OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



EXAM QUESTION PACK

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

SCORE	PERCENTAGE
/68	%

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1(a). Some diseases are multifactorial diseases. This means that many factors contribute to their cause. Cardiovascular disease is an example.

Age and gender are known risk factors for coronary heart disease.

The data in the table below shows the number of deaths from this disease in 2007 in the UK.

Age (years)	Number of deaths in males	Number of deaths in females
Under 35	129	27
35 – 44	783	183
45 – 54	2 679	578
55 – 64	6 687	1 779
65 – 74	11 335	4 987

What can you conclude from the table about the effect of age **and** gender on the risk of death from cardiovascular disease?

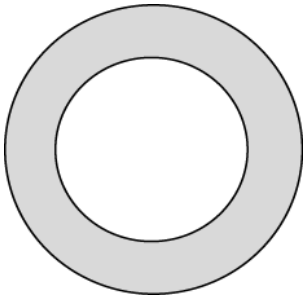
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[2]

(b).

(i) Many factors increase the risk of developing cardiovascular disease.

When Richard was a young boy, a section through a coronary artery (that supplies blood to the heart muscle) looked like this:

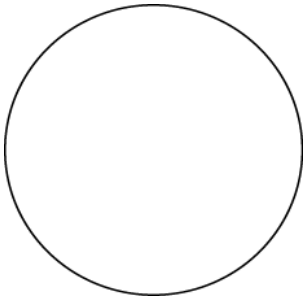


Richard has eaten a high fat diet for many years.

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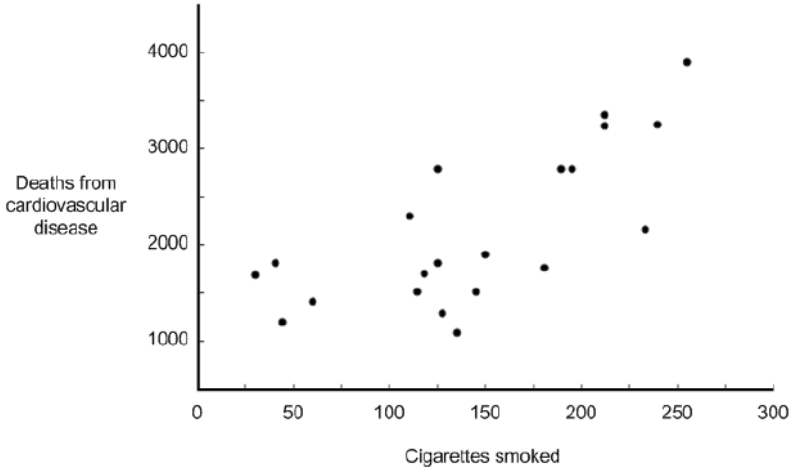
Complete the diagram below to show what Richard's coronary artery is likely to look like now:



[2]

(ii) Cigarette smoking can increase the risk of developing cardiovascular disease but does not necessarily lead to it.

Identify the type of correlation shown in the graph below.



[1]

(iii) Richard smoked 40 cigarettes a day and died of old age when he was 95 years old.

Explain why this cannot be used as convincing evidence of a correlation between the risk of smoking cigarettes and developing cardiovascular disease.

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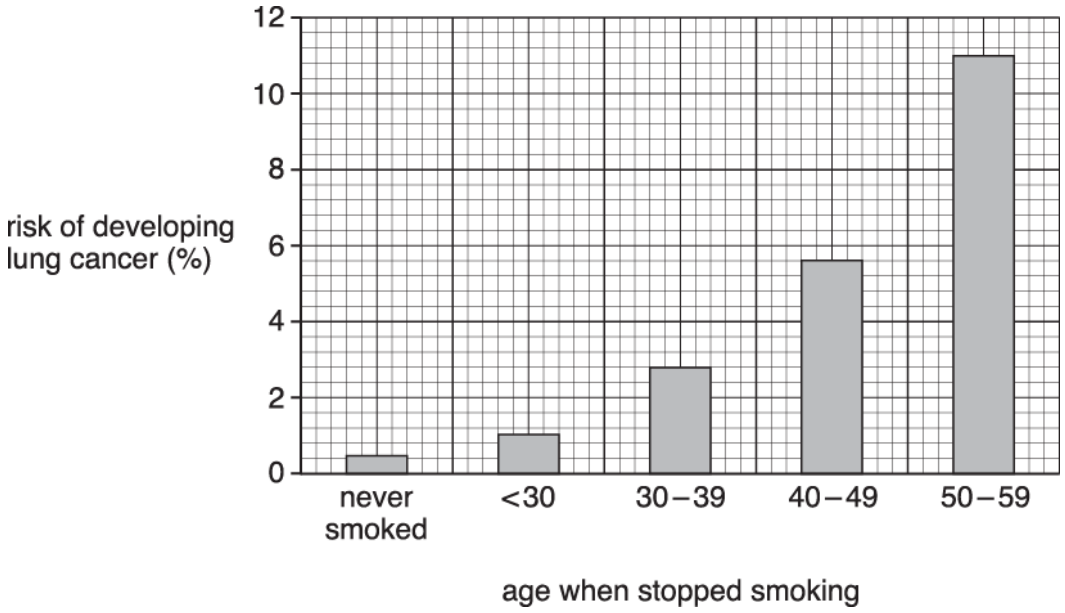
[2]

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2(a). 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]

(b). 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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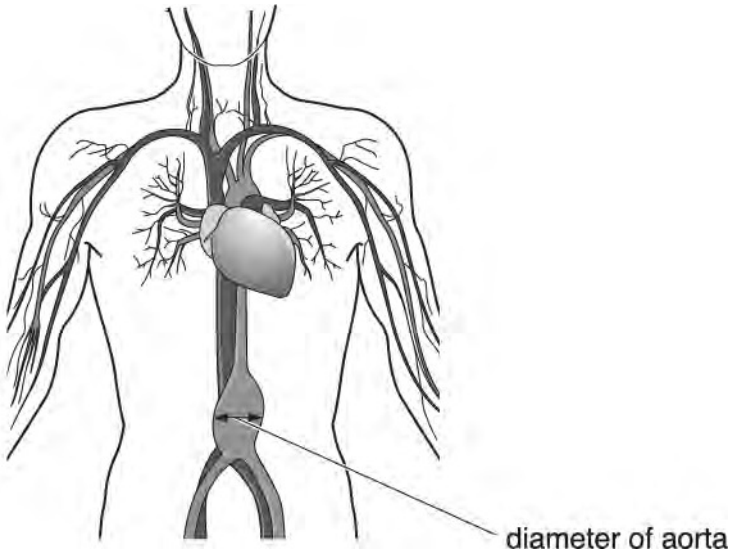
3. Swelling of the aorta is dangerous.

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.

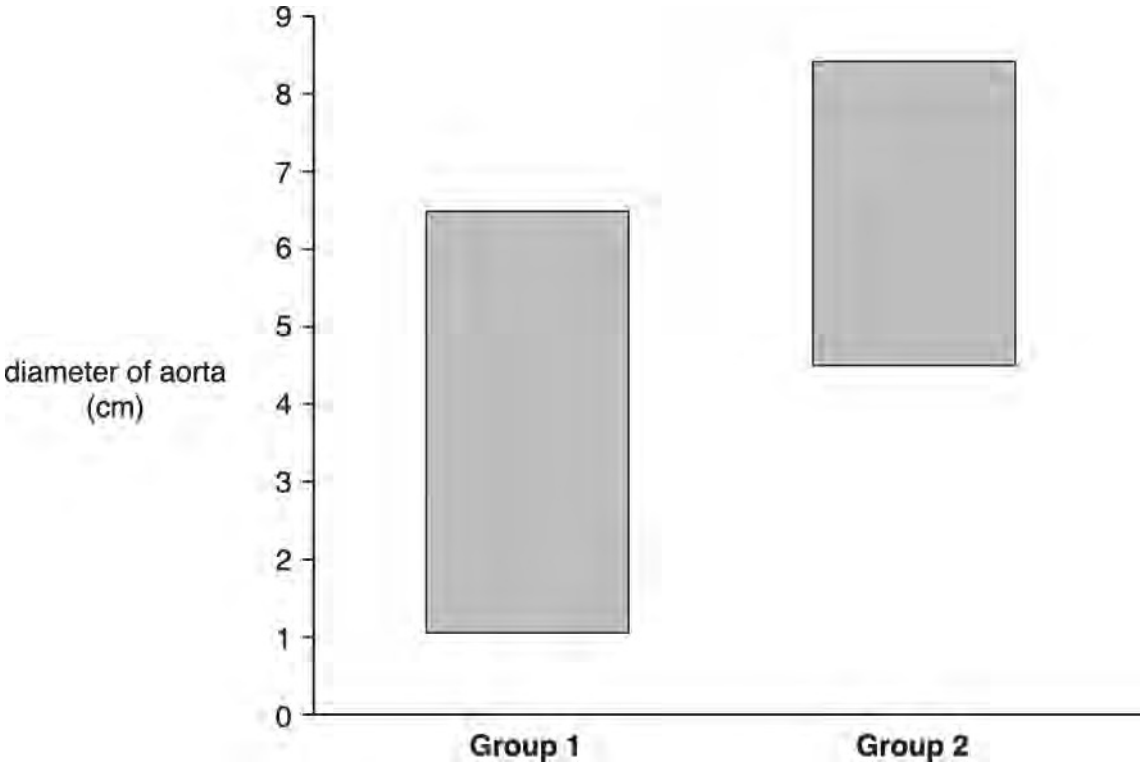
The diameter of a healthy aorta is approximately 2 cm.



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 diagram and graph on the opposite page.

Discuss the decision to give surgery to the men in **Group 2** but not to the men in **Group 1**. Use the data to support your answer.

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

[6]

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4. 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	Lean			Ideal			Average						Above average				
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

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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5(a). Nikita wants to improve her fitness level.

She is interviewed by her fitness trainer before she starts her exercise programme.

Describe the questions her fitness trainer should ask and explain their importance.



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

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[6]

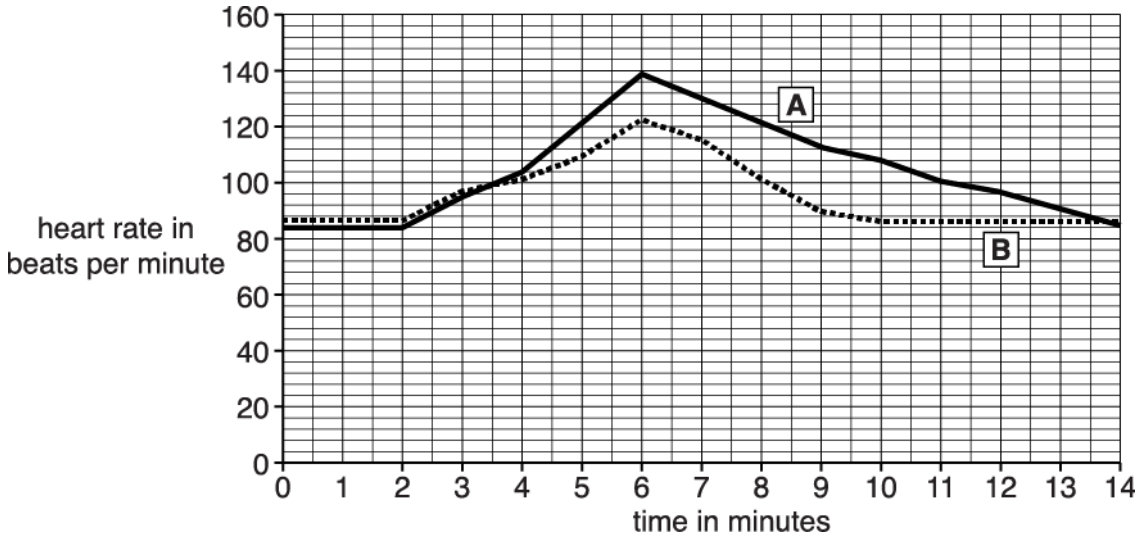
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(b). Her trainer sets a fitness test for Nikita.

Nikita takes a short test at the start of her fitness programme and repeatsthe test three months later.

The graph shows her heart rate during these two tests.

One test is labelled **A** and the other **B**.



(i) On the graph draw

- a short arrow labelled X to show when Nikita starts to exercise.
- a short arrow labelled Z to show when Nikita stops exercising.

[1]

(ii) How long did Nikita exercise during each test?

_____ min

[1]

(iii) Which test, **A** or **B**, shows data for Nikita three months after she started her exercise programme?

Test _____

Explanation _____

_____

_____ **[2]**

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

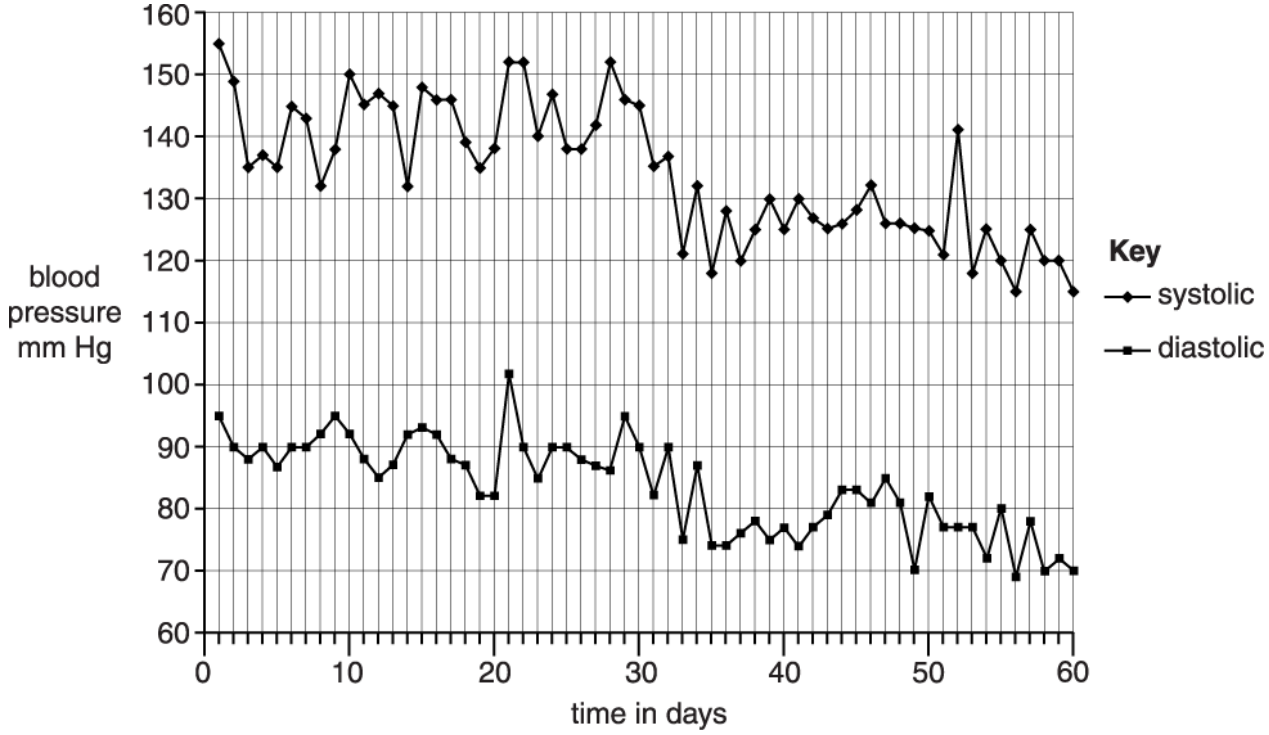
He decides to measure his blood pressure every day.

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 _____

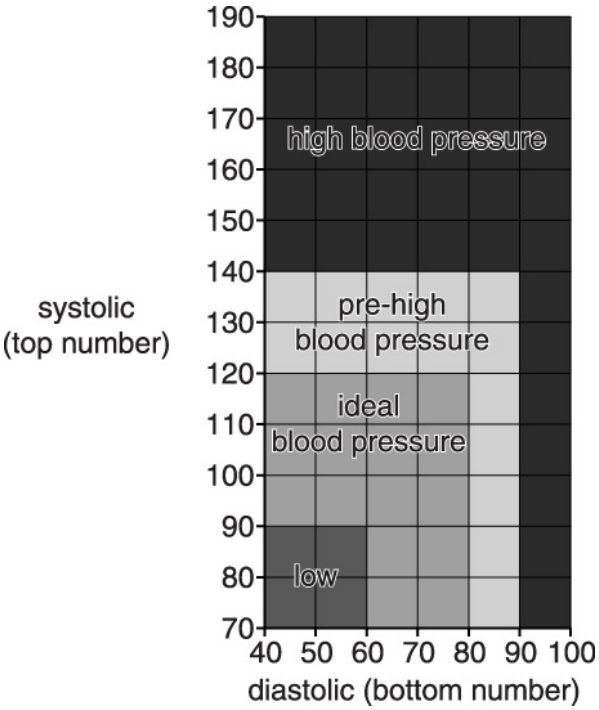
diastolic _____

[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	68	80	5440
Colin	71	70	4970
Ian	75	92	

(i) Complete the table by calculating Ian's cardiac output.

[1]

(ii) Write down the range of the cardiac output measurements for these members of the running club.

range = _____ to _____

[1]

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(iii) The instructor says that resting pulse rate is a good indicator of the level of fitness.

The lower your resting pulse rate the fitter you are.

From the data, put the men in order of fitness from the least fit to the most fit.

least fit

_____

_____

_____

most fit

_____

[1]

(iv) The instructor thinks that the order of fitness may be incorrect.

Which **two** reasons, when taken together, explain why the order may be incorrect?

Put ticks (?) in the boxes next to the **two** most likely reasons.

Ian has only just joined the running club.	☐
The measurements were only recorded once.	☐
A person's pulse rate may vary.	☐
Blood pressure measurements were not recorded.	☐
The men had different diets.	☐

[2]

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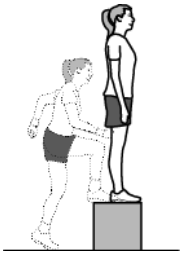
8(a). Jarinder wants to measure her fitness.

She does a fitness test.

She steps up and down on a box every two seconds for five minutes.

She then waits one minute after finishing the test and takes her pulse rate.

After a further one and two minutes she takes her pulse rate again.



These are her results.

	Pulse rate in beats per minute
1 minute after finishing test	114
2 minutes after finishing test	102
3 minutes after finishing test	90

Use this formula for calculating Jarinder's fitness number.

$$\text{fitness number} = \frac{30\,000}{2 \times (\text{pulse rate 1} + \text{pulse rate 2} + \text{pulse rate 3})}$$

Show your working.

fitness number = _____

[3]

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(b). The table shows how a person's fitness number relates to their actual fitness.

Use this table to determine Jarinder's actual fitness.

	Fitness				
Gender	**Excellent**	**Above average**	**Average**	**Below average**	**Poor**
Male	more than 90	80–90	65–79	55–64	less than 55
Female	more than 86	76–86	61–75	50–60	less than 50

Jarinder's fitness is _____

[1]

(c). Obtaining the fitness number and using the table may not precisely show how fit Jarinder is. Suggest reasons why.

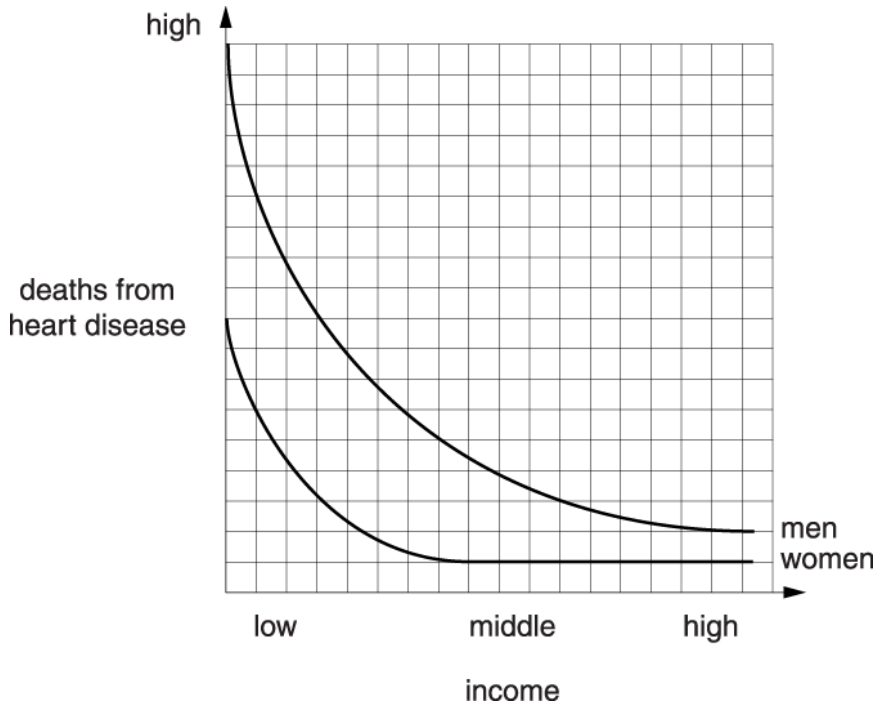
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[2]

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

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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10. Diabetes and cardiovascular disease are common diseases in the UK.

Ben is a middle-aged man with type 2 diabetes.

He is worried because he has heard that having type 2 diabetes will mean he also gets cardiovascular disease.

What advice would you give to Ben?

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[3]

END OF QUESTION PAPER

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