H02-test Correlation and Causation (Higher): Test Pack

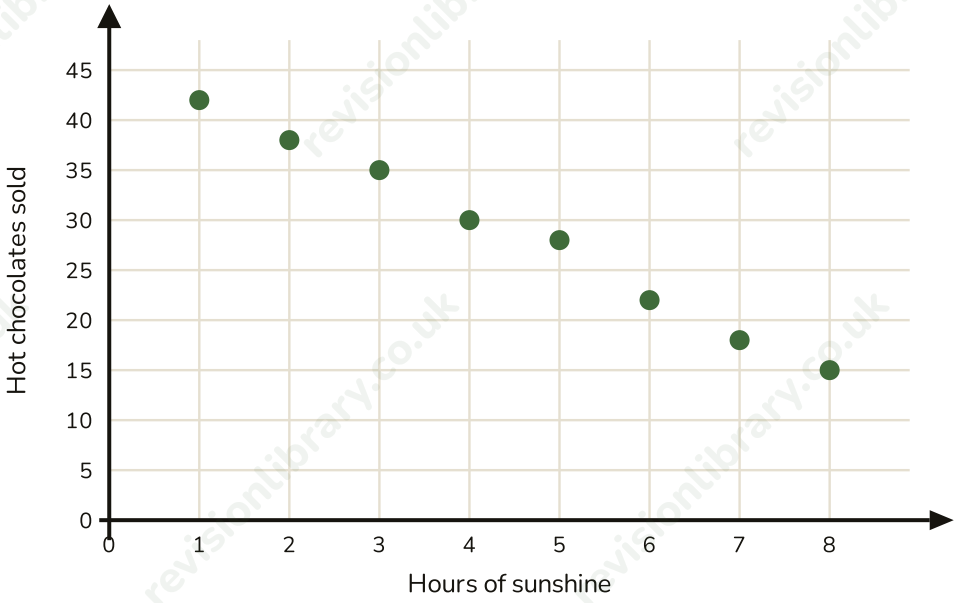
Total Marks

EDEXCEL 1ST0 · Calculator allowed · about 20 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A cafe owner records the number of hours of sunshine each afternoon and the number of hot chocolates sold that afternoon, over 8 different afternoons. The scatter graph shows the results.



(a) Write down the type of correlation shown by the scatter graph. **(1)**

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(b) Describe what the scatter graph shows about the relationship between hours of sunshine and the number of hot chocolates sold. **(2)**

(c) Suggest one reason why this information could be useful to the cafe owner. **(1)**

(Total for Question 1 is 4 marks)

2 A researcher records the distance (in miles) and the cost (in £) of several taxi journeys. She plots the results on a scatter graph and draws a line of best fit. Two points that lie exactly on this line of best fit are (2, 7) and (10, 23), where x is the distance in miles and y is the cost in £.

(a) Work out the gradient of the line of best fit. **(2)**

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(b) Find the equation of the line of best fit in the form $y = mx + c$. **(2)**

.....

(c) Use the equation to estimate the cost of a 6-mile taxi journey. **(1)**

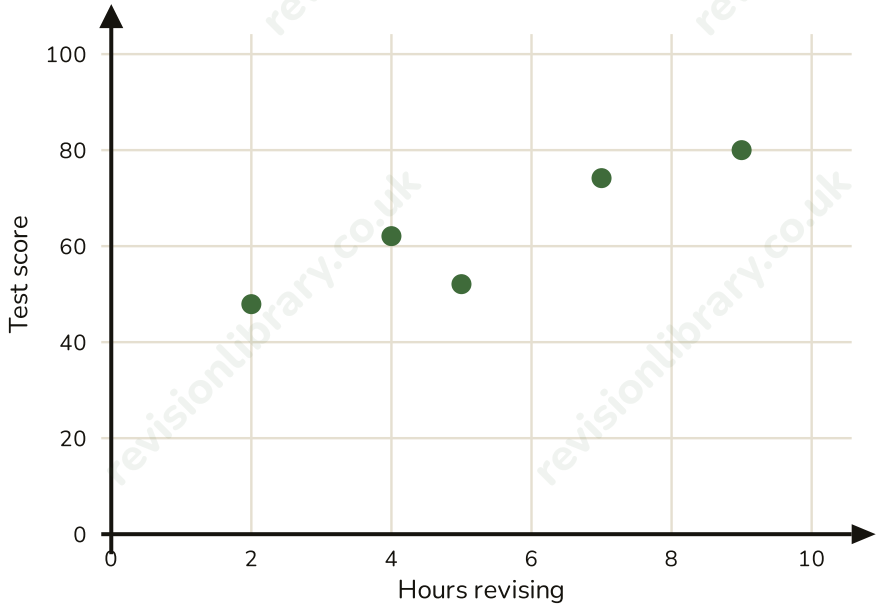
(d) Explain why using this equation to estimate the cost of a 50-mile taxi journey would be unreliable. **(1)**

(Total for Question 2 is 6 marks)

3 A teacher records the number of hours 5 pupils spent revising for a test, x, and their test score, y. The table and scatter graph show the results.

Pupil	Hours revising, x	Test score, y
1	2	48
2	4	62
3	5	52
4	7	74
5	9	80

You may use: Sxy = (sum of xy) - (sum of x)(sum of y)/n, Sxx = (sum of x^2) - (sum of x)^2/n, Syy = (sum of y^2) - (sum of y)^2/n, and r = Sxy / $\sqrt{Sxx * Syy}$.



(a) Show that Sxy = 135.6, Sxx = 29.2 and Syy = 756.8. **(3)**

(b) Hence calculate the value of r, giving your answer correct to 3 significant figures. **(2)**

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(c) Interpret the value of r in the context of hours spent revising and test score. **(2)**

(Total for Question 3 is 7 marks)

Mark scheme · H02-test Correlation and Causation (Higher): Test Pack

Question 1

- (a) **B1** Negative cao
- **(a) Answer: Negative correlation**
- (b) **B1** identifies that as hours of sunshine increases, hot chocolate sales decrease, oe
- (b) **B1** correct context, e.g. sunnier afternoons are linked with fewer hot chocolates being sold
- **(b) Answer: As the number of hours of sunshine increases, the number of hot chocolates sold tends to decrease.**
- (c) **B1** a sensible practical use, e.g. to help decide how much hot chocolate stock to prepare based on the weather forecast, oe
- **(c) Answer: It could help her decide how much hot chocolate to prepare based on the weather forecast (less on sunny days).**

Question 2

- (a) **M1** (23-7)/(10-2), oe
- (a) **A1** 2 cao
- **(a) Answer: 2**
- (b) **M1** substitutes gradient and one point to find c, e.g. $7 = 2(2) + c$
- (b) **A1** $y = 2x + 3$ cao
- **(b) Answer: $y = 2x + 3$**
- (c) **B1** £15 cao, ft from (b)
- **(c) Answer: £15**
- (d) **B1** 50 miles is well outside the range of the original data (2 to 10 miles), so this is extrapolation and the linear pattern may not continue, e.g. taxis may charge at a different rate for very long journeys, oe
- **(d) Answer: 50 miles is far outside the 2-10 mile range of the original data, so this is extrapolation - the fare may not keep increasing at the same steady rate for much longer journeys.**

Question 3

- (a) **B1** $Sxy = 1842 - (27)(316)/5 = 135.6$
- (a) **B1** $Sxx = 175 - 27^2/5 = 29.2$
- (a) **B1** $Syy = 20728 - 316^2/5 = 756.8$
- **(a) Answer: Sxy = 135.6, Sxx = 29.2, Syy = 756.8**
- (b) **M1** $r = 135.6 / \sqrt{29.2 * 756.8}$, oe
- (b) **A1** 0.912 (3 sf), ft from (a)
- **(b) Answer: 0.912**
- (c) **B1** identifies a strong positive correlation/association
- (c) **B1** correct context, e.g. pupils who revised for longer tended to get higher test scores, oe
- **(c) Answer: There is a strong positive correlation - pupils who spent longer revising tended to achieve higher test scores.**