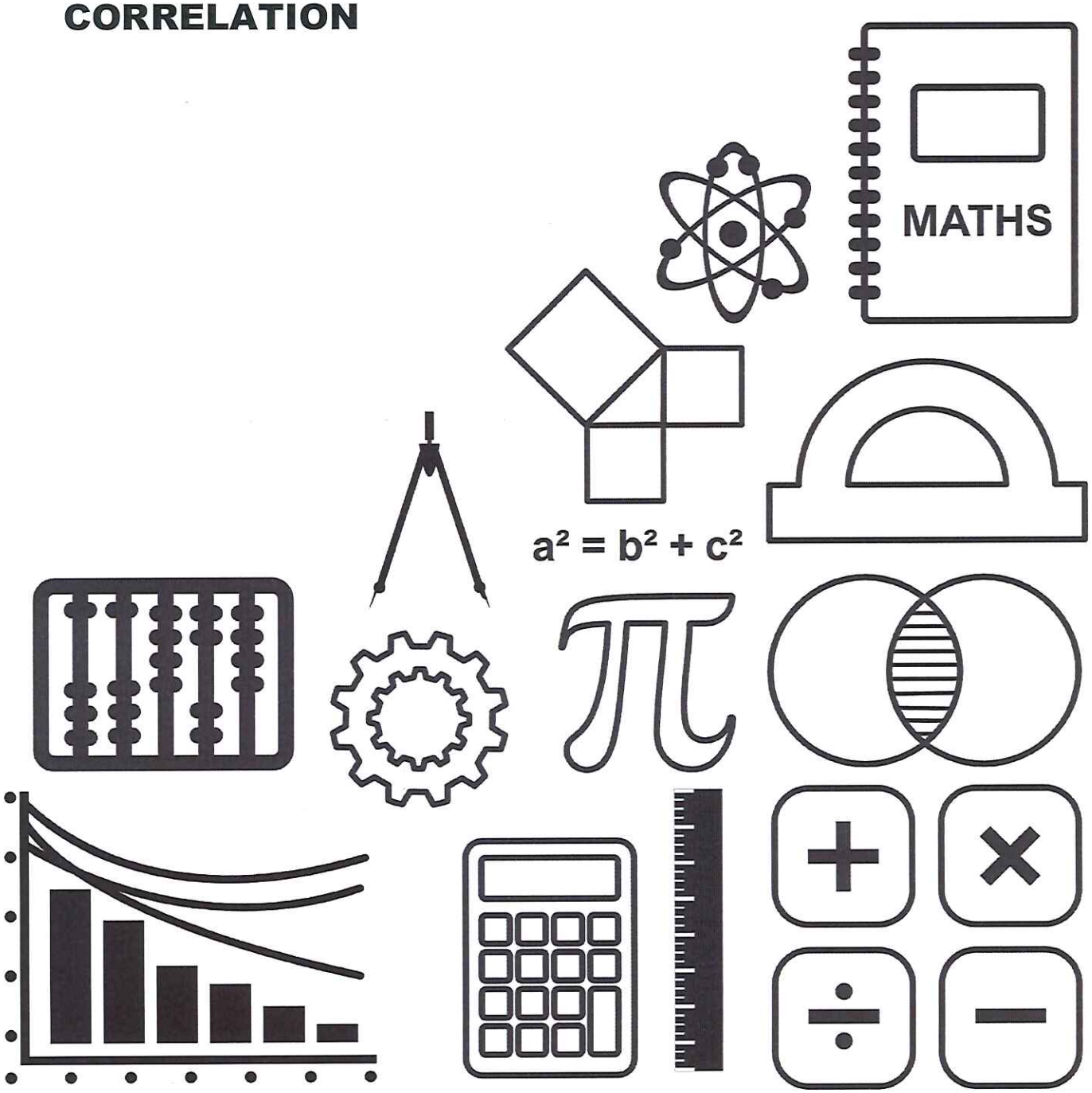
MATHSDIY

GCSE TOPIC BOOKLET
CORRELATION

SOLUTIONS

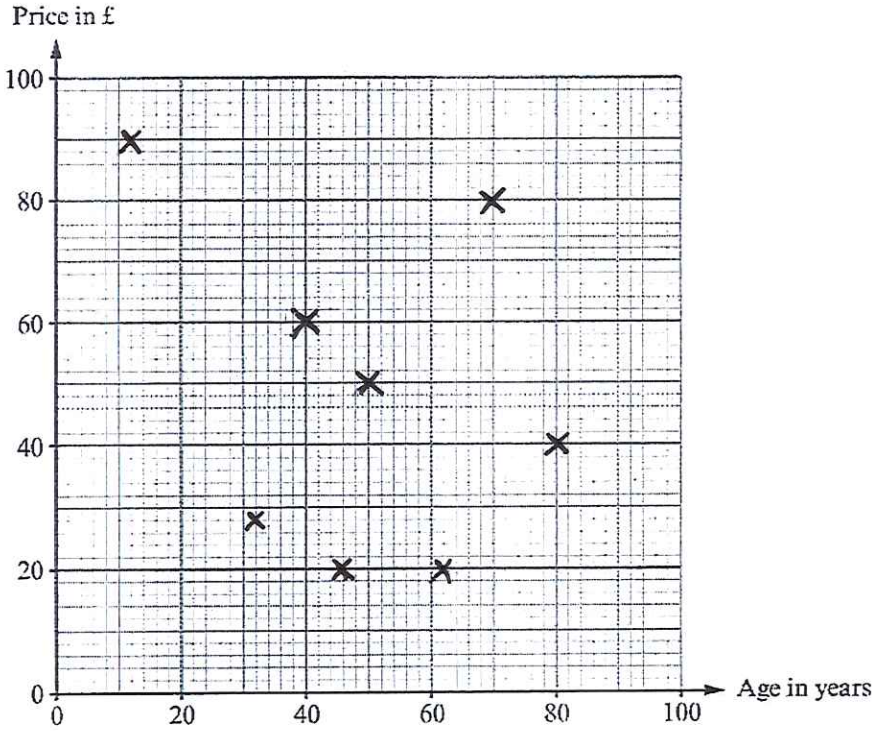


1. The age and price of each of 8 clocks in an antique shop are recorded in the table.

Age in years	12	40	70	50	46	80	62	32
Price in £	90	60	80	50	20	40	20	28

(a) Draw a scatter diagram to display these ages and prices.

[2]



(b) Write down the price of the oldest clock.

Price £ 40

[1]

(c) Does the scatter diagram indicate that there is a correlation between the age and price of the clocks? You must give a reason for your answer.

No, the points are scattered.

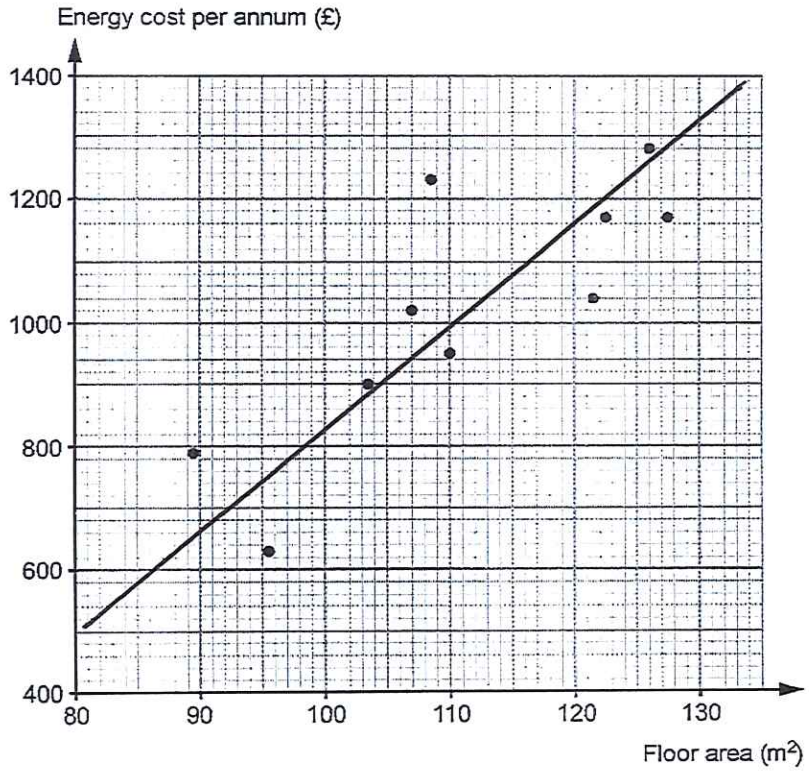
or not clustered around a line

[1]

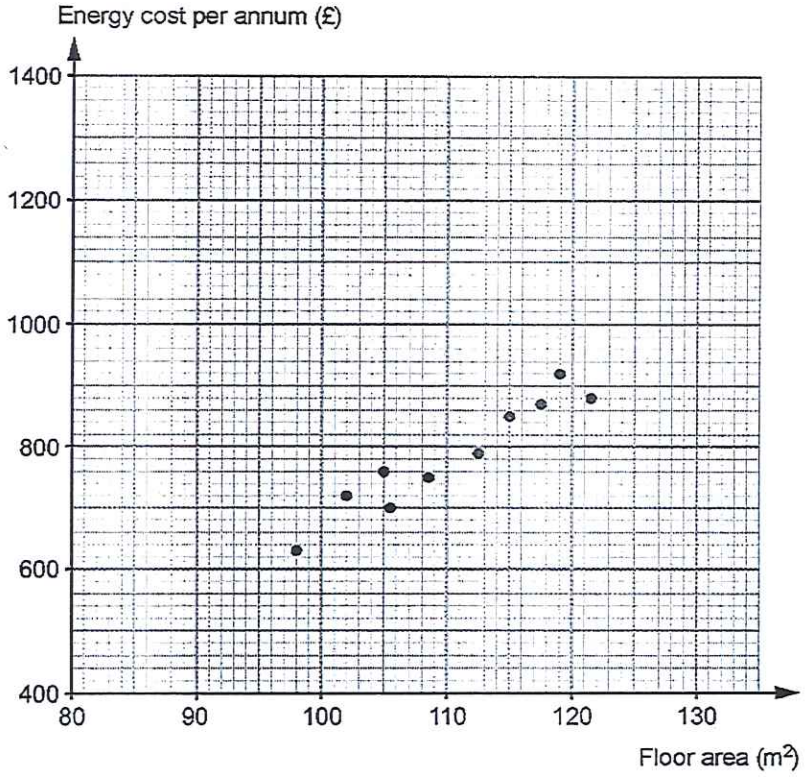
2. Rowena and Wilf each collected information about the floor area of a number of flats in different villages and the related energy cost per annum.

They each displayed their information in a scatter diagram.

Rowena's scatter diagram



Wilf's scatter diagram



(a) By considering the information collected by both Rowena and Wilf, what is the floor area of the flat with the highest energy cost? [1]

126 m²

(b) Who drew the scatter diagram showing the strongest correlation?

Rowena ☐ Wilf ☑

You must give a reason for your answer. [1]

Wilf's data points are close together
or Rowena's points are more spread out.

(c) Draw, by eye, a line of best fit on Rowena's scatter diagram. [1]

(d) *Heat-in* is a company that installs insulation.
Heat-in makes the following claim.

> Make huge savings on your heating bills by insulating your flat.

Heat-in has insulated the flats in only one of these villages.
One of the scatter diagrams shows flats that have been insulated by *Heat-in*.

(i) Whose scatter diagram is this more likely to be?
You must give a reason for your answer. [1]

Wilf's as costs are lower.

or Wilf's because for the same area the heating costs are much lower.

(ii) A newspaper headline says:

> The smaller your flat, the more you save by insulating it.

From the information in the scatter diagrams, would you suggest this headline is possibly true or not?
You must give a reason for your answer. [1]

- Not true, larger flats save more

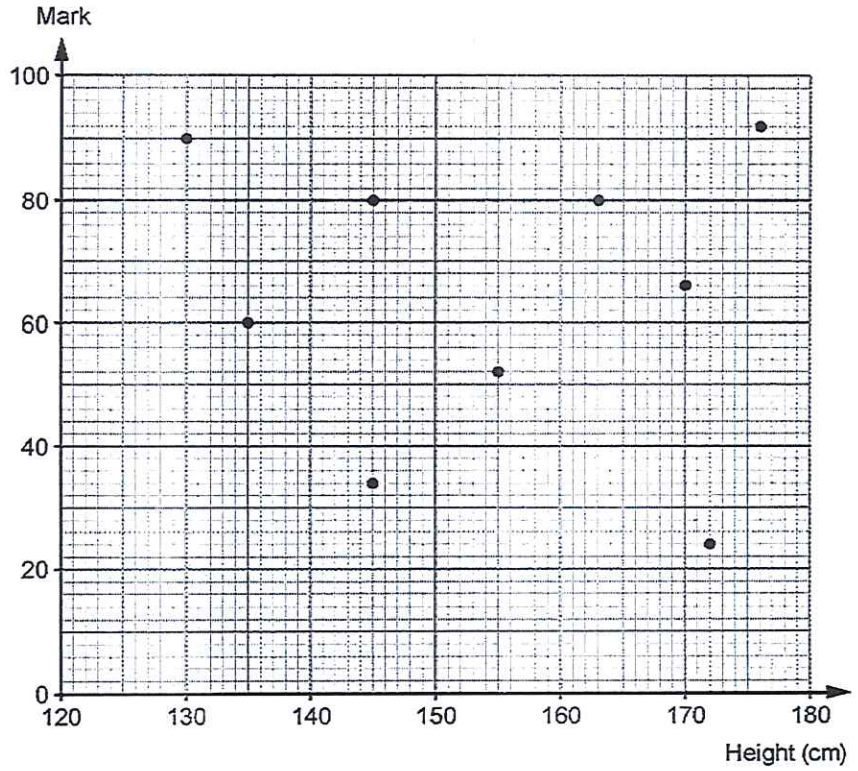
or

- Not necessarily true as costs fall more for larger flats

or

- Not necessarily true as the smallest flat in both have roughly the same cost.

3. A number of students took an examination.
The heights of these students and the mark they each scored is shown in the scatter diagram below.



(a) Describe the correlation shown by the scatter diagram. [1]

No correlation (no relationship) (none)

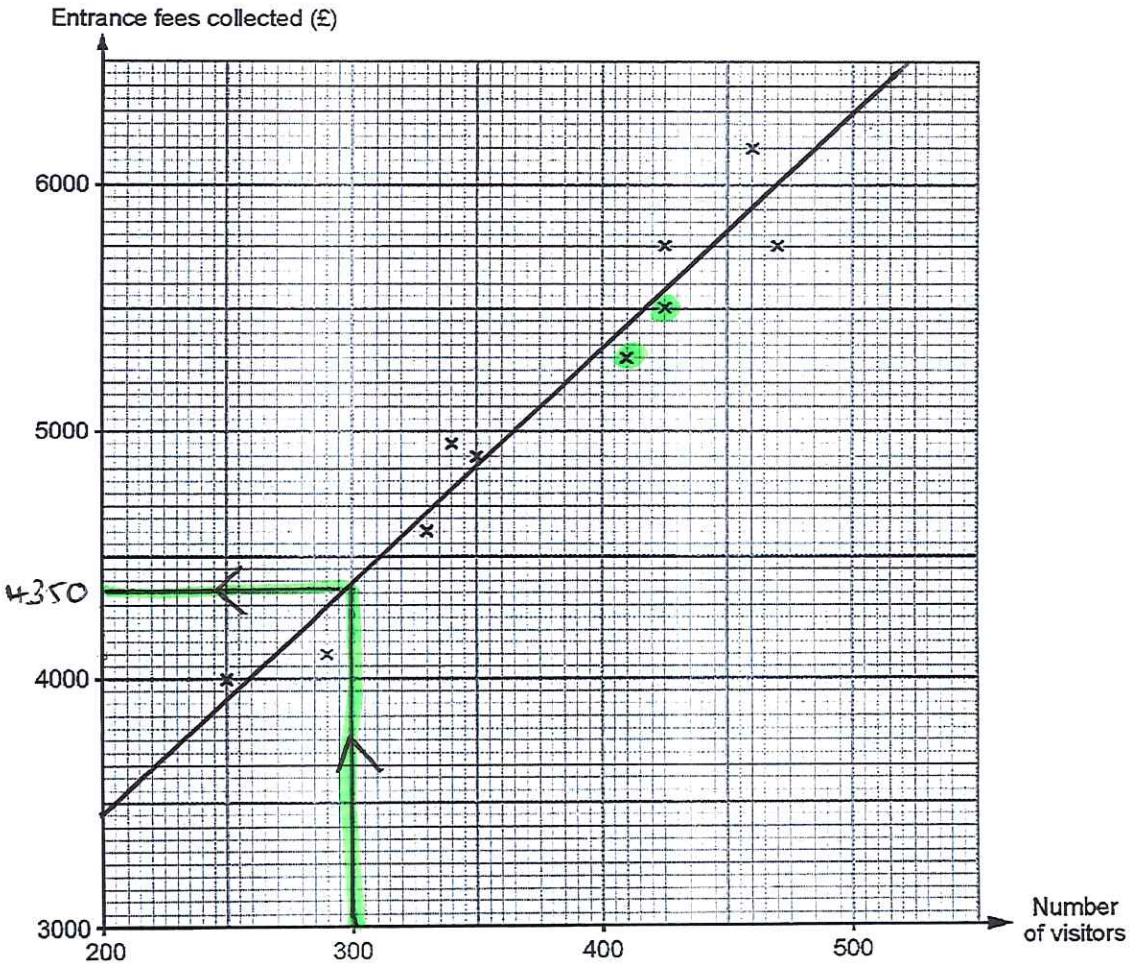
(b) Charlotte scored the same mark as Dewi.
Charlotte is taller than Dewi.
Henri is the tallest student in the class.
Dewi and Gareth are both the same height.

Complete the table. [3]

Name	Height (cm)	Mark
Dewi	145	80
Charlotte	163	80
Henri	176	92
Gareth	145	34

4.

A theme park manager records the number of visitors to the park and the entrance fees collected.
He does this every day for 10 days.
The scatter diagram below shows this data.



(a) Use the scatter diagram to complete the manager's table of the data. [2]

Number of visitors	250	460	470	340	290	330	425	350	410	425
Entrance fees collected (£)	4000	6150	5750	4950	4100	4600	5750	4900	5300	5500

(b) Describe the relationship between the number of visitors to the theme park and the entrance fees collected. [1]

Positive Correlation

o/ As the number of visitors increases, the entrance fee collected increases

(c) Draw a line of best fit, by eye, on the scatter diagram. [1]

(d) Estimate the entrance fees that would be collected on a day when 300 visitors came to the park. [1]

£4350

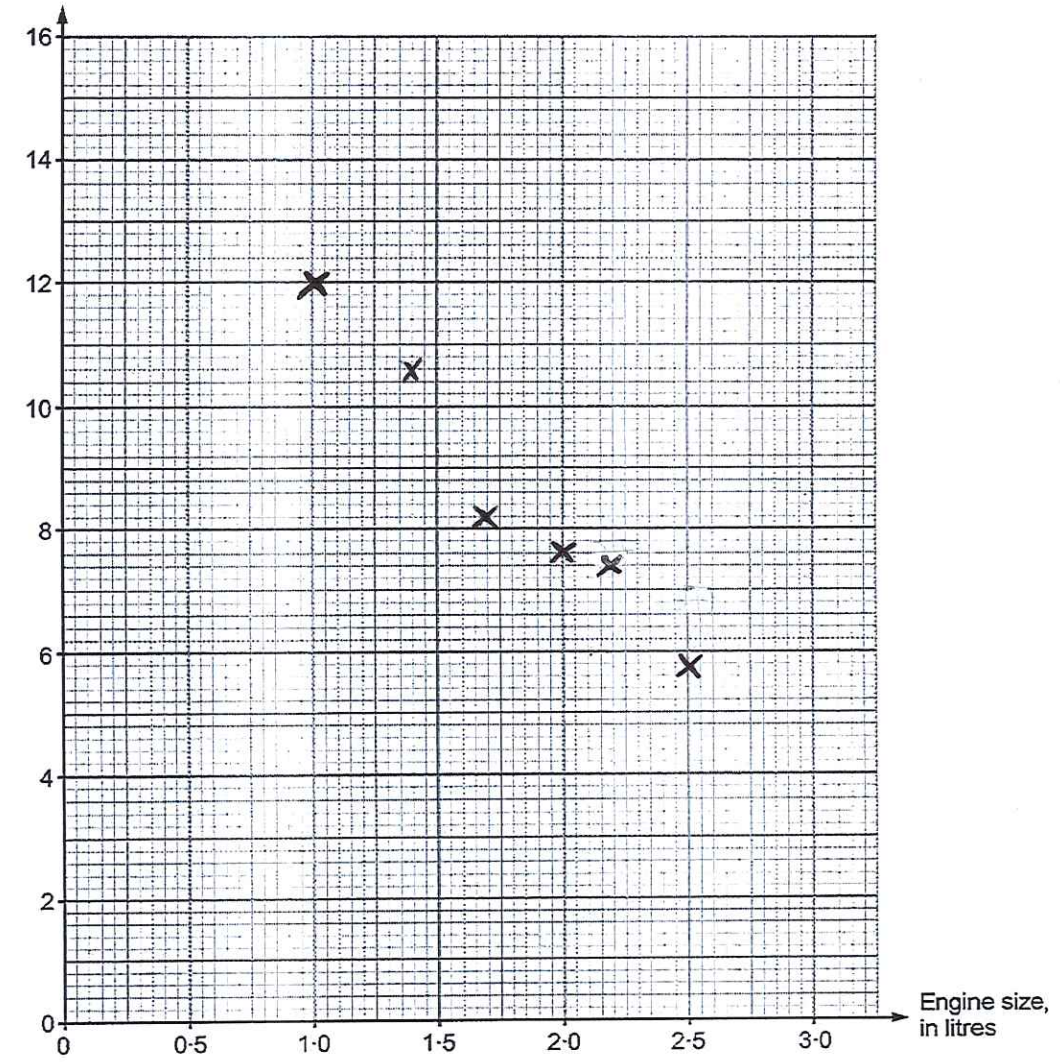
according to my line of best fit.
Yours might be slightly different.

5.

The table shows the engine sizes of six cars and the distance they each travel per litre of petrol.

Engine size, in litres	1·0	2·2	1·4	2·0	2·5	1·7
Distance travelled per litre, in km	12·0	7·4	10·6	7·6	5·8	8·2

(a) Draw a scatter diagram to display this data. [2]



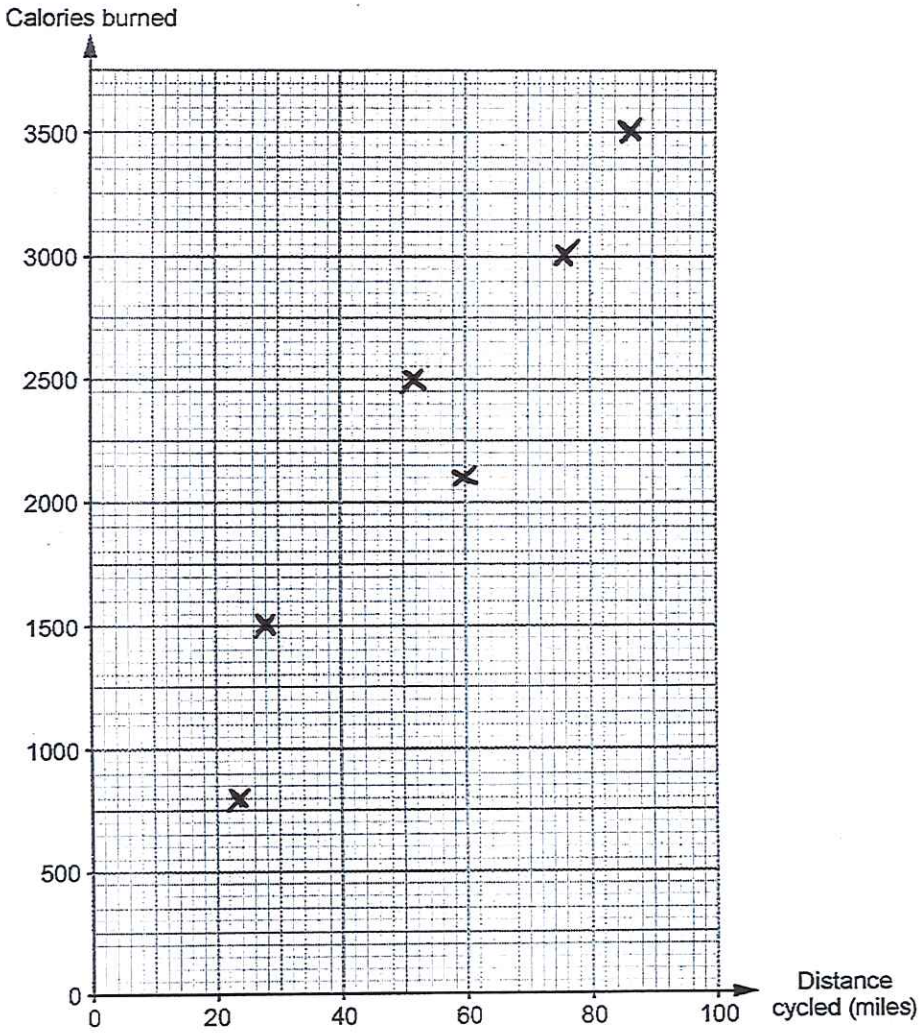
(b) Describe the relationship between engine size and distance travelled per litre shown by your scatter diagram. [1]

Negative correlation
or As engine size increases the distance travelled on one litre decreases.

6. A cyclist used an App on his mobile phone to record the distance he cycled and the calories he burned, on each of his last six rides.
His results are shown in the table below.

Distance cycled (miles)	60	28	86	52	24	76
Calories burned	2100	1500	3500	2500	800	3000

(a) Draw a scatter diagram of this data. [2]



(b) What type of correlation is shown in the scatter diagram? [1]

Positive

(c) Give a possible reason why the cyclist burned fewer calories on the 60 mile ride than he did on the 52 mile ride. [1]

The 60 mile ride could have been on the flat, whereas the 52 mile ride may have been uphill.

or He may have ridden more slowly on the 60 mile ride or hotter weather on 52 mile ride.

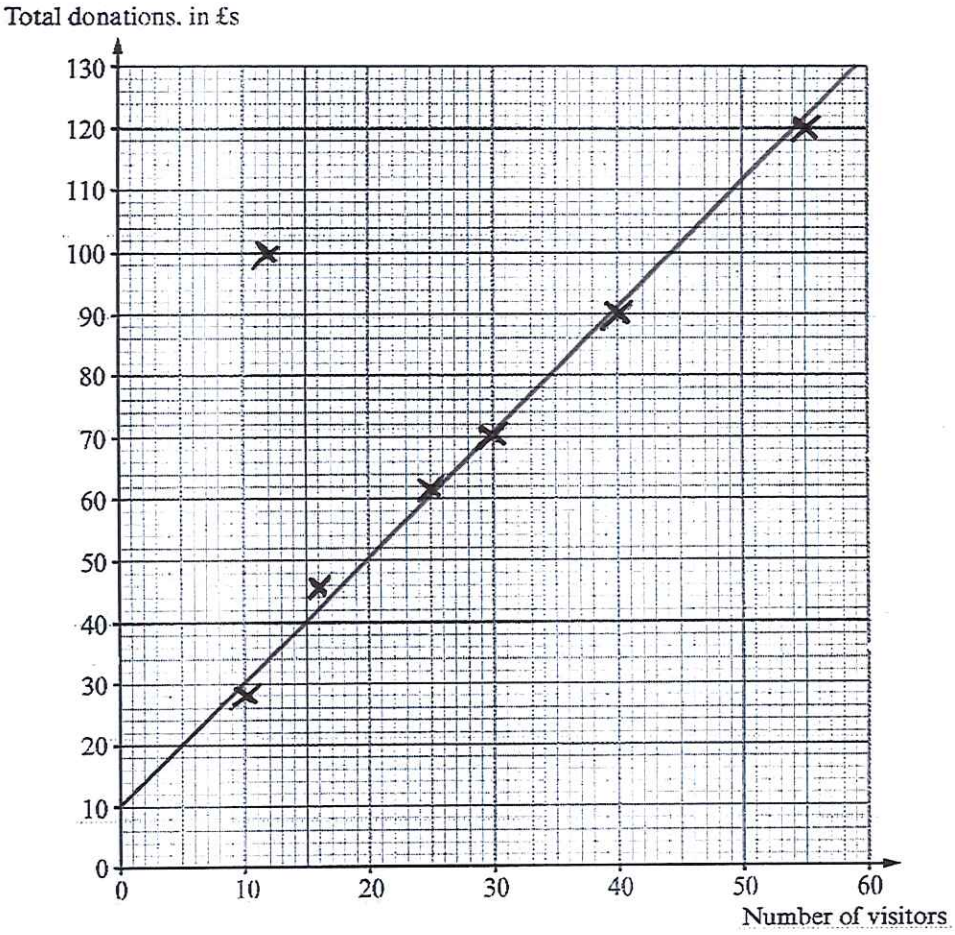
or The wind could have helped on the 60 mile ride

7.

The number of visitors to an animal rescue centre and the total donations received were recorded every day for 7 days.
The table below shows the results.

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of visitors	40	10	16	30	25	55	12
Total donations, in £s	90	28	46	70	62	120	100

(a) On the graph paper provided, draw a scatter diagram of these results. [2]



(b) Draw, by eye, a line of best fit on your scatter diagram. [1]

(c) Describe the correlation between the number of visitors and the total donations.

Positive

[1]

(d) Which particular day does not fit the correlation?

Sunday

[1]

(e) The animal rescue centre is given a target to raise £100 a day on each of the next 5 days. The manager says this should be possible just by making sure that they advertise and get 50 visitors a day.

The number of visitors on each of the next 5 days was as follows:

62, 55, 51, 52, and 58.

Can the manager be sure of achieving her target of £100 per day in total donations? You must give a reason for your answer.

No. It might be possible but she cannot be sure as there is not a 'perfect' relationship. For example the Sunday does not fit the pattern.

[2]

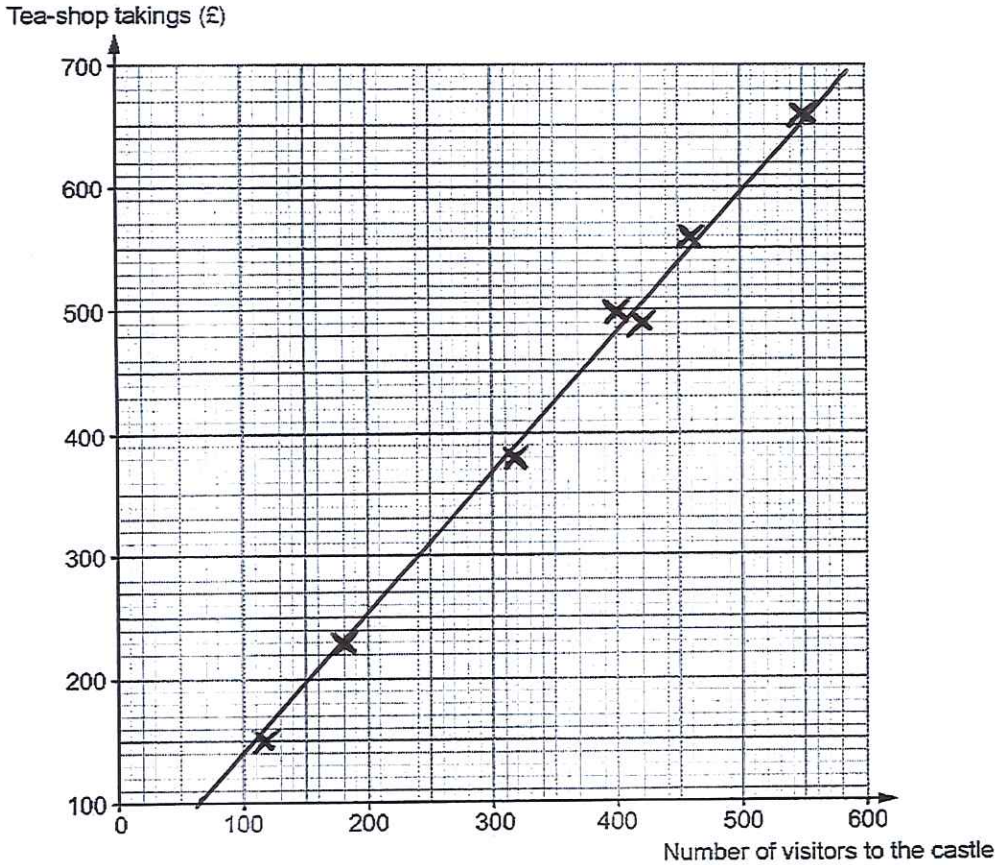
8.

The manager of a tea-shop at a castle kept some records every day for 7 days.
The manager recorded:

- The number of visitors to the castle.
- The total money taken at the tea-shop.

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of visitors to the castle	120	180	400	320	460	550	420
Tea-shop takings (£)	150	230	500	380	560	660	490

(a) On the graph paper provided, draw a scatter diagram of these results. [2]



(b) Draw, by eye, a line of best fit on your scatter diagram opposite. [1]

(c) Describe the correlation between the number of visitors to the castle and the tea-shop takings. [1]

Positive

(d) The manager of the tea-shop states,

'My records tell me that each visitor to the castle spends more than £1 each at the tea-shop.'

(i) Explain why the manager might have come to this conclusion. [2]

If you compare the takings with the number of visitors, the number of visitors is always less than the takings (in pounds)

(ii) The statement is not necessarily true.
Explain why this statement may not be true. [1]

Some visitors might not even visit the teashop, also some might spend a bit more than £1, some might spend less than £1.