Q1. A popular diet book claims that a low-carbohydrate diet results in quicker weight loss and a more healthy body than a low-fat diet.

Scientists carried out an investigation to see if this claim is true.

- They used 120 overweight volunteers divided into two equal groups.
- **Group 1** was given a diet containing less than 20 g of carbohydrate per day.
- **Group 2** was given a low-fat diet. This contained less than 30% of energy from fat and less than 300 mg of cholesterol per day.
- Both groups were given the same exercise programmes and a weekly information meeting.
- Both groups were allowed only 2000 kilocalories per day.

The results after 24 weeks are shown in the table.

	Group 1 Low-carbohydrate diet	**Group 2 Low-fat diet**
Proportion of volunteers who completed the trial	76%	57%
Mean change in body mass	−12.9%	−6.7%
Mean change in body fat mass	−9.4 kg	−4.8 kg
Mean change in blood HDL concentration	+55 mg per litre	−16 mg per litre
Mean change in blood LDL concentration	+16 mg per litre	−74 mg per litre

(a) What was the independent variable in this investigation?

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(1)

(b) Give **one** variable that the scientists tried to control in this investigation.

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(1)

(c) Give **two** ways in which the method used by the scientists could have led to unreliable data.

1 .....

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2 .....

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(2)

(d) Does the data support the claim in the book?

Draw a ring around your answer. **Yes / No**

Give **two** reasons for your answer.

1 .....

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2 .....

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(2)

(Total 6 marks)

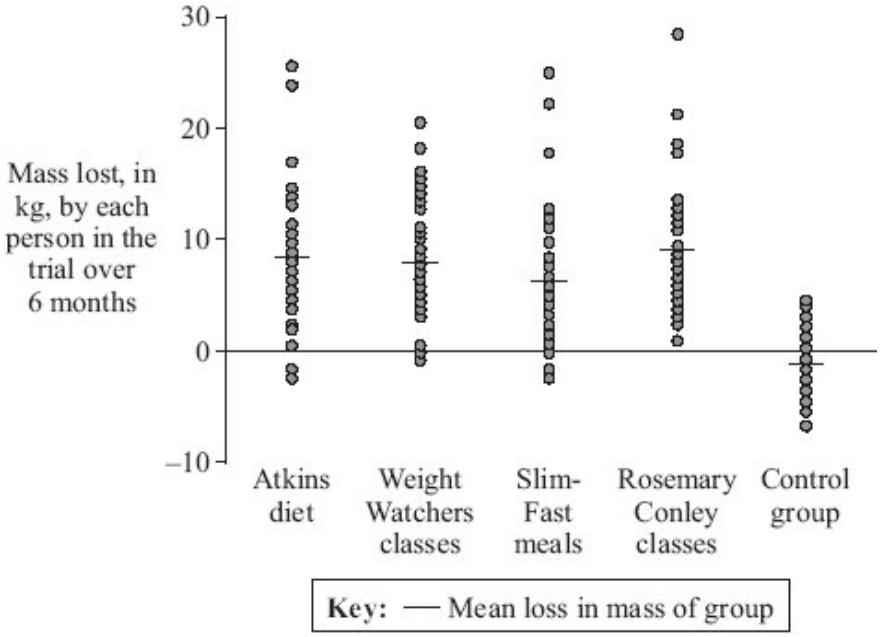
Q2. Many people who are overweight try slimming programmes.

A research study evaluated four different slimming programmes over 6 months.

Scientists selected a group of 40 people for each slimming programme and a control group.

Each of the five groups was matched for age, gender and mass.

The graph shows the results of the study.



Adapted from British Medical Journal, 2006, volume 332, pages 1309 –1314.

(a) Give **two** control variables that were used in this study.

1 .....

2 .....

(2)

(b) Give **two** conclusions that can be drawn from the results of this study.

1 .....

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2 .....

.....

(2)

(c) The costs of the four programmes were:

- Atkins book cost £3
- Rosemary Conley classes cost £140 for 6 months
- Weight Watchers classes cost £170 for 6 months
- Twice-daily Slim-Fast meal replacements cost £240 for 6 months.

Use this information and the graph to answer this question.

Which is the most cost effective of the four programmes?

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Explain the reason for your answer.

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(2)

(d) Some slimming programmes include daily exercise.

Explain how daily exercise helps a person to lose mass.

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(2)

(Total 8 marks)

Q3. Diet and exercise affect health.

(a) Many people are obese (very overweight).

Obesity can lead to heart disease.

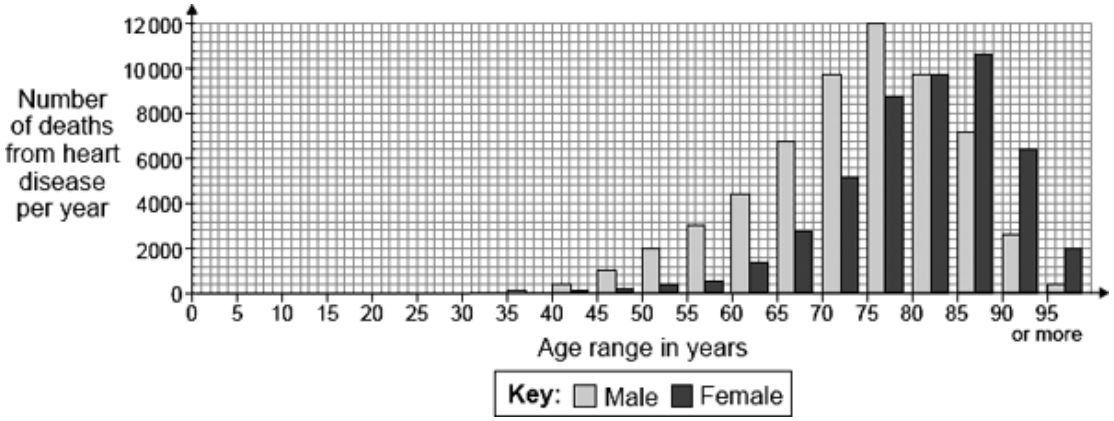
Other than heart disease, name **two** conditions which are linked to obesity.

1 .....

2 .....

(2)

(b) The graph shows the number of deaths from heart disease each year in the UK.



The pattern for deaths from heart disease in men is different from the pattern in women.

(i) Give **two** differences between the patterns for men and women.

1 .....

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2 .....

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(2)

(ii) Suggest **two** reasons for the difference in the number of deaths from heart disease in men and women between the ages of 40 and 60.

1 .....

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2 .....

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(2)

(c) Scientists have developed drugs to reduce the concentration of cholesterol in the blood.

Give the **three** main stages in testing a new drug before it is sold to the public.

1 .....

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2 .....

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3 .....

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(3)
(Total 9 marks)

Q4. One factor that may affect body mass is *metabolic rate*.

(a) (i) What is meant by *metabolic rate* ?

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(1)

(ii) Metabolic rate is affected by the amount of activity a person does.

Give **two** other factors that may affect a person's metabolic rate.

1.....

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2.....

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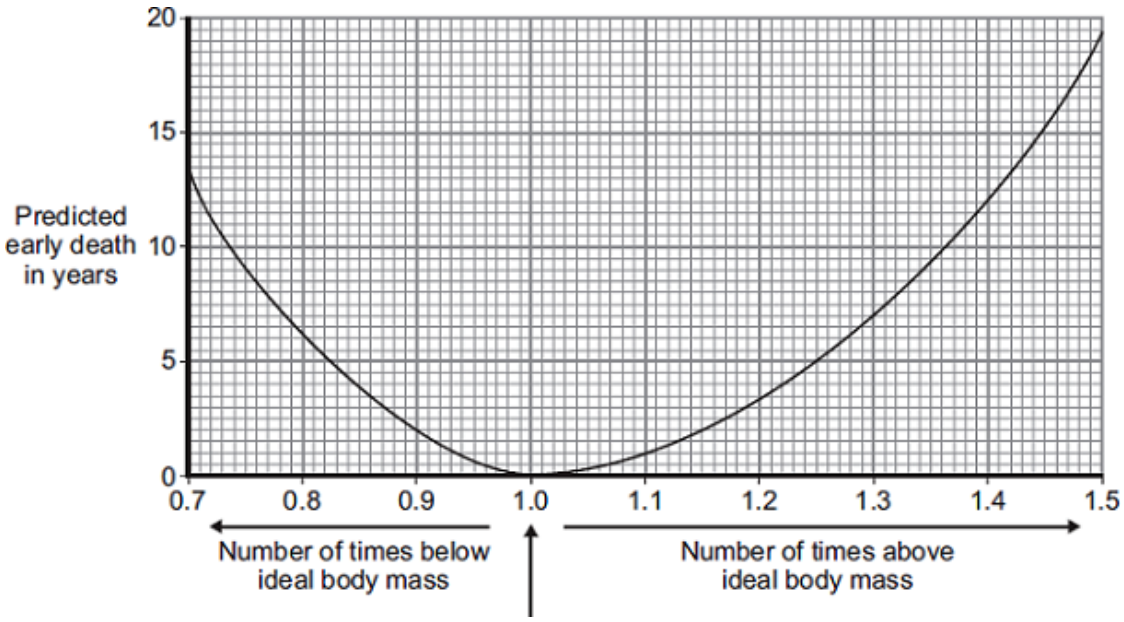
(2)

(b) Predicted early death is the number of years that a person will die before the mean age of death for the whole population. The predicted early death of a person is affected by their body mass.

Scientists have calculated the effect of body mass on predicted early death.

The graph shows the results of the scientists' calculations.



The number of times above or below ideal body mass is given by the equation:

$$\frac{\text{Actual body mass}}{\text{Ideal body mass}}$$

In the UK the mean age of death for women is 82.

A woman has a body mass of 70 kg. The woman's ideal body mass is 56 kg.

(i) Use the information from the graph to predict the age of this woman when she dies.

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Age at death = ... years

(2)

(ii) The woman could live longer by changing her lifestyle.

Give **two** changes she should make.

1.....

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2.....

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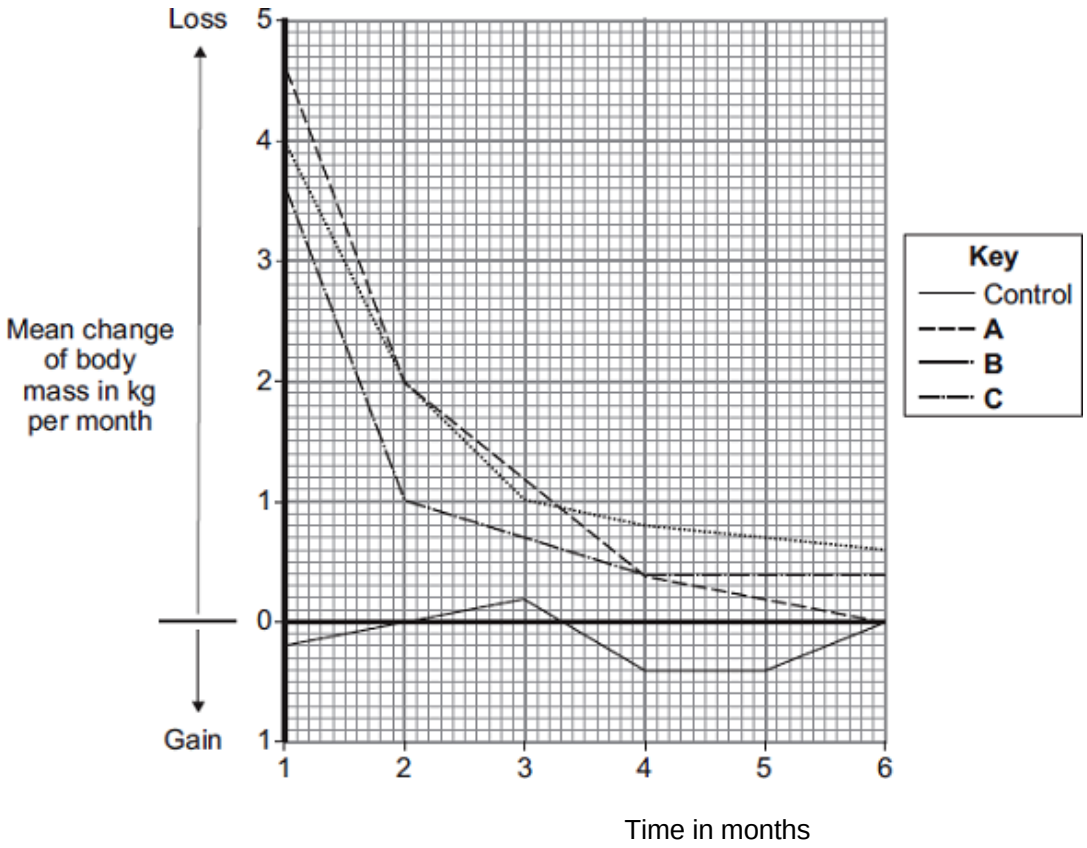
(2)
(Total 7 marks)

Q5. Scientists investigated the effectiveness of three slimming programmes, **A**, **B** and **C**.

The scientists recorded the body mass of four groups of volunteers each month for 6 months.
Three of the groups were each given a different slimming programme.
The fourth group was a control group.

The graph shows the mean change of body mass each month for all four groups.



(a) (i) What should the control group eat?

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(1)

(ii) Why did the scientists include a control group in this study?

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(1)

(b) (i) The three groups of volunteers using the slimming programmes each showed a similar pattern of body mass loss over the 6 months.

Describe this pattern.

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(2)

(ii) All the slimming programmes seemed to be effective.

How does the information in the graph show this?

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(1)
(Total 5 marks)