Reliability of regression predictions

Grade 9 | Higher | 5 questions, 21 marks

GCSE Statistics topic practice

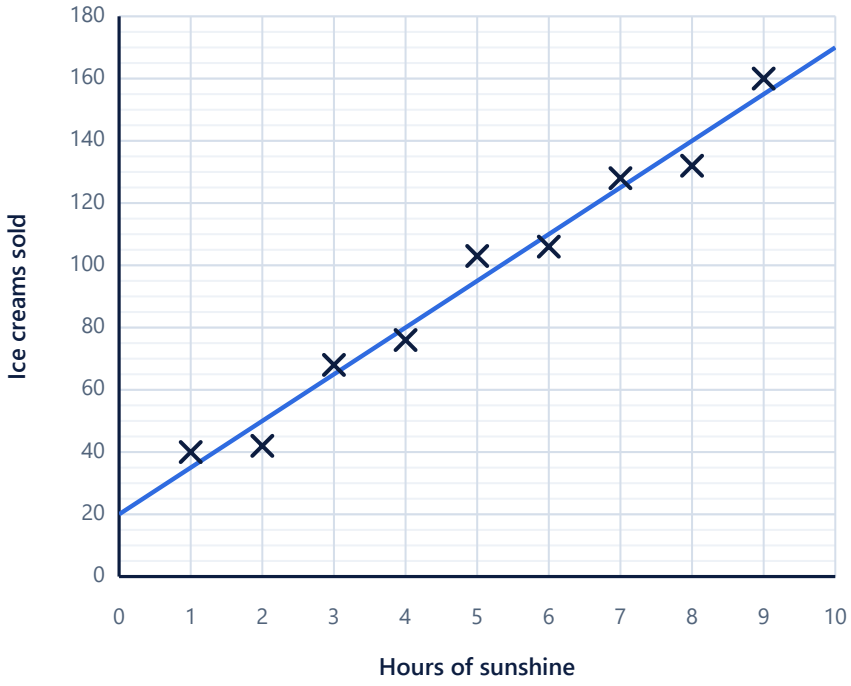
Name: _____ **Date:** _____ **Score:** _____ **/ 21**

1 Elif owns an ice cream van. On each of 9 days she records the number of hours of sunshine, x, and the number of ice creams she sells, y. The scatter diagram shows her data and the regression line.

The equation of the regression line is $y = 20 + 15x$

a. Use the equation to estimate the number of ice creams Elif sells on a day with 6 hours of sunshine. (1)

b. Elif also uses the equation to estimate her sales on a day with 12 hours of sunshine. Which of her two estimates is more reliable? Give a reason for your answer. (2)



(3 marks)

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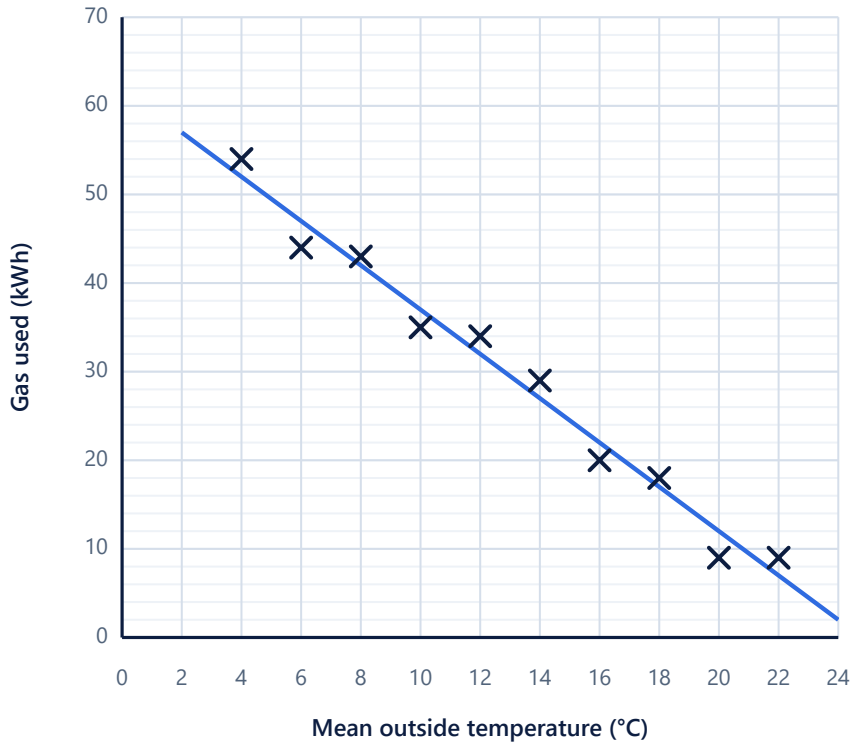
2 Imran records the mean outside temperature, x °C, and the amount of gas used to heat his house, y kWh, on each of 10 days. The scatter diagram shows his data and the regression line.

The equation of the regression line is $y = 62 - 2.5x$

a. Use the equation to estimate the gas used on a day when the mean outside temperature is 15 °C. (1)

b. Interpret the value −2.5 in the equation of the regression line. (1)

c. Imran uses the equation to predict the gas used on a day when the mean outside temperature is 30 °C. Work out his prediction and give two reasons why it is not reliable. (2)



(4 marks)

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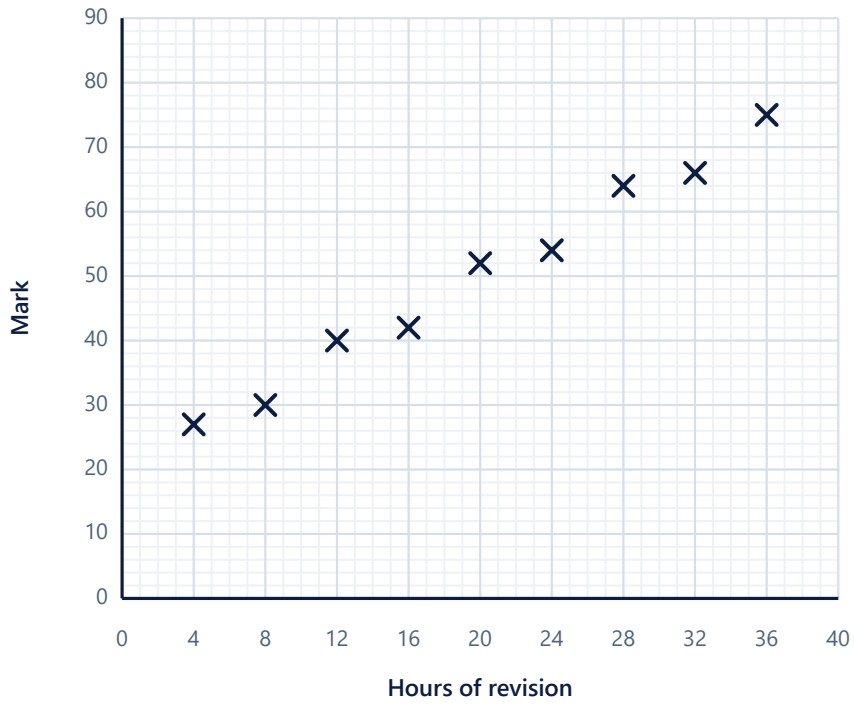
3 A teacher records the number of hours of revision, x, and the mark in a test, y, for each of 9 students. The scatter diagram shows the data. The mean number of hours is 20 and the mean mark is 50.

The equation of the regression line is $y = 20 + 1.5x$

a. Show that the regression line passes through the point of the means. (1)

b. Draw the regression line on the scatter diagram. (2)

c. The teacher uses the regression line to predict the mark of a student who revises for 25 hours. Give two reasons why this prediction is likely to be reliable. (1)



(4 marks)

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4 A sports scientist measures the age, x years, and the reaction time, y milliseconds, of each of 30 adults. The adults are aged from 20 to 60. She finds that the equation of the regression line is $y = 180 + 1.2x$

a. Interpret the value 1.2 in the equation of the regression line. (1)

b. Interpret the value 180 in the equation of the regression line, and explain why this interpretation is not sensible. (2)

c. Use the equation to predict the reaction time of an adult aged 45. (1)

d. Spearman's rank correlation coefficient for the data is 0.35. Comment on the reliability of your prediction in part (c). (1)

(5 marks)

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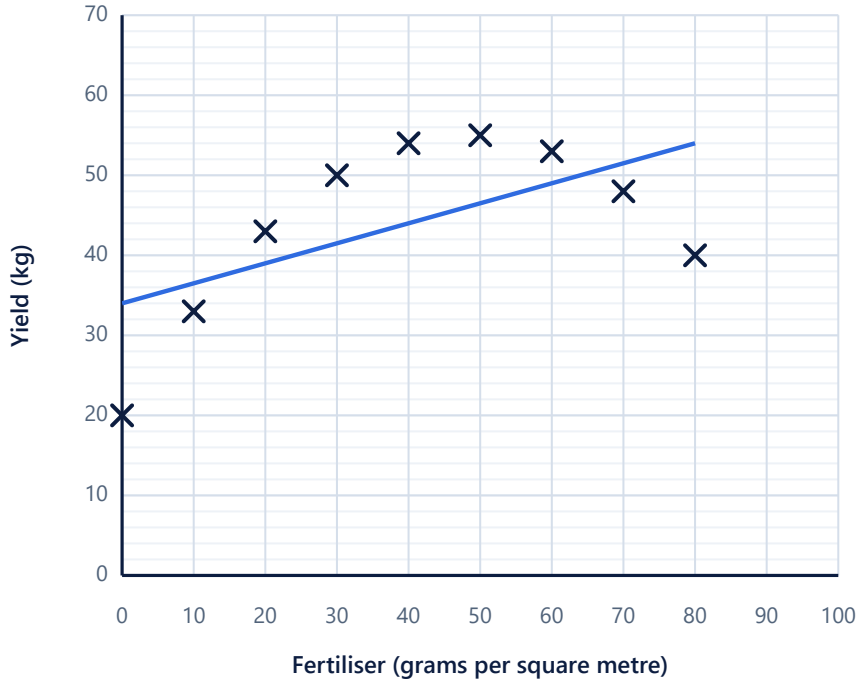
5 A farmer puts different amounts of fertiliser, x grams per square metre, on 9 plots of land and records the yield of wheat, y kg, from each plot. The scatter diagram shows his data and the regression line.

The equation of the regression line is $y = 34 + 0.25x$

a. Use the equation to predict the yield from a plot given 100 grams of fertiliser per square metre. (1)

b. Give two reasons, using the scatter diagram, why this prediction is not reliable. (2)

c. The farmer says, "The regression line shows that the more fertiliser I use, the more wheat I get." Use the scatter diagram to comment on his statement. (2)



(5 marks)

End of questions | Total 21 marks

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