

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic

Statistics

Plotting and interpreting scatter graphs

v1.0

Name _____

Materials

For this paper you must have:

- Mathematical instruments

Information

- The marks for questions are shown in brackets

Advice

- In all calculations, show clearly how you work out your answer

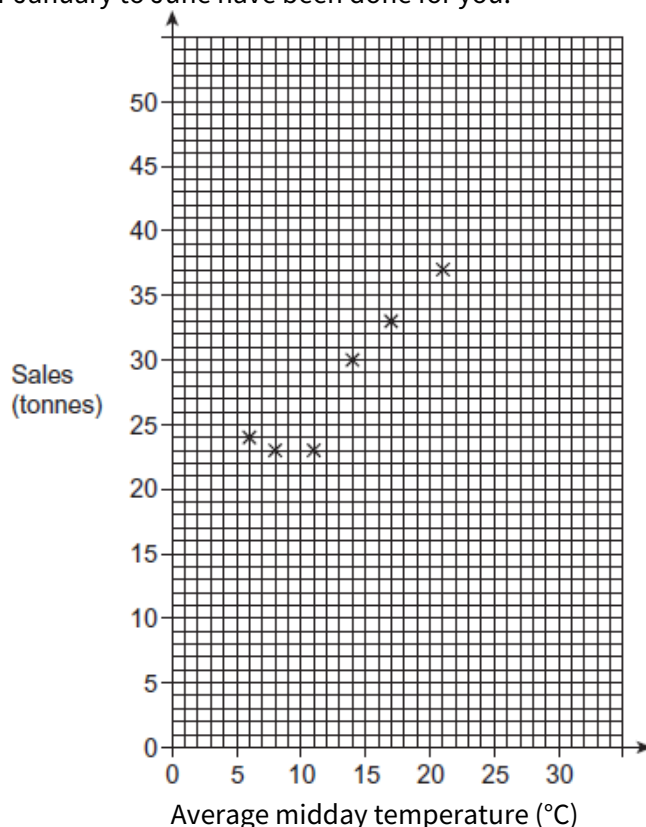
Q1.

A company sells ice cream.

The average midday temperature and the sales for each month in 2011 are shown.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average midday temperature (°C)	8	6	11	14	17	21	22	29	20	14	10	4
Sales (tonnes)	23	24	23	30	33	37	39	47	36	28	22	23

- (a) Complete the scatter diagram by plotting the values for July to December.
The values for January to June have been done for you.



(2)

- (b) In July 2012, the average midday temperature is predicted to be 25 °C.
Use the graph to estimate the sales of ice cream in July 2012.
Show clearly how you obtain your answer.

(2)

- (c) In December 2012, the average midday temperature is predicted to be 5 °C higher than in December 2011.
Should the company increase its production of ice cream for December 2012?
Tick a box.

Yes

☐

No

☐

Give a reason for your answer.

(1)

(Total 5 marks)

Q2.

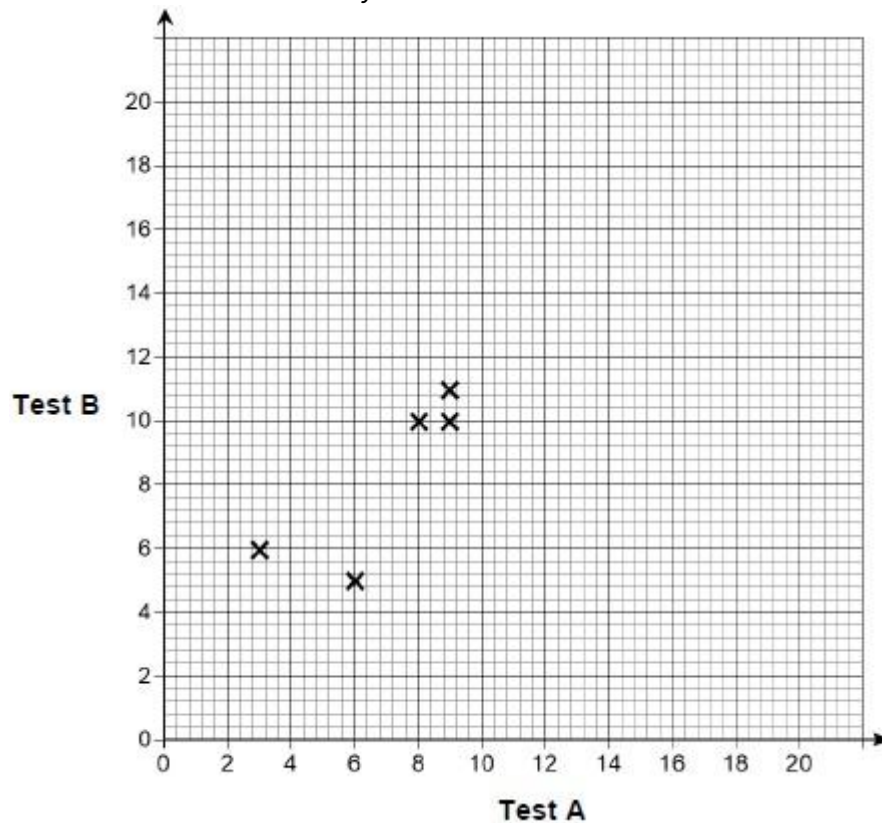
Here are the scores of 10 students in two tests.

Test A	3	6	8	9	9	10	11	12	13	15
Test B	6	5	10	11	10	5	18	17	20	14

(a) What is the median score for **Test A**?

(1)

(b) Plot the scores on the scatter graph.
The first five have been done for you.



(2)

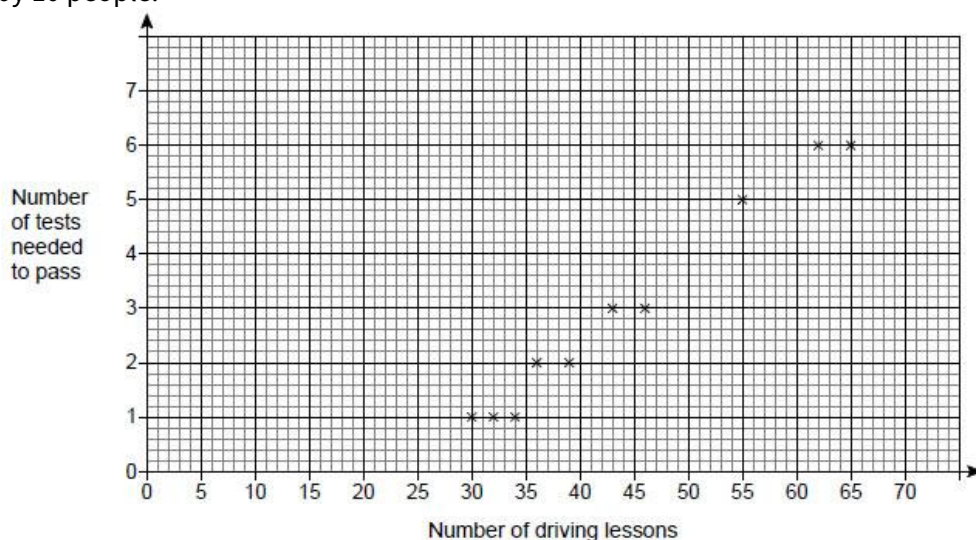
(c) The data for one of the students on **Test B** seems unusual.
On the scatter graph, put a circle around the point that represents this student.
Give a reason for your choice.

(2)

(Total 5 marks)

Q3.

The scatter graph shows the number of driving lessons and the number of tests needed to pass by 10 people.



(a) Describe the correlation.

Circle your answer.

strong positive weak positive weak negative strong negative

(1)

(b) Use a line of best fit to estimate the number of tests needed to pass by a person who has 50 lessons.

(2)

(c) Meera says,

“I can use the trend to predict the number of driving tests needed to pass for any number of driving lessons.”

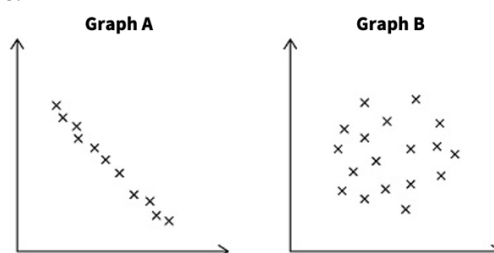
Comment on their statement.

(1)

(Total 4 marks)

Q4.

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	

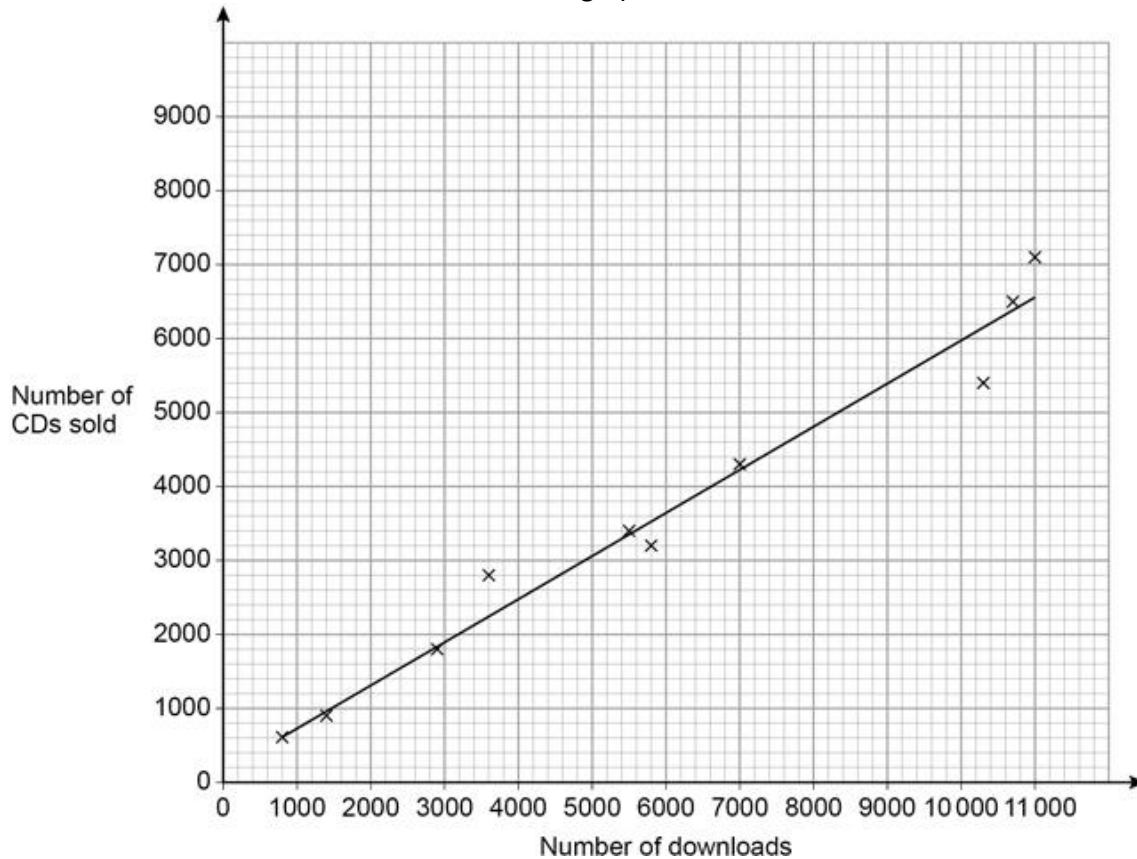
Graph A _____

Graph B _____

(Total 2 marks)

Q5.

A music company releases 10 albums.
The scatter graph shows, for each album,
the number of downloads on the first day
and
the number of CDs sold on the first day.
A line of best fit has been drawn on the scatter graph.



- (a) The scatter graph shows positive correlation.
Describe the relationship between number of downloads and number of CDs sold.

(1)

- (b) The company earns
£2.50 for each download
and
£3 for each CD sold.

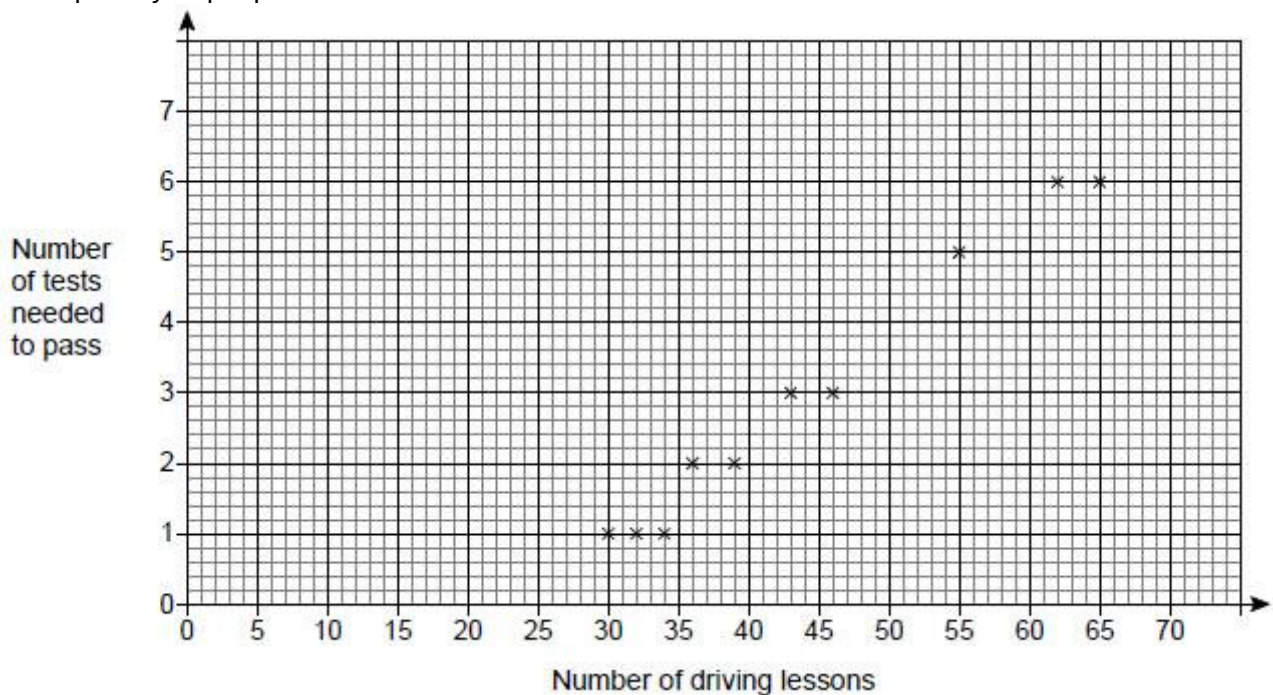
The company releases another album.
On the first day it has 9000 downloads.
Estimate the **total** amount the company earns from downloads and CDs of the album
that day.

(3)

(Total 4 marks)

Q6.

The scatter graph shows the number of driving lessons and the number of tests needed to pass by 10 people.



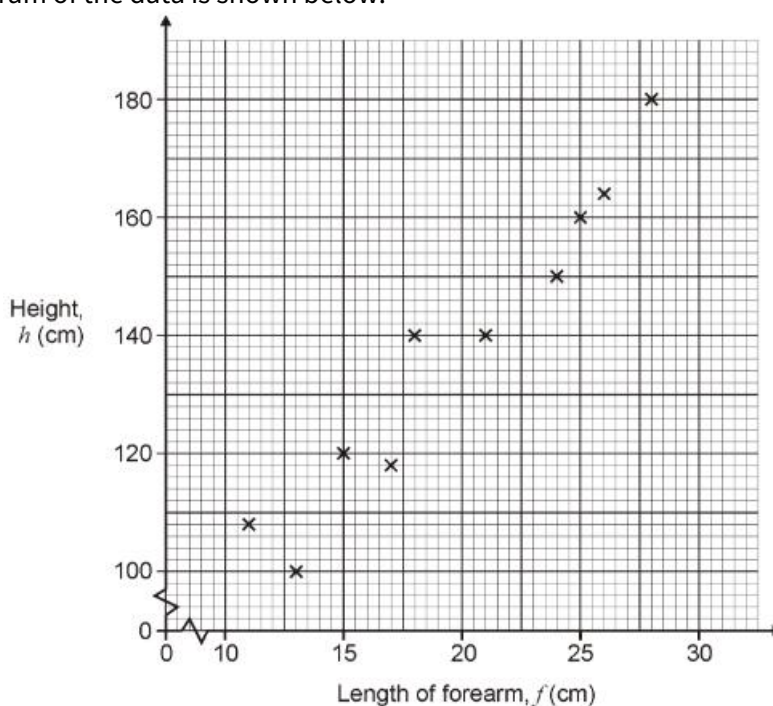
- (a) What proportion of the 10 people passed on their first test? (1)
- (b) Write down the type of correlation shown in the graph. (1)
- (c) Use a line of best fit to estimate the number of tests needed to pass by a person who has 50 lessons. (2)
- (d) Selma says,
"I can use the trend to predict the number of driving tests needed to pass for any number of driving lessons."
Comment on their statement. (1)
- (Total 5 marks)**

Q7.

The table shows the length of the forearm, f , measured in cm, and the height, h , measured in cm, for 10 people.

Person	Length of forearm, f (cm)	Height, h (cm)
A	11	108
B	25	160
C	18	140
D	28	180
E	15	120
F	21	140
G	17	118
H	26	164
I	13	100
J	24	150

A scatter diagram of the data is shown below.



- (a) Another person has a height of 145 cm
Use the scatter diagram to estimate the length of their forearm.
Show clearly how you found your estimate.

(2)

- (b) An approximate formula connecting h and f is $h = 4 \times f + 60$
Choose a person from the table and test the formula.
Person chosen ____
Does the formula work **exactly**?
Tick a box.

☐

Yes

☐

No

Show how you worked out your answer.

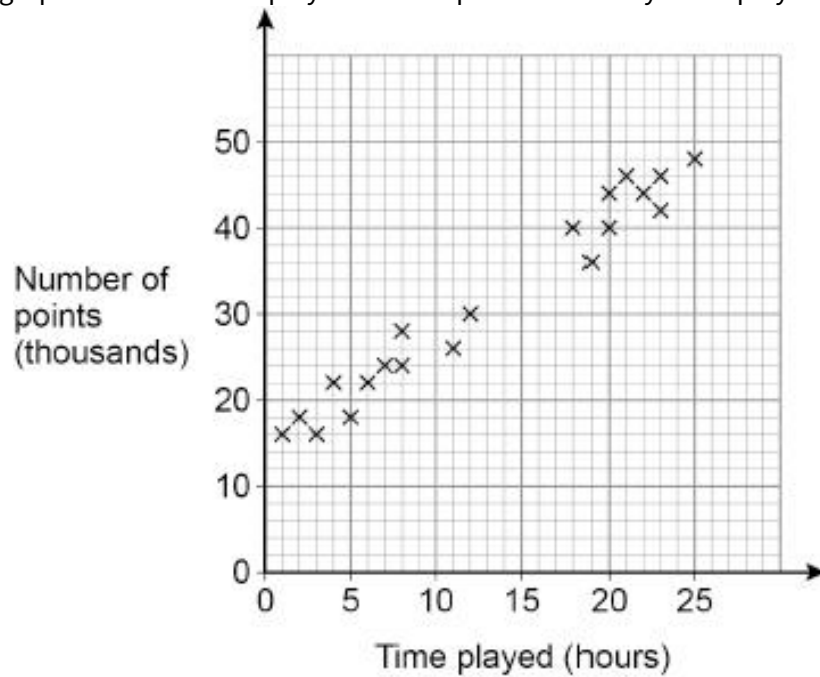
(2)

(Total 4 marks)

Q8.

Players score points in a game.

The scatter graph shows the time played and the points scored by some players.



- (a) Circle the strength and type of correlation shown.
weak positive strong positive weak negative strong negative

(1)

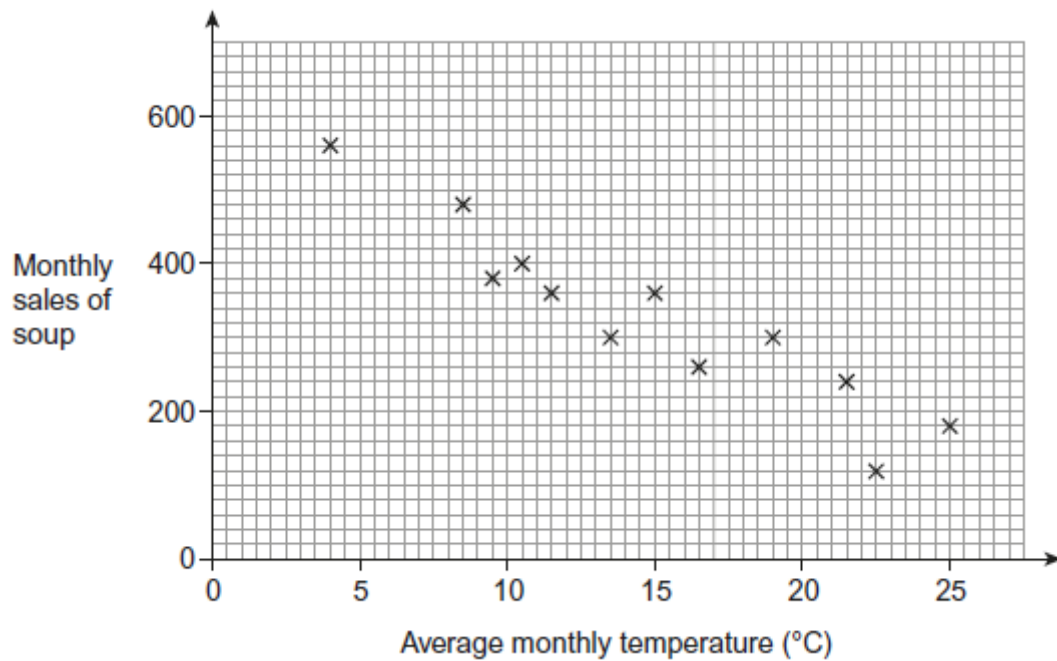
- (b) Players get one extra life for every 2000 points they score.
Jonah plays the game for 15 hours.
Use a line of best fit to estimate the number of extra lives he gets.

(3)

(Total 4 marks)

Q9.

A café owner records the average monthly temperature and the monthly sales of soup over a year.



- (a) The scatter graph shows negative correlation.
Write down the relationship between average monthly temperature and monthly sales of soup.

(1)

- (b) The average monthly temperature for the next month is predicted to be 7°C
Use the graph to estimate the sales of soup that month.
You **must** show your working.

(2)

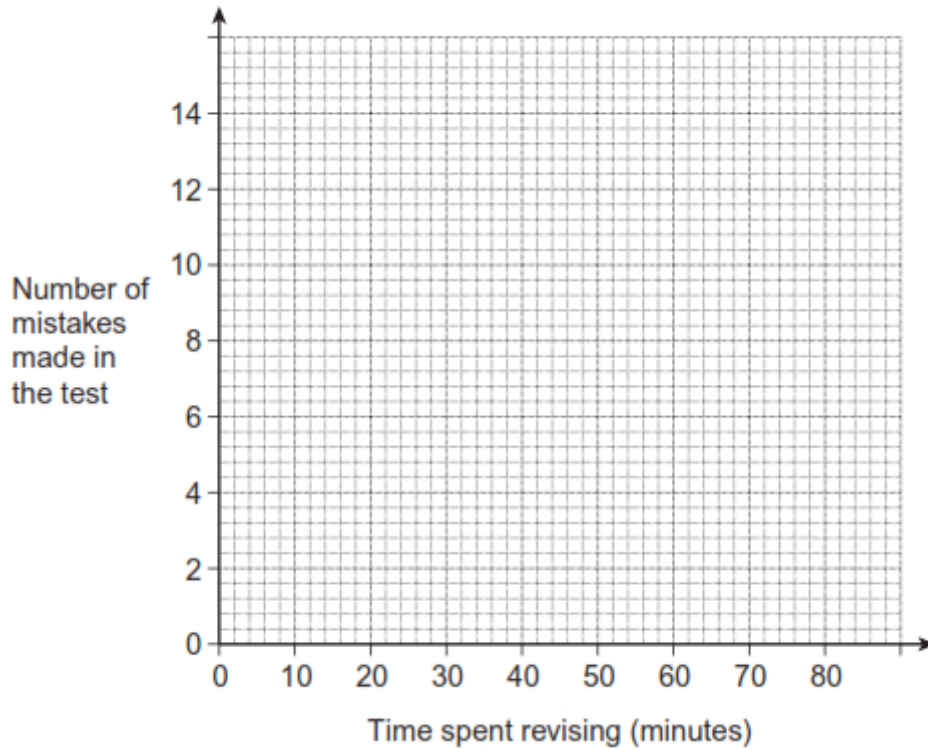
(Total 3 marks)

Q10.

Six pupils took a spelling test.

Time spent revising (minutes)	10	15	35	40	45	50
Number of mistakes made in the test	14	11	5	5	2	3

(a) Plot the data on the scatter diagram.



(2)

(b) A pupil revised for 25 minutes.
Use a line of best fit to estimate the number of mistakes he made.

(2)

(c) Another pupil in the class revised for 75 minutes.
Did she make any mistakes?
Tick a box.

Yes ☐

No ☐

Cannot tell ☐

(1)

(Total 5 marks)

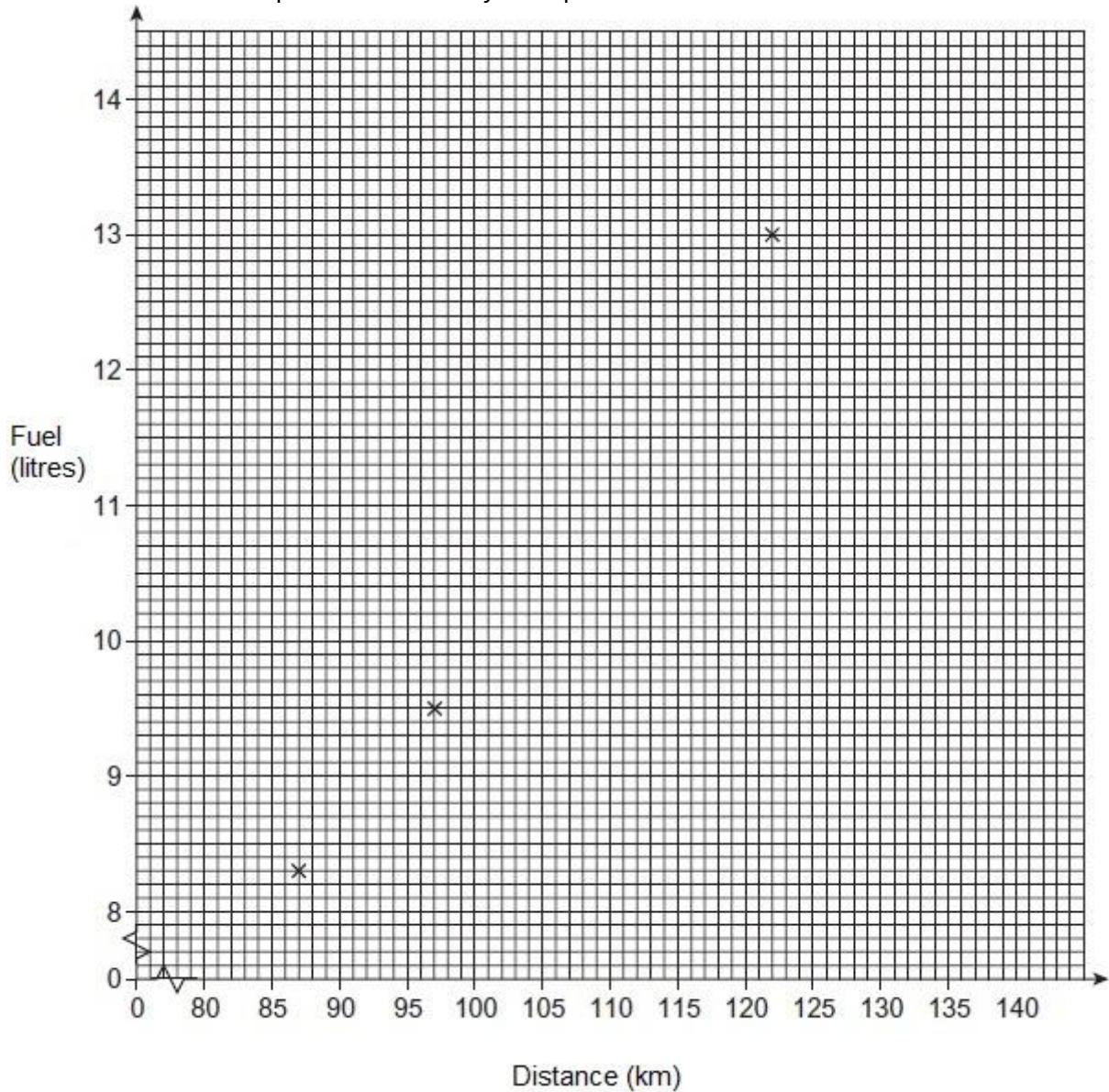
Q11.

Each day a taxi driver records the distance he travels.
He also records the amount of fuel his car uses.

Distance (km)	87	122	97	90	105	100	135	116
Fuel (litres)	8.3	13.0	9.5	9.4	11.2	9.9	14.0	12.0

- (a) Complete the scatter graph.

The first three points have already been plotted.



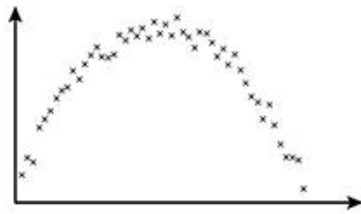
- (b) Draw a line of best fit. (2)
- (c) Use your line of best fit to predict the fuel used to travel 110 km. (1)

(1)
(Total 4 marks)

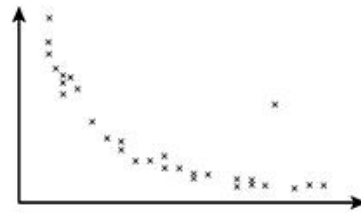
Q12.

Here are four scatter graphs.

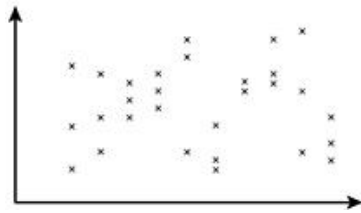
Graph A



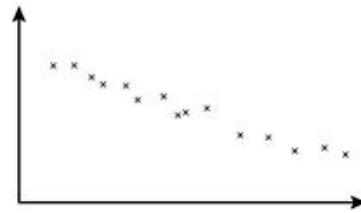
Graph B



Graph C



Graph D



Which graph has **one** outlier?
Circle your answer.

A

B

C

D

(Total 1 mark)

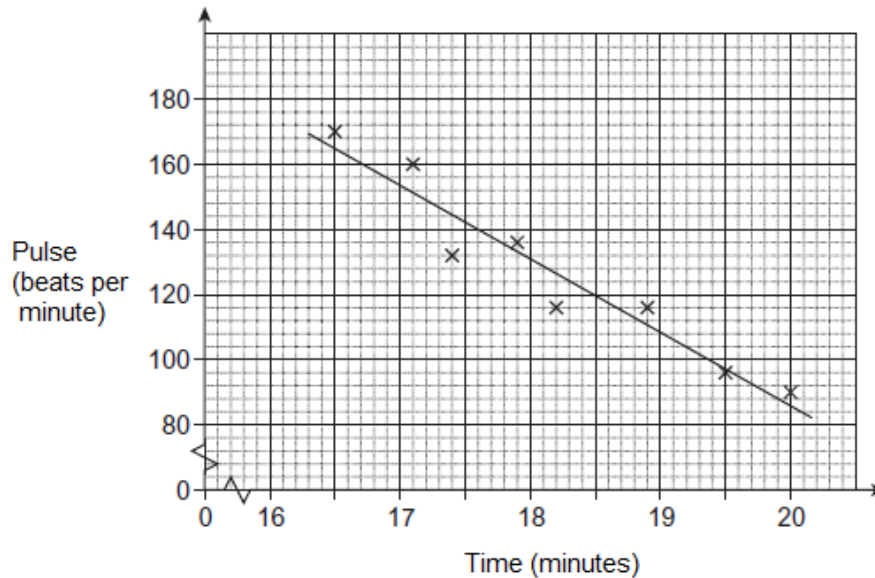
Q13.

Julia goes for the same run every day.

After each run she records her time and measures her pulse.

The scatter graph shows her results for 8 days.

A line of best fit has been drawn.



(a) What type of correlation does the graph show?

(1)

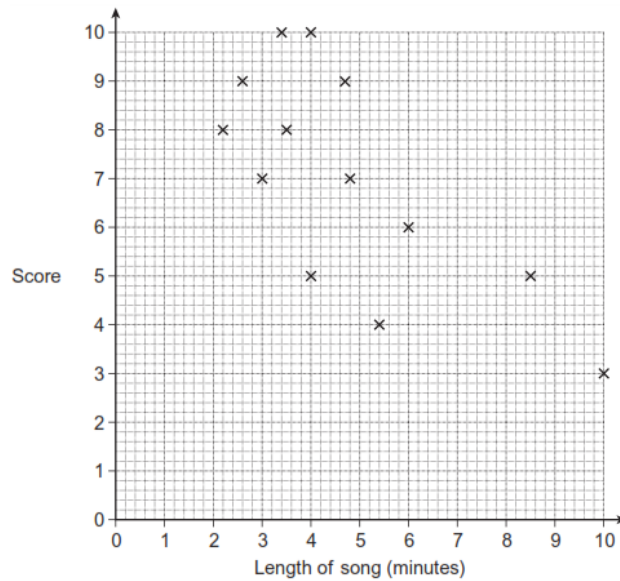
(b) She completes her next run in 18.5 minutes.
Use the line of best fit to estimate her pulse.

(1)

(Total 2 marks)

Q14.

Freddie and Priya both like music. Freddie gives some songs a score out of 10. The scatter diagram shows his results.



- (a) What fraction of the songs is given full marks?

(1)

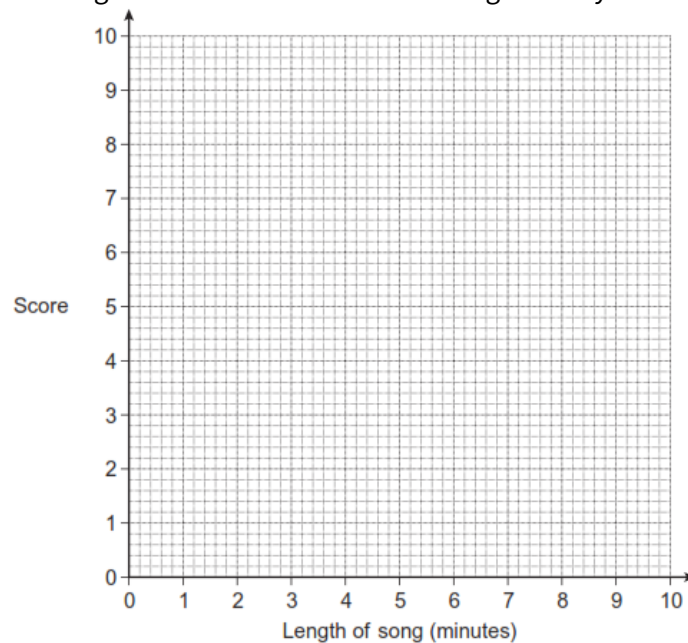
- (b) How long is the song that is given a score of 4?
Give your answer in minutes and seconds.

(2)

- (c) Freddie has this hypothesis.
He says, "The shorter the song the more I like it".
Comment on his hypothesis.

(1)

- (d) Priya also gives some songs a score out of 10.
She has a different hypothesis. She says, "The longer the song the more I like it".
Her hypothesis is strongly supported by the data she collects.
Plot points on the grid to show how her scatter diagram may look.



(1)

(Total 5 marks)

Q15.

Olivia usually drives home from work.
Some of her journey times are shown.

Week 1

	Mon	Tue	Wed	Thu	Fri
Leaves work (pm)	5.13	5.24	5.30	5.28	5.02
Arrives home (pm)	5.55	6.03	6.15	6.06	5.32
Time taken (minutes)	42	39	45	38	30

Week 2

	Mon	Tue	Wed	Thu	Fri
Leaves work (pm)	5.15	5.18	5.20	5.07	5.10
Arrives home (pm)	5.49	5.50	5.57	5.40	
Time taken (minutes)		32	37	33	121

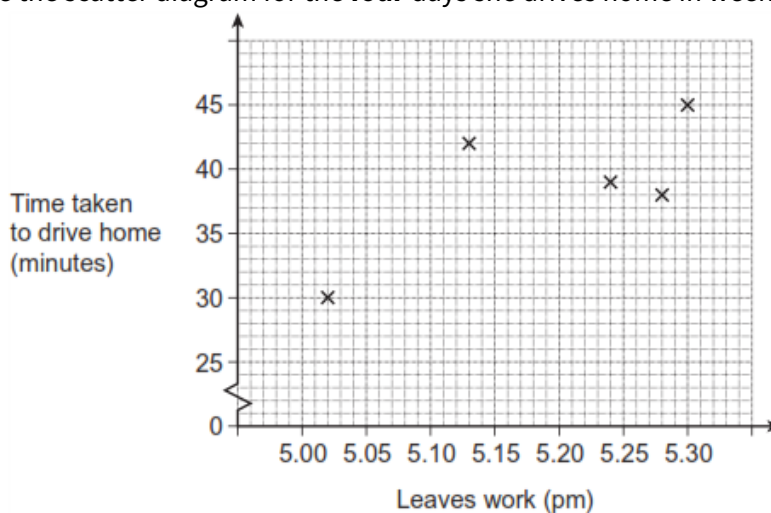
(a) How long did it take Olivia to drive home on Monday of week 2?

(1)

(b) On Friday of week 2 Olivia walked home.
What time did she arrive home?

(2)

(c) Complete the scatter diagram for the **four** days she drives home in week 2.



(2)

(d) Estimate the time Olivia would have arrived home on Friday of week 2 if she had driven.
Use your scatter diagram to show how you decide.

(3)

(Total 8 marks)

Q16.

A student draws three scatter diagrams.
She draws a line of best fit on each one.

Diagram A

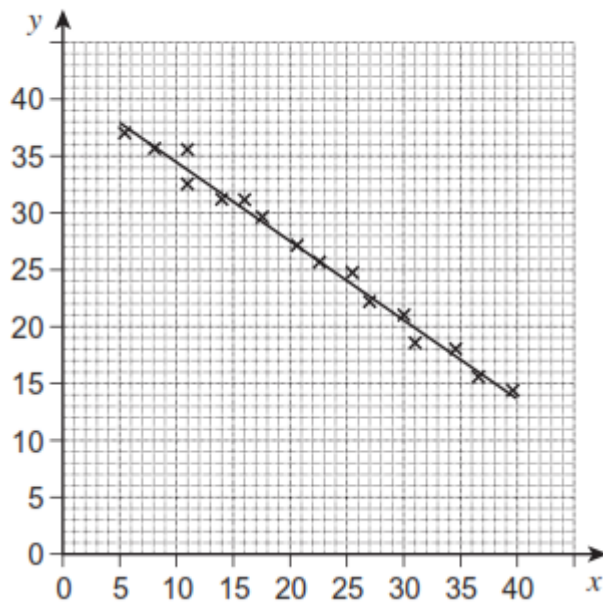


Diagram B

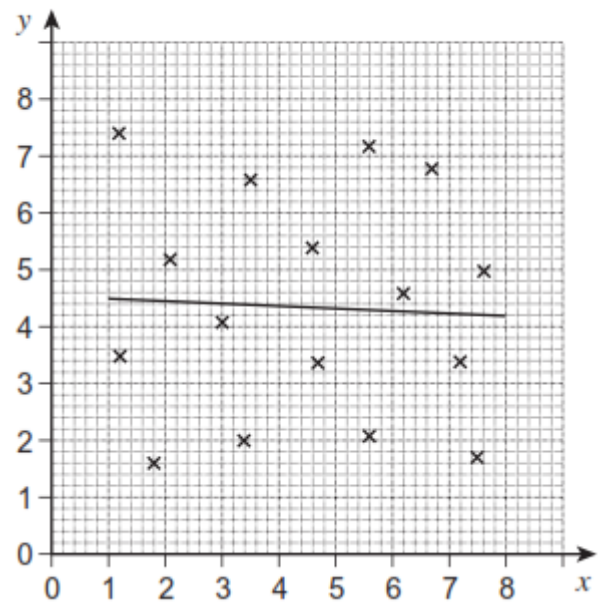
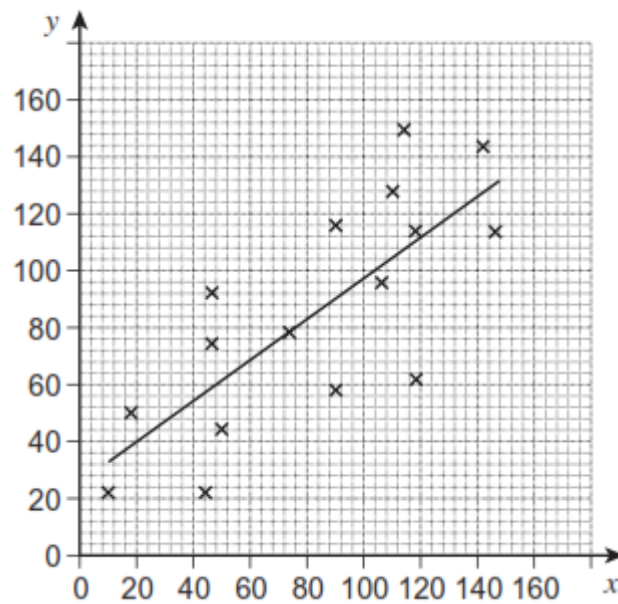


Diagram C



- (a) Which diagram shows the strongest correlation?
Circle your answer.

A B C

(1)

- (b) Which line of best fit should **not** have been drawn?
Give a reason for your answer.

(1)

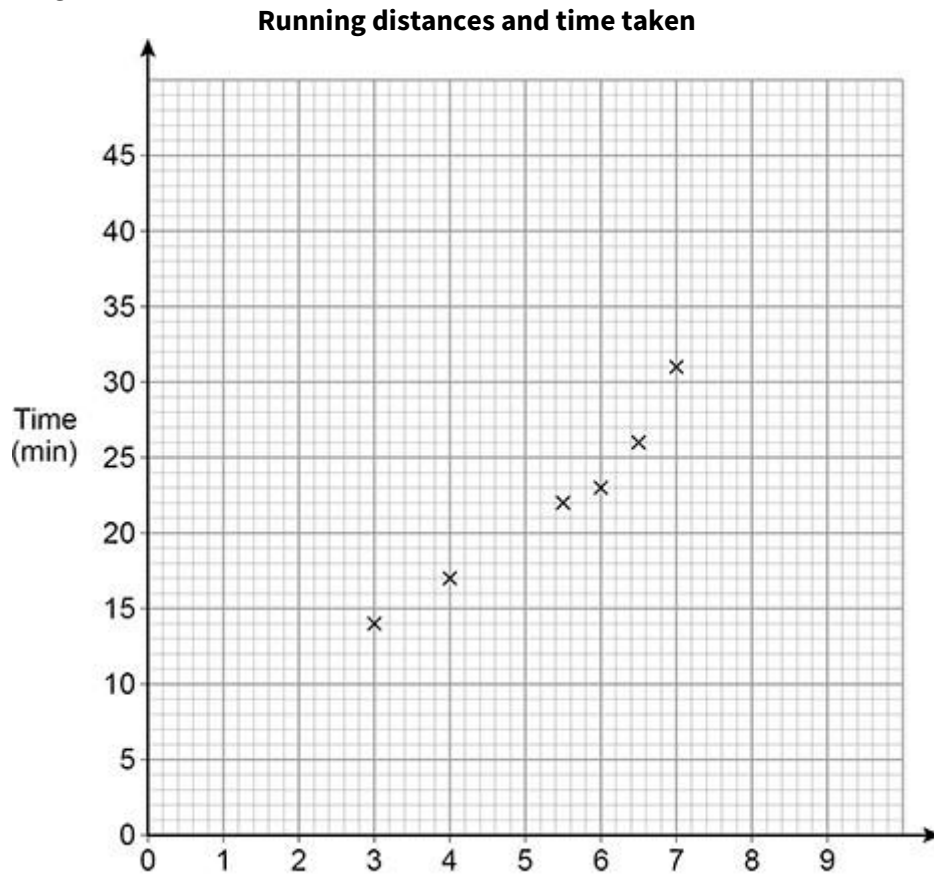
(Total 2 marks)

Q17.

Liz records the distance of some runs and the time each run takes.

Distance (km)	3	4	5.5	6	6.5	7	8	8.5
Time (min)	14	17	22	23	26	31	38	42

The scatter graph shows **some** of the information from the table.



- (a) Complete the graph by adding the missing **label** and plotting the **two** missing points.

(2)

- (b) Describe the correlation shown in the scatter graph.

Type of correlation _____

Strength of correlation _____

(2)

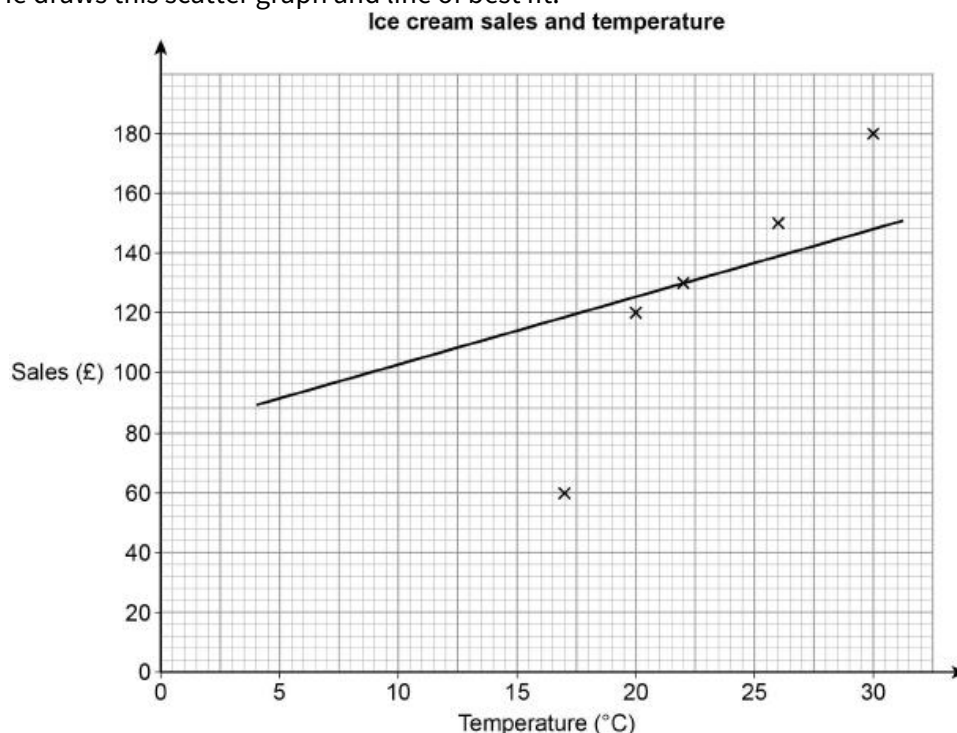
(Total 4 marks)

Q18.

Lee sells ice creams. The table shows the midday temperature and his sales for five days.

	Day 1	Day 2	Day 3	Day 4	Day 5
Temperature (°C)	30	26	17	22	20
Sales (£)	180	150	80	130	120

(a) He draws this scatter graph and line of best fit.



Write down **two** mistakes he has made.

Mistake 1 _____

Mistake 2 _____

(2)

(b) Lee wants to work out the range of the five temperatures.

His calculation is $30 - 20 = 10$

Is his method correct?

Tick a box.

Yes

☐

No

☐

Give a reason to support your answer.

(1)

(c) The table shows Lee's costs.

Ingredients	15% of sales
Fuel	£7 per day

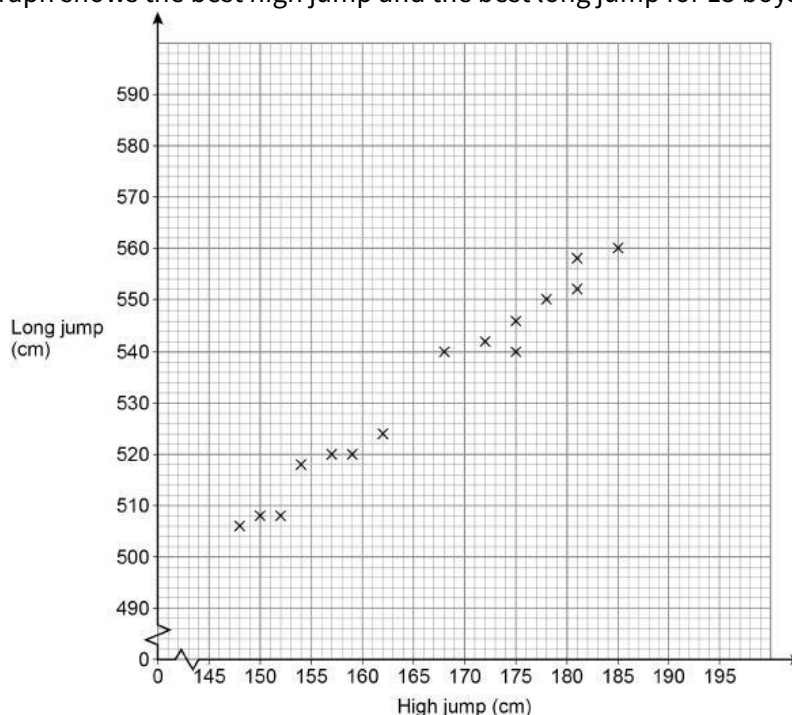
Work out his total profit for the five days.

(5)

(Total 8 marks)

Q19.

The scatter graph shows the best high jump and the best long jump for 15 boys.



(a) Write down the type of correlation shown.

(1)

(b) Liam has a best high jump of 166 cm
Use a line of best fit to estimate his best long jump.

(2)

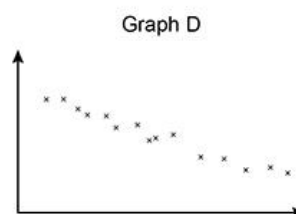
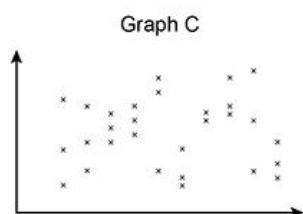
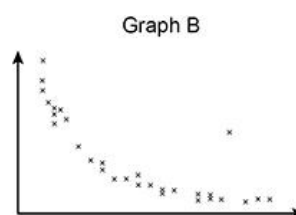
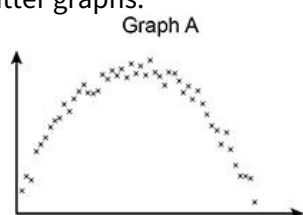
(c) Another boy has a best high jump of 195 cm
Give a reason why you should **not** use a line of best fit to estimate his best long jump.

(1)

(Total 4 marks)

Q20.

Here are four scatter graphs.



For which graph is a straight line of best fit appropriate?
Circle your answer.

A

B

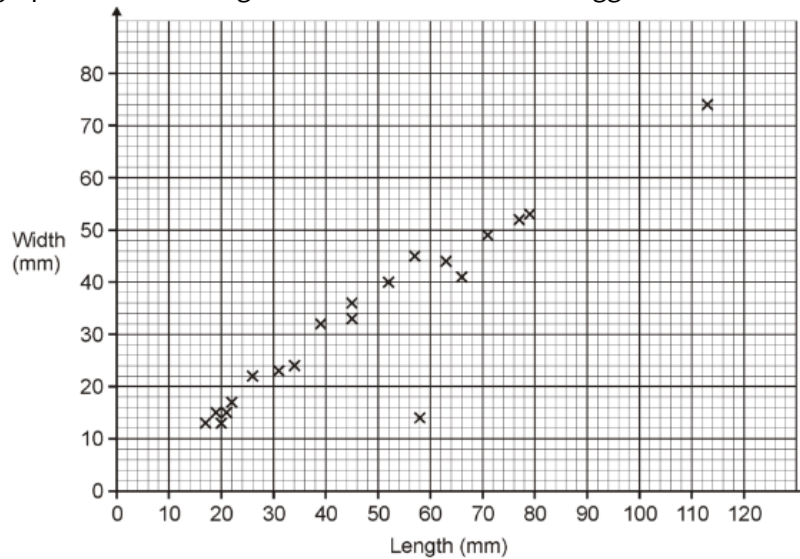
C

D

(Total 1 mark)

Q21.

The scatter graph shows the lengths and widths of 20 birds' eggs.



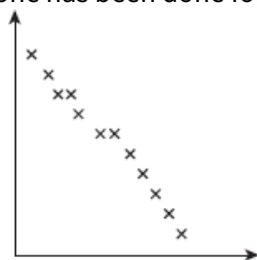
- (a) One of the eggs has a length of 52 mm.
What is its width?

(1)

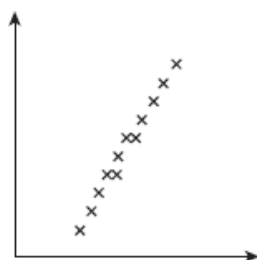
- (b) All the points except one show strong correlation.
Circle the point that does **not** fit this pattern.

(1)

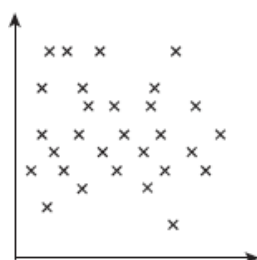
- (c) Match each scatter graph with a description.
The first one has been done for you.



- Strong positive correlation



- Weak positive correlation



- Little or no correlation

- Weak negative correlation

- Strong negative correlation

(2)

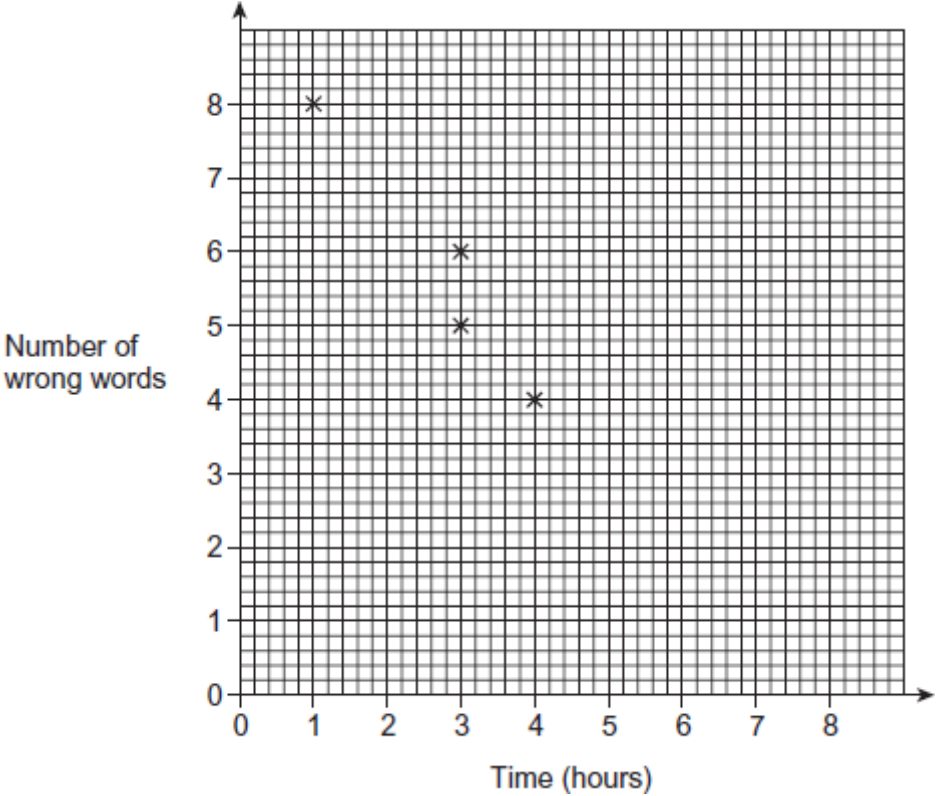
(Total 4 marks)

Q22.

Seven students have to learn some French words.
The table shows the time they spent learning the words and the number of words they got wrong in a test.

Time (hours)	1	3	3	4	6	7	8
Number of wrong words	8	6	5	4	3	2	2

- (a) The first four points have been plotted.
Complete the scatter diagram.

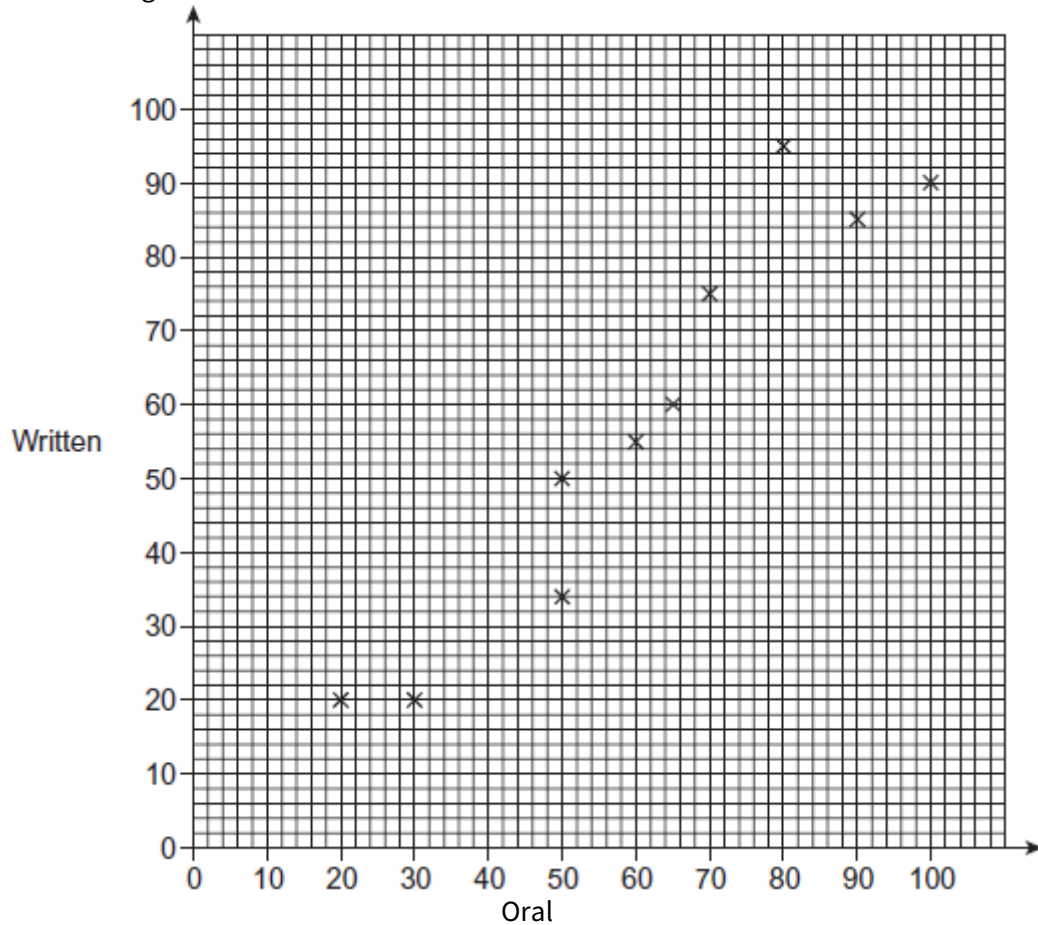


- (b) Describe the relationship shown by the scatter diagram. (1)
- (c) Another student spent 5 hours learning the words.
Use a line of best fit to estimate the number of words he got wrong. (1)
- (d) Ellie has to take the test.
She says,
“If I learn the words for 12 hours, I will definitely not get any wrong.”
Is she correct?
Give a reason for your answer. (2)

(1)
(Total 5 marks)

Q23.

The scatter diagram shows the scores of 10 students in their Oral and Written tests.



- (a) How many students scored 50 in their Oral test?

(1)

- (b) Four **more** students take the same tests.
The table shows their scores.

Oral	10	94	52	84
Written	15	90	46	80

Plot the scores on the scatter diagram.

(2)

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

(1)

- (d) Rob scored 40 in the Oral test.

He was absent for the Written test.

Use your line of best fit to estimate a score for him in the Written test.

(1)

(Total 5 marks)

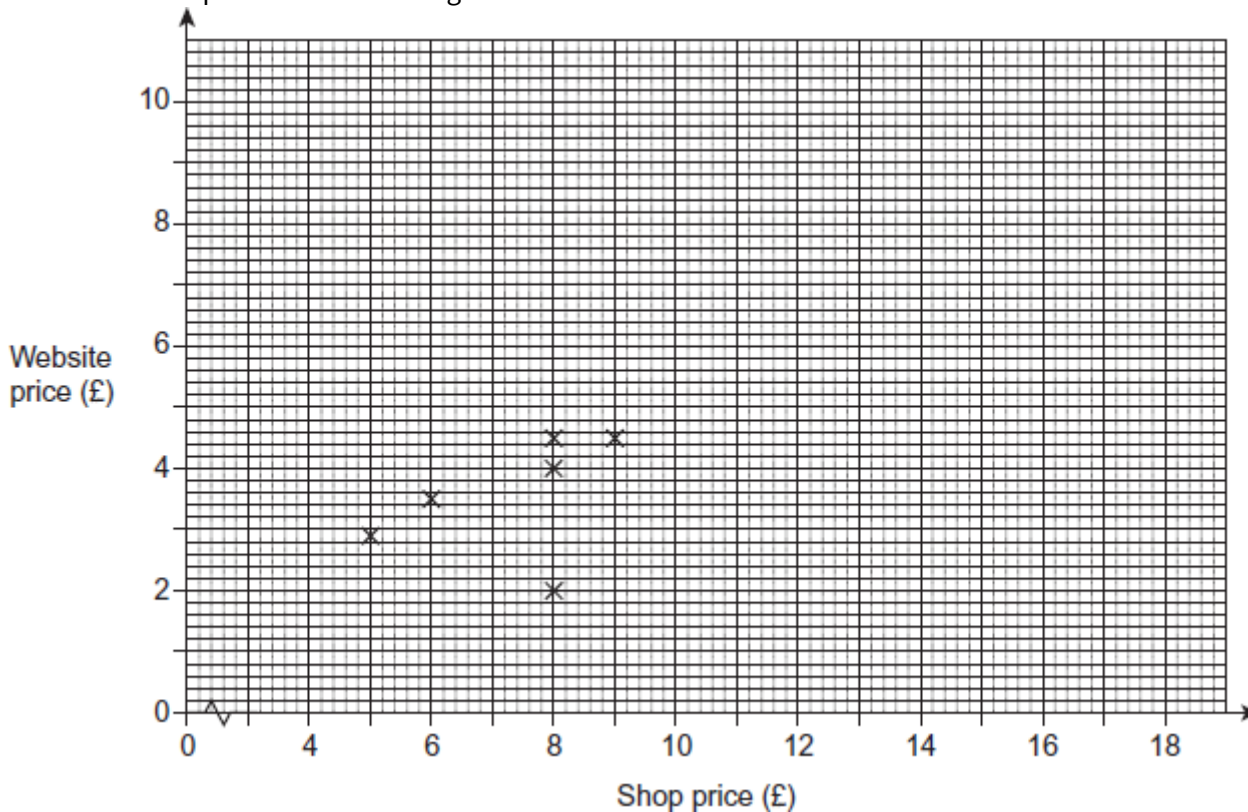
Q24.

Here are the shop and website prices of some books.

Shop price (£)	5	6	8	8	8	9	10	13	13	17
Website price (£)	2.90	3.50	2	4	4.50	4.50	5.40	7.20	8.00	9.80

(a) The first six points have been plotted on this scatter diagram.

Complete the scatter diagram



(2)

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

(1)

(c) A book has a shop price of £ 15.

Estimate its website price.

You **must** show your working.

(2)

(d) The shop manager thinks that one of the prices on the website is incorrect.

Circle this point on the graph.

Give a reason for your answer.

(2)

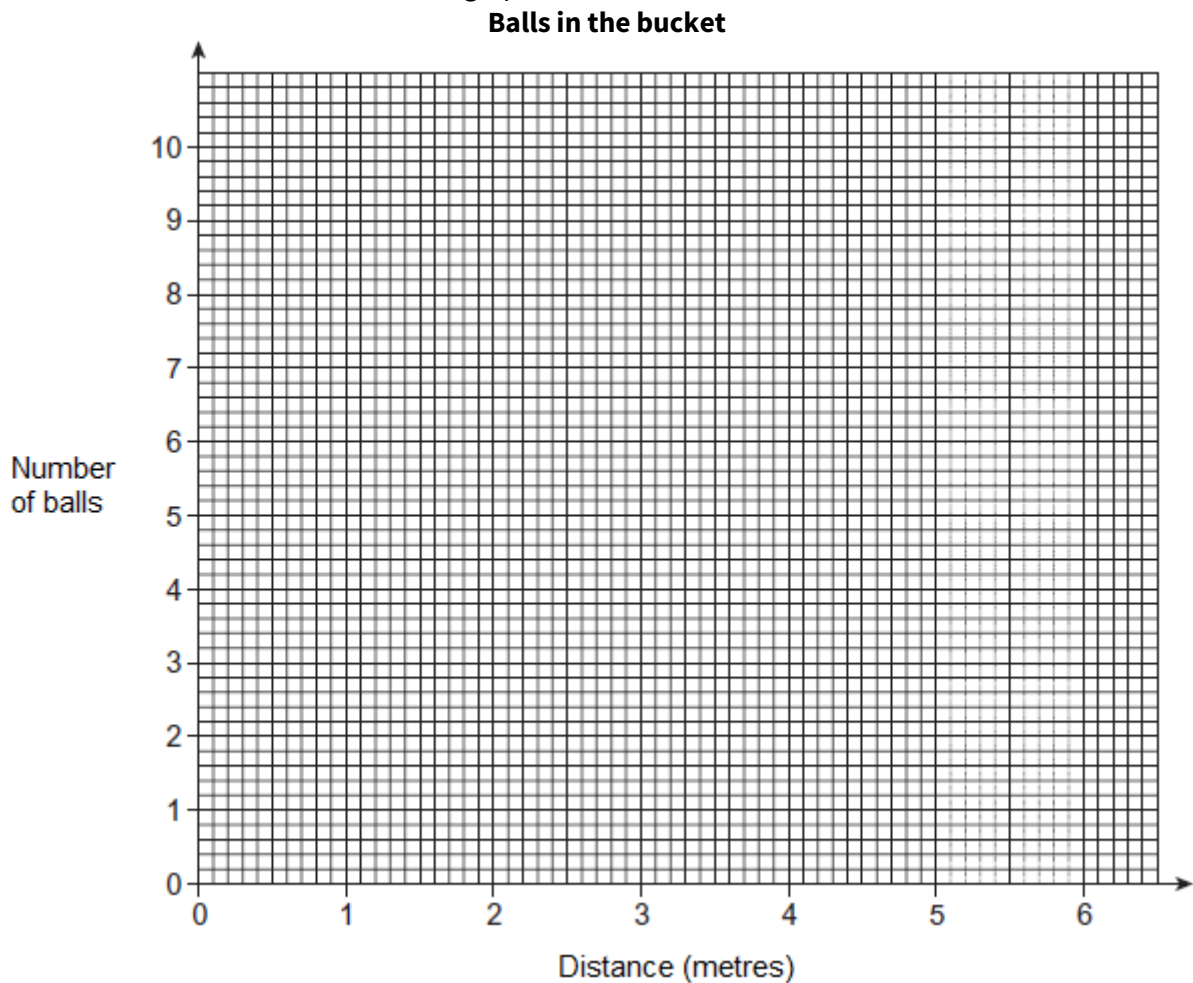
(Total 7 marks)

Q25.

Matthew tried to throw balls into a bucket from different distances.
He threw 10 balls from each distance.
His results are shown in the table.

Distance (metres)	2.0	2.5	3.2	4.1	4.5	5.3	6.0
Number of balls in the bucket	9	7	8	6	2	4	1

(a) Plot these results as a scatter graph.



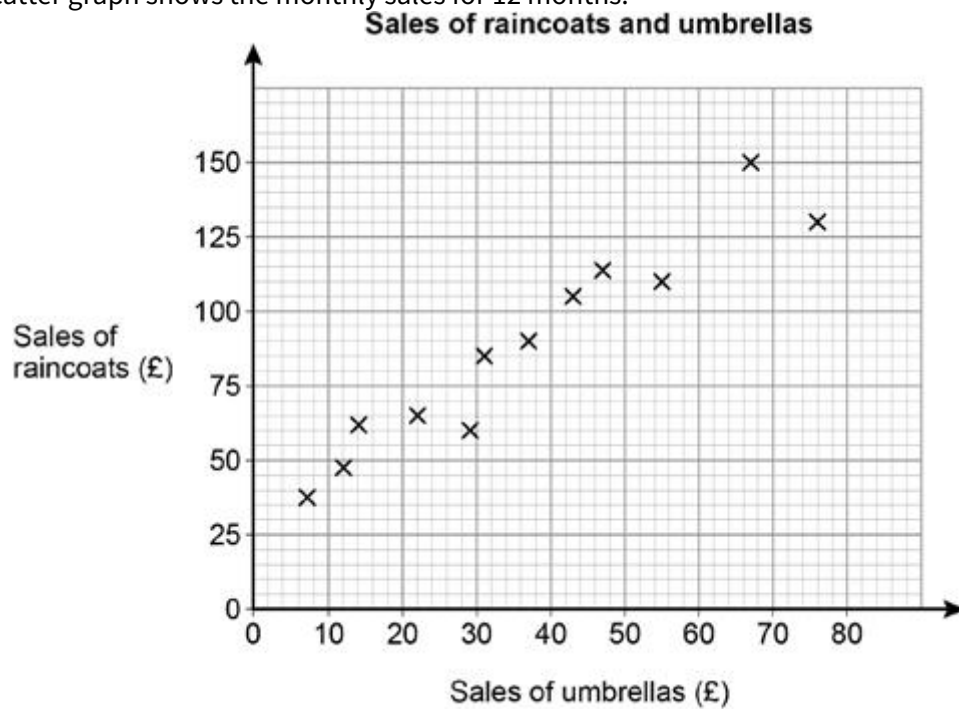
- (b) Draw a line of best fit on your scatter graph. (2)
- (c) What type of correlation is shown? (1)
- (d) Matthew is organising a game at the school fayre. (1)
- Each player will be given 10 attempts to throw a ball into a bucket.
- He wants the average number in the bucket to be 5.
- Use your line of best fit to decide how far the bucket should be from each player.

(2)
(Total 6 marks)

Q26.

A shop sells raincoats and umbrellas.

The scatter graph shows the monthly sales for 12 months.



- (a) Write down the type of correlation shown by the graph.
- (b) The manager expects the sales of umbrellas next month to be £60
Draw a line of best fit to estimate the sales of raincoats next month.

(1)

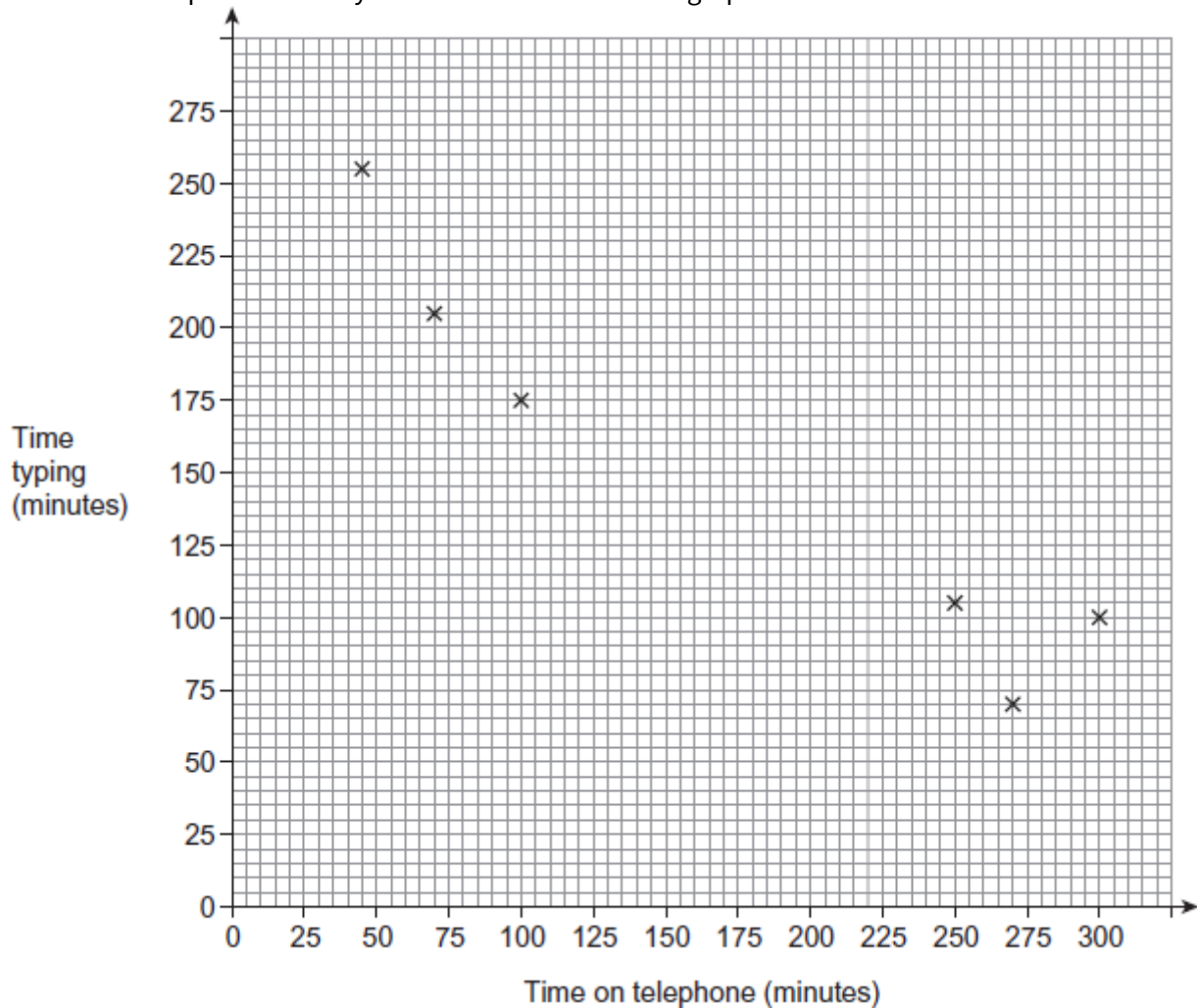
(3)

(Total 4 marks)

Q27.

A secretary types letters and answers the telephone.

The times spent on six days are shown on the scatter graph.



- (a) The table shows the times spent on the next four days.

Time on telephone (minutes)	275	150	125	180
Time typing (minutes)	125	190	225	175

Show these times on the scatter graph.

(2)

- (b) Draw a line of best fit.

(1)

- (c) On another day she spent 200 minutes on the telephone.

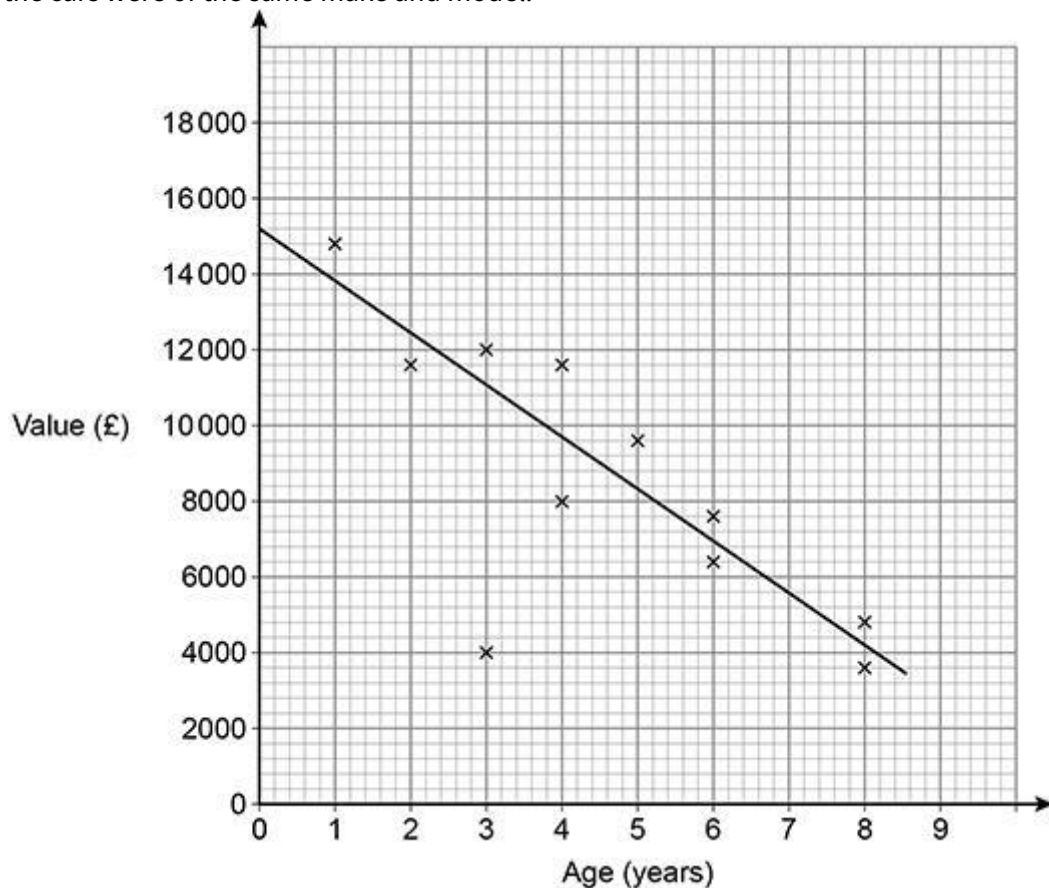
Use your line of best fit to estimate the time she spent typing that day.

(1)

(Total 4 marks)

Q28.

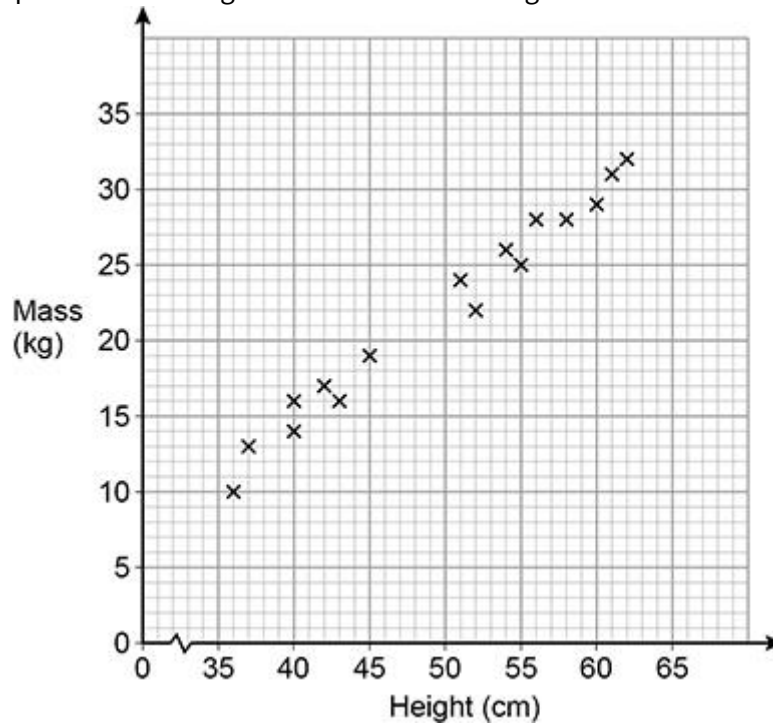
The scatter diagram shows the age and value of some cars in 2019
All the cars were of the same make and model.



- (a) What type of correlation does the scatter graph show? (1)
- (b) Write down the value of the car that was an outlier. (1)
- (c) Use the graph to estimate the value of a new car of this make and model in 2019 (1)
- (d) A car of this make and model had a value of £5600 in 2019
Use the graph to estimate the year in which it was made. (2)
- (Total 5 marks)**

Q29.

The scatter graph shows the height and mass of some dogs.



- (a) The scatter graph shows positive correlation.
Describe the relationship between the height and mass of the dogs.
- (b) Use a line of best fit to estimate the mass of a dog with height 48 cm

(1)

(2)

(Total 3 marks)