



Name

Mark

Class

Date

GCSE Science /Biology

Internally Assessed Activity Unit B1b

Topic 4 – Use, Misuse and Abuse

Caffeine

Adam, Laura and Raj have been learning about different drugs. They want to know more about the effect of the drug caffeine on the heart.

- Adam takes caffeine every day in cola and tea
- Laura takes caffeine occasionally in hot chocolate
- Raj avoids caffeine whenever possible.



Question 1

Adam finds the information below about different drinks on the internet.

source of caffeine	volume of one drink (cm ³)	mass of caffeine in one drink (mg)
cola	300	50
instant coffee	250	70
espresso coffee	100	100
tea	250	70
hot chocolate	250	5

- (a) (i) Which drink in the table has the most caffeine in it?

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1 mark

- (ii) How much cola contains the same mass of caffeine as 100 cm³ of espresso coffee?

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1 mark

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Turn over

(b) Caffeine speeds up the nerve impulses.

Tick the box next to the word that completes each sentence.

(i) Because the speed of nerve impulses is increased, caffeine is a

- depressant
- sedative
- stimulant

1 mark

(ii) If the speed of nerve impulses increases, the time taken to react to a stimulus

- decreases
- increases
- stays the same

1 mark

(c) Explain why it is better to drink a cup of hot chocolate instead of a cup of coffee before going to sleep.

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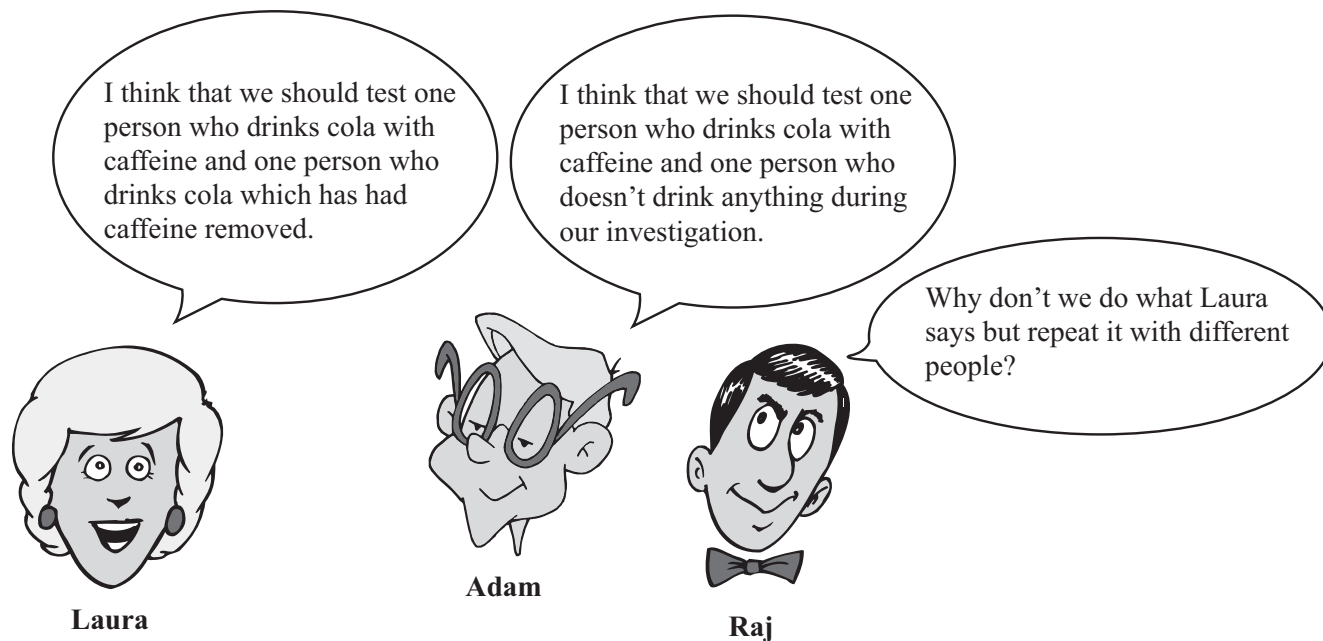
2 marks

(6 marks)

Question 2

Adam, Laura and Raj want to find out how caffeine affects heart rate. They plan to do this by measuring people's pulse rates after they have drunk cola.

Here are some of their thoughts.



(a) They decide to follow Laura's idea, but include Raj's suggestion.

- (i) Raj's idea will give them more trust in their results. Give **one** reason why.

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1 mark

- (ii) Explain why Laura's idea will make the experiment a more valid test than Adam's idea.

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2 marks

(b) This is the method that they chose.

- Six people will be split into two groups of three people. One group will be given cola that contains caffeine. The other group will drink cola that does not contain caffeine.
- Each person will have their pulse rate measured at the start of the test.
- Each person will then drink 100 cm³ of cola.
- Five minutes later they will each have their pulse rate taken again.
- Each person will then take two 100 cm³ drinks of the same cola and have their pulse rate measured again.
- They will then repeat this with three 100 cm³ drinks and finally four 100 cm³ drinks.

(i) Adam chooses six people for the test.

Suggest two characteristics of the six people chosen that should be considered to make the test fair.

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2 marks

(ii) Why it is important that the six people do not know which type of cola (with or without caffeine) they are drinking?

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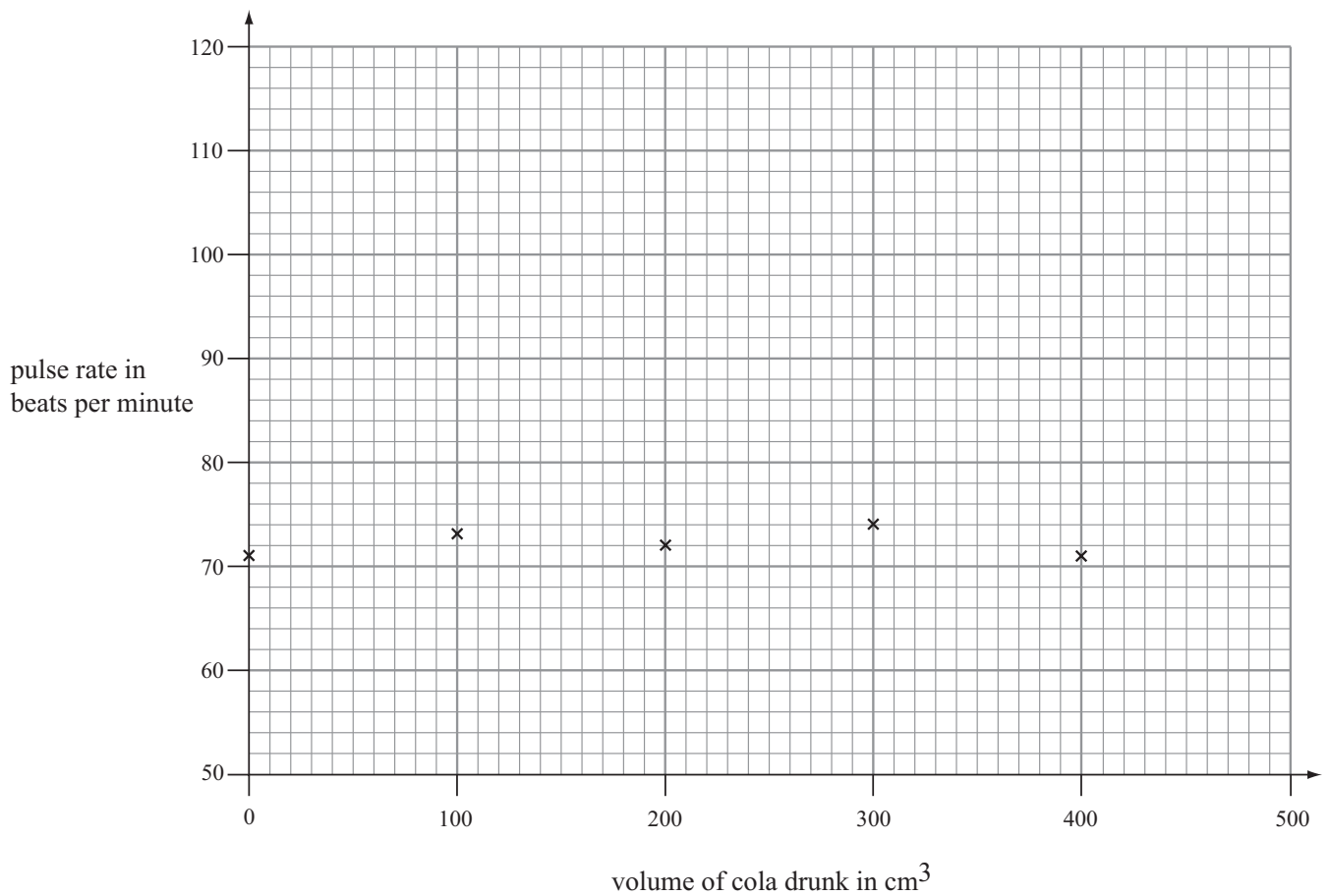
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1 mark

(c) The numbers in the table below show the pulse rates in beats per minute. In each case the pulse rate was taken 5 minutes after the cola was drunk.

type of cola	name	pulse rate (beats per minute) after drinking				
		0 cm ³ cola	100 cm ³ cola	200 cm ³ cola	300 cm ³ cola	400 cm ³ cola
with caffeine group	Charlie	68	74	88	100	120
	Sandy	70	74	80	90	104
	Alex	72	75	80	92	106
	average	70	74	83	94	110
without caffeine group	Chris	76	74	74	74	70
	Sam	66	70	72	70	74
	Rob	74	74	70	78	70
	average	71	73	72	74	71

The average pulse rates for the 'without caffeine' group are plotted below.



- (i) Complete the graph by plotting the average pulse rates for the 'with caffeine' group. **2 marks**
- (ii) Draw lines of best fit for each group. **2 marks**
- (iii) Describe and explain the results shown on the graph for the 'without caffeine' group.

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2 marks

(iv) Describe and explain the trends shown in the graph for the 'with caffeine' group.

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3 marks

(15 marks)

Question 3

Raj looked on the internet for information on caffeine and health. He found this article.

Got the Jitters?

Many people feel that caffeine taken in small amounts makes them more mentally alert, but higher doses of caffeine can cause anxiety and headaches and interfere with sleep.

If you take large amounts of caffeine regularly and then suddenly stop you may experience withdrawal symptoms.

- (a) Raj thinks caffeine should be made illegal. Give two reasons why Raj does not have a strong case for making caffeine illegal?

reason 1

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reason 2

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2 marks

- (b) A cola company is trying to develop a new drug to replace caffeine. Explain why developing this new drug will be expensive.

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4 marks

(6 marks)
27 marks

Quality of written communication

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Total 30 marks