

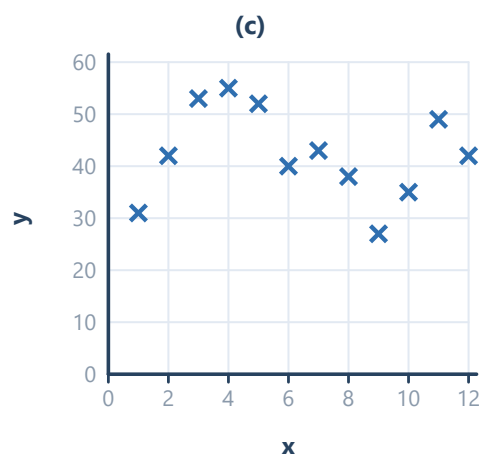
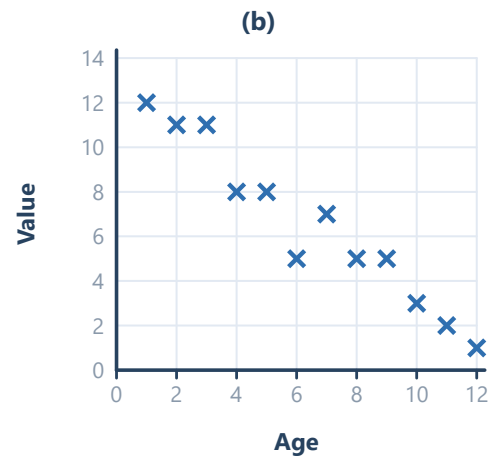
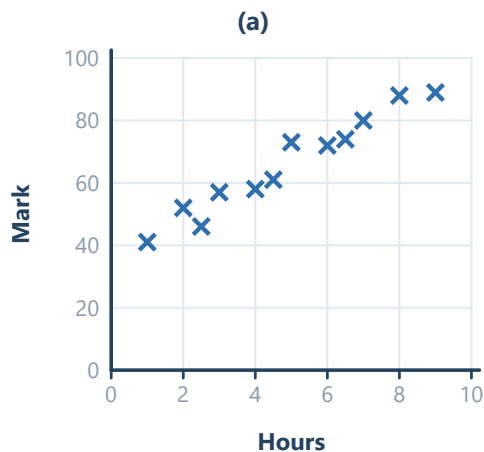
GCSE Maths: Scatter graphs (Higher): answers

GCSE Maths - Statistics - Higher - Lesson 24.10

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch24-statistics/higher/scatter-graphs/

Exercise 24J Scatter graphs Non-calculator

- 1 Describe the correlation shown by each scatter graph. Choose from: positive, negative, no correlation (and say strong or weak where it applies).



(a) Graph (a)

Answer: Strong positive correlation

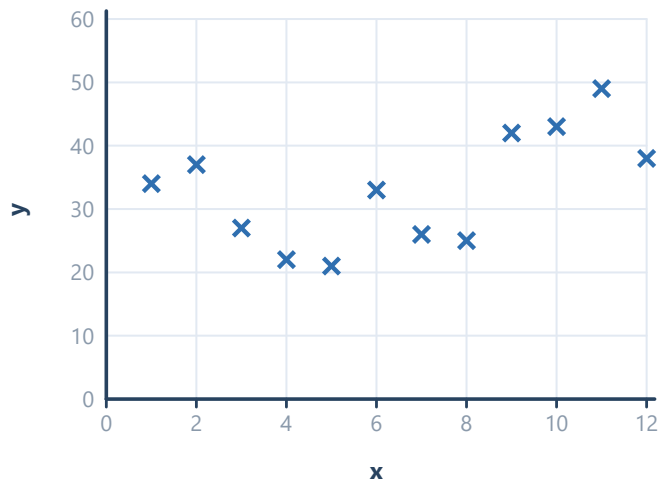
(b) Graph (b)

Answer: Strong negative correlation

(c) Graph (c)

Answer: No correlation

- 2 The scatter graph shows 12 pairs of values. Describe the correlation.



Answer: Weak positive correlation

- 3 The table shows the maths and science marks of eight students.

Maths mark	34	48	55	62	70	75	82	90
Science mark	40	52	50	66	68	80	79	92

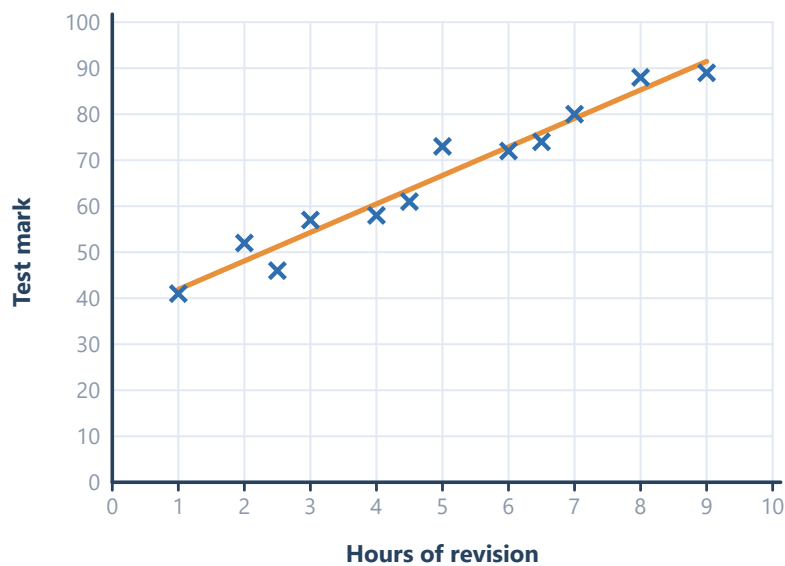
Plot the scatter graph (use axes from 30 to 100) and describe the correlation.

Answer: Strong positive correlation

- 4 Work out the mean point of the data in question 3 (the mean of the maths marks and the mean of the science marks).

Answer: (64.5, 65.875)

- 5 A line of best fit has been drawn on the scatter graph of revision hours and test marks. Use it to estimate (a) the mark for a student who revised for 3 hours, (b) the mark for 7 hours, (c) the number of hours needed to get a mark of 80.



- (a) Mark for 3 hours

Answer: about 54

- (b) Mark for 7 hours

Answer: about 79

- (c) Hours for a mark of 80

Answer: about 7

- 6 The data in question 5 range from 1 to 9 hours. For each estimate, say whether it is interpolation or extrapolation, and whether it is likely to be reliable.

- (a) The mark for 4.5 hours

Answer: Interpolation (inside the range): reliable.

- (b) The mark for 15 hours

Answer: Extrapolation (outside the range): not reliable.

- (c) The mark for 0.5 hours

Answer: Extrapolation (outside the range): not reliable.

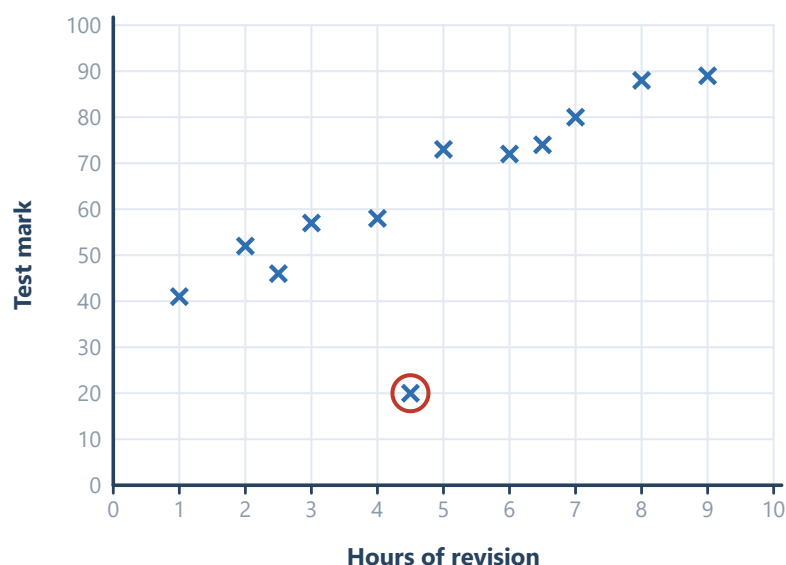
- 7 A scatter graph shows the age and height of children aged 3 to 12 and the line of best fit goes up steeply. Charlie uses the line to say that a 40-year-old will be about 3 m tall. Explain what is wrong.

Answer: He has extrapolated far outside the data. People stop growing in their teens, so the trend does not continue.

- 8 There is a positive correlation between the number of firefighters at a fire and the amount of damage. Does this show that firefighters cause damage? Explain.

Answer: No: bigger fires cause both more damage and more firefighters being sent.

- 9 The scatter graph shows revision hours and test marks. One point is circled. (a) Write down the coordinates of the circled point. (b) Suggest a reason why this student's mark is so different from the pattern. (c) Should it be used to draw the line of best fit?



- (a) Coordinates

Answer: (4.5, 20)

- (b) A reason

Answer: For example: the student was ill on the day, or revised the wrong topics.

(c) Include it?

Answer: No: it is an outlier, so the line should follow the trend of the other points.

- 10 Dan draws a line of best fit by joining the first point on the left to the last point on the right. Explain why this may not be a good line of best fit.

Answer: The line of best fit should follow the trend of all the points, with about equal numbers of points on each side. Joining the end points ignores all the other points.

- 11 A taxi company uses the line $y = 2x + 3$ to estimate the cost, £ y , of a journey of x km. (a) Use the line to estimate the cost of a 6 km journey. (b) Write down what the number 3 and the number 2 mean in this situation.

(a) Cost of 6 km

Answer: £15

(b) Meaning of 3 and 2

Answer: 3 is the fixed charge (£3) and 2 is the cost per km (£2).

- 12 A line of best fit passes through the points (0, 35) and (10, 97). (a) Work out the gradient. (b) Write the equation of the line in the form $y = mx + c$. (c) Use it to estimate y when $x = 7.5$.

(a) Gradient

Answer: 6.2

(b) Equation

Answer: $y = 6.2x + 35$

(c) Estimate at $x = 7.5$

Answer: 81.5

- 13 The equation of a line of best fit is $y = 6x + 20$, where x is the number of hours of practice per week and y is the score in a game. Explain what the gradient 6 tells you, and say why the line may not be sensible for $x = 30$.

Answer: Each extra hour of practice adds about 6 points. At 30 hours the line gives 200, which may be impossible (scores have a maximum, and nobody practises that much).

- 14 Two scatter graphs show different data. In graph A the points lie very close to a straight line sloping down. In graph B the points are widely scattered but slope slightly downwards. Which graph shows stronger correlation? What type of correlation is each?

Answer: Graph A is stronger; both are negative.

- 15 The mean point of a set of data is (6, 40). A student draws a line of best fit with equation $y = 3x + 22$. Show that the line passes through the mean point, and use it to estimate y when $x = 8$.

Answer: Passes through (6, 40); $y = 46$