Reaction time

Biology required practical | AQA Combined Science 8464 and AQA GCSE Biology 8461 | 14 questions, 35 marks

GCSE science required practicals

This practical online

Name: _____ **Date:** _____ **Score:** _____ / 35

Aim: To find out whether drinking a caffeinated drink changes a person's reaction time, measured with the ruler-drop test.

Equipment: 30 cm ruler (or metre ruler) with clear cm markings; Chair and table so the forearm can rest on the edge; Conversion table from distance caught to reaction time; Caffeinated drink, such as cola (only for people allowed caffeine); Measuring cylinder to give the same volume of drink; Stopwatch or timer to time the wait after drinking; Results table and pen.

Results

Kwame tested his friend Lucy with a 30 cm ruler. He dropped it five times before Lucy drank 250 cm^3 of cola, then five more times 10 minutes after the drink. On trial 5 before the drink, Lucy was laughing at a joke.

Trial	Distance caught before drink in cm	Distance caught after drink in cm
1	18	13
2	17	11
3	19	12
4	18	14
5	31	10

Questions

1 In Kwame's investigation:

a. What is the independent variable?

b. What did Kwame actually measure in order to find the dependent variable?

(2 marks)

2 Kwame used Lucy's dominant hand for every trial. Give one other control variable and explain why it matters.

(2 marks)

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3 Explain why Kwame should wait a different length of time before each drop. (2 marks)

4 Give one reason why some people should not take part in this investigation, and say what Kwame should do about it. (2 marks)

5 Identify the anomalous result. Suggest a reason for it. (2 marks)

6 Calculate the mean distance caught before the drink. Do not include the anomalous result. (2 marks)

7 Calculate the mean distance caught after the drink. (2 marks)

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8 Kwame used this conversion table:

10 cm = 0.14 s
12 cm = 0.16 s
14 cm = 0.17 s
16 cm = 0.18 s
18 cm = 0.19 s
20 cm = 0.20 s
22 cm = 0.21 s

Use the table and your means to find Lucy's reaction time before and after the drink. Then calculate the decrease in her reaction time. Show your working.

(3 marks)

9 Calculate the percentage decrease in Lucy's reaction time after the drink.

Give your answer to 2 significant figures. Show your working.

(3 marks)

10 **Higher tier**

Use the conversion table to explain why the distance caught is not directly proportional to reaction time.

(2 marks)

11 Kwame concluded that caffeine made Lucy's reaction time shorter. Give two reasons why this conclusion may not be valid, and suggest how to improve the investigation.

(3 marks)

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12 The ruler has markings every 1 cm. Explain how a ruler with millimetre markings would improve the results.

(2 marks)

13 Explain why a reaction time is longer than the time for a reflex, such as pulling your hand away from a hot plate.

(2 marks)

14 Plan an investigation to find out whether people's reaction times are shorter with their dominant hand than with their non-dominant hand, using the ruler-drop test.

(6 marks)

End of questions | Total 35 marks | The answers sheet has the full method as revision notes.

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