



1 Write down the type of correlation you would expect to see in a scatter graph of each of the following.

- The daily temperature and the number of ice creams sold at a kiosk.
- The age of a car and its value.

(2 marks)

As temperature rises, more ice creams are sold, so positive correlation

As a car gets older, its value falls, so negative correlation

2 The table shows the age and the value of six second-hand cars of the same model.

Age (years)	1	2	3	5	6	8
Value (£1000s)	12	10.5	9	7	6	3.5

A scatter graph is drawn of value against age. Describe the type of correlation.

(1 mark)

Age up, value down

Negative correlation

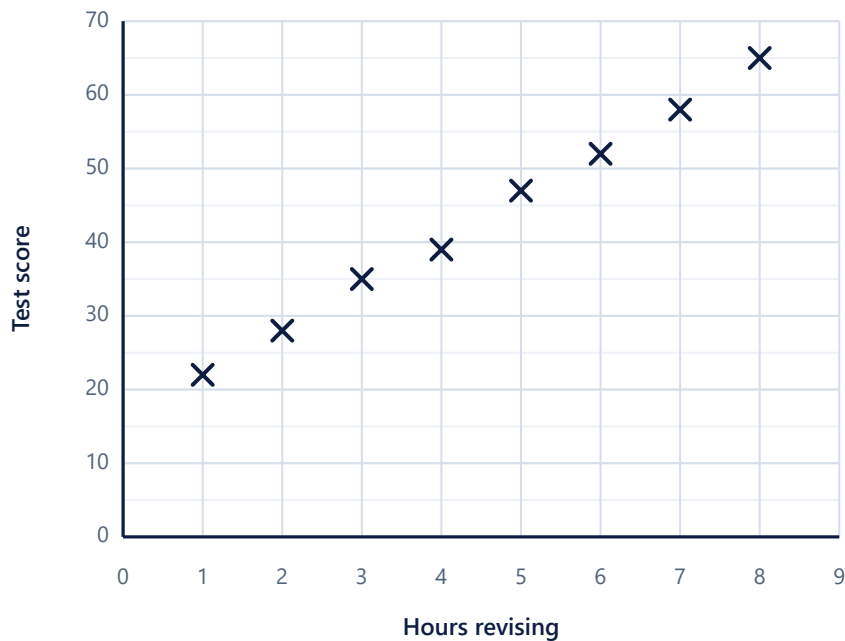
3

The table shows the number of hours that each of 8 students spent revising, and their scores in a test.

Hours revising	1	2	3	4	5	6	7	8
Test score	22	28	35	39	47	52	58	65

The data is plotted on a scatter graph.

- Describe the type of correlation the scatter graph would show.
- Interpret this correlation for these students.



(2 marks)

As the hours increase from 1 to 8, the scores rise steadily from 22 to 65, so the correlation is positive

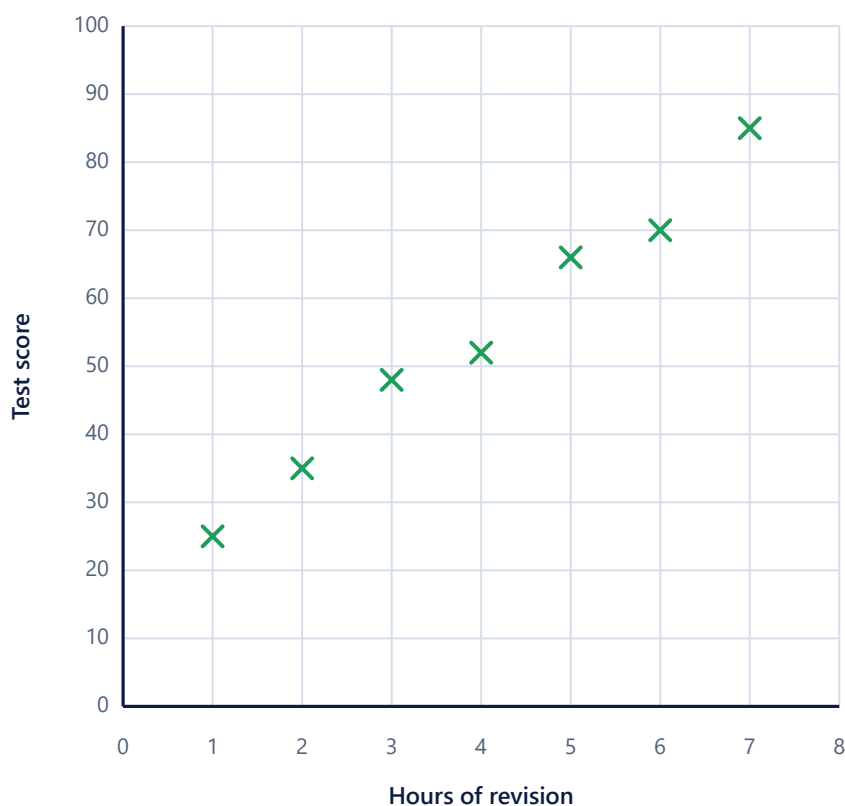
In context, more revision time is associated with a higher test score

4

The table shows the hours seven students spent revising and their test scores.

Hours	1	2	3	4	5	6	7
Score	25	35	48	52	66	70	85

On the grid, plot these points to make a scatter graph.



(2 marks)

$(1, 25)$ $(2, 35)$ $(3, 48)$

$(4, 52)$ $(5, 66)$

$(6, 70)$ $(7, 85)$

5

The table shows the hours of sunshine and the number of ice creams a kiosk sold on seven days.

Hours of sunshine	2	3	4	5	6	7	8
Ice creams sold	30	42	50	22	71	80	92

a. One day does not fit the pattern. Write down the hours of sunshine and the ice creams sold on that day.

b. Ignoring that day, describe the correlation.

(2 marks)

a)

Others rise steadily; 5 hours should be about 60

Outlier: $(5, 22)$

b)

More sunshine, more sales

a) $(5, 22)$ b) positive

6 A garage records the engine size, in litres, and the top speed of a number of cars. The engine sizes range from 1.0 litres to 2.5 litres. A scatter graph of the data shows strong positive correlation and a line of best fit has been drawn.

- Priya uses the line of best fit to estimate the top speed of a car with a 4.5 litre engine. Explain why her estimate may not be reliable.
- Dev says, "The graph proves that a bigger engine causes a higher top speed." Give one reason why Dev may be wrong.

(2 marks)

The data only covers engine sizes from 1.0 to 2.5 litres, so using the line at 4.5 litres assumes the trend continues outside the data range, which may not be true
A correlation between two variables does not prove that one causes the other; a third factor may be involved

7 A scatter graph of children aged 5 to 11 shows positive correlation between shoe size and score on a reading test.

Sam says, "Bigger feet make you better at reading." Explain why Sam is wrong.

(2 marks)

Correlation does not mean cause

Older children: bigger feet

Older children: better reading

Age explains both

8 The table shows the midday temperature and the number of hot chocolates a café sold on seven days.

Temperature (°C)	2	5	8	11	14	17	20
Hot chocolates	64	55	46	60	28	19	10

The line of best fit has equation $y = 70 - 3x$, where x is the temperature and y is the number of hot chocolates.

- Write down the outlier.
- Describe the correlation.
- Use the line of best fit to estimate the number sold when the temperature is 10°C .

(3 marks)

a)

Expected about 37 at 11°C , but 60

Outlier (11, 60)

b)

Temperature up, sales down

c)

$$y = 70 - 3 \times 10$$

$$= 40$$

a) (11, 60) b) negative c) 40

- 9 A line of best fit on a scatter graph passes through the points (2, 10) and (8, 34).

Use the line to estimate the value of y when $x = 5$.

(2 marks)

5 is halfway between 2 and 8

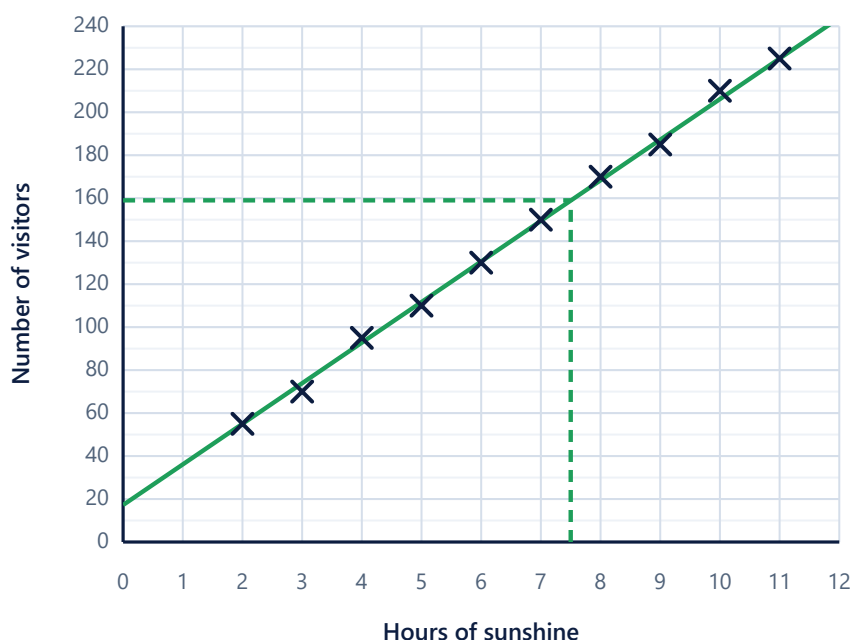
$$y = (10 + 34) \div 2$$

$$= 22$$

22

- 10 The scatter graph shows the number of hours of sunshine and the number of visitors to a country park on each of 10 days.

- Describe the correlation shown by the scatter graph.
- On another day there were 7.5 hours of sunshine. By drawing a line of best fit, estimate the number of visitors to the park on this day.



(3 marks)

The points rise from bottom left to top right, so the correlation is positive

Draw a line of best fit through the middle of the points

Reading up from 7.5 hours to the line and across gives roughly 160 visitors (any value from 150 to 175 with a sensible line)

11

A shop records the temperature (from 12°C to 28°C) and the number of cold drinks sold each day. The line of best fit has equation $y = 4x + 10$, where x is the temperature in $^{\circ}\text{C}$ and y is the number of drinks.

- Estimate the number of drinks sold when the temperature is 20°C .
- Write down what the gradient of 4 tells you.
- Kim uses the line to predict sales on a day when the temperature is 40°C . Explain why her prediction may not be reliable.

(4 marks)

a)

$$y = 4 \times 20 + 10$$
$$= 90$$

b)

4 more drinks for each 1°C

c)

Data only goes up to 28°C

40°C is extrapolation: may not continue

a) 90 b) 4 more per 1°C c) extrapolation

12

The table shows the maths score and the science score of 8 students.

Maths score	10	20	25	30	35	40	45	50
Science score	18	26	32	38	40	44	50	54

The first six points have been plotted on the scatter graph.

- Complete the scatter graph by plotting the last two points.
- Describe the correlation between the maths scores and the science scores.
- Interpret this correlation.



(3 marks)

Plot (45, 50) and (50, 54) on the grid

The points rise from bottom left to top right, so the correlation is positive

In context, students who do well in maths also tend to do well in science

13

A factory records the age, in years, and the weekly maintenance cost, in pounds, of its machines. A scatter graph of the data is drawn and a line of best fit passes through the points (1, 20) and (9, 60).

- What type of correlation does the graph show?
- Use the line of best fit to find an estimate for the weekly maintenance cost of a machine that is 5 years old.

(3 marks)

Cost rises as age rises, so the correlation is positive

The line rises by $60 - 20 = 40$ pounds over $9 - 1 = 8$ years, which is £5 per year

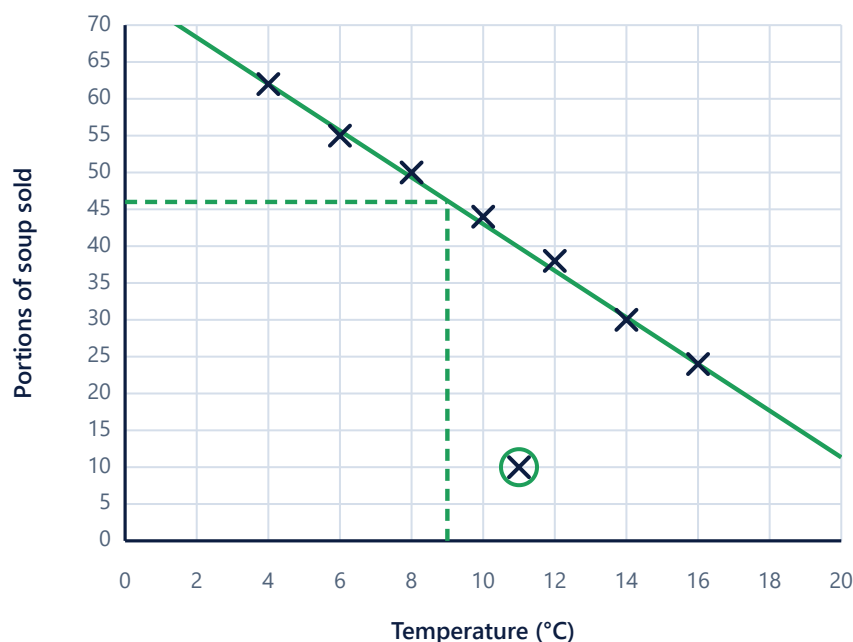
At 5 years

$$20 + (5 - 1) \times 5 = 20 + 20 = £40$$

14

The scatter graph shows the outside temperature, in $^{\circ}\text{C}$, and the number of portions of soup sold by a cafe on each of 8 days.

- One of the points is an outlier. Write down the coordinates of this point.
- Ignoring the outlier, use the graph to estimate the number of portions of soup sold on a day when the outside temperature is 9°C .



(3 marks)

The general trend is negative, with points falling steadily as temperature rises; the point (11, 10) lies far below this trend, so it is the outlier

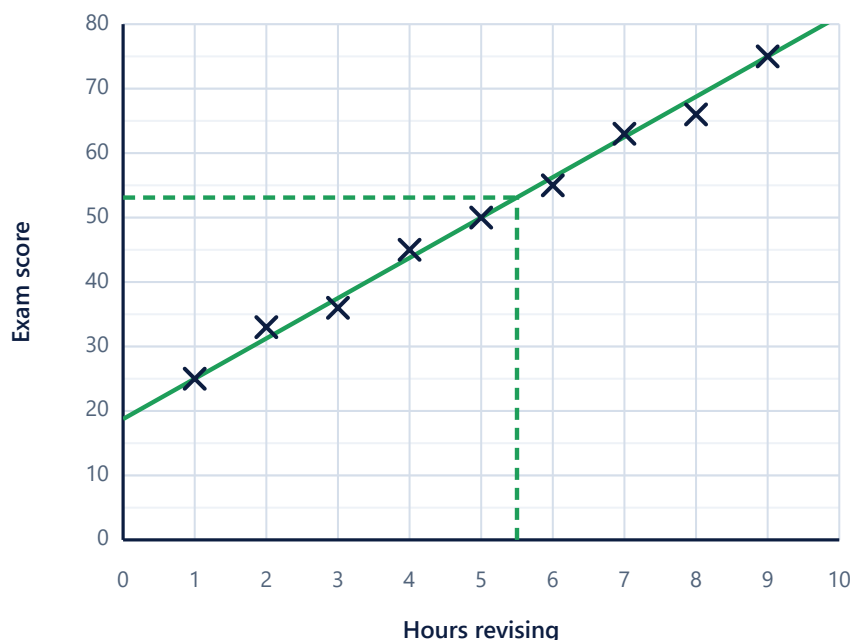
Draw a line of best fit through the remaining points

Reading from 9°C to the line gives roughly 47 portions (accept 44 to 50)

15

The scatter graph shows the number of hours each of 9 students spent revising and their scores in an exam marked out of 80.

- Write down the type of correlation shown.
- Draw a line of best fit on the scatter graph.
- Use your line of best fit to estimate the exam score of a student who revised for 5.5 hours.
- Amir revised for 20 hours. Explain why the line of best fit should not be used to estimate his score.



(4 marks)

The points rise together, so the correlation is positive

Draw a straight line through the middle of the points, following the trend

Reading from 5.5 hours to the line gives roughly 53 marks (accept 49 to 57)

The data only goes up to 9 hours of revision, so using the line at 20 hours is extrapolation and may give a score that is impossible (over 80) or simply wrong