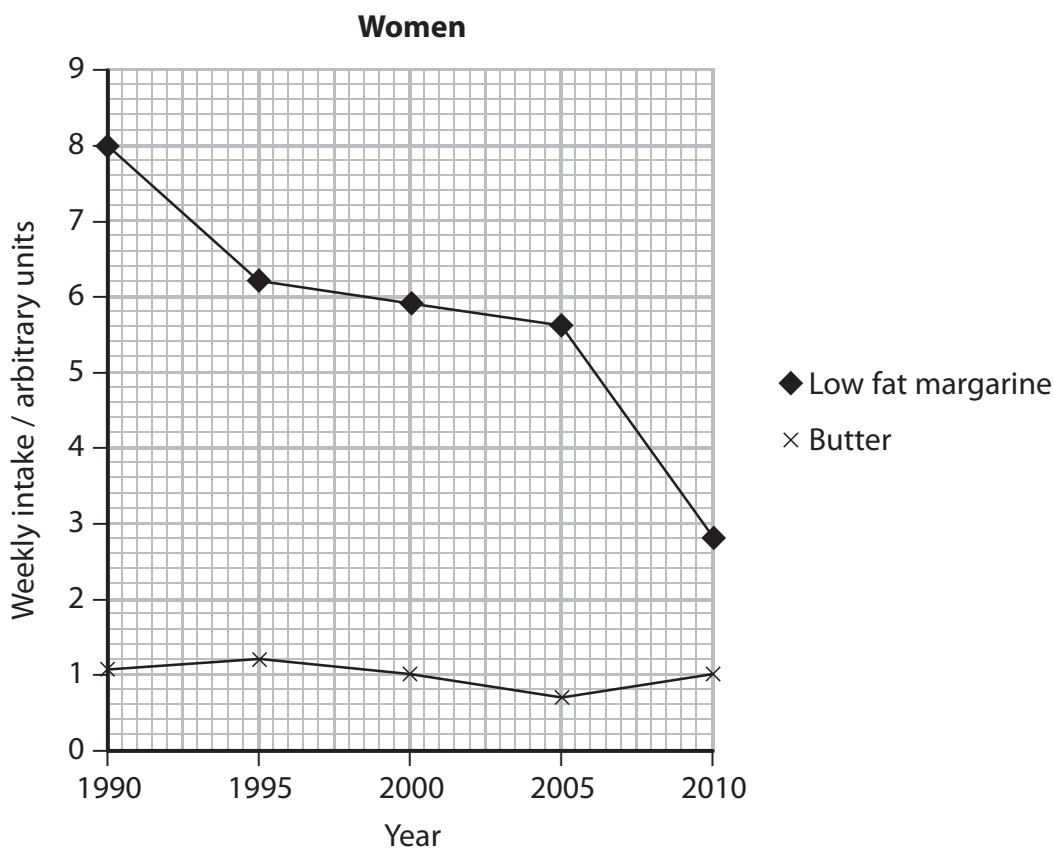
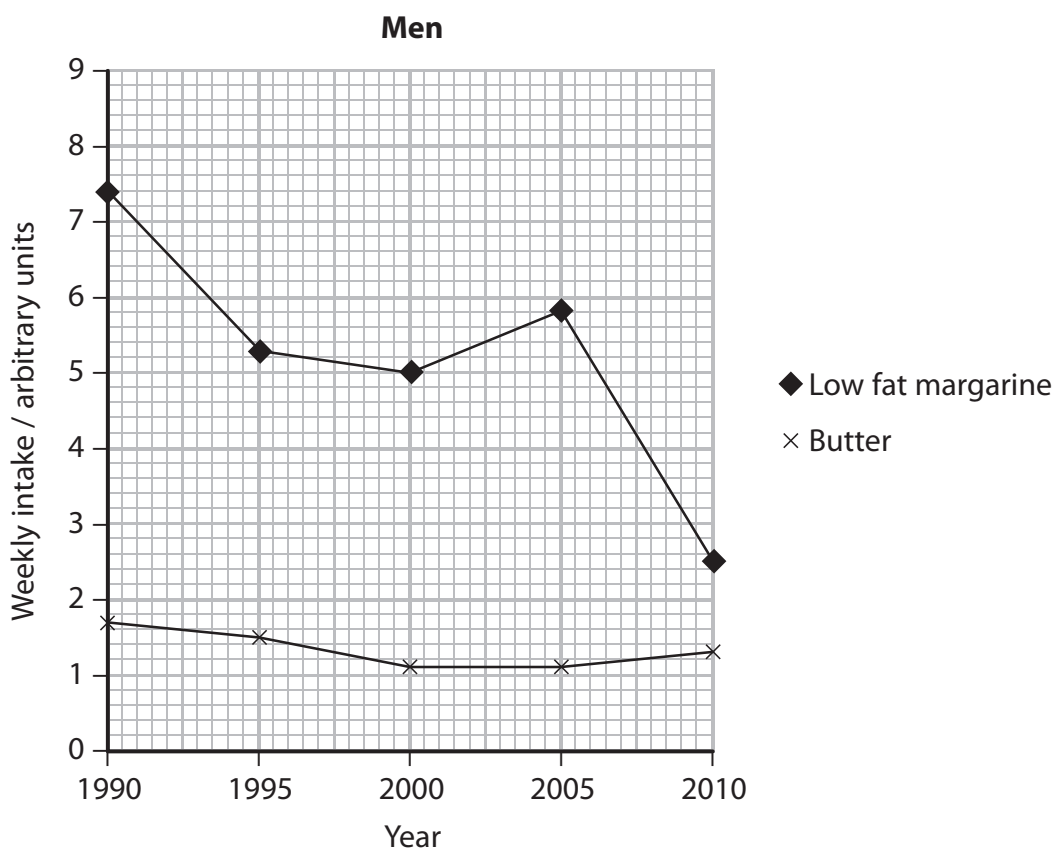
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(Total for Question 4 = 13 marks)

- 5 Scientists studied the diets of a group of men and women in Northern Sweden. People were asked to record their weekly intake of low fat margarine and butter. Some of the results of this study are shown in the graphs below.



(a) (i) Using the information in the graph for **men**, describe the trends in consumption of low fat margarine and butter.

(3)

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(ii) Using the information in both graphs, give **two** differences between the weekly intake of low fat margarine of men and women.

(2)

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- (b) (i) The scientists planned to continue the study with the same group of men and women.

Suggest **two** reasons why this was difficult to achieve.

(2)

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- (ii) The information in the graphs was collected using questionnaires that were completed at home.

Suggest **one** advantage and **one** disadvantage of using this method of data collection, rather than face-to-face questioning by the scientists.

(2)

Advantage

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Disadvantage

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(Total for Question 5 = 9 marks)

- 6 The canopy of a forest is made up of branches and leaves of the mature trees. The canopy limits the light reaching the ground.

Scientists from the UK Forestry Commission investigated the growth of tree seedlings under a canopy of Sitka spruce trees.

The species of tree seedlings used were: Noble fir, Silver fir and Sitka spruce.

Three plots, each containing 50 Noble fir seedlings, were planted under the Sitka spruce trees. This was repeated for Silver fir seedlings and Sitka spruce seedlings. This is shown in the diagram below.



The canopy above each plot covered between 50% and 70% of the ground.

- (a) For each of the statements below, place a cross ☒ in the box next to the term that completes each statement.

- (i) In this investigation, three plots each containing 50 tree seedlings were planted for each species, to ensure that the investigation was

(1)

- A accurate
 B precise
 C reliable
 D valid

- (ii) In this investigation, the canopy above every plot covered between 50% and 70% of the ground.

This ensured that the investigation was

(1)

- A accurate
 B precise
 C reliable
 D valid

(b) After four years, the growth and survival of the seedlings were measured and recorded.

The graphs below show the results of this investigation.

