

Heart & Circulation

Question Paper 4

Level	International A Level
Subject	Biology
Exam Board	Edexcel
Topic	Molecules, Transport and Health
Sub-Topic	Heart & Circulation
Booklet	Question paper 4

Time Allowed: 40 minutes

Score: /33

Percentage: /100

Grade Boundaries:

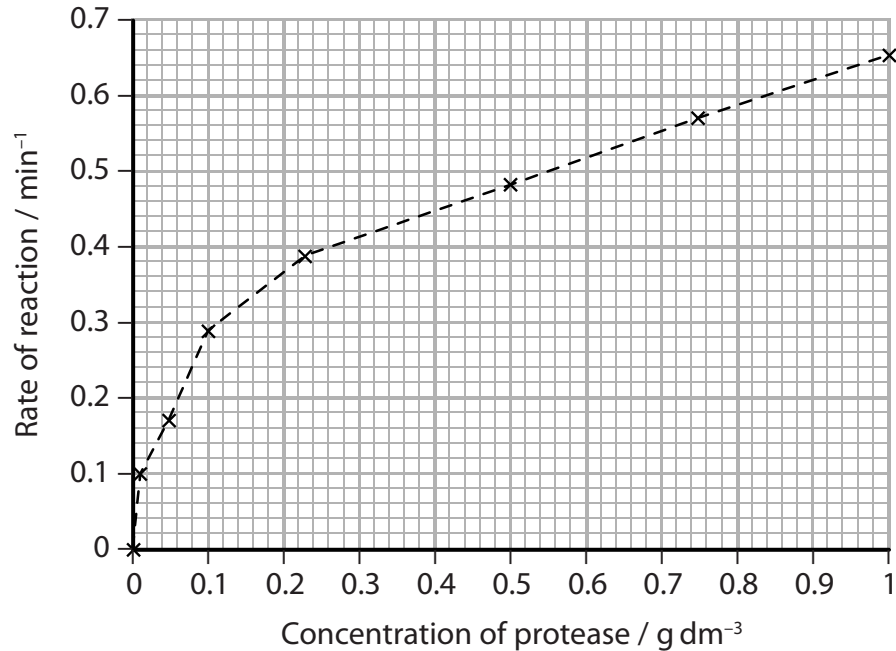
A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

- 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.

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

(2)

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(Total for Question 1 = 12 marks)

- 2 Scientists investigated the BMI (Body Mass Index) of male office workers aged 40 and the type of breakfast they ate most regularly.

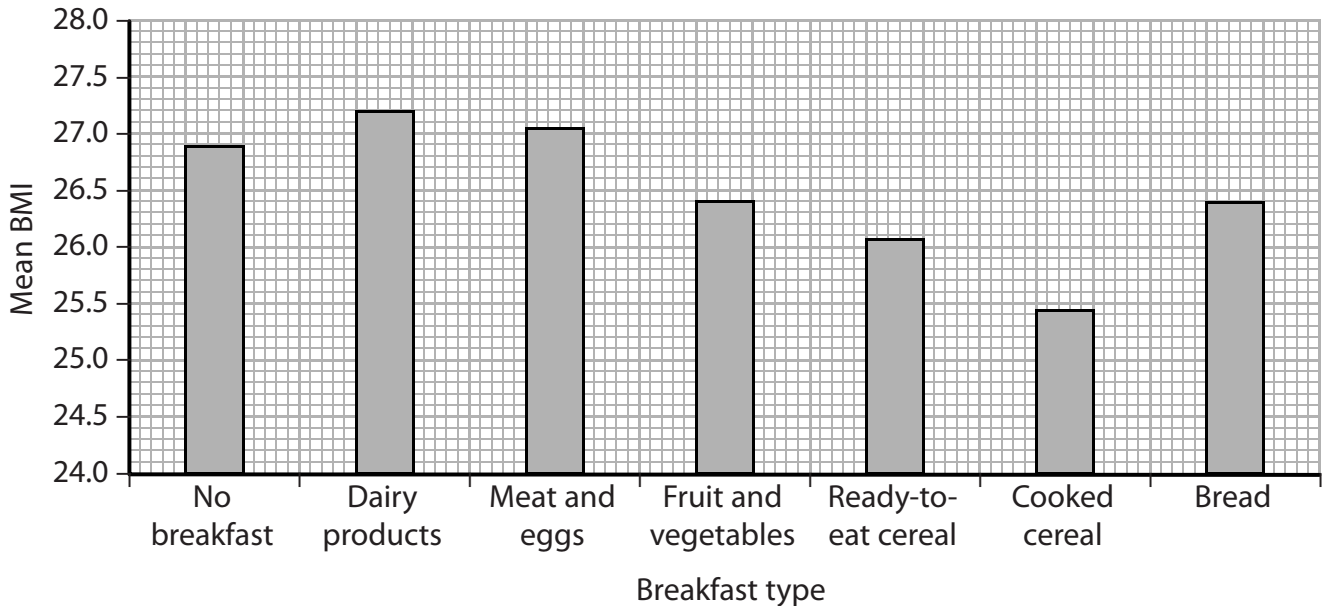
BMI is calculated using the formula below.

$$\text{BMI} = \frac{\text{mass in kilograms}}{(\text{height in metres})^2}$$

BMI can be used to indicate the category, shown in the table below, to which a person belongs.

Category	BMI range
underweight	less than 18.5
healthy weight	from 18.5 to 25
overweight	from 25 to 30
obese	over 30

The graph below shows the results of their investigation.



- (a) Put a cross in the box to complete each of the following statements.

(i) The graph shows that people who ate

(1)

- A** dairy products have a lower mean BMI than those people who ate bread.
- B** fruit and vegetables have the lowest mean BMI
- C** no breakfast have a higher mean BMI than those people who ate meat and eggs
- D** ready-to-eat cereal have a higher mean BMI than those people who ate cooked cereal

(ii) The graph shows that the mean BMI for (1)

- A** every group sampled in the investigation indicates that they were overweight
- B** those who ate bread for breakfast indicates that they were a healthy weight
- C** those who ate cooked cereals for breakfast indicates that they were underweight
- D** those who ate dairy products for breakfast indicates that they were obese

(iii) The units for mean BMI are (1)

- A** kg m^2
- B** kg m^{-2}
- C** $\text{m}^2 \text{kg}$
- D** m kg^{-2}

(iv) The scientists ensured that their data were reliable by repeating the investigation with (1)

- A** a larger sample size
- B** female office workers aged 40
- C** more types of breakfast
- D** male footballers

(b) Suggest how the scientists ensured that their investigation was valid. (2)

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(c) Some people avoid eating breakfast in an attempt to lose weight.

Using information from the graph, suggest why eating no breakfast is unlikely to lead to weight loss.

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(d) Cooked cereal, such as porridge, contain a high proportion of dietary fibre. This helps to lower blood cholesterol levels.

Using the information in the graph and your knowledge of blood cholesterol, suggest why a breakfast of cooked cereal could reduce the chances of developing cardiovascular disease (CVD).

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3 Obesity is a risk factor in the development of cardiovascular disease (CVD).

(a) Pima Indians living in Arizona are genetically very similar to those living in Mexico.

The table below shows the frequency of obesity in Pima Indians in these two locations.

Location of Pima Indians	Frequency of obesity (%)
Arizona	30
Mexico	13

(i) Suggest why there is a higher frequency of obesity in Pima Indians living in Arizona than in Pima Indians living in Mexico.

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(ii) Scientists are studying Pima Indians to investigate the causes of CVD.

State **two** risk factors, other than obesity and genetic factors, associated with developing CVD.

(2)

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(b) Body mass index (BMI) is one way of identifying individuals that are overweight or obese.

BMI is calculated using the formula below.

$$\text{BMI} = \frac{(\text{mass in kilograms})}{(\text{height in metres})^2}$$

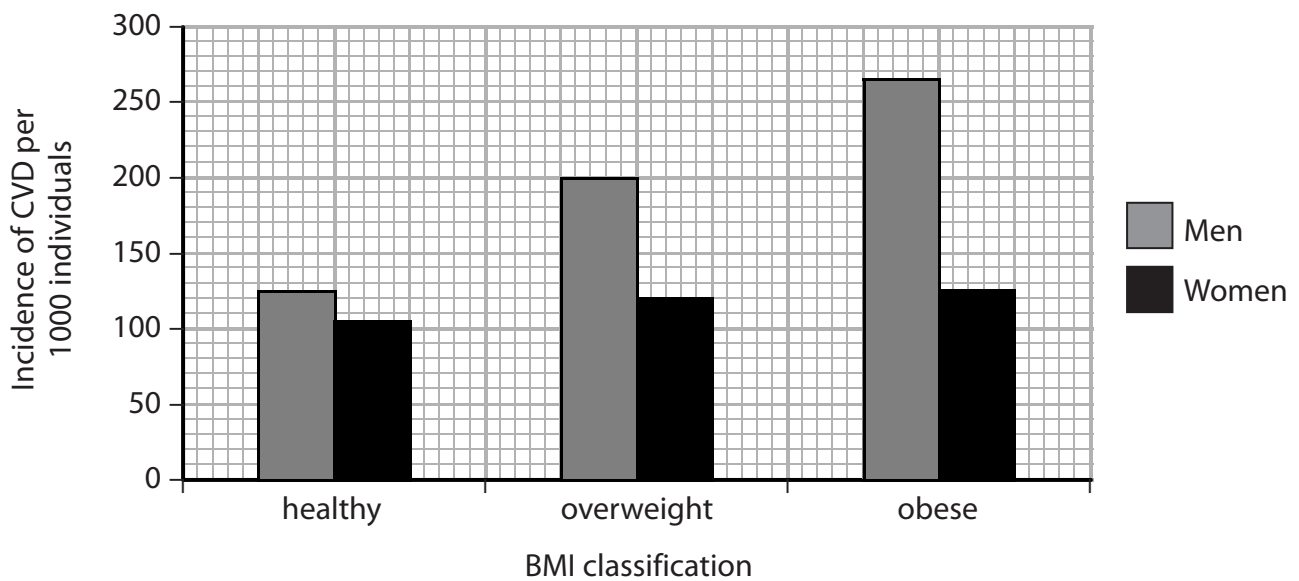
A person has a mass of 70 kg and a height of 1.65 m.

Place a cross ☒ in the box that gives the BMI classification for this person.

(1)

	BMI	Classification
<input checked="" type="checkbox"/> A	< 18.5	underweight
<input checked="" type="checkbox"/> B	18.5 to 25.0	healthy
<input checked="" type="checkbox"/> C	25.1 – 30.0	overweight
<input checked="" type="checkbox"/> D	> 30.	obese

(c) The results of a different study on the relationship between CVD and body mass index are shown in the graph below.



(i) Using the information in the graph, describe the relationship between body mass index and the incidence of CVD.

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(ii) Suggest why BMI was used in this study.

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(iii) Suggest why CVD is expressed as incidence per 1000.

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(Total for Question 4 = 10 marks)