

Data Collection and Analysis - Questions by Topic

Q1.

There have been several studies into the relationship between cigarette smoking and deaths from lung cancer. The data in the table comes from a review of these studies.

Country	Size of study	Number of deaths from lung cancer	Ratio of smokers to non-smokers dying from lung cancer
UK	34000 males	441	14.00
	6 194 females	27	5.00
Sweden	27000 males	55	7.00
	28000 females	8	4.50
Japan	122000 males	940	3.76
	143000 females	304	2.03
Canada	78000 males	331	14.20
USA	358000 males	2018	8.53
	483000 females	439	3.58
USA	290000 males	3126	11.28
USA	188000 males	448	10.73
USA	68000 males	368	7.61

(a) Give **two** reasons why the ratios of smokers to non-smokers who die from lung cancer are different for males compared with females.

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(b) These studies suggest that there is a correlation between smoking and lung cancer.

State what is meant by correlation.

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(c) Smoking tobacco can result in the development of a variety of other health problems including atherosclerosis.

Explain how smoking increases the risk of developing atherosclerosis.

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*(d) Cancer is the result of the abnormal growth of cells in an organ. These cells develop into a tumour which does not carry out the function of the tissues in the organ.

An article states:

"Tobacco smoke is the cause of kidney cancer!"

Evaluate the claim that tobacco smoke is the primary cause of kidney cancer.

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(Total for question = 15 marks)

Q2.

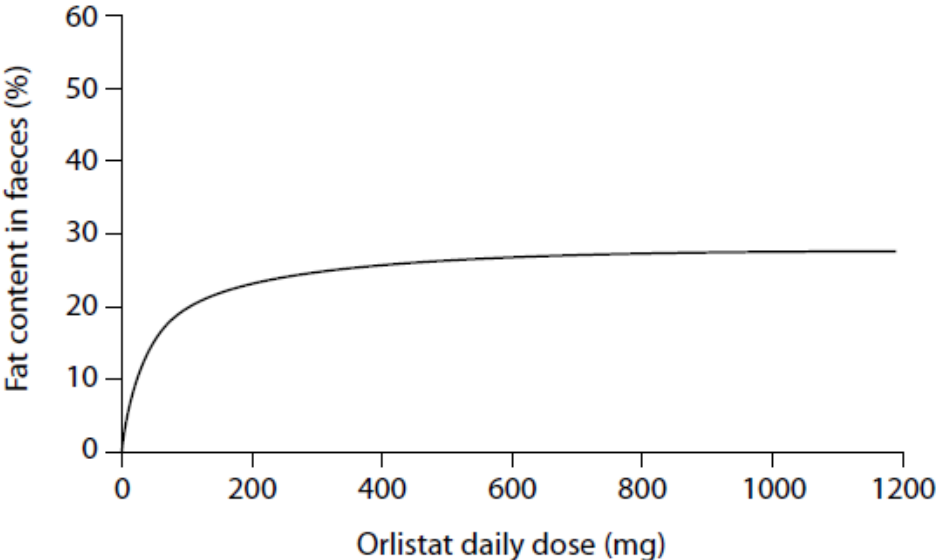
Obesity is a risk to health.

There is a drug called Orlistat that can help obese people to lose weight. This drug works by permanently attaching to the enzyme lipase.

Two studies, A and B, were carried out to investigate the effectiveness of the drug.

In study A, 20 people were given different concentrations of the drug and the fat content of their faeces was measured. The graph below shows the results.

Results of study A



(a) Analyse the data in the graph to explain how the drug helps obese people to lose weight.

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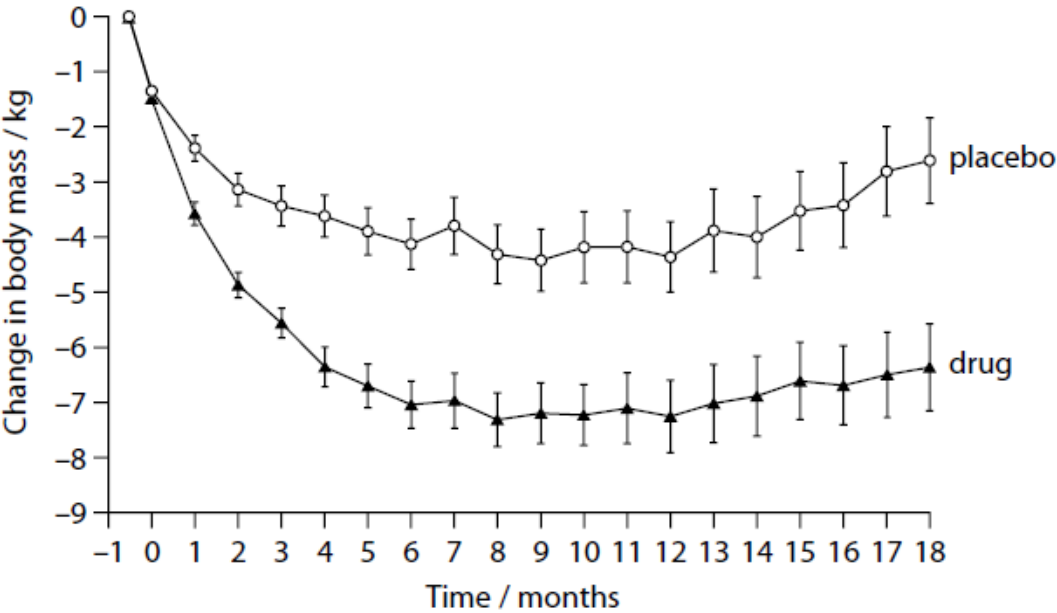
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(b) Study B was a placebo-controlled study. The change in body mass of 300 patients was measured over a period of 18 months. The graph below shows the results.

Results of study B



Explain how the data in study B show that the design of study B is better than the design of study A.

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(c) (i) A high body mass index (BMI) is an indicator of obesity. Use the formula for BMI to calculate the height of a person with a mass of 80 kg and a BMI of 31.25.

(3)

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

Answer

(ii) The table shows the percentage decrease in the BMI of 350 people who took the placebo and a group of 350 people who took the drug daily for a period of 12 months.

Treatment	Percentage decrease in BMI (%)	Percentage decrease in body mass (%)
Drug	26.5	19.0
Placebo	15.7	11.7

Give **one** reason why the percentage of people with a decrease in BMI is higher than the percentage of people with a decrease in body mass.

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(iii) Explain the health risks of having a very high BMI.

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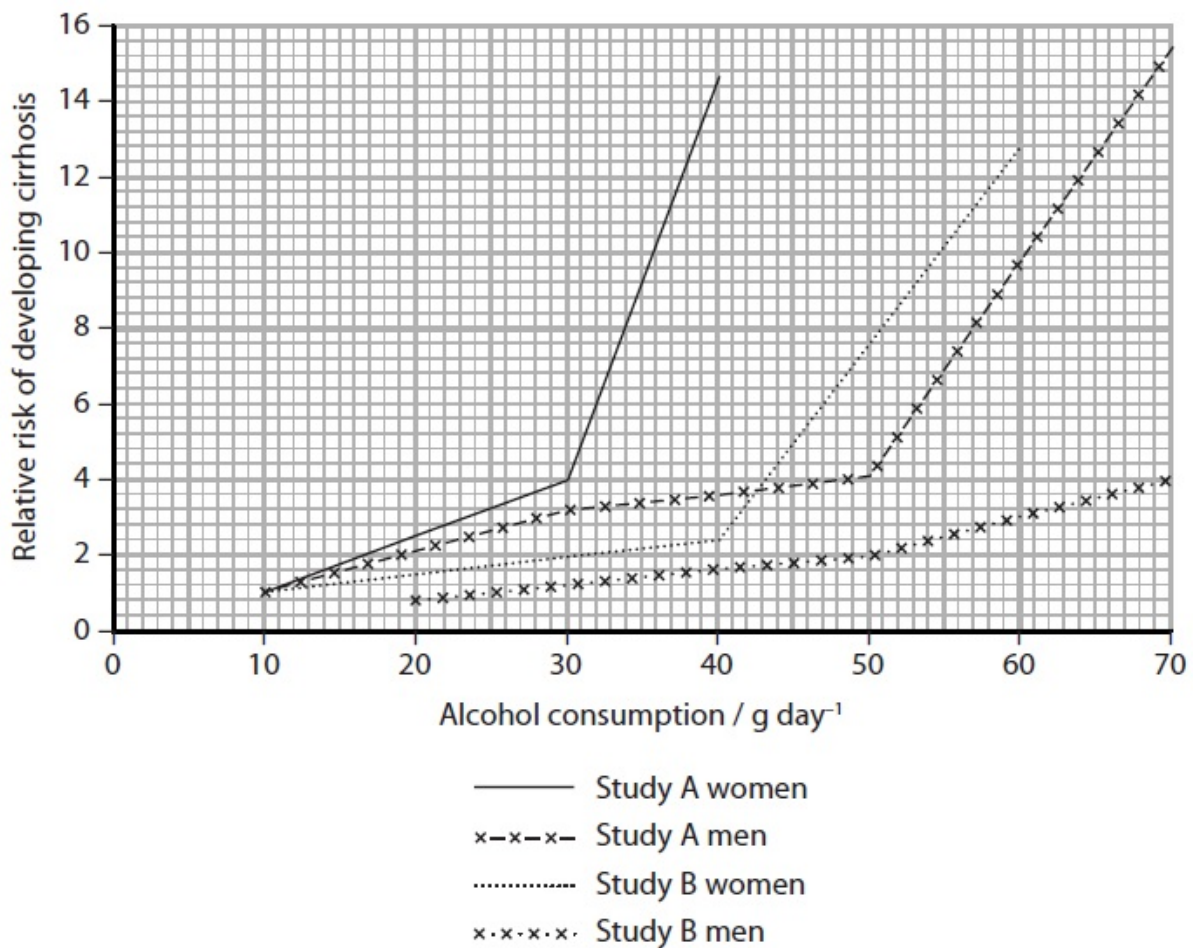
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(Total for question = 18 marks)

Q3. Cirrhosis is a disease of the liver that is associated with alcohol abuse.

Two studies, study A and study B, were carried out to determine the relative risk of developing cirrhosis in relation to the mass of alcohol consumed each day by men and women.

The graph below shows the results of these two studies.



(a) The results of these studies indicate that there is a correlation between alcohol consumption and cirrhosis.

Explain how these results indicate that there is a **correlation** between alcohol consumption and cirrhosis.

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(b) (i) Using the information in the graph, compare the results for women in studies A and B.

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(ii) Suggest **two** reasons for the differences between the results for women in these two studies.

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(c) Describe the evidence shown in the graph that suggests that the risk of developing cirrhosis depends on gender.

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(d) Comment on the reliability of these results

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(e) It is possible that the men and women in these studies underestimated their alcohol consumption.

Suggest **one** reason for this.

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(Total for Question = 10 marks)

Q4.

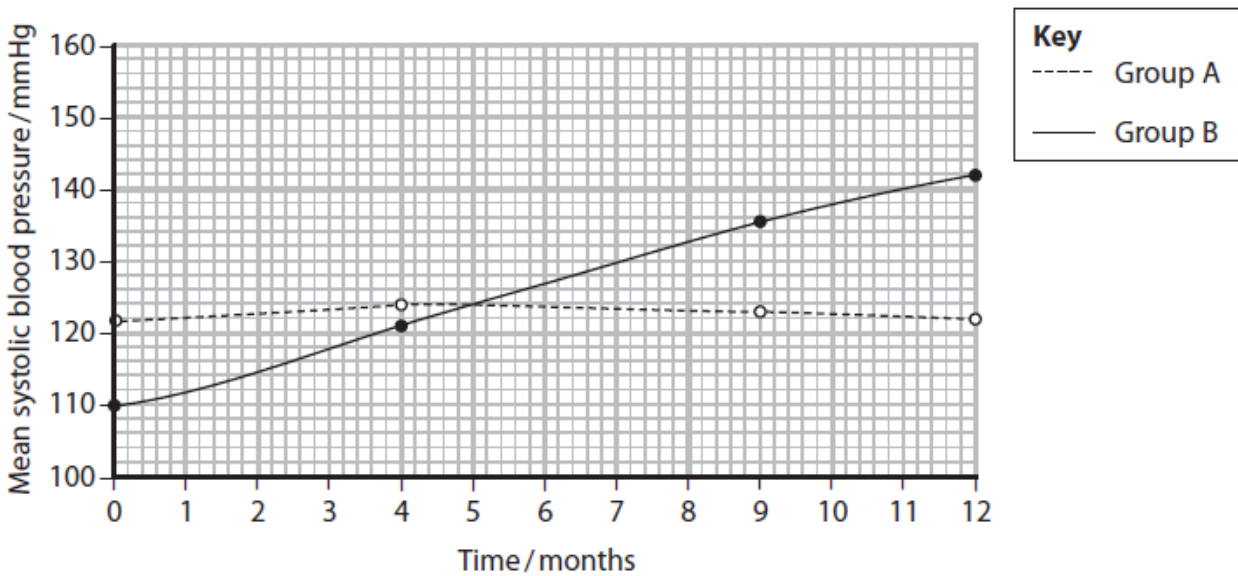
The effect of salt in the diet on blood pressure was investigated.

This investigation involved 15 males and 5 females, all between 20 and 30 years old. They were split into two groups, A and B, each of 10 people.

Group A had a diet containing 3 g of salt per day. Group B had a diet containing 9 g of salt per day.

The systolic blood pressures, measured in mmHg, were recorded during one year.

The results are shown in the graph.



Explain how the validity of this investigation could be improved.

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(Total for question = 3 marks)

Q5.

Studies have provided evidence for a link between heart rate when a person is at rest and various medical conditions.

In one study, the relationships between resting heart rate and the percentage incidence of coronary heart disease and cancer were investigated.

The results are shown in the table.

Range of resting heart rate / beats per min	Number of individuals in each range	Percentage incidence of condition (%)	
		Coronary heart disease	Cancer
< 59	961	4.2	1.0
60–69	2277	6.0	1.5
70–79	2120	7.5	2.0
80–89	1202	8.0	2.5
90–99	576	8.2	4.0
> 99	379	7.9	3.8

(i) Comment on the evidence for a link between resting heart rate and the percentage incidence of coronary heart disease and cancer.

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(ii) Give two reasons why there were different numbers of people in each resting heart rate group.

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(iii) Give two reasons why the number of people in each resting heart rate group did not affect the validity of this investigation.

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(Total for question = 9 marks)

Q6.

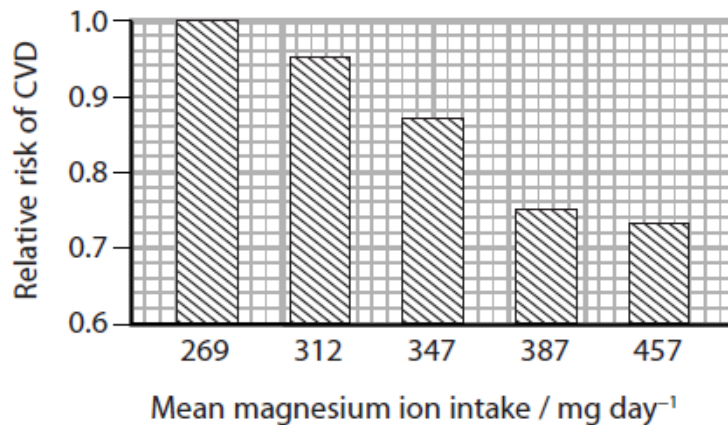
Cardiovascular disease (CVD) is a major cause of death and disability in the UK.

The relationship between magnesium ions in the diet and CVD has been studied.

In one study, magnesium ions were added to the diets of a group of men. The effect of this on the relative risk of CVD was recorded.

The mean normal dietary intake of magnesium ions is 269 mg day^{-1} .

The results of the study are shown in the graph.



(i) Which of the following statements can be made about the relationship between an increased magnesium ion intake and the risk of CVD in this study?

(1)

An increased magnesium ion intake

- A** causes an increase in CVD
- B** causes a reduction in CVD
- C** is correlated with an increase in CVD
- D** is correlated with a reduction in CVD

(ii) What is the daily increase in magnesium ion intake that reduces the relative risk of CVD by 0.13?

(1)

- A** 43 mg day^{-1}
- B** 78 mg day^{-1}
- C** 118 mg day^{-1}
- D** 347 mg day^{-1}

(Total for question = 2 marks)