GCSE · Edexcel · Maths

2 hours 33 questions

Exam Questions

Scatter Graphs & Correlation

Scatter Graphs & Correlation / Lines of Best Fit

Easy (14 questions)	/41
Medium (14 questions)	/62
Hard (5 questions)	/29
Total Marks	**/132**

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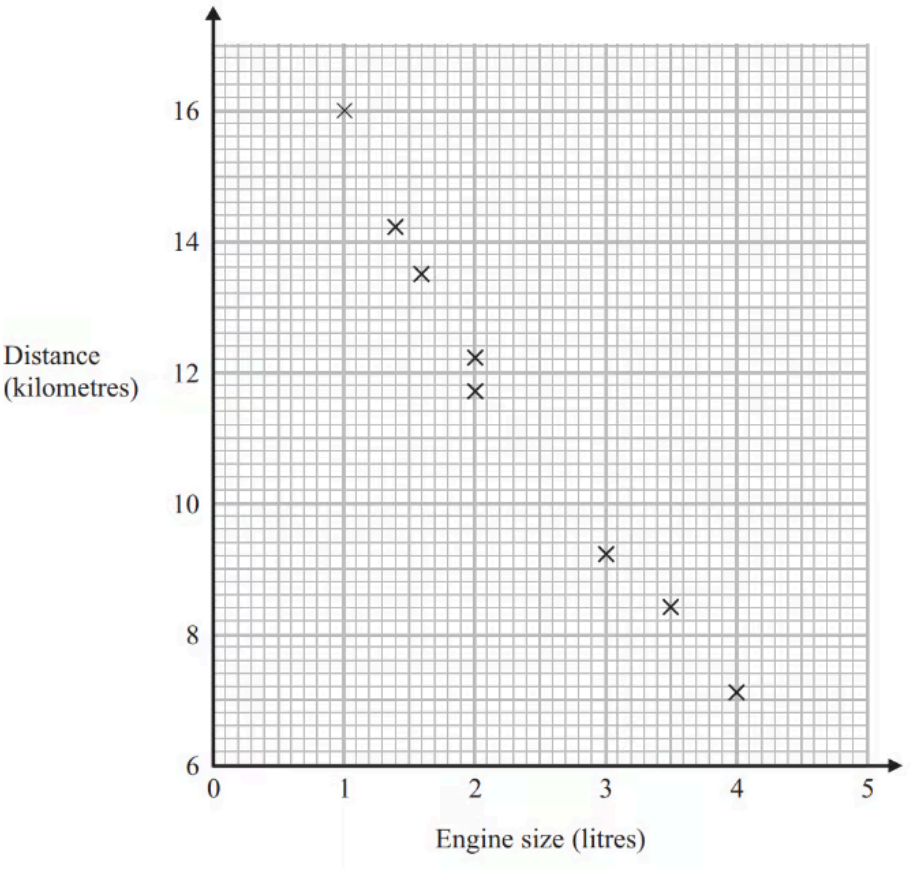
Easy Questions

1 (a) The scatter graph shows some information about 8 cars.
For each car it shows the engine size, in litres, and the distance, in kilometres, the car travels on one litre of petrol.



What type of correlation does the scatter graph show?

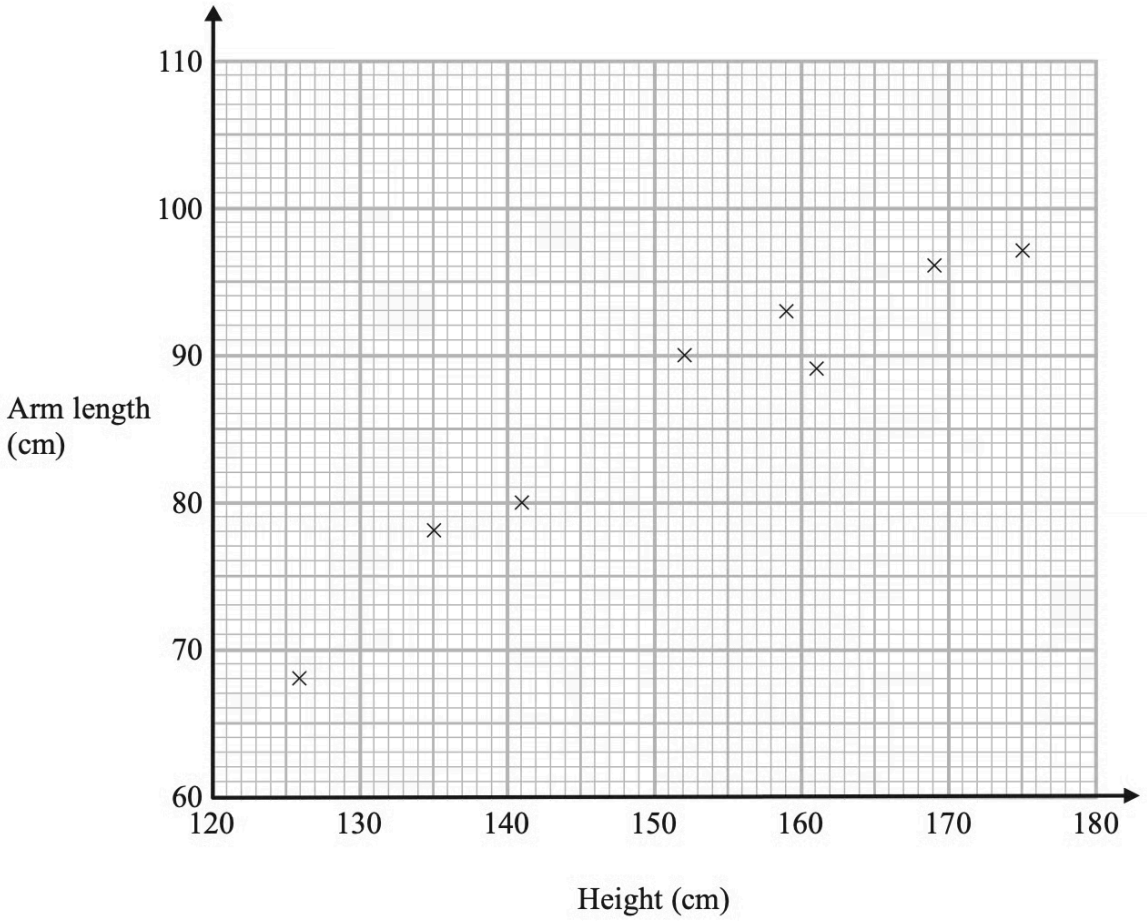
(1 mark)

(b) A different car of the same type has an engine size of 2.5 litres.

Estimate the distance travelled on one litre of petrol by this car.

(2 marks)

2 (a) The scatter graph shows information about the height and arm length of each of 8 students in Year 11



What type of correlation does this scatter graph show?

(1 mark)

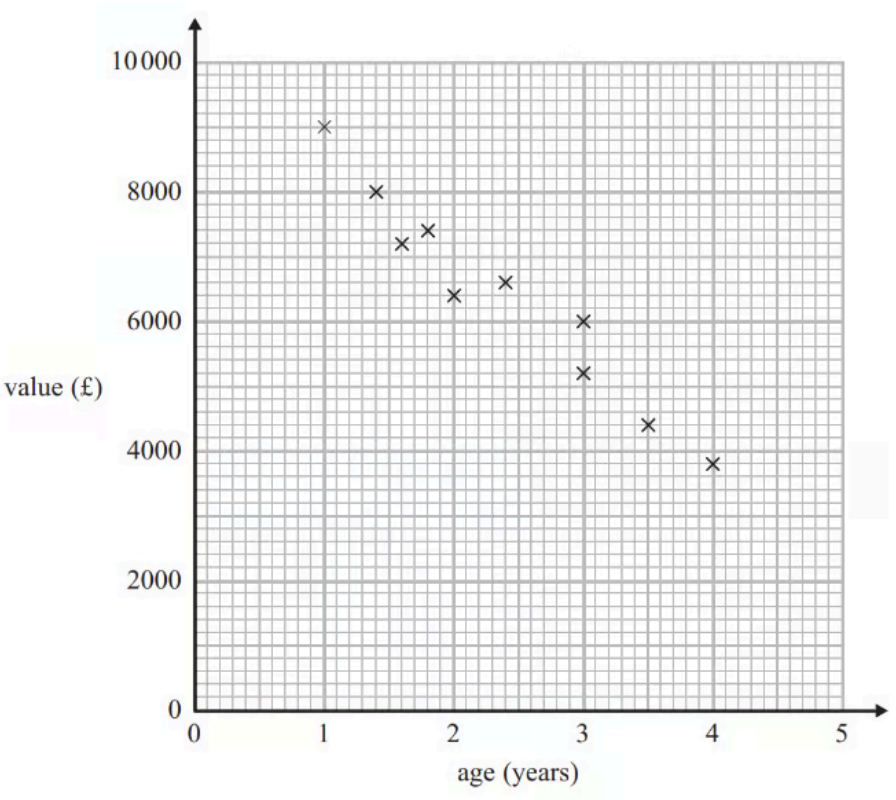
(b) A different student in Year 11 has a height of 148 cm.

Estimate the arm length of this student.

(2 marks)

3 (a) The scatter graph shows some information about 10 cars, of the same type and make.

The graph shows the age (years) and the value (£) of each car.



The table shows the age and the value of two other cars of the same type and make.

age(years)	1	3.5
value(£)	8200	5000

On the scatter graph, plot the information from the table.

(1 mark)

(b) Describe the relationship between the age and the value of the cars.

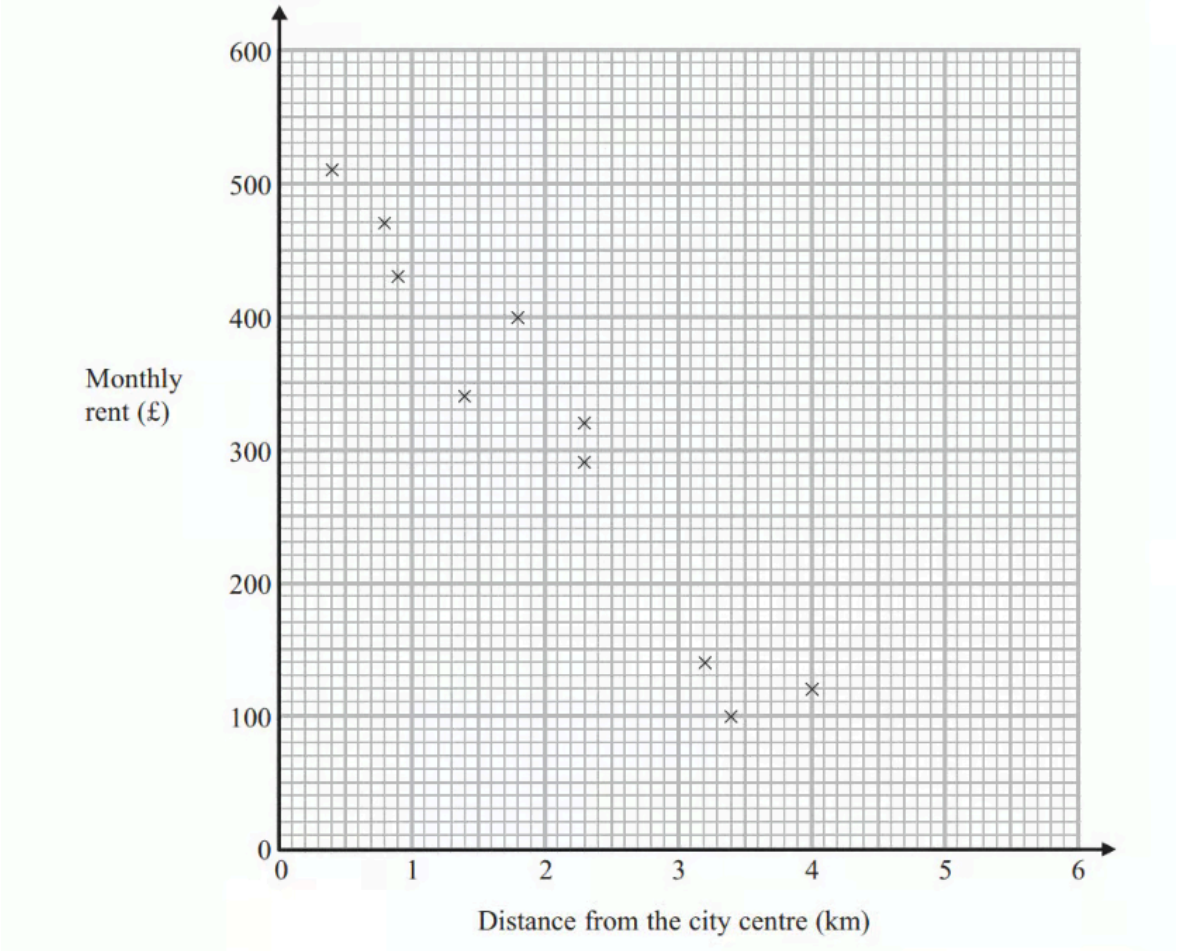
(1 mark)

(c) A car of the same type and make is $2\frac{1}{2}$ years old.

Estimate the value of the car.

(2 marks)

4 (a) The scatter graph shows information about 10 apartments in a city.
The graph shows the distance from the city centre and the monthly rent of each apartment.



The table shows the distance from the city centre and the monthly rent for two other apartments.

Distance from the city centre(km)	2	3.1
Monthly rent(£)	250	190

On the scatter graph, plot the information from the table.

(1 mark)

(b) Describe the relationship between the distance from the city centre and the monthly rent.

(1 mark)

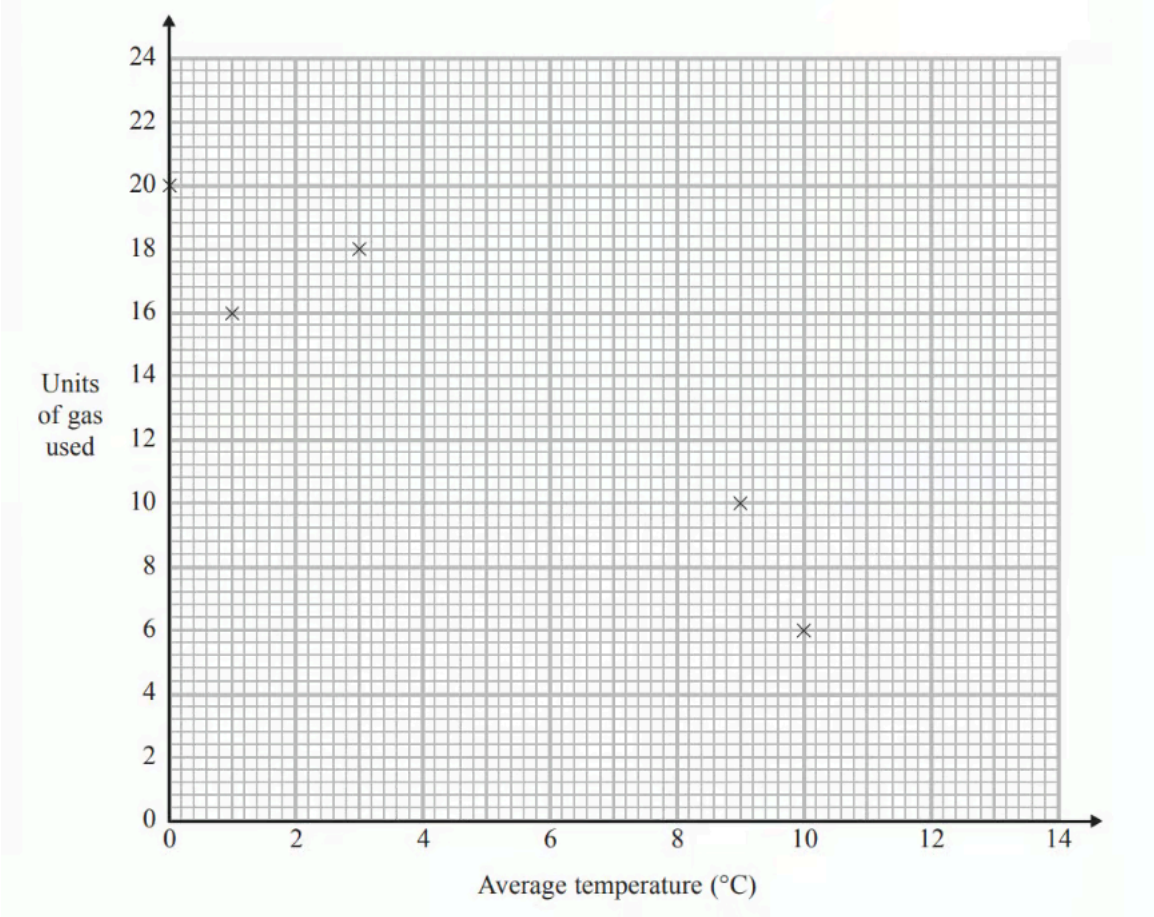
(c) An apartment is 2.8 km from the city centre.

Find an estimate for the monthly rent for this apartment.

(2 marks)

5 (a) The table shows the average temperature on each of seven days and the number of units of gas used to heat a house on these days.

Average temperature(°C)	0	1	3	9	10	12	13
Units of gas used	20	16	18	10	6	6	2



Complete the scatter graph to show the information in the table. The first 5 points have been plotted for you.

(1 mark)

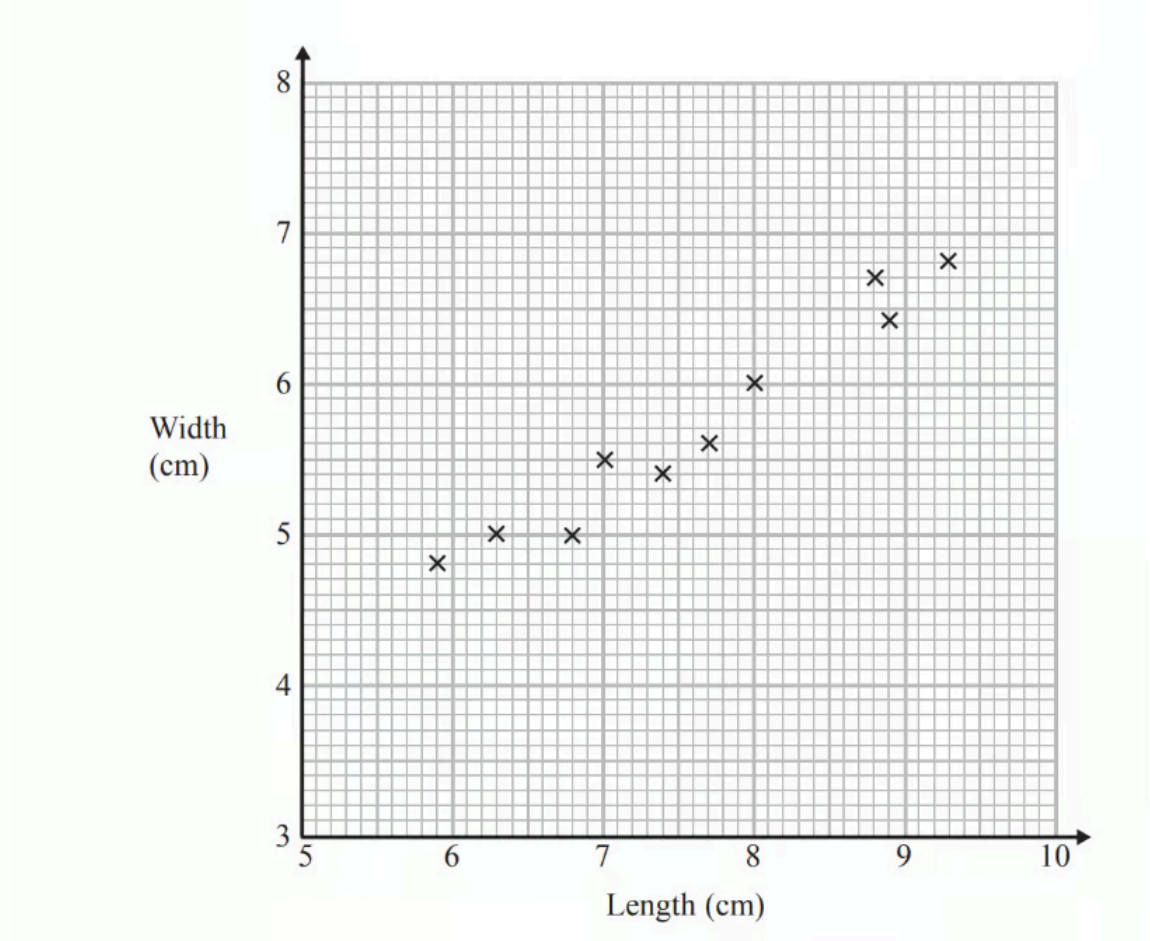
(b) Describe the relationship between the average temperature and the number of units of gas used.

(1 mark)

(c) Estimate the average temperature on a day when 12 units of gas are used.

(2 marks)

6 (a) The scatter graph shows some information about ten pine cones from the same tree.
It shows the length and the width of each pine cone.



Describe the relationship between the length and the width of a pine cone.

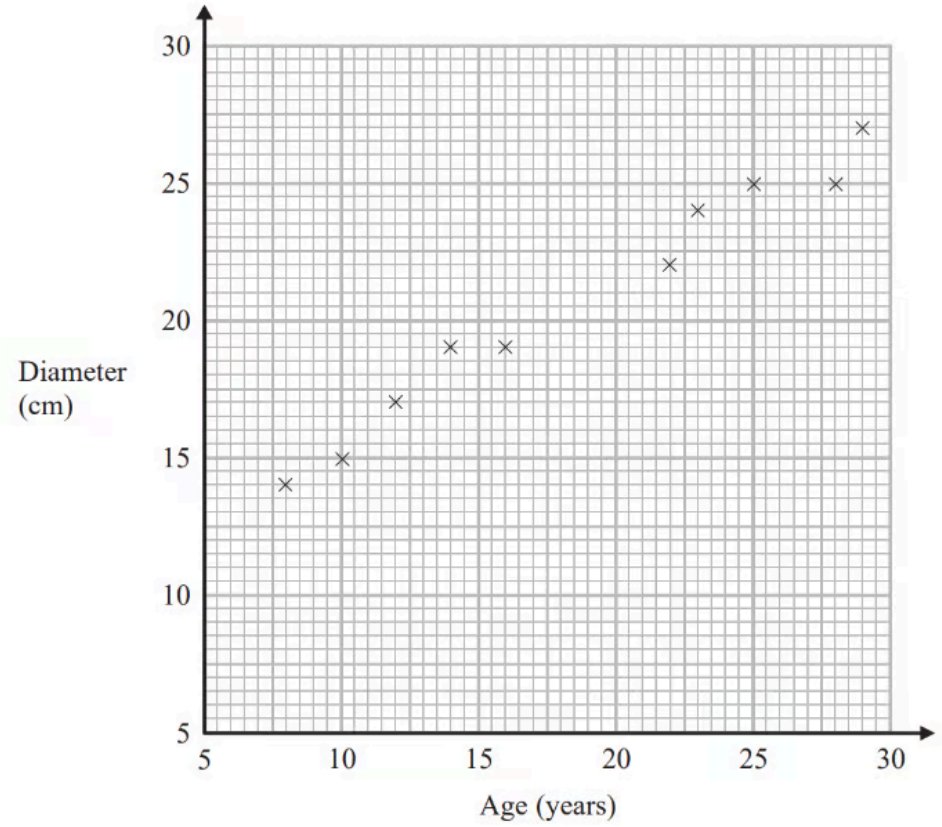
(1 mark)

(b) Another pine cone from this tree has a length of 8.4 cm.

Estimate the width of this pine cone.

(2 marks)

7 (a) The scatter graph shows information about ten trees of the same type.
It shows the age and the diameter of the trunk of each tree.



What type of correlation does this scatter graph show?

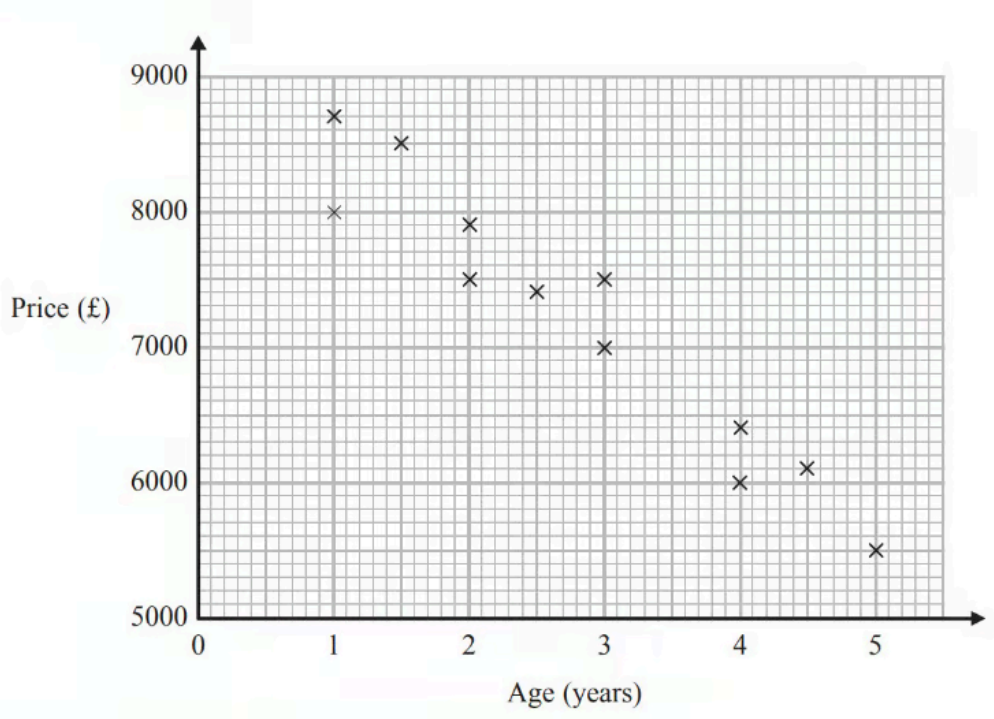
(1 mark)

(b) Another tree of the same type has a trunk with diameter 21 cm.

Estimate the age of this tree.

(2 marks)

8 (a) The scatter graph shows information about the age and the price of each of 12 cars of the same model.



Describe the relationship between the age of a car and its price.

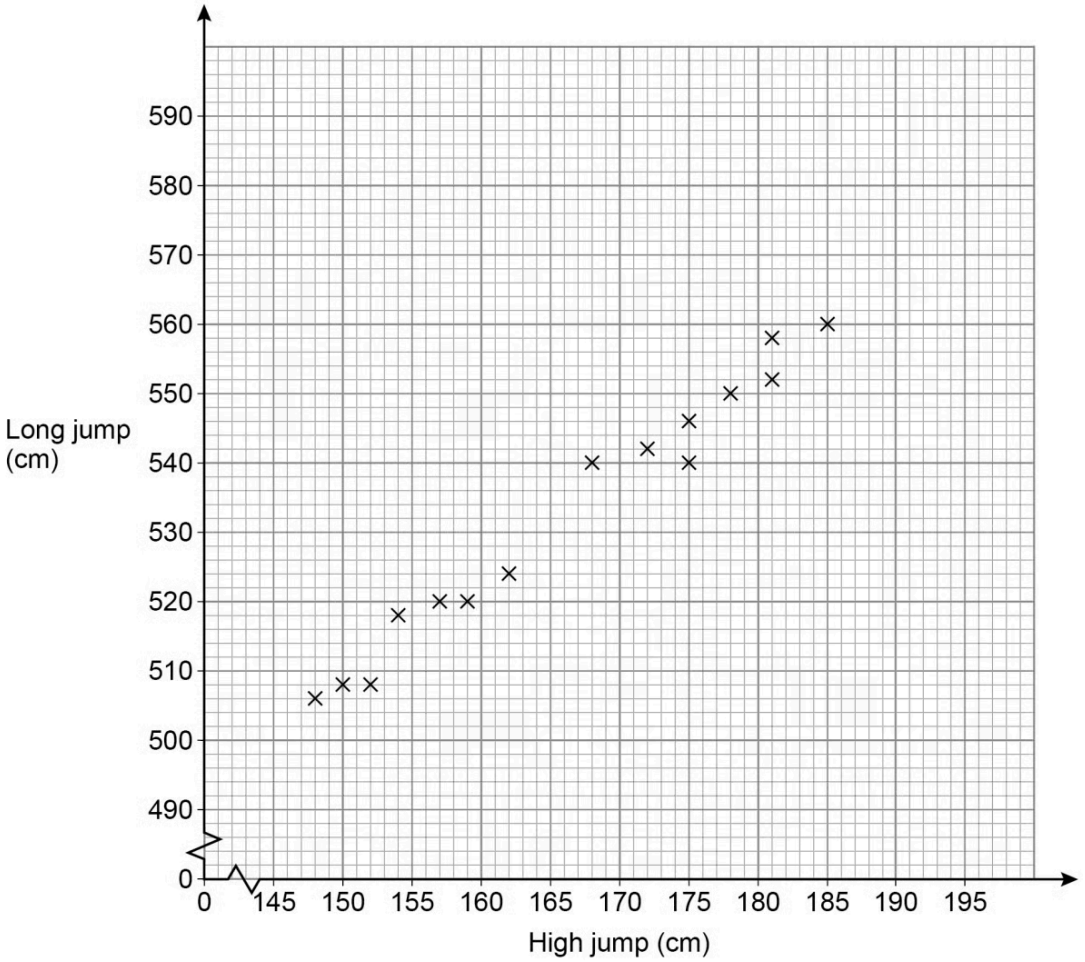
(1 mark)

(b) A different car of the same model is $3\frac{1}{2}$ years old.

Estimate the price of this car.

(2 marks)

9 (a) The scatter graph shows the best high jump and the best long jump for 15 boys.



Write down the type of correlation shown.

(1 mark)

(b) Liam has a best high jump of 166 cm

Use a line of best fit to estimate his best long jump.

.....cm

(2 marks)

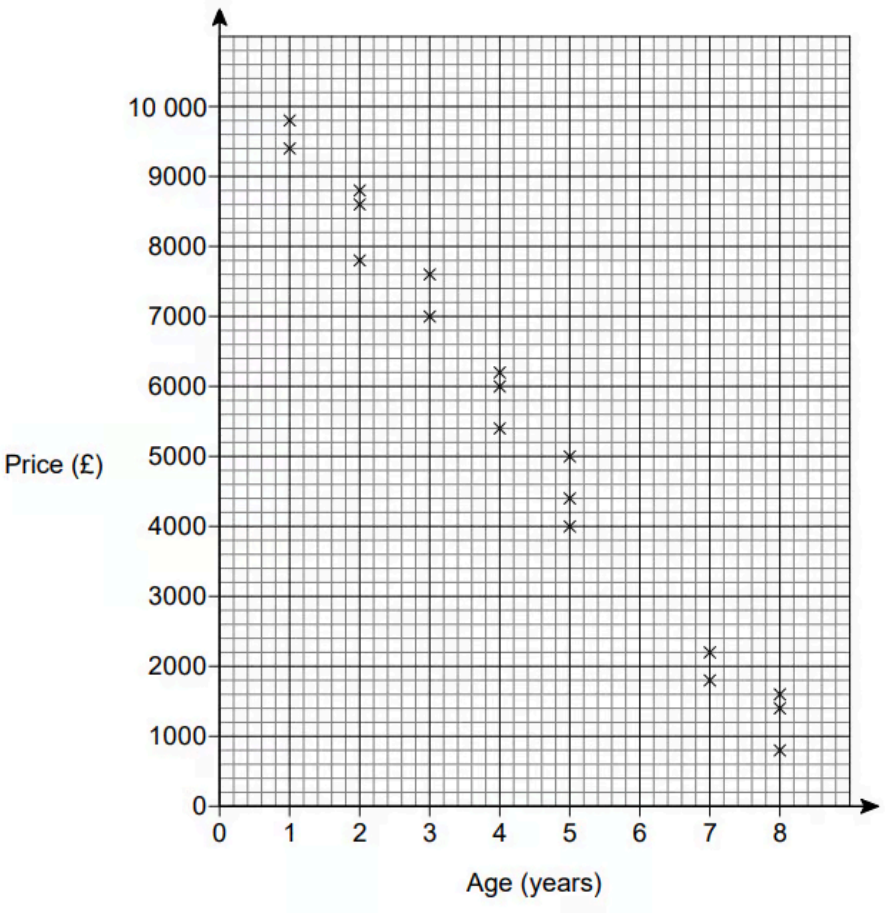
(c) Another boy has a best high jump of 195 cm

Give a reason why you should **not** use a line of best fit to estimate his best long jump.

(1 mark)

10 The scatter graph shows the age and the price of 18 cars.

The cars are all the same make and model.



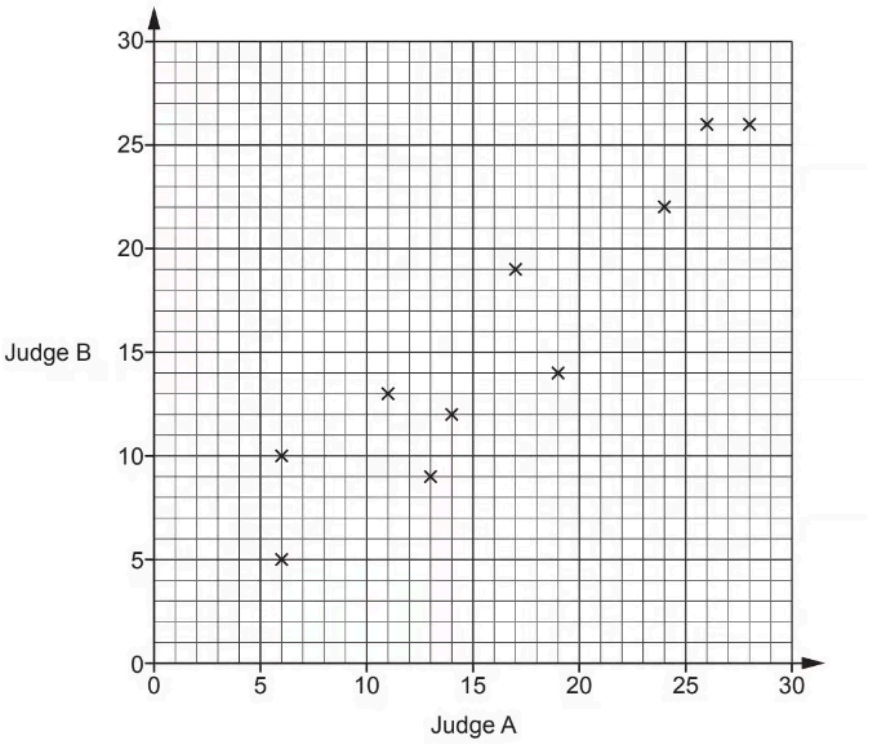
Use a line of best fit to estimate the price of a 6-year old car.

£.....

(2 marks)

11 (a) In a dance competition, two judges each award scores out of 30.

The scatter diagram shows the scores awarded to the first 10 dancers.



Here are the scores for the next two dancers.

Judge A	21	7
Judge B	18	8

Plot their scores on the scatter diagram.

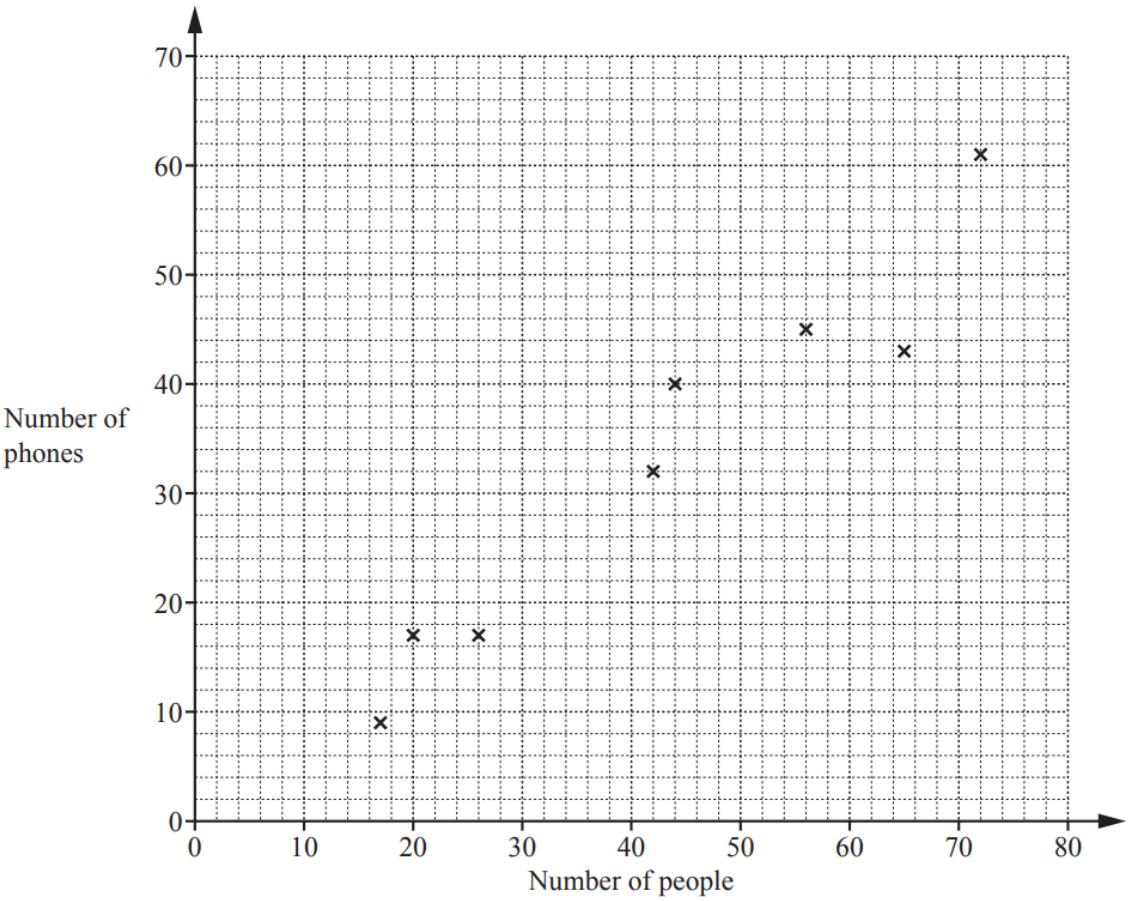
(1 mark)

(b) Dancers who are awarded a score of more than 20 by **both** judges receive a medal.

For the 12 dancers, express the ratio of medal winners to non-medal winners in its simplest form.

(3 marks)

12 (a) The scatter diagram shows the number of people and the number of phones in each of 8 buildings.



One of the buildings contains 42 people.

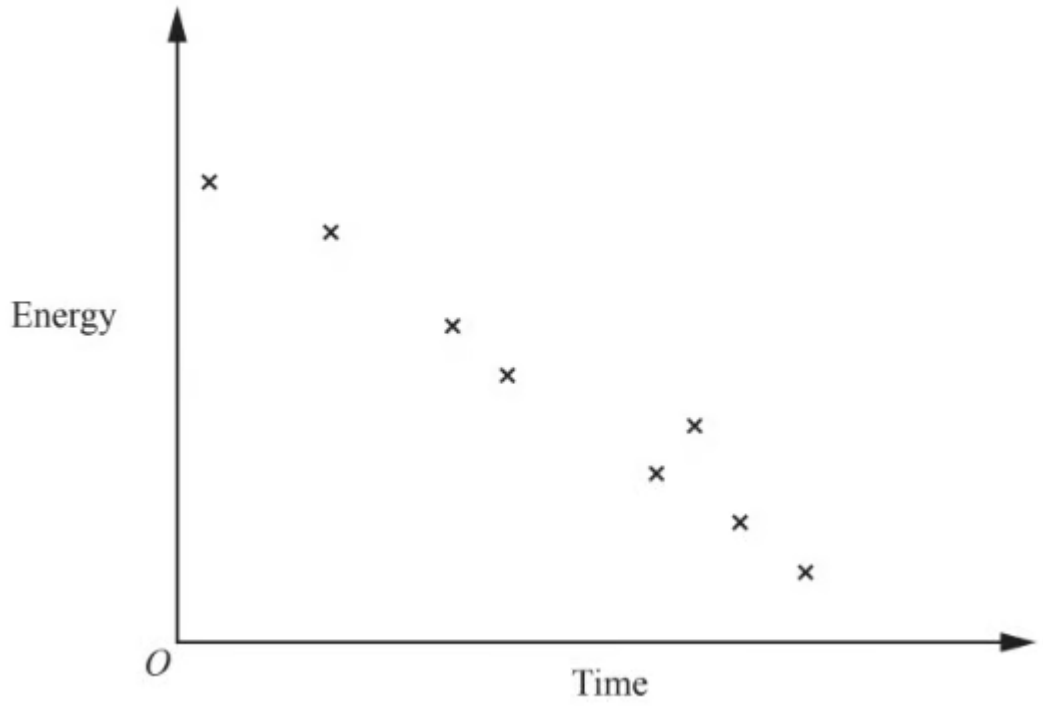
Write down the number of phones in this building.

(1 mark)

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

(1 mark)

13



What type of correlation does the scatter diagram show?

(1 mark)

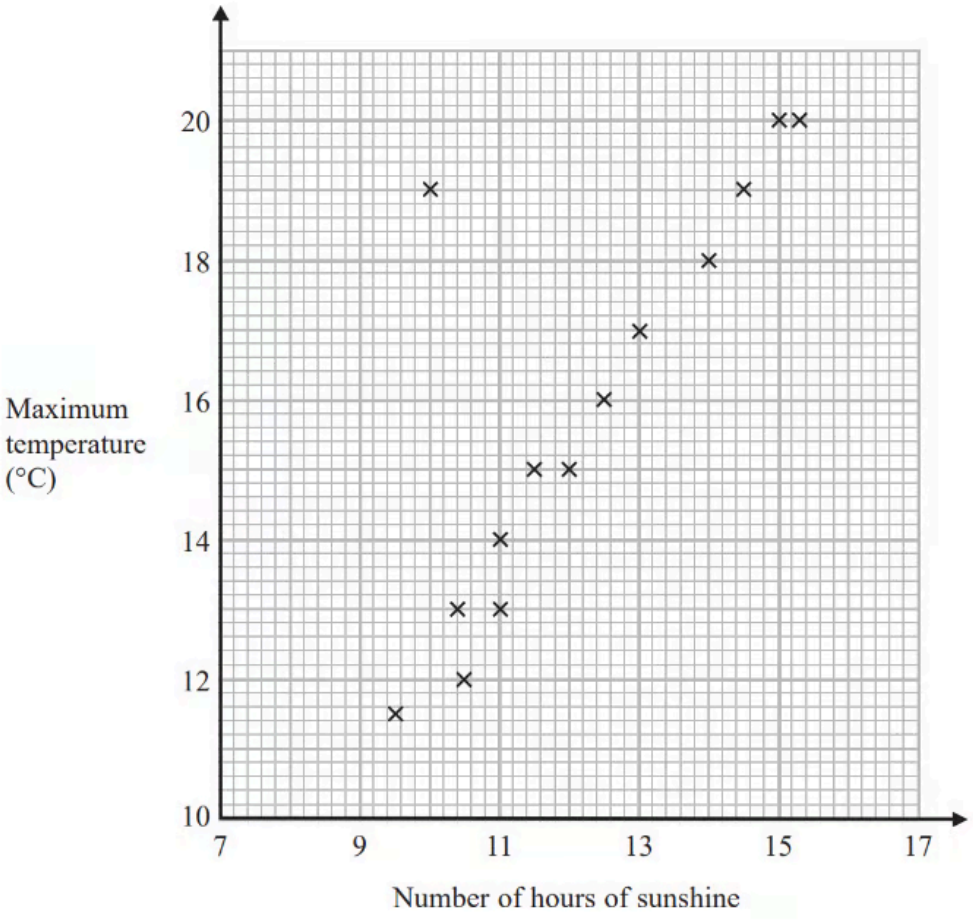
14 "We eat more ice cream as the temperature rises."

What type of correlation is this?

(1 mark)

Medium Questions

1 (a) The scatter graph shows the maximum temperature and the number of hours of sunshine in fourteen British towns on one day.



One of the points is an outlier.

Write down the coordinates of this point.

(1 mark)

(b) For all the other points write down the type of correlation.

(1 mark)

(c) On the same day, in another British town, the maximum temperature was 16.4°c.

Estimate the number of hours of sunshine in this town on this day.

(2 marks)

(d) A weatherman says,

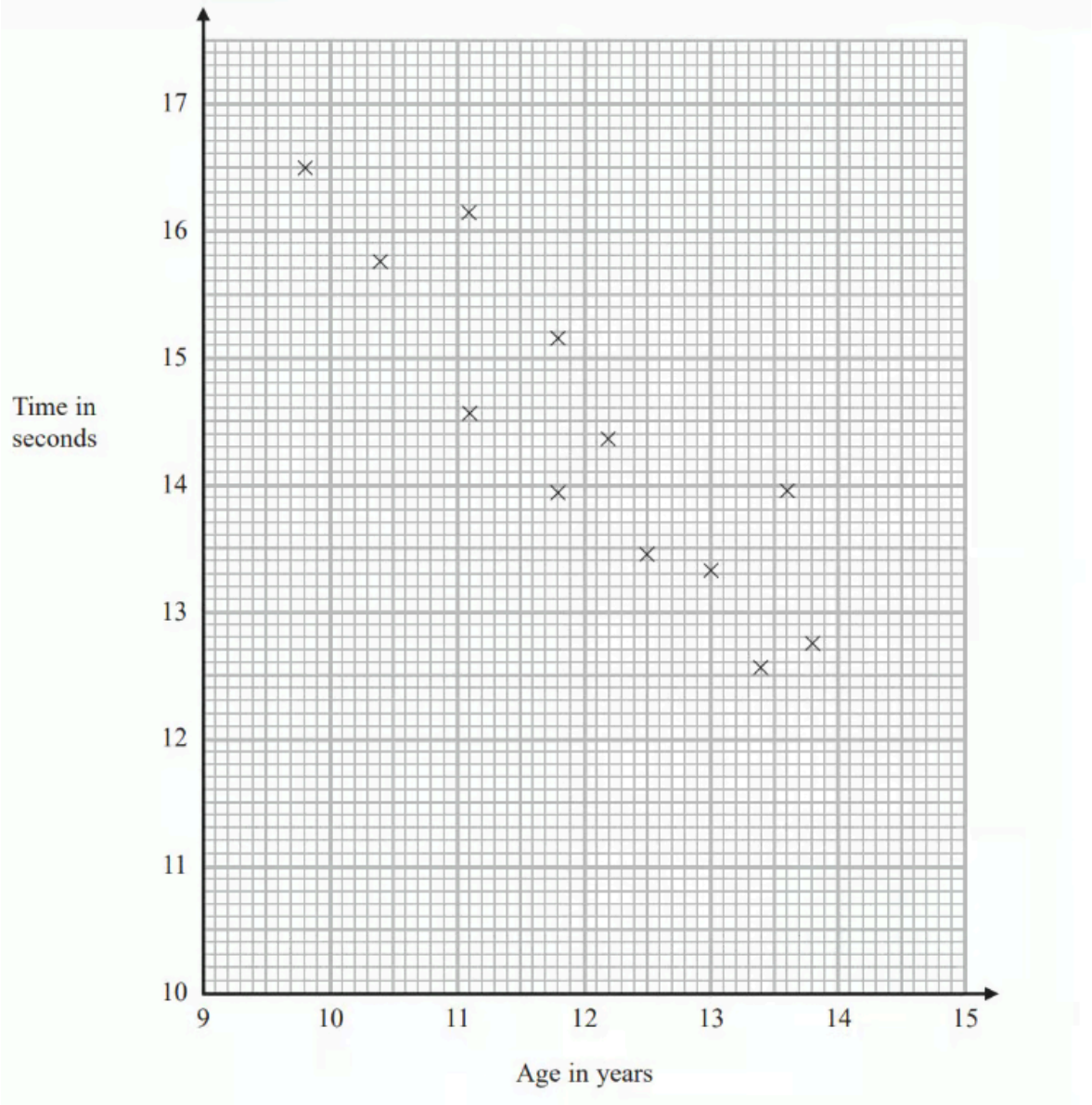
"Temperatures are higher on days when there is more sunshine."

Does the scatter graph support what the weatherman says?
Give a reason for your answer.

(1 mark)

2 (a) The scatter diagram shows information about 12 girls.

It shows the age of each girl and the best time she takes to run 100 metres.



Write down the type of correlation.

(1 mark)

(b) Kristina is 11 years old.
Her best time to run 100 metres is 12 seconds.

The point representing this information would be an outlier on the scatter diagram.

Explain why.

(1 mark)

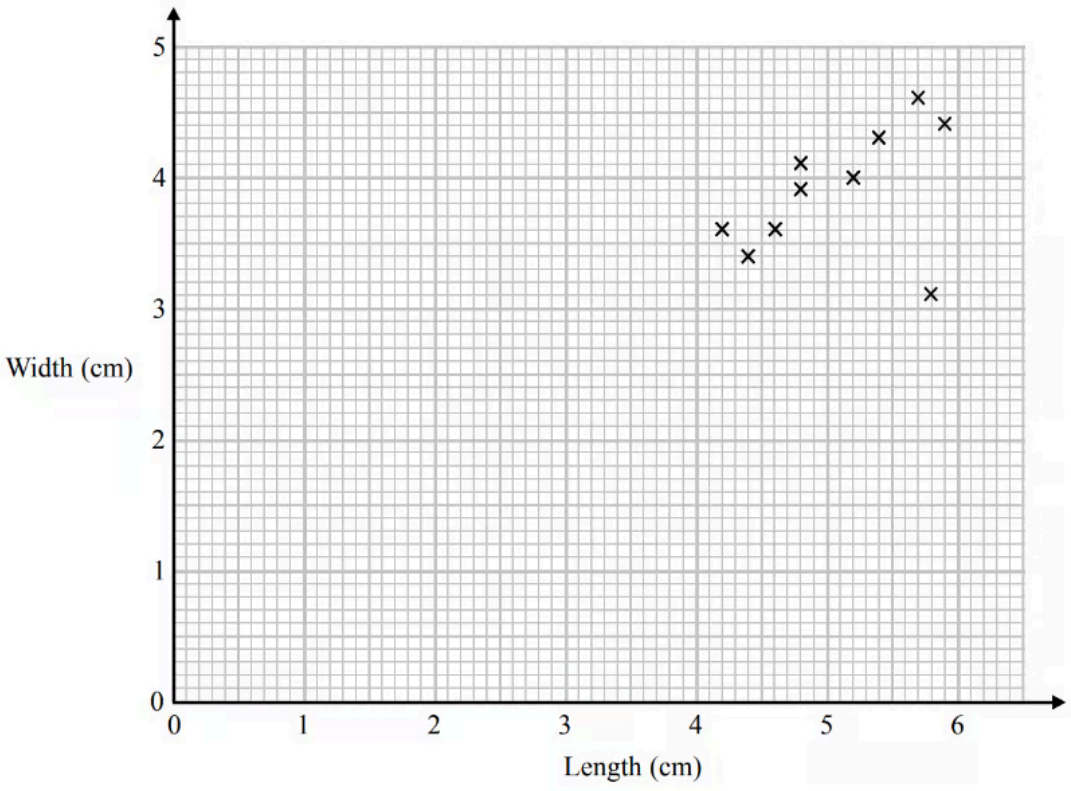
(c) Debbie is 15 years old.
Debbie says,

"The scatter diagram shows I should take less than 12 seconds to run 100 metres."

Comment on what Debbie says.

(1 mark)

3 (a) Katie measured the length and the width of each of 10 pine cones from the same tree. She used her results to draw this scatter graph.



Describe one improvement Katie can make to her scatter graph.

(1 mark)

(b) The point representing the results for one of the pine cones is an outlier.

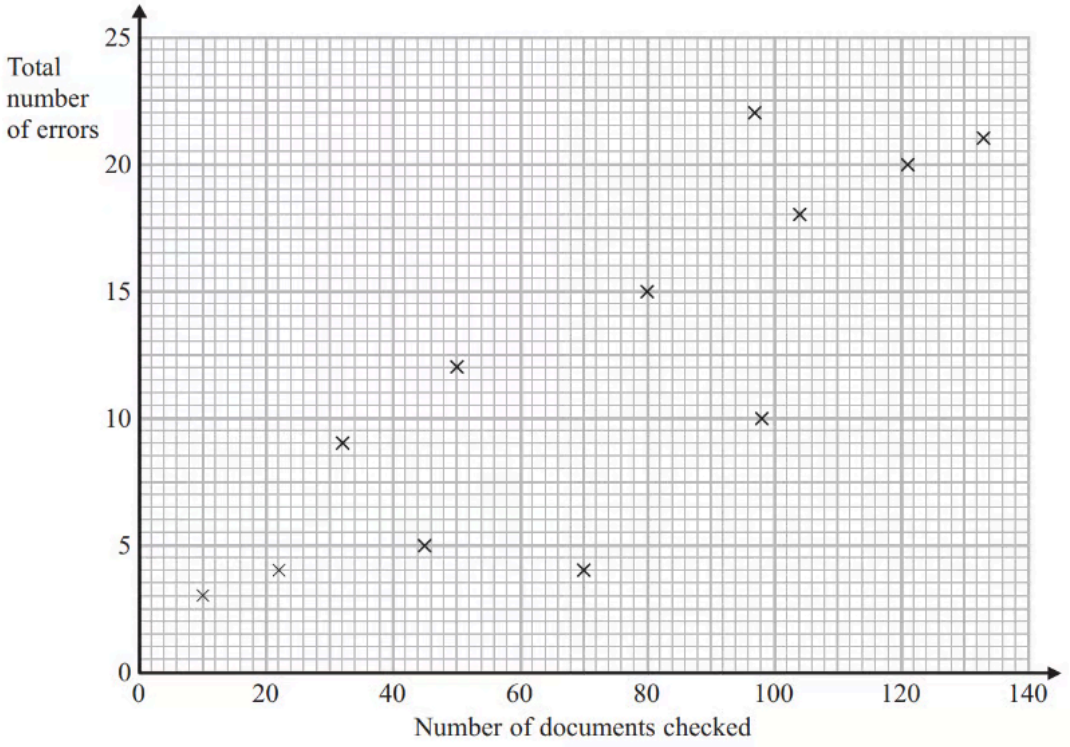
Explain how the results for this pine cone differ from the results for the other pine cones.

(1 mark)

4 (a) A publisher checks documents for errors.

He records the number of documents that are checked each day.
He also records the total number of errors in the documents each day.

The scatter graph shows this information.



On another day 90 documents are checked.
There is a total of 17 errors.

Show this information on the scatter graph.

(1 mark)

(b) Describe the correlation between the number of documents checked and the total number of errors.

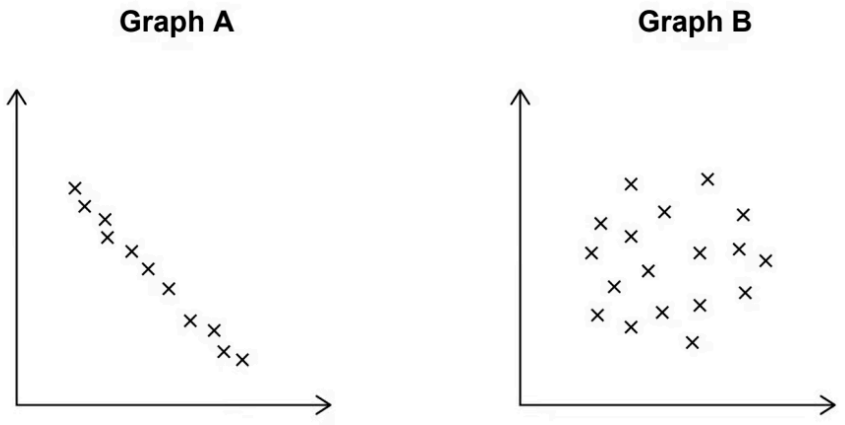
(1 mark)

(c) One day 110 documents are checked.

Estimate the total number of errors in these documents.

(2 marks)

5 A and B are scatter graphs.



What type of correlation is shown by each graph?

Choose from

Weak positive Strong positive Weak negative Strong negative No correlation

Graph A.....

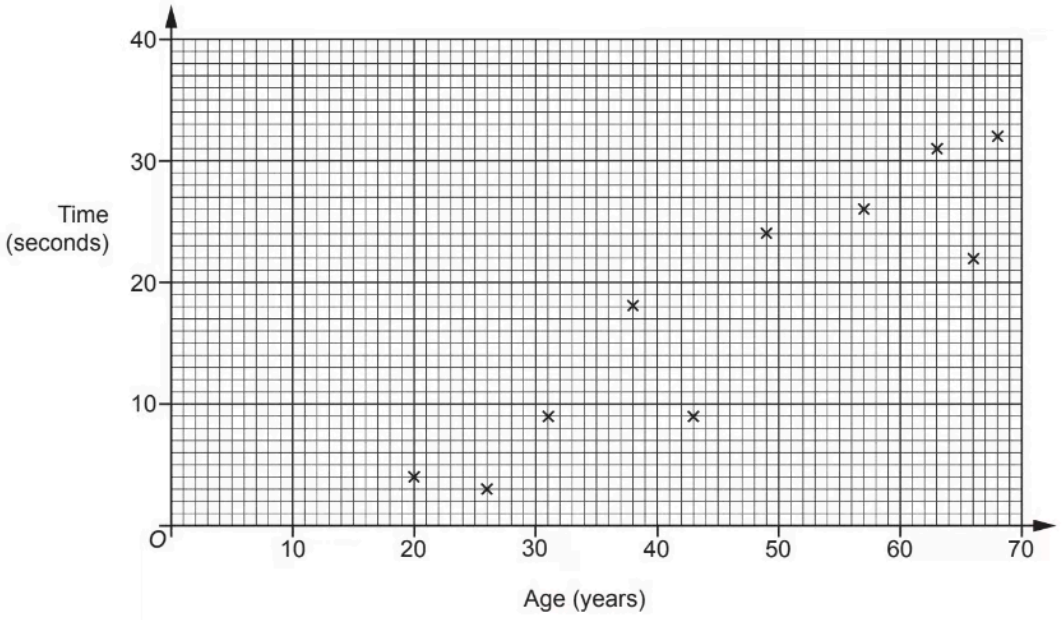
Graph B.....

(2 marks)

6 (a) Lee wishes to find out if there is a relationship between a person's age and the time it takes them to complete a puzzle.

Lee decides to conduct an experiment.
She asks 12 people to complete the puzzle.
She records each person's age and the time taken to complete the puzzle.

This scatter diagram shows the results for ten of the people in Lee's experiment.



Here are the other two results.

Age (years)	47	60
Time (seconds)	21	34

Plot these results on the scatter diagram.

(2 marks)

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

(1 mark)

(c) Estimate the time it would take a person aged 35 to complete the puzzle.

Show your working to justify your answer.

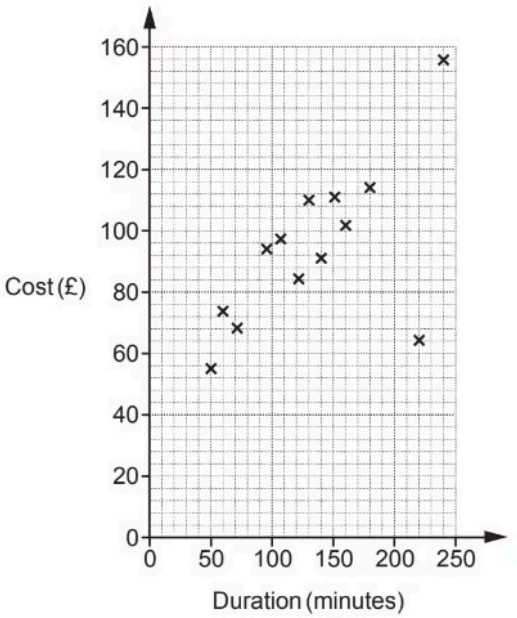
(2 marks)

(d) Lee says that at least 80% of the 12 people completed the puzzle in under 30 seconds.

Is Lee correct?
Show working to support your answer.

(3 marks)

7 (a) A travel agent records the duration and cost of the 15 flights he sold on one day.
The data for the first 13 flights are plotted on the scatter diagram.



The data for the final two flights is:

Duration	210 minutes	1 hour 40 minutes
Cost	£130	£80

Plot these flights on the scatter diagram.

(2 marks)

(b) The cost of one of the 15 flights had been discounted in a sale.

Circle the most likely flight on the scatter diagram.

(1 mark)

(c) i) Draw a line of best fit on the scatter diagram.

[1]

ii) Use your line of best fit to estimate the duration of a flight costing £90.

..... minutes [1]

(2 marks)

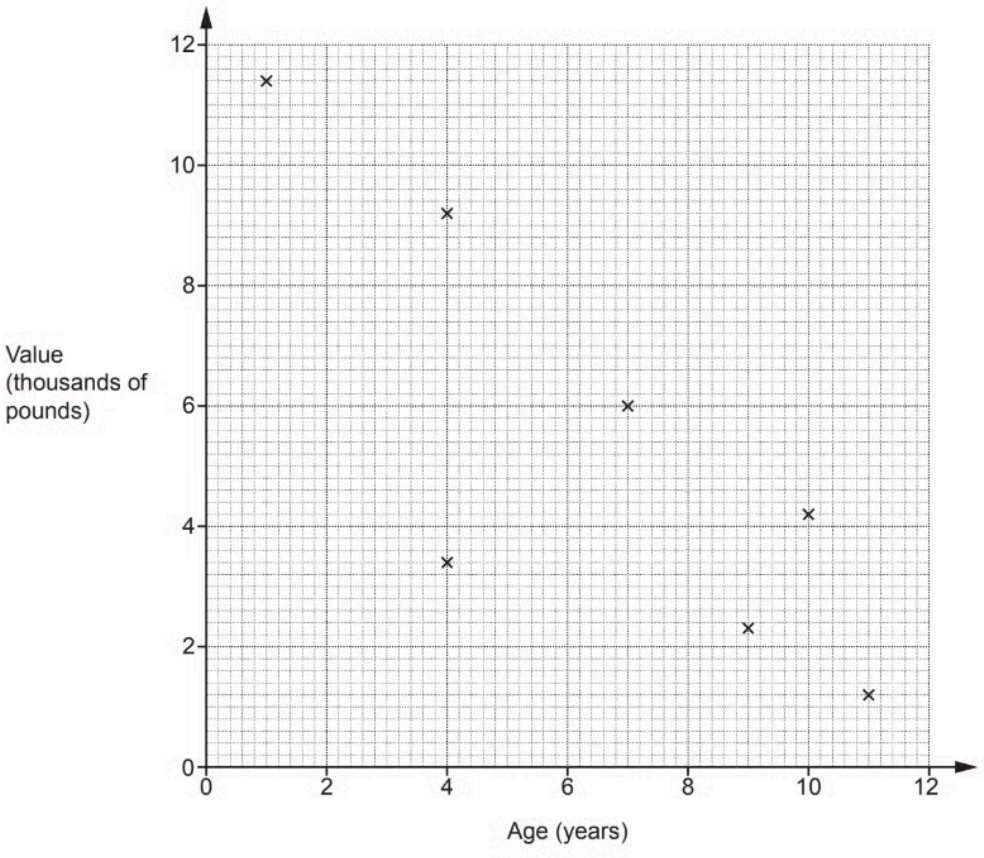
(d) Explain why the travel agent should not use his records to estimate the cost of a 7 hour flight.

(1 mark)

8 (a) The table shows the ages and values of 11 cars of the same model.

Age (years)	4	7	11	1	9	10	4	3	7	8	12
Value (thousands of pounds)	9.2	6.0	1.2	11.4	2.3	4.2	3.4	8.0	5.6	5.0	0.4

The points for the first 7 cars are plotted on the scatter diagram.



Plot the points for the remaining 4 cars.

(2 marks)

(b) Describe the type and strength of the correlation shown in the completed scatter diagram.

(2 marks)

(c) One car lost its value more quickly than the other cars.

On the scatter diagram, draw a circle around the point representing this car.

(1 mark)

(d) By drawing a line of best fit, estimate the value of a car that is 6 years old.

£ .....

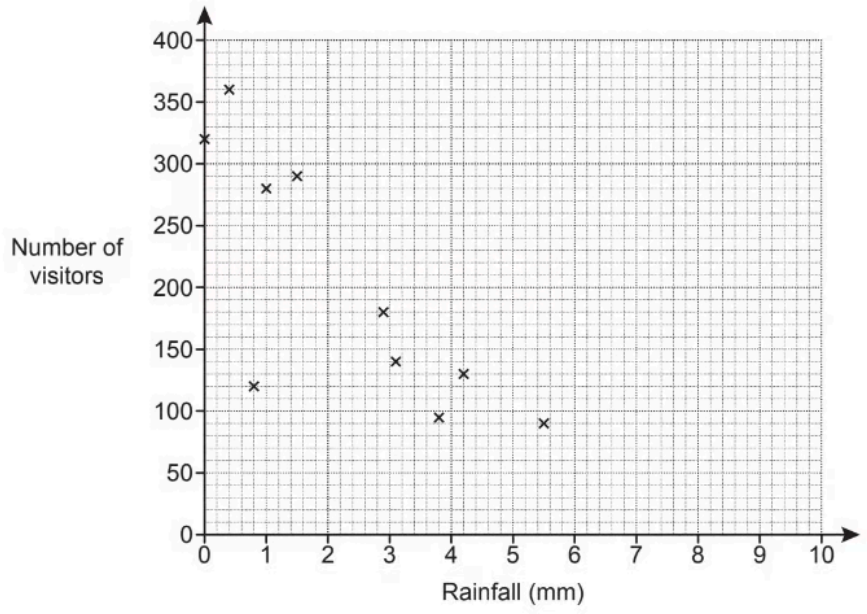
(2 marks)

(e) Explain the limitations of using the equation of the line of best fit to estimate the value of a car that is 16 years old.

(1 mark)

9 The owner of a tourist attraction records the amount of rainfall, in millimetres, and the number of visitors each day.

The results for 10 days are shown in the scatter diagram.



i) Circle the outlier on the scatter diagram.

[1]

ii) The owner claims that he would expect around 320 visitors on a day with 2 mm of rainfall.
Does the scatter diagram support his statement?
Explain how you made your decision.

[2]

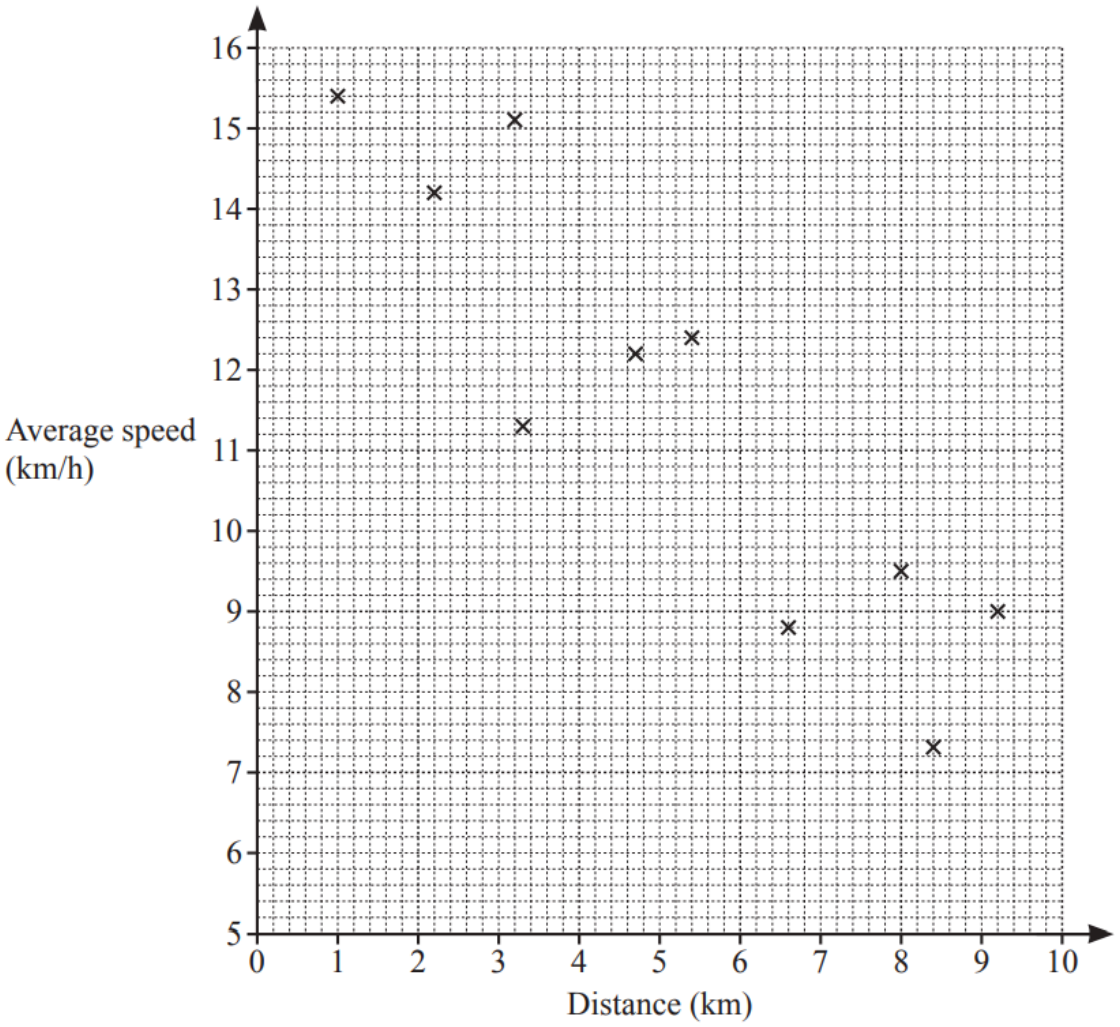
iii) Explain why the scatter diagram should not be used to estimate the number of visitors on a day with 9 mm of rainfall.

[1]

(4 marks)

10 (a) Aisha records the distance she runs and her average speed.

The results are shown in the scatter diagram.



The table shows the results of four more runs.

Distance (km)	4.2	5.7	7.1	8.8
Average speed (km/h)	13.4	11.8	9.8	8.3

On the scatter diagram, plot these points.

(2 marks)

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

(1 mark)

(c) On the scatter diagram, draw a line of best fit.

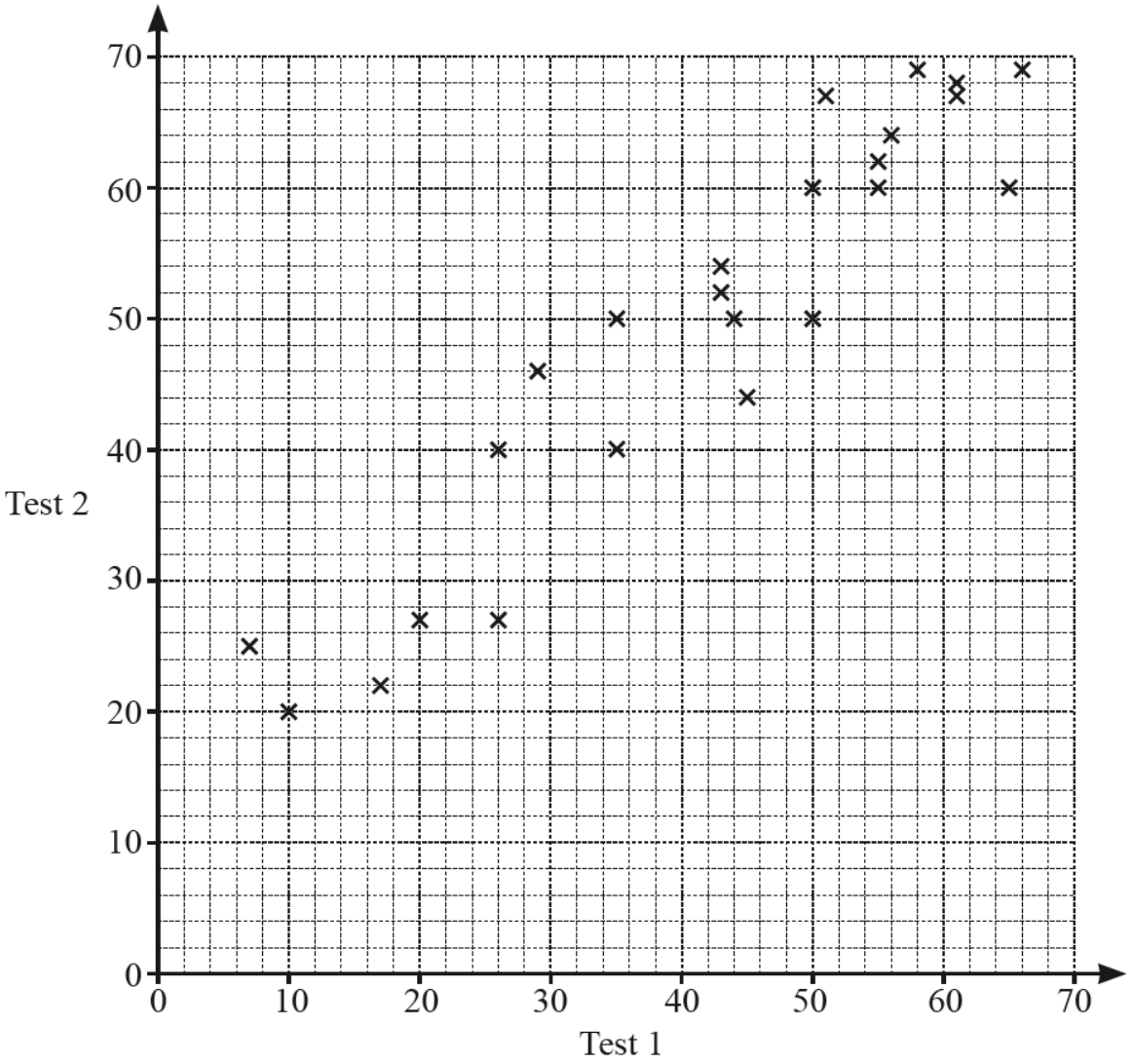
(1 mark)

(d) Use your line of best fit to estimate her average speed when she runs a distance of 6 km.

..... km/h

(1 mark)

11 (a) Mrs Salaman gives her class two mathematics tests.
The scatter diagram shows information about the marks each student scored.



Write down the highest mark scored on test 1.

(1 mark)

(b) Write down the type of correlation shown in the scatter diagram.

(1 mark)

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

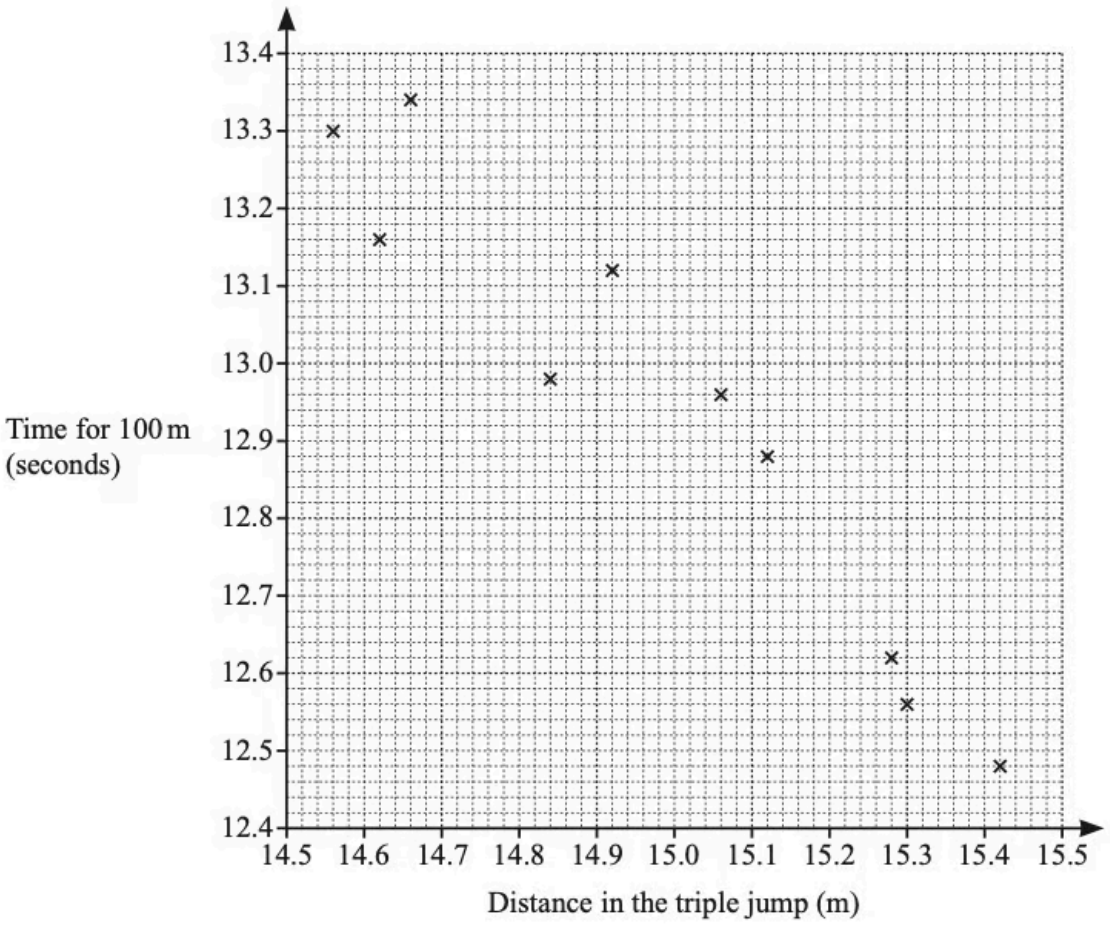
(1 mark)

(d) Hamish scored a mark of 40 on test 1.
He was absent for test 2.

Use your line of best fit to find an estimate for his mark on test 2.

(1 mark)

12 (a) Ten athletes compete in both the 100 metre race and the triple jump.
Their results are shown in the scatter diagram.



One of these athletes jumps 15.12 m in the triple jump.

Write down his time for the 100 metre race.

..... s

(1 mark)

(b) The values for two other athletes are shown in the table.

Distance in the triple jump (m)	14.74	15.2
Time for 100 m (seconds)	13.2	12.76

On the scatter diagram, plot these points.

(1 mark)

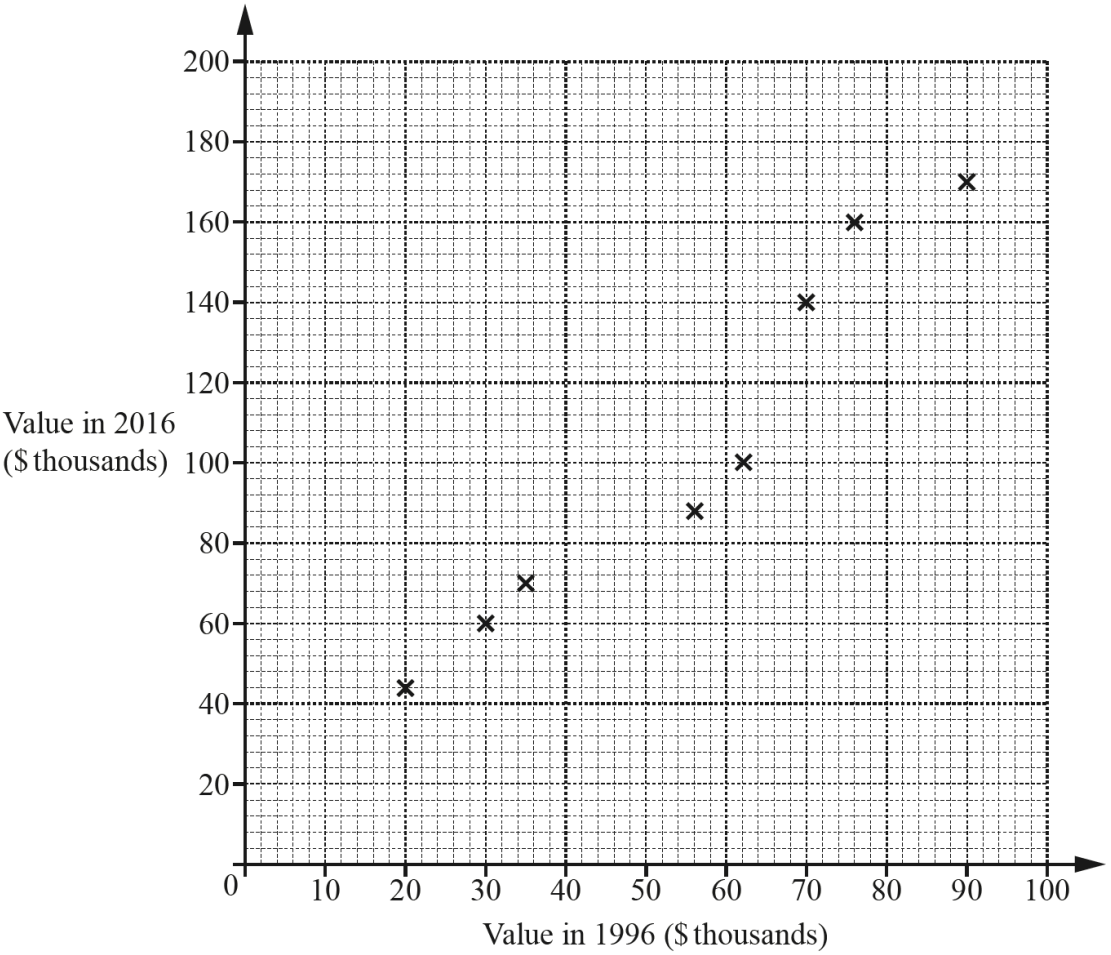
(c) On the scatter diagram, draw a line of best fit.

(1 mark)

(d) What type of correlation is shown in the scatter diagram?

(1 mark)

13 (a) The scatter diagram shows the value, in thousands of dollars, of eight houses in 1996 and the value of the same houses in 2016.



One of these eight houses had a value of $70 000 in 1996.

Write down the value of this house in 2016.

$ .....

(1 mark)

(b) The values of two more houses are shown in the table.

Value in 1996 ($ thousands)	40	80
Value in 2016 ($ thousands)	80	150

On the scatter diagram, plot these values.

(1 mark)

(c) On the scatter diagram, draw a line of best fit.

(1 mark)

(d) Another house had a value of $50 000 in 1996.

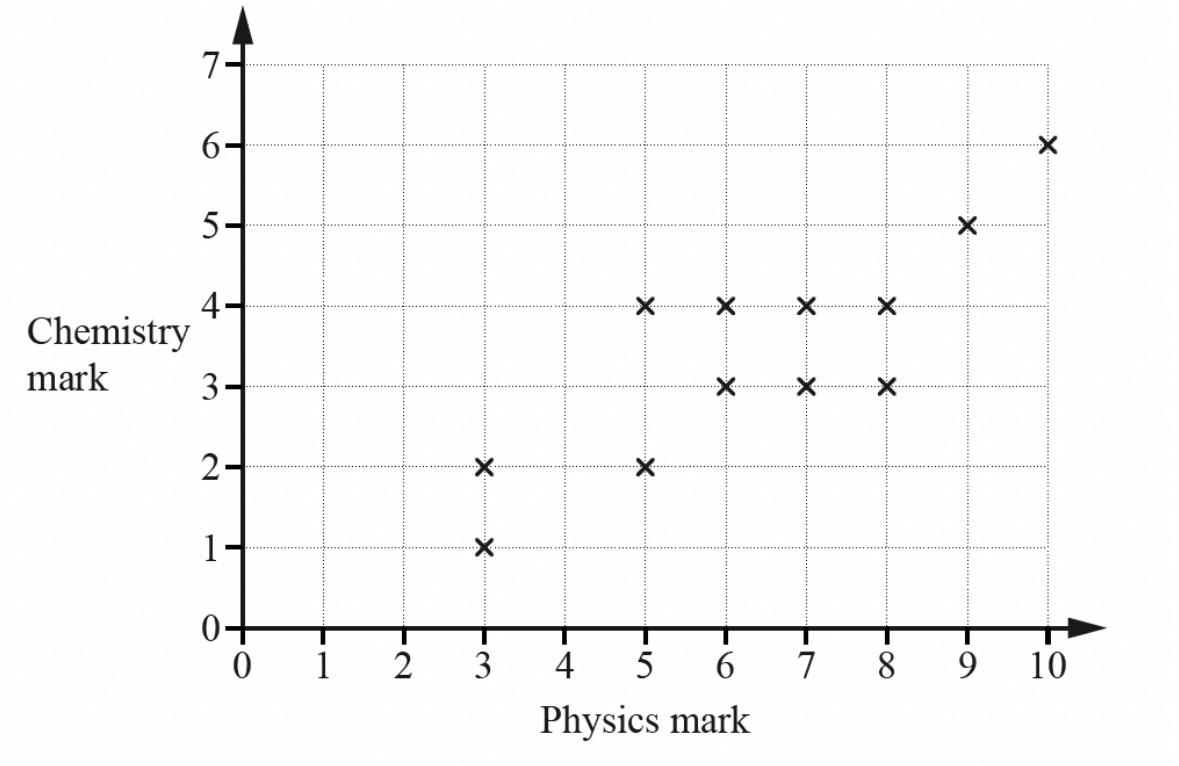
Find an estimate of the value of this house in 2016.

$ .....

(1 mark)

14 The scatter diagram shows the physics mark and the chemistry mark for each of 12

students.



i) What type of correlation is shown in the scatter diagram?

[1]

ii) On the scatter diagram, draw a line of best fit.

[1]

iii) Find an estimate of the chemistry mark for another student who has a physics mark of 4.

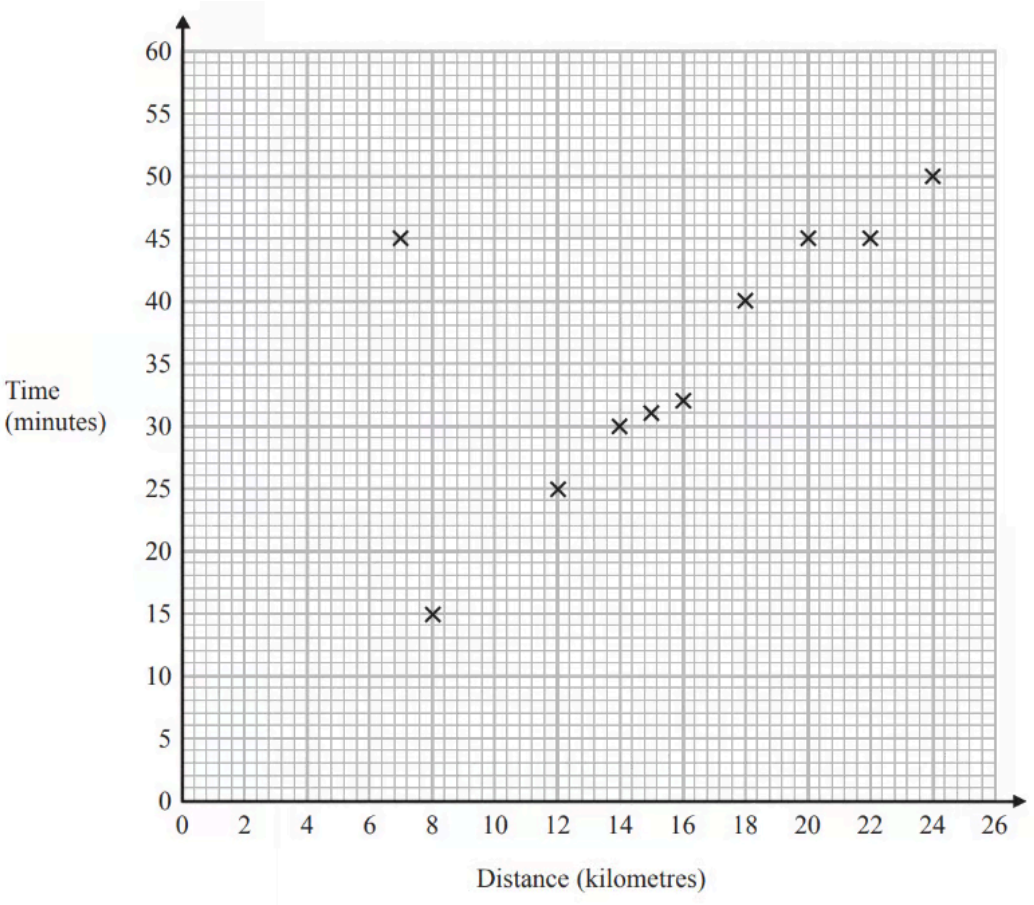
[1]

(3 marks)

Hard Questions

1 (a) A delivery driver records for each delivery the distance he drives and the time taken.

The scatter graph shows this information.



For another delivery he drives 22 kilometres and takes 50 minutes.

Show this information on the scatter graph.

(1 mark)

(b) What type of correlation does the scatter graph show?

(1 mark)

(c) The driver has to drive a distance of 10 km for his next delivery.

Estimate the time taken for this delivery.

(2 marks)

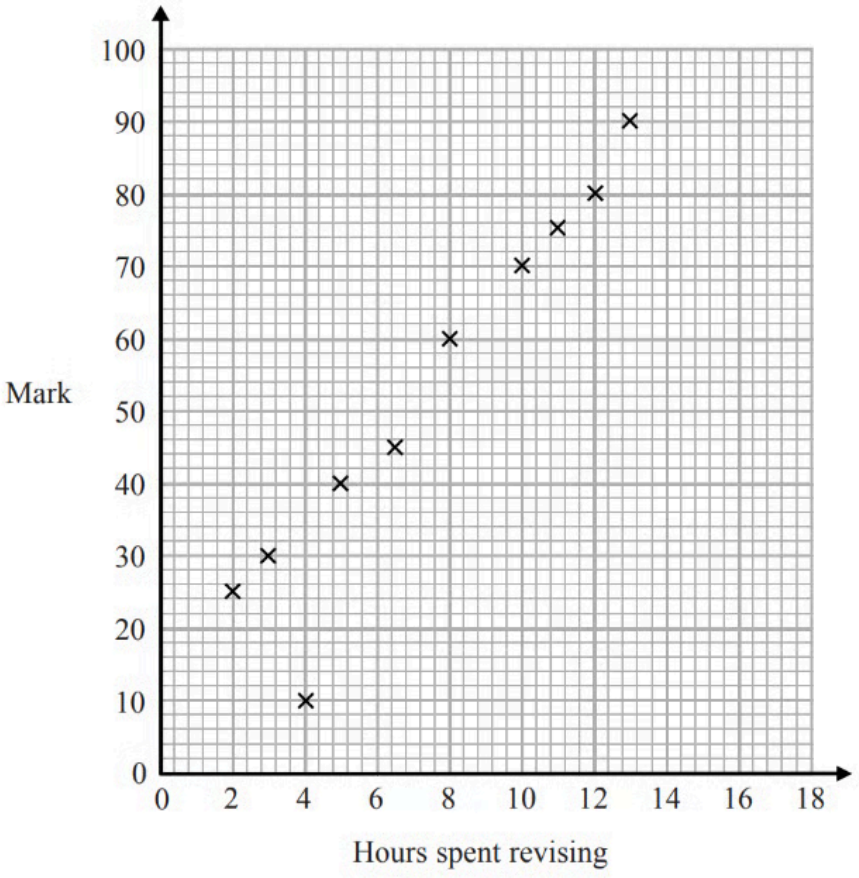
(d) During one of the deliveries, the driver was delayed by road works.

Using the graph write down the time taken for this delivery.

(1 mark)

2 (a) The scatter diagram shows information about 10 students.

For each student, it shows the number of hours spent revising and the mark the student achieved in the Spanish test.



One of the points is an outlier.

Write down the coordinates of the outlier.

(1 mark)

(b) For all the **other** points

i) draw the line of best fit,

[1]

ii) describe the correlation.

[1]

(2 marks)

(c) A different student studies for 9 hours.

Estimate the mark gained by this student.

(1 mark)

(d) The Spanish test was marked out of 100

Lucia says,

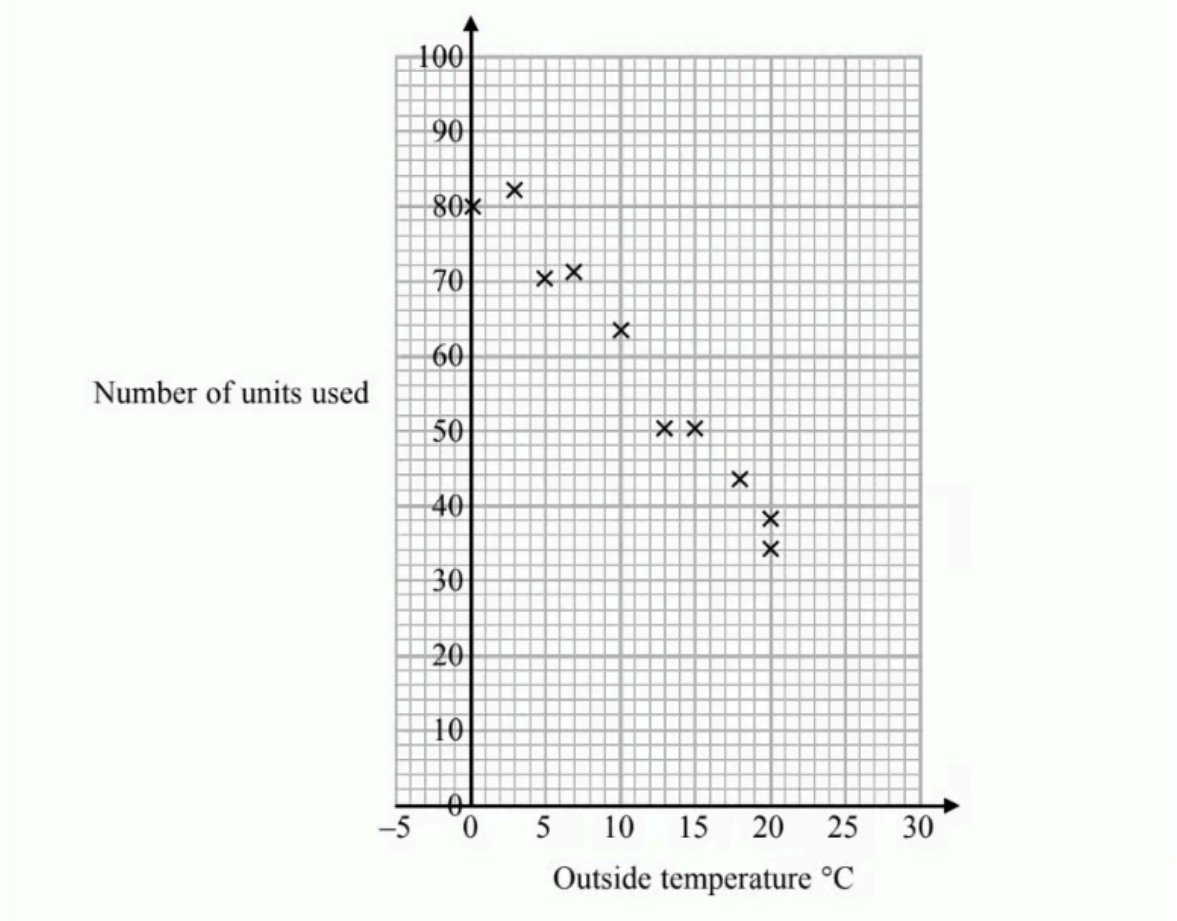
"I can see from the graph that had I revised for 18 hours I would have got full marks."

Comment on what Lucia says.

(1 mark)

3 (a) In a survey, the outside temperature and the number of units of electricity used for heating were recorded for ten homes.

The scatter diagram shows this information.



Molly says,

"On average the number of units of electricity used for heating decreases by 4 units for each °C increase in outside temperature."

Is Molly right?
Show how you get your answer.

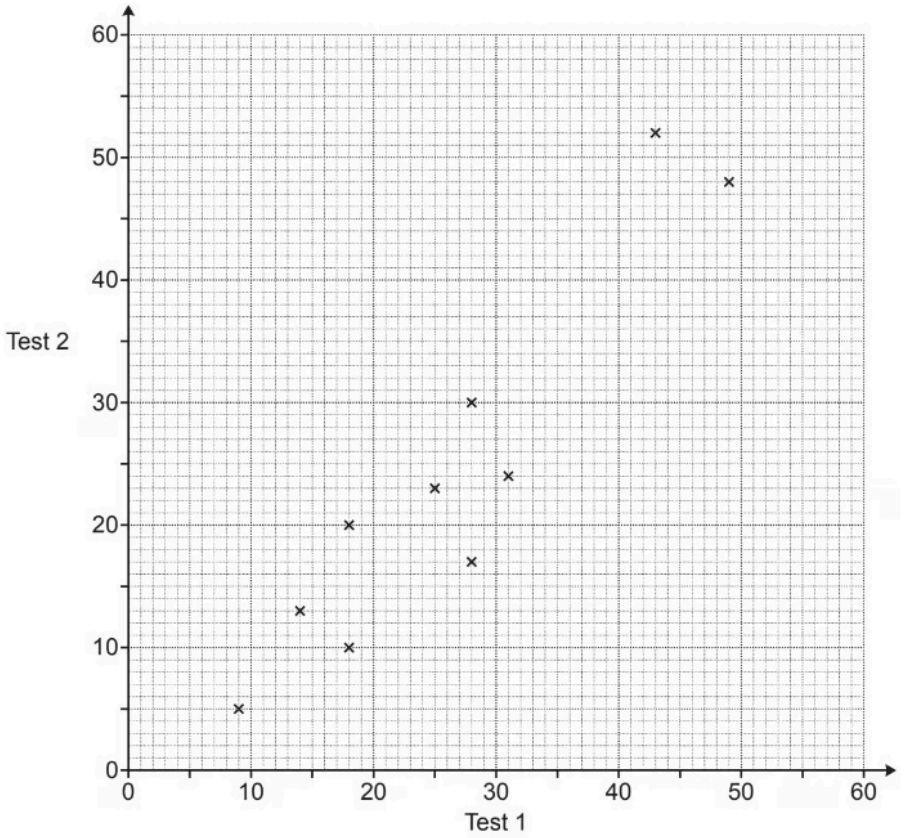
(3 marks)

(b) You should **not** use a line of best fit to predict the number of units of electricity used for heating when the outside temperature is 30 °C.

Give one reason why.

(1 mark)

4 (a) 12 students take two tests.
Each test is out of 60.
The scatter diagram shows the results for 10 of the students.



The table shows the results for the other 2 students.

Test 1	36	38
Test 2	44	41

Plot these results on the scatter diagram.

(1 mark)

(b) Describe the type of correlation shown in the scatter diagram.

(1 mark)

(c) i) Draw a line of best fit on the scatter diagram.

[1]

ii) Another student was absent for Test 2.
The student scored 40 marks on Test 1.

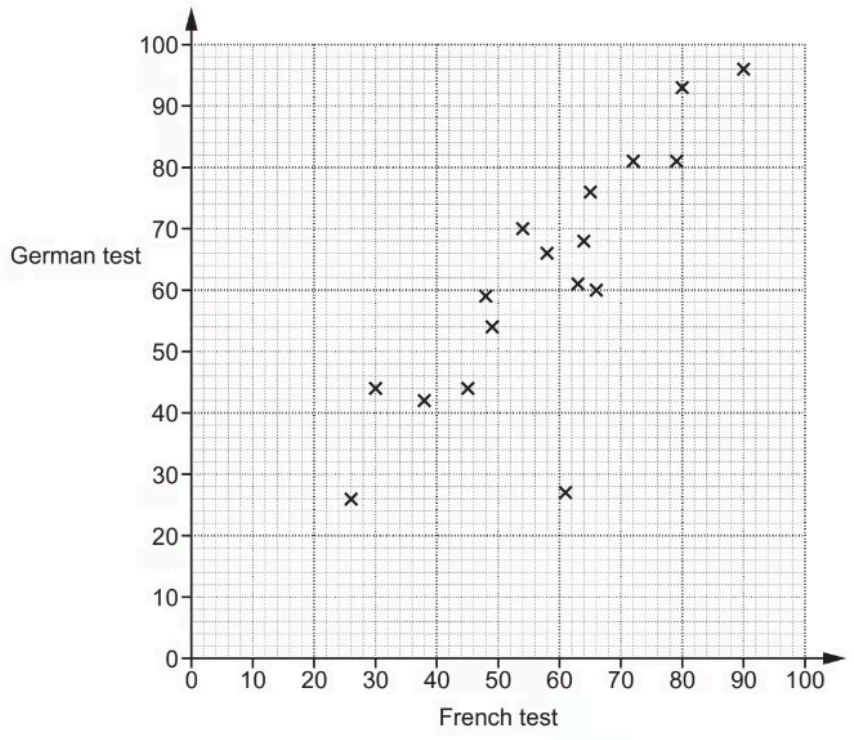
Use your line of best fit to estimate a result for this student on Test 2.

[1]
(1 mark)

(d) Work out the percentage of **the 12 students** whose result on Test 1 is **lower** than their result on Test 2.

(4 marks)

5 (a) The scatter diagram shows the results of 17 students in their French test and their German test.
Both tests are out of 100.



Here are the results of another 4 students.

French	21	75	48	53
German	30	78	46	61

Plot these results on the scatter diagram.

(2 marks)

(b) Describe the type and strength of the correlation shown in this diagram.

(2 marks)

(c) Work out the percentage of the students whose German result was **higher** than their French result.

(4 marks)