OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



EXAM QUESTION PACK

B2.5 HOW CAN LIFESTYLE, GENES AND THE ENVIRONMENT AFFECT HEALTH? (HIGHER)

SCORE	PERCENTAGE
/64	%

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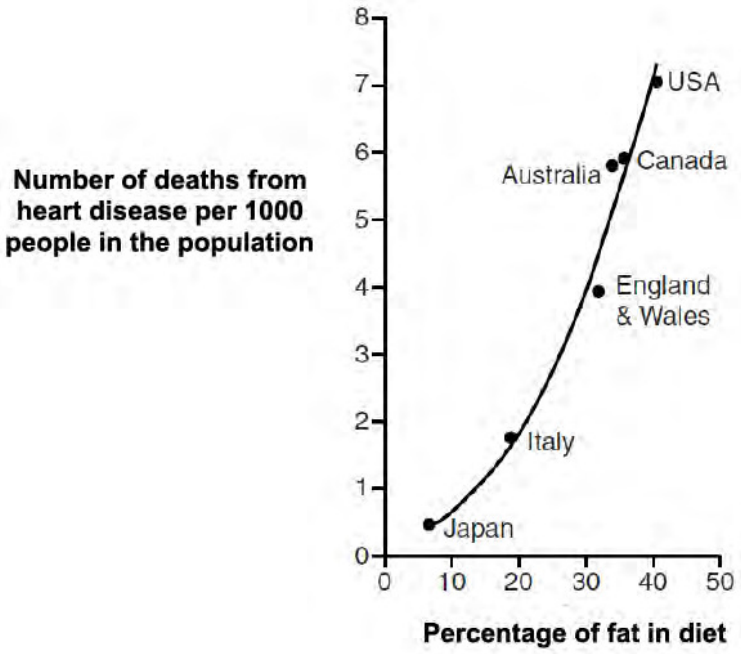
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1. A scientist collected information about the percentage of fat in people's diet and the number of deaths from heart disease in various countries around the world.

The information was plotted in the graph below.



(i) What can you conclude about the percentage of fat in the diet and the chance of dying from heart disease?

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[1]

(ii) What **two** lifestyle changes might you suggest to a person from the USA in order to decrease their chance of dying from heart disease?

1

2

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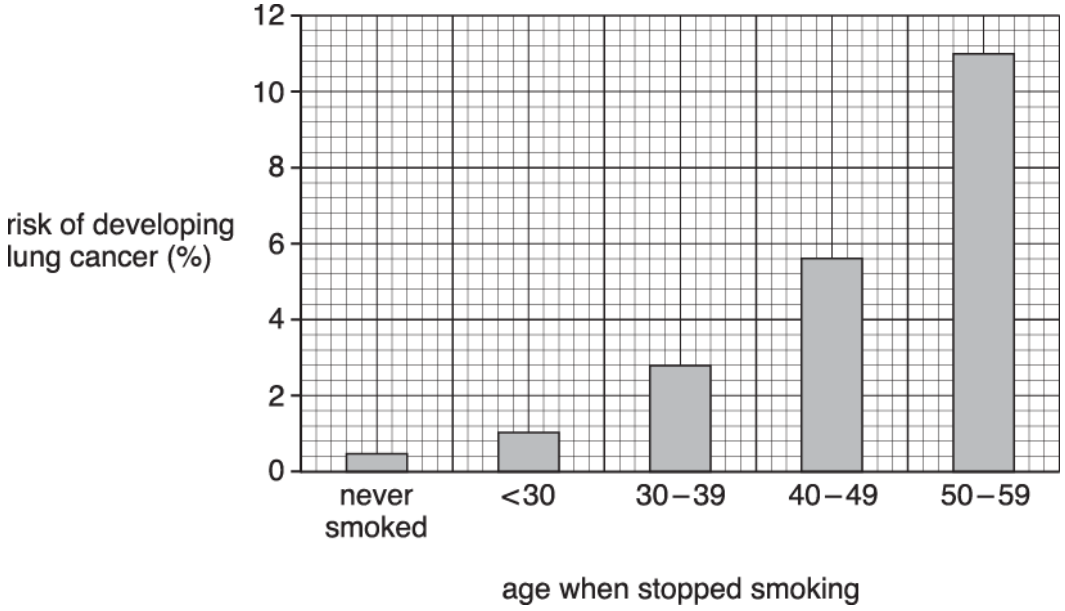
[2]

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2. Smoking cigarettes increases the risk of developing lung cancer.
This risk can be reduced by stopping smoking.

The graph shows the risk of developing lung cancer in people who have never smoked and people who have stopped smoking.



Look at the graph.

(i) What does the number <30 on the horizontal axis mean?

_____

_____ [2]

(ii) Steve was 45 years old when he stopped smoking.

Write down his increase of percentage risk of developing lung cancer if he had waited until he was 55 years old.

increase of percentage risk = _____ % [2]

(iii) Write down **two** different conclusions that can be made from looking at the graph.

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[2]

(iv) The graph does not show the age at which people started smoking.

Suggest why this information is important when making conclusions from the graph.

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[2]

3. Smoking is an example of an unhealthy lifestyle choice.

Write down **two** other examples of an unhealthy lifestyle choice.
Explain why each lifestyle choice may cause health problems.

Lifestyle choice 1 _____

Lifestyle choice 2 _____

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[2]

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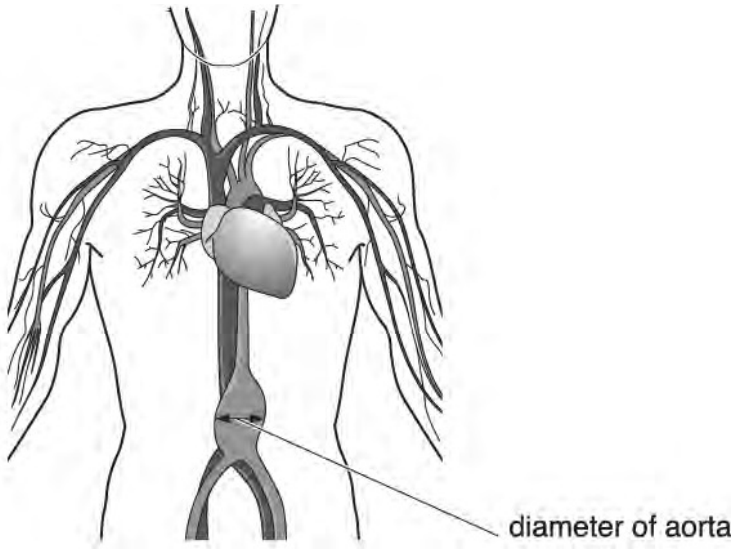
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4(a). Swelling of the aorta is dangerous.

The swelling is called an aneurysm.
A swollen aorta can burst and usually results in death.

Men are screened to detect a dangerous swelling of the aorta.

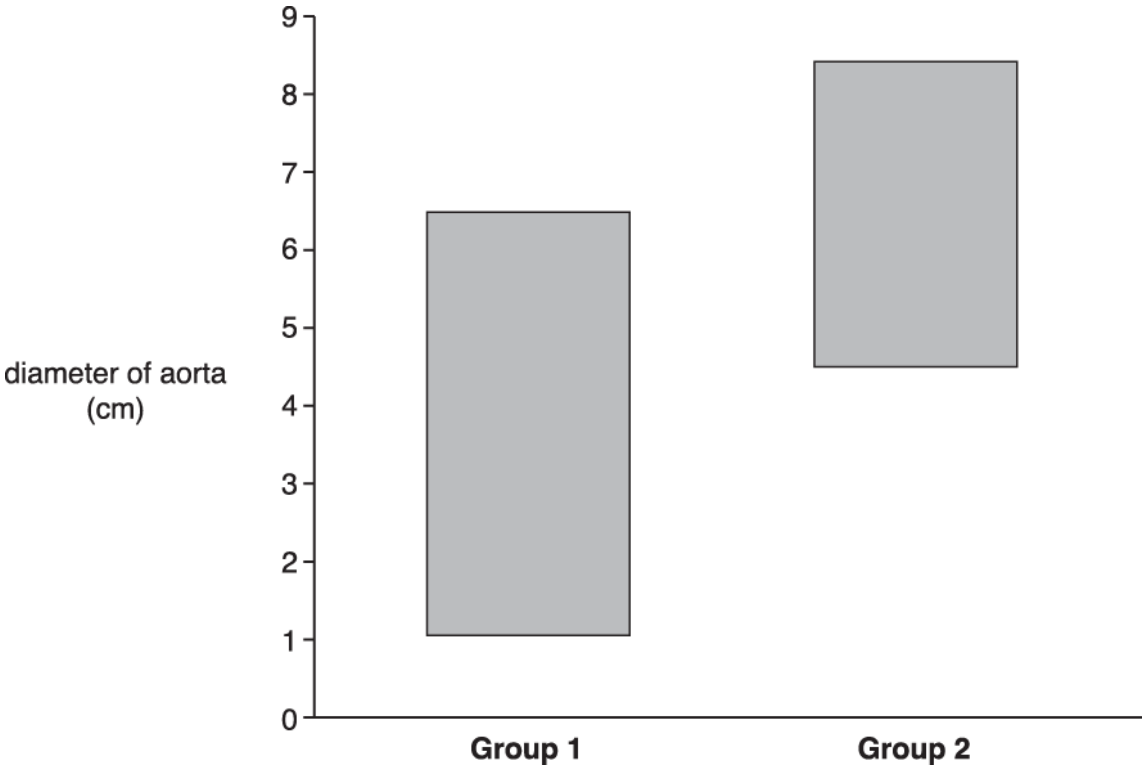
The diameter of a healthy aorta is approximately 2 cm.



The diameter of the aorta was measured in two groups of men aged over 65.
The range of diameters of the aorta is shown in the graph for both groups.

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It was decided to give the men in **Group 2** surgery to repair the aneurysm.
Men in **Group 1** were not given surgery.

Look at the graph.

(i) Doctors have to decide whether or not to operate to repair an aneurysm.

Write down the minimum diameter of the aorta at which doctors decided to operate.

_____ cm

[1]

(ii) Some men who had an aneurysm of 6 cm were operated on, while others were not.

Suggest **two** reasons why.

---

[2]

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(b). Surgery always carries some risk.

Suggest why most patients are prepared to accept this risk when agreeing to have the surgery.

[1]

(c). An aneurysm is repaired by inserting a plastic tube called a stent into the aorta.
In 1990, the risk of death from this operation was 5.7%.

Explain the difference between **perceived** and **calculated** risk when patients decide whether or not to have the operation.

[2]

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5. Neil is worried that he might have too much body fat and be overweight.

Here are some facts about Neil:

- his age is 43
- his body fat is 29%
- his mass is 90 kg
- his height is 1.7 m

Look at the formula, table and body fat chart below.

$$\text{Body Mass Index (BMI)} = \frac{\text{body mass (kg)}}{[\text{height (m)}]^2}$$

BMI	Category
<19	underweight
19 – 24	healthy weight
25 – 29	overweight
30 – 40	obese
>40	very obese

BODY FAT % MEASUREMENT CHART FOR MEN

AGE																	
18–20	2.0	3.9	6.2	8.5	10.5	12.5	14.3	16.0	17.5	18.9	20.2	21.3	22.3	23.1	23.8	24.3	24.9
21–25	2.5	4.9	7.3	9.5	11.6	13.6	15.4	17.0	18.6	20.0	21.3	22.3	23.3	24.2	24.9	25.4	25.8
26–30	3.5	6.0	8.4	10.6	12.7	14.6	16.4	18.1	19.6	21.0	22.3	23.4	24.4	25.2	25.9	26.5	26.9
31–35	4.5	7.1	9.4	11.7	13.7	15.7	17.5	19.2	20.7	22.1	23.4	24.5	25.5	26.3	27.0	27.5	28.0
36–40	5.6	8.1	10.5	12.7	14.8	16.8	18.6	20.2	21.8	23.2	24.4	25.6	26.5	27.4	28.1	28.6	29.0
41–45	6.7	9.2	11.5	13.8	15.9	17.8	19.6	21.3	22.8	24.7	25.5	26.6	27.6	28.4	29.1	29.7	30.1
46–50	7.7	10.2	12.6	14.8	16.9	18.9	20.7	22.4	23.9	25.3	26.6	27.7	28.7	29.5	30.2	30.7	31.2
51–55	8.8	11.3	13.7	15.9	18.0	20.0	21.8	23.4	25.0	26.4	27.6	28.7	29.7	30.6	31.2	31.8	32.2
>55	9.9	12.4	14.7	17.0	19.1	21.0	22.8	24.5	26.0	27.4	28.7	29.8	30.8	31.6	32.3	32.9	33.3
	Lean				Ideal					Average				Above average			

Should Neil be worried?
Use the information on the opposite page to **explain** your conclusion and suggest what action Neil should take.

The quality of written communication will be assessed in your answer.

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[6]

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6(a). Robert is worrying about his blood pressure.

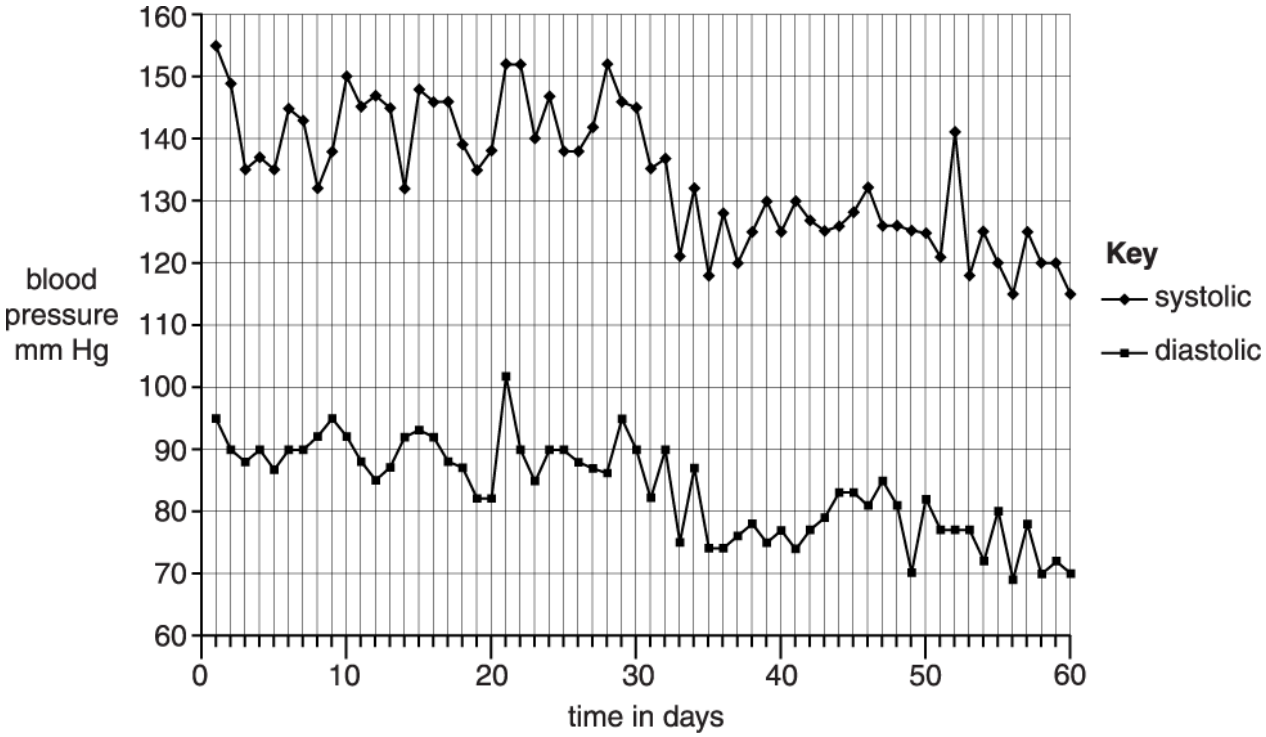
He decides to measure his blood pressure every day.

Blood pressure consists of two readings.

Systolic pressure is when the heart muscle is contracting.

Diastolic pressure is when the heart muscle is relaxing.

The graph shows Robert's blood pressure taken over sixty days.



(i) Use the graph to find Robert's blood pressure readings on day 1.

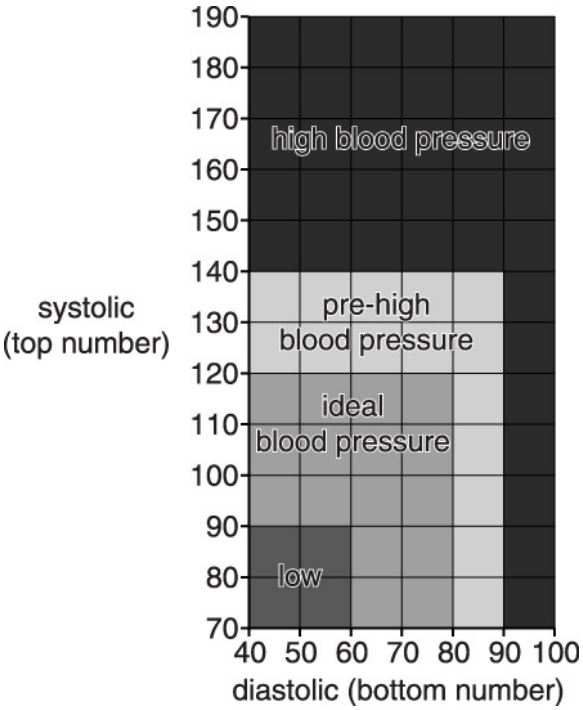
systolic _____

diastolic _____

[1]

(ii) Robert looks at a chart about blood pressure readings.

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Use this chart and your answer to part **(i)** to describe Robert's blood pressure **on day 1**.
Put a tick (✓) in the correct box.

	low	ideal	pre-high	high
Robert's blood pressure on day 1				

[1]

(b). At some point during the sixty days, Robert's doctor gave him some medicine to reduce his blood pressure.
On which day do you think that Robert started to take his medicine?

day _____

[1]

(c). Robert's blood pressure changes from day to day.
Suggest one **other** reason why.

_____ **[1]**

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(d). Robert's average systolic blood pressure for the first seven days was 142.7 mm Hg.
The table shows his systolic blood pressure for the last seven days.

(i) Complete the table by calculating Robert's average (mean) systolic blood pressure readings for the last seven days.

Day	Robert's systolic blood pressure in mm Hg
54	125
55	120
56	115
57	125
58	120
59	120
60	115
mean	

[2]

(ii) Suggest why scientists often calculate the mean of a set of data.

---

[1]

(iii) Write down the range of systolic readings of Robert's blood pressure during the last seven days.
from _____ to _____

[1]

(iv) Use the data to provide evidence that the medicine reduced Robert's blood pressure.

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[2]

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7. Ian decides to join a running club.

At the first session, the instructor takes Ian's resting pulse rate.

The instructor wants to work out how much blood the heart pumps out in a minute.

This is called cardiac output.

He uses this formula.

cardiac output = pulse rate × volume of blood pumped out per heart beat

The results for Ian and three other members of the running club are shown in the table.

Name	Resting pulse rate in beats per minute	Volume of blood pumped out per heart beat in cm^3	Cardiac output in cm^3 per minute
Alistair	80	75	6000
Byron		80	5440
Colin		70	4970
Ian	75	92	

(i) Calculate Ian's cardiac output.

_____ cm^3 per minute **[1]**

(ii) The instructor says that resting pulse rate is a good indication of fitness.

The lower your resting pulse rate the fitter you are.

Use the data in the table to work out who is the fittest person.

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Show your working.

[2]

(iii) Although the pulse rate measurements are accurate, the instructor is not convinced that his measurements identify the fittest person.

Suggest reasons why he may think this, and explain what he could do to have more confidence in his measurements.

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[2]

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8. Having an unhealthy lifestyle can increase the risk of some conditions.
Which of the following conditions are most likely caused by lifestyle factors?
Put ticks (?) in the boxes next to the **three** correct answers.

Huntington's disease inherited from mother	☐
obesity	☐
sore throat caused by bacterial infection	☐
heart disease	☐
skin cancer	☐
common cold caused by a virus	☐
cystic fibrosis inherited from both parents	☐
colour blindness inherited from father	☐

[1]

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9(a). Jason is concerned that he may be overweight.

He wants to calculate his Body Mass Index (BMI).
He knows that his mass is 86.0 kg and his height is 1.70 m.

The formula used to calculate BMI is

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

Use the formula to calculate Jason's BMI to three significant figures.
Show your working.

BMI = _____ [2]

(b). Use the result of your calculation and the table below to determine Jason's condition.

BMI reading	Condition
< 18.5	underweight
18.5–24.9	healthy weight
25.0–29.9	overweight
☐ 30.0	obese

Jason's condition _____

[1]

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(c). Jason is concerned about the repeatability of the data he has collected and the accuracy of the equipment that he has used.

Explain what is meant by **repeatability** and **accuracy** in this case.

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[2]

(d). Jason knows that the greater his BMI, the greater his risk of having heart disease.

(i) Jason looks at this table of data that he sees on the internet.

BMI	Increased risk of heart disease
23–25	50%
26–29	72%

He concludes that the increased risk is reduced from 72% to 50% if the BMI is reduced from 26 to 25.

What is the problem with Jason's interpretation of the data?

Explain your answer.

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[2]

(ii) Jason loses weight.

His doctor tells him that his probability of having a heart attack within the next ten years is 0.3%.

Use this example to discuss the risk to Jason, by referring to probability and consequence.

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[2]

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10. Ranjit has high blood pressure. It is increasing his risk of heart disease.

Explain blood pressure measurements and suggest why they may vary between individuals.



The quality of written communication will be assessed in your answer.

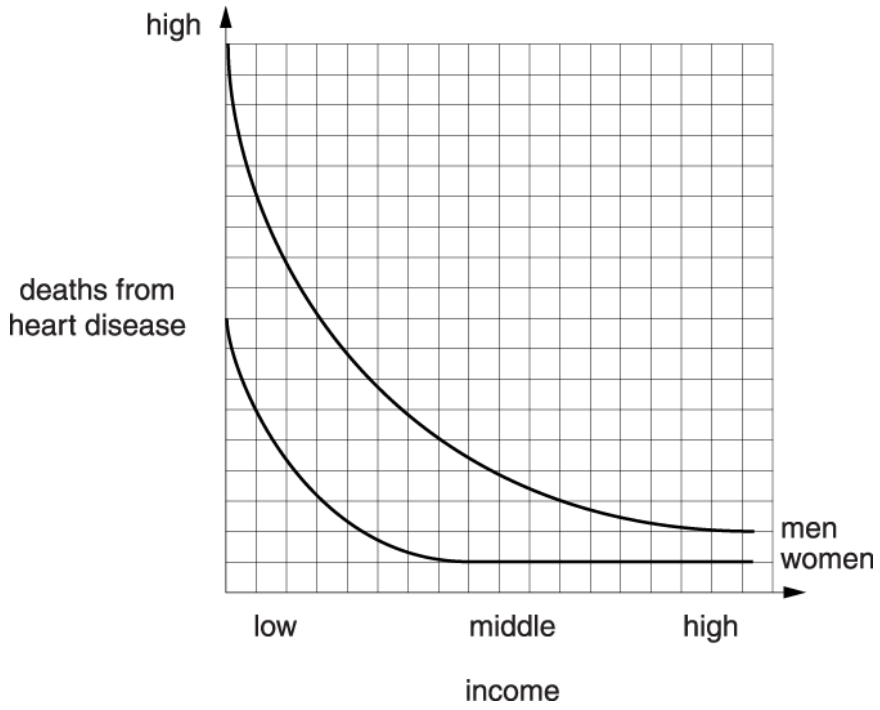
[6]

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11(a) A student examined this graph about heart disease.

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It shows the deaths from heart disease in men and women, depending upon how much money they earned (income).



The student made the following conclusions.

Using **only** information from the graph, put ticks (?) in the boxes next to the three correct conclusions.

With a very low income, women are certain to get heart disease. ☐

In women, each time income is halved, the risk of heart disease is doubled. ☐

Men are more at risk of heart disease than women. ☐

With a high income, women are more at risk of heart disease than men. ☐

There are other risk factors for heart disease apart from income. ☐

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No one with a high income gets heart disease. ☐

For men, the lower the income the greater the risk of heart disease. ☐

From middle to high income, the risk for women remains unchanged. ☐

[3]

(b). Which beginning, **A**, **B**, **C** or **D**, and which **end**, **1**, **2**, **3** or **4**, of a sentence, when put together, gives the best conclusion?

	beginning
A	An outcome exists between a factor and a correlation …
B	The study needs to be repeated …
C	Low income increases the risk of heart disease …
D	The right decision is the one that leads to the best outcome …

	end
1	… and proves the factor is a causal link.
2	… and this needs to be peer reviewed by other scientists.
3	… and includes the greatest number of people involved.
4	… but does not always lead to it.

answer _____ and _____ **[2]**

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(c). Scientists need to consider different factors when designing a study.

When designing this study on heart disease, they decided on three factors to make sure the data collected was valid.

Put ticks (?) in the boxes next to the **three** correct factors.

All the men should be the same height.	☐
Both the men and the women should be chosen at random.	☐
The sample size should be as large as possible.	☐
The women should all have a high income.	☐
Only people with a history of heart disease should be included.	☐
The two groups should be checked that they match on as many factors as possible.	☐
The study should be a double blind trial.	☐

[3]

END OF QUESTION PAPER

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