Line of best fit, interpolation and extrapolation

Grade 4 | Worked solutions

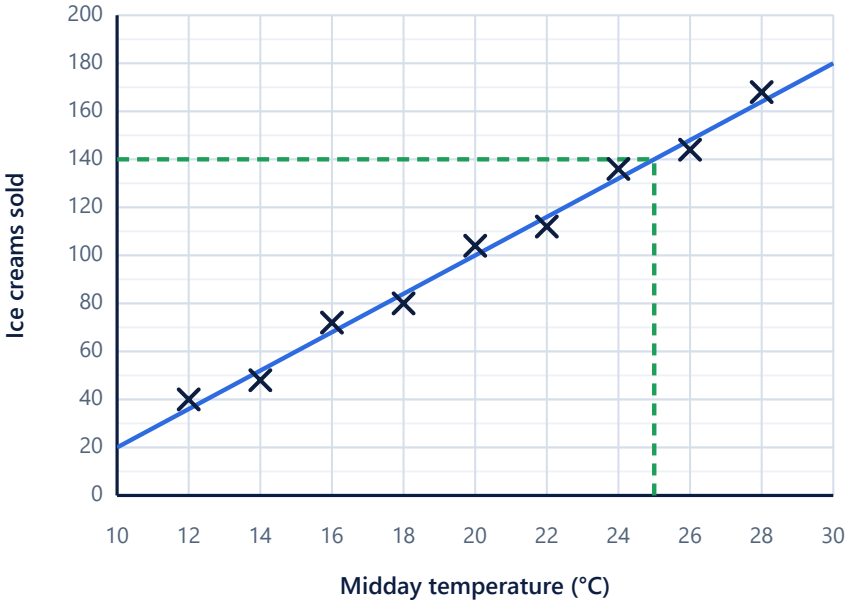
GCSE Statistics topic practice

1 A kiosk sells ice creams. The scatter diagram shows the midday temperature and the number of ice creams sold on each of 9 days. A line of best fit has been drawn.

a. Describe the correlation shown. (1)

b. Use the line of best fit to estimate the number of ice creams sold on a day when the midday temperature is 25°C. (1)

c. Is your answer to part (b) found by interpolation or by extrapolation? Give a reason for your answer. (1)



(3 marks)

a)

Positive. As the temperature goes up, sales go up.

b)

Go up from 25°C to the line, then across.

About 140 ice creams

c)

Interpolation.

25°C is inside the range of the data, 12°C to 28°C.

a) positive b) 140 c) interpolation, inside the data

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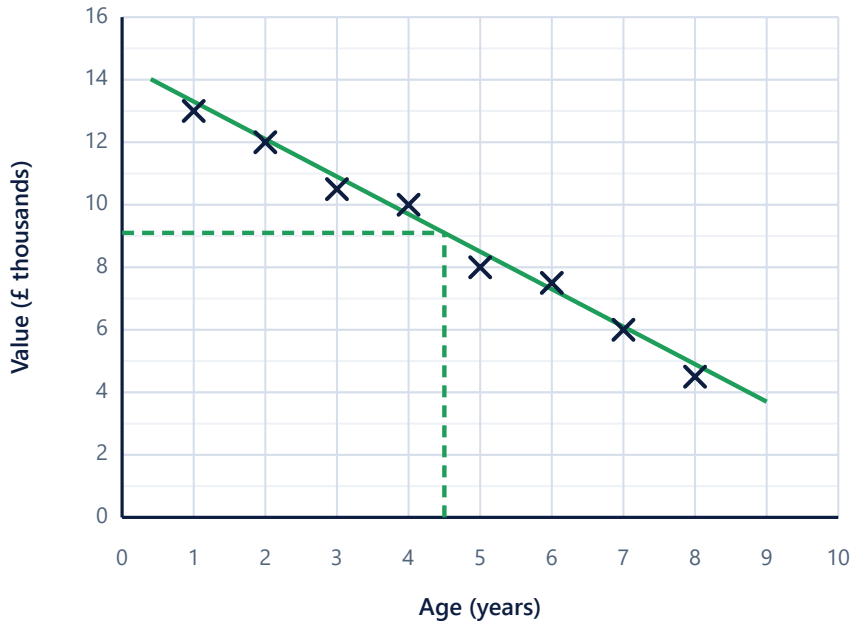
2 A garage sells used cars. The scatter diagram shows the age and the value of 8 cars of the same model.

a. Describe the correlation shown. (1)

b. Draw a line of best fit on the scatter diagram. (1)

c. Use your line to estimate the value of a car of this model that is 4.5 years old. (1)

d. Ravi uses the line of best fit to estimate the value of a car of this model that is 12 years old. Comment on the reliability of his estimate. (1)



(4 marks)

a)

Negative. As the age goes up, the value goes down.

b)

Draw a straight line through the middle of the points.

c)

Go up from 4.5 years to the line, then across.

About 9.1, so about £9100

d)

Not reliable. 12 years is outside the range of the data.

The trend may not continue (extrapolation).

a) negative b) line drawn c) about £9100 d) not reliable

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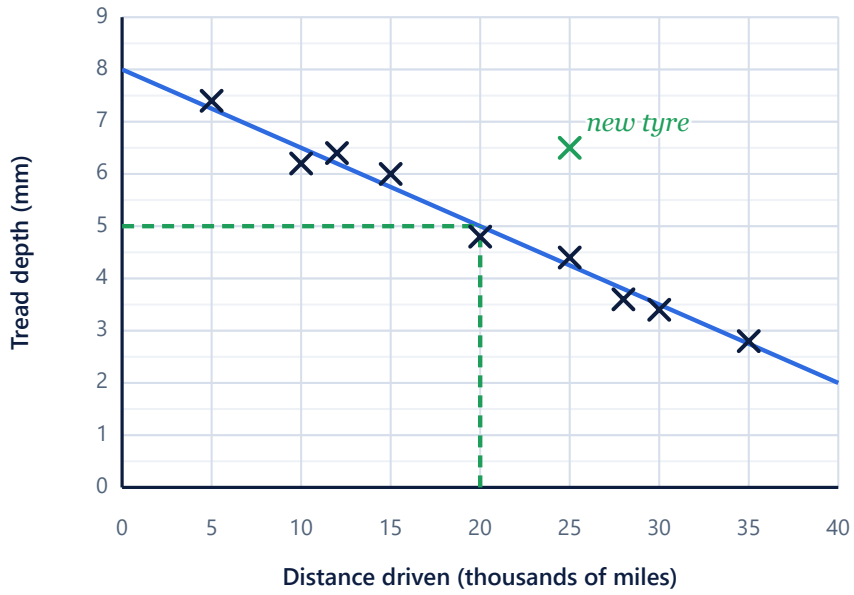
3 A garage records the distance driven and the tread depth of 9 tyres of the same make. The scatter diagram shows the results. A line of best fit has been drawn.

a. Use the line of best fit to estimate the tread depth of a tyre that has been driven 20 thousand miles. (1)

b. Leah extends the line of best fit to estimate the tread depth of a tyre that has been driven 60 thousand miles. She gets −1 mm. Explain why Leah's estimate cannot be correct. (1)

c. Which estimate would be more reliable, one for a tyre driven 20 thousand miles or one for a tyre driven 38 thousand miles? Give a reason for your answer. (1)

d. Another tyre of this make has been driven 25 thousand miles and has a tread depth of 6.5 mm. Compare this tyre with the pattern shown by the other tyres. (1)



(4 marks)

a)

Go up from 20 to the line, then across.

About 5 mm

b)

A tread depth cannot be negative.

60 thousand miles is far outside the data.

c)

The one for 20 thousand miles.

20 is inside the range of the data, 5 to 35

38 is outside the range, so it is extrapolation.

d)

The line gives about 4.3 mm at 25 thousand miles.

6.5 mm is much deeper, so it does not fit the pattern.

a) 5 mm b) cannot be negative c) 20 d) does not fit

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4 The table shows the number of hours that 6 students spent revising and their scores in a test.

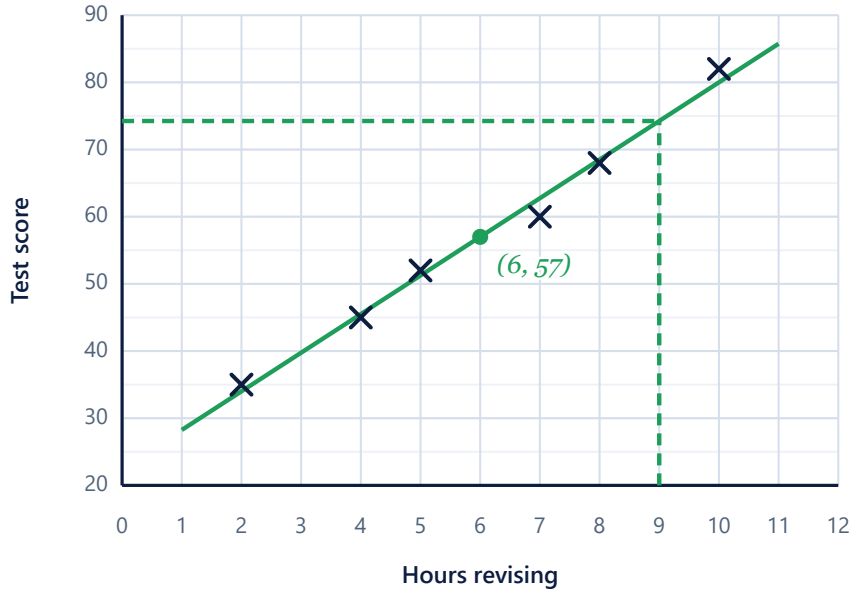
Hours revising	2	4	5	7	8	10
Test score	35	45	52	60	68	82

The 6 points have been plotted on the scatter diagram.

a. Work out the mean number of hours and the mean test score. (2)

b. Plot the mean point on the scatter diagram and draw a line of best fit through it. (1)

c. Use your line to estimate the test score of a student who revises for 9 hours. (1)



(4 marks)

a)

Hours

$2 + 4 + 5 + 7 + 8 + 10 = 36$

$36 \div 6 = 6$

Scores

$35 + 45 + 52 + 60 + 68 + 82 = 342$

$342 \div 6 = 57$

The mean point is (6, 57)

b)

Plot (6, 57)

Draw a straight line through it

that follows the middle of the points.

c)

Go up from 9 hours to the line, then across.

About 74

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a) 6 hours and 57 b) Line through (6, 57) c) about 74

5 A taxi firm records the distance and the fare for each of 10 journeys. The scatter diagram shows the results.

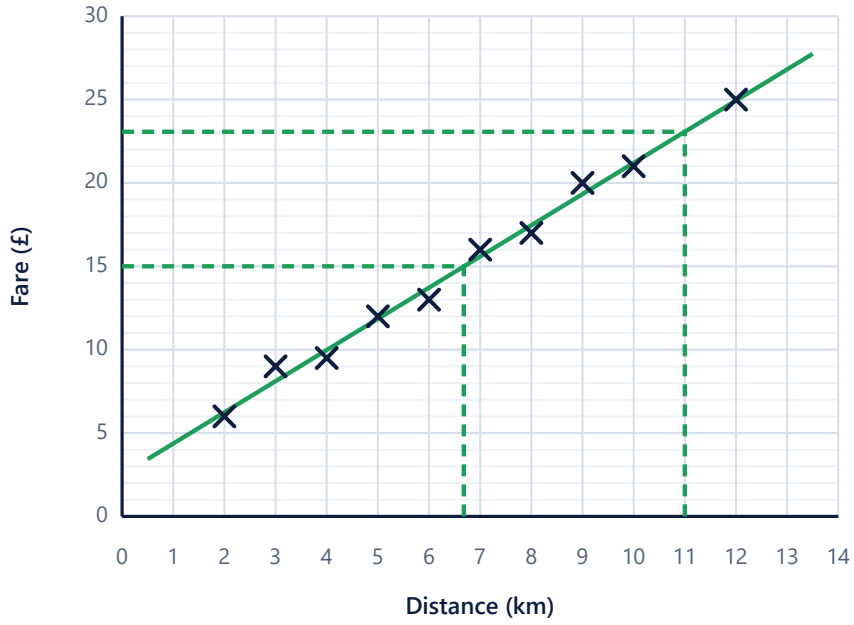
a. Describe the relationship between the distance and the fare. (1)

b. Draw a line of best fit on the scatter diagram. (1)

c. Use your line to estimate the fare for a journey of 11 km. (1)

d. One journey cost £15. Use your line to estimate the distance of this journey. (1)

e. Explain why the line of best fit should not be used to estimate the fare for a journey of 30 km. (1)



(5 marks)

a)

The longer the journey, the higher the fare.

b)

Draw a straight line through the middle of the points.

c)

Go up from 11 km to the line, then across.

About £23

d)

Go across from £15 to the line, then down.

About 6.7 km

e)

30 km is outside the range of the data, 2 km to 12 km.

The pattern may not continue (extrapolation).

a) positive b) line c) £23 d) 6.7 km e) extrapolation

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