# Scatter Graphs and Correlation

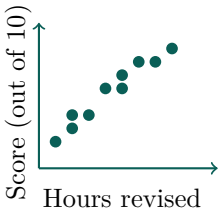
GCSE Mathematics • **Foundation Tier** • Grades 3–5 • Non-calculator

**WORKED SOLUTIONS**

Name: worked example Class: _____ Total: 43 / 43

*Show all your working. Marks are given for correct method as well as the final answer.*

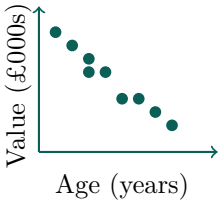
**1.** Describe the correlation shown by this scatter graph. **[1 mark]**




as hours go up, score goes up

**Answer:** positive

**2.** Describe the correlation shown by this scatter graph. **[1 mark]**




as age goes up, value goes down

**Answer:** negative

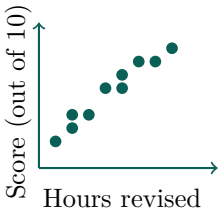
**3.** Describe the correlation shown by this scatter graph. **[1 mark]**




the points are scattered with no pattern

**Answer:** none

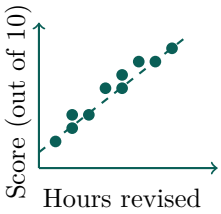
**4.** Write down what the revision graph suggests about revising and scoring well. **[1 mark]**




describe it IN CONTEXT, not just positive

**Answer:** more revision tends to mean a higher score

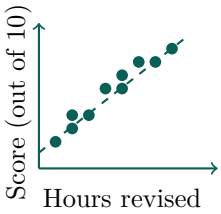
**5.** A line of best fit has been drawn. Use it to estimate the score for 4 hours of revision. **[2 marks]**




go up from 4 to the line, then across

**Answer:** about 5--6

**6.** Use the line of best fit to estimate the hours revised by someone scoring 8. **[2 marks]**




go across from 8 to the line, then down

**Answer:** about 6--7

**7.** Explain why the line of best fit should not be used to estimate the score for 20 hours of revision. **[2 marks]**




this is EXTRAPOLATION
the pattern may not continue
and the score cannot exceed 10 anyway

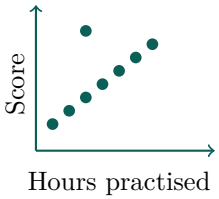
**Answer:** 20 is outside the data, so it is unreliable

**8.** Write down two rules for drawing a good line of best fit. **[2 marks]**

*a straight line, not through every point*
*it does NOT have to pass through the origin*

**Answer:** ____ *follow the trend; roughly equal points each side* ____

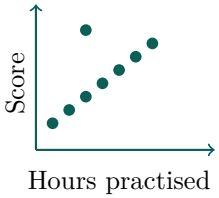
**9.** One point on this graph does not fit the pattern. Write down its coordinates. **[2 marks]**




*every other point follows a straight trend*
*(3, 9) sits well above it*

**Answer:** _____ *(3, 9)* _____

**10.** Explain what should be done with that point when drawing a line of best fit. **[2 marks]**




*an outlier would drag the line away from the trend*

**Answer:** _____ *ignore it* _____

**11.** A student says *bigger feet cause higher test scores*. Use the shoe-size graph to explain why this is wrong. **[2 marks]**




*the points show no pattern*
*so there is no evidence of any link*

**Answer:** ____ *there is no correlation at all* ____

**12.** Ice-cream sales and drowning numbers both rise in summer. Explain why this does not mean ice cream causes drowning. **[2 marks]**

*hot weather explains BOTH*
*a third factor is the usual culprit*

**Answer:** ____ *correlation is not causation* ____

**13.** Write down the type of correlation you would expect between the temperature and the number of coats sold. **[1 mark]**

hotter weather, fewer coats

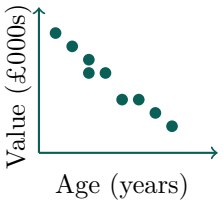
**Answer:** negative

**14.** Write down the type of correlation you would expect between the height and the arm span of a person. **[1 mark]**

taller people tend to have longer arms

**Answer:** positive

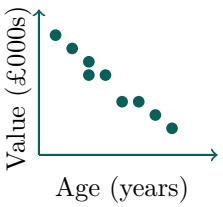
**15.** Use the car graph to estimate the value of a car that is 5 years old. **[2 marks]**




read up from 5 on the age axis

**Answer:** about £4000--5000

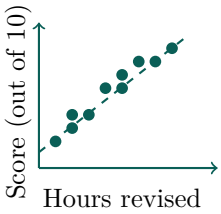
**16.** Explain why the car graph cannot sensibly predict the value of a 30-year-old car. **[2 marks]**




extrapolation
a classic car might even go UP in value

**Answer:** 30 is far outside the data

**17.** The line of best fit on the revision graph passes through $(0, 1)$ and $(8, 9)$.




**(a)** Work out its gradient. **[3 marks]**

gradient = change in y ÷ change in x
(9 − 1) ÷ (8 − 0)
= 1

**(b)** Explain what the gradient means in context. **[2 marks]**

each extra hour of revision
gives about 1 more mark

**Answer:** gradient 1 ; about 1 extra mark per hour

**18.** A scatter graph of 12 plants shows water given against height grown.

**(a)** Write down what positive correlation would mean here. **[2 marks]**

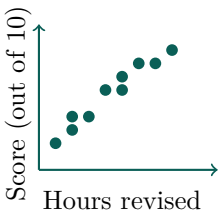
more water tends to mean taller plants

**(b)** Explain why very heavy watering might break that pattern. **[2 marks]**

too much water can drown the roots
a real trend often stops holding at the extremes

**Answer:** more water, taller plants ; too much water harms them

**19.** Two students draw different lines of best fit on the same scatter graph.




**(a)** Explain why their estimates can differ. **[2 marks]**

a line of best fit is drawn BY EYE
so no two are identical

**(b)** Write down which estimate is more reliable: one inside the data or one outside it. **[2 marks]**

inside the data (interpolation)
the trend is known to hold there

**Answer:** drawn by eye ; the one inside the data

**20.** The table shows six pupils' hours of sleep and their reaction times. The correlation is negative.

**(a)** Write down what negative correlation means here. **[2 marks]**

more sleep tends to mean a FASTER reaction
so a lower time

**(b)** A seventh pupil sleeps 9 hours. Explain whether you can be sure of their reaction time. **[2 marks]**

no -- correlation is a trend, not a rule
individuals vary

**Answer:** more sleep, lower times ; no, it is only a trend

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