

# Scatter Graphs - Worksheet

## Skill

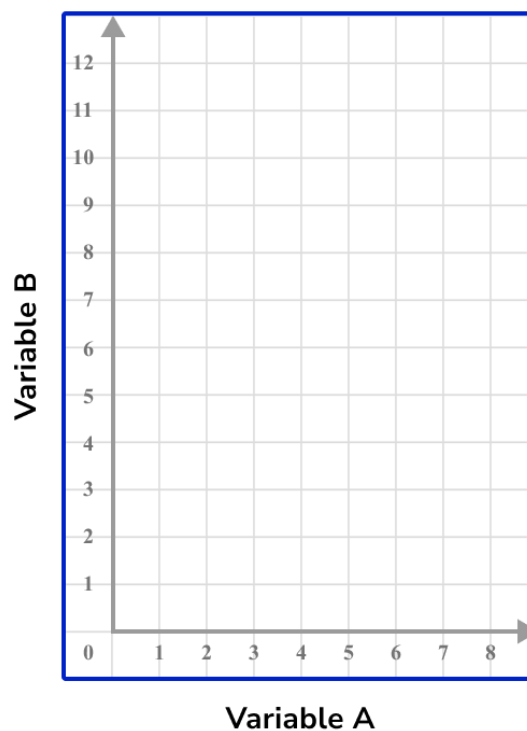
### Group A – Scatter graphs with simple unit step scales.

1) Here is a table containing bivariate data.

Subject	1	2	3	4	5	6	7	8
Variable A	7	2	5	6	2	4	1	4
Variable B	2	9	4	5	12	6	10	7

- Plot a scatter graph for the data in the table using the axes provided.
- Draw an estimated line of best fit on your scatter graph.
- Describe the relationship between variable A and variable B.

A scatter graph showing the relationship between variable A and variable B



2) Here is a table containing bivariate data.

Subject	1	2	3	4	5	6	7	8
Variable A	6	11	14	2	11	4	1	10
Variable B	7	5	8	1	8	4	5	10

- Using squared paper, plot a scatter graph for the data in the table.
- Draw an estimated line of best fit on your scatter graph.
- Describe the relationship between variable A and variable B.

## Scatter Graphs - Worksheet

3) Here is a table containing bivariate data.

Subject	1	2	3	4	5	6	7	8
Variable A	2	6	10	4	7	9	4	9
Variable B	4	10	14	6	12	15	7	11

- Using squared paper, plot a scatter graph for the data in the table.
- Draw an estimated line of best fit on your scatter graph.
- Describe the relationship between variable A and variable B.

### Group B – Scatter graphs with scales of varying step length

1) Here is a table containing bivariate data.

Subject	1	2	3	4	5	6	7	8
Variable A	9	2	5	10	9	1	7	7
Variable B	65	30	30	55	70	15	50	40

- Plot a scatter graph for the data in the table using the axes provided.
- Draw an estimated line of best fit on your scatter graph.
- Describe the relationship between variable A and variable B.

2) Here is a table containing bivariate data.

Subject	Variable A	Variable B
1	35	6
2	160	19
3	110	24
4	95	17
5	10	9
6	20	16
7	90	21
8	55	14

- Using squared paper, plot a scatter graph for the data in the table.
- Draw an estimated line of best fit on your scatter graph.
- Describe the relationship between variable A and variable B.

## Scatter Graphs - Worksheet

3) Here is a table containing bivariate data.

Subject	1	2	3	4	5	6	7	8
Variable A	18	24	20	23	17	16	25	20
Variable B	65	10	35	45	45	70	20	50

- Using squared paper, plot a scatter graph for the data in the table.
- Draw an estimated line of best fit on your scatter graph.
- Describe the relationship between variable A and variable B.

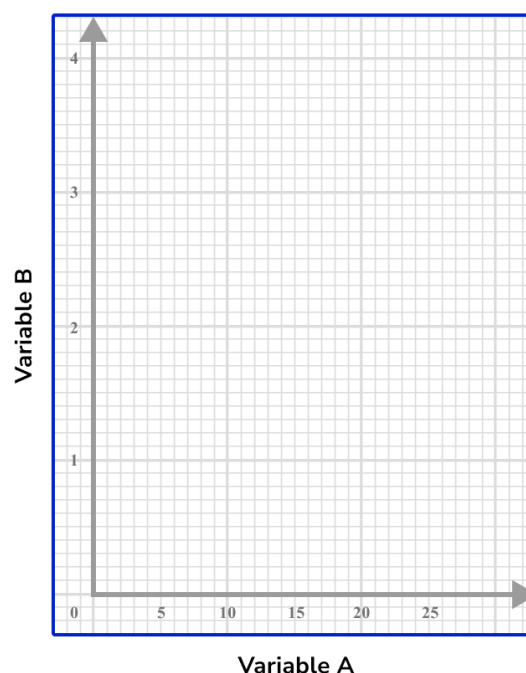
### Group C – Scatter graphs with scales of varying step length (inc. broken axes)

1) Here is a table containing bivariate data.

Subject	1	2	3	4	5	6	7	8
Variable A	5	25	19	8	13	19	23	15
Variable B	2.8	0.4	1.5	3.8	2.6	3	1.4	1.1

- Plot a scatter graph for the data in the table using the axes provided.
- Draw an estimated line of best fit on your scatter graph.
- Describe the relationship between variable A and variable B.

A scatter graph showing the relationship between variable A and variable B



## Scatter Graphs - Worksheet

2) Here is a table containing bivariate data.

Subject	1	2	3	4	5	6	7	8
Variable A	4.4	7.9	1.4	3.6	0.7	7.0	2.5	5.3
Variable B	46	60	40	49	37	53	44	52

- Using graph paper, plot a scatter graph for the data in the table.
- Draw an estimated line of best fit on your scatter graph.
- Describe the relationship between variable A and variable B.

3) Here is a table containing bivariate data.

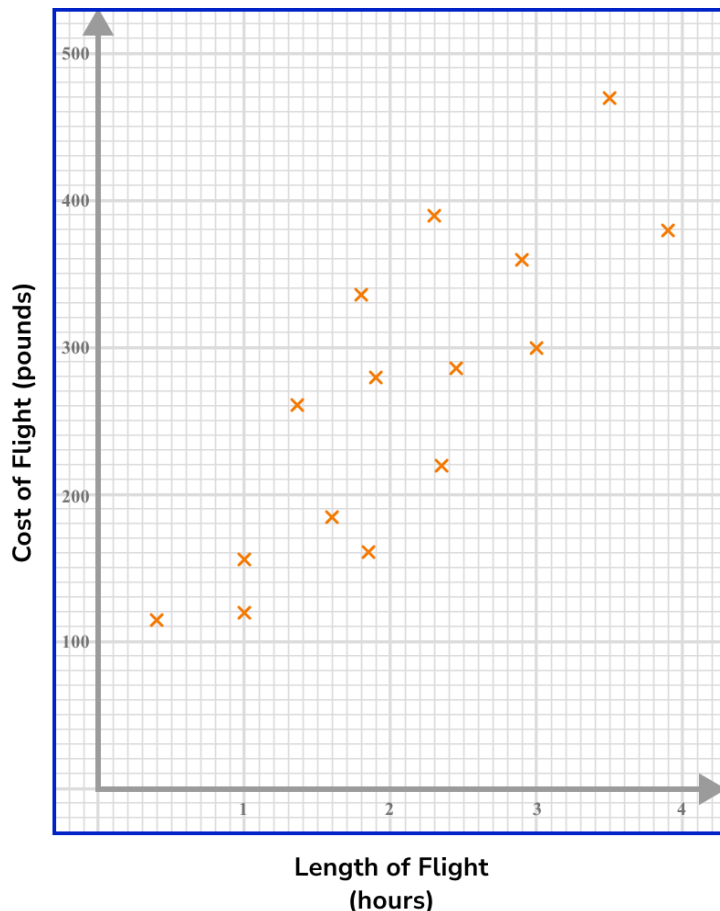
Subject	Variable A	Variable B
1	11	30
2	15	82
3	17	69
4	13	34
5	19	100
6	14	57
7	13	59
8	19	84

- Using graph paper, plot a scatter graph for the data in the table.
- Draw an estimated line of best fit on your scatter graph.
- Describe the relationship between variable A and variable B.

## Scatter Graphs - Worksheet

### Applied

- 1) The scatter graph shows the cost and length of 15 flights available to purchase from a budget airline.



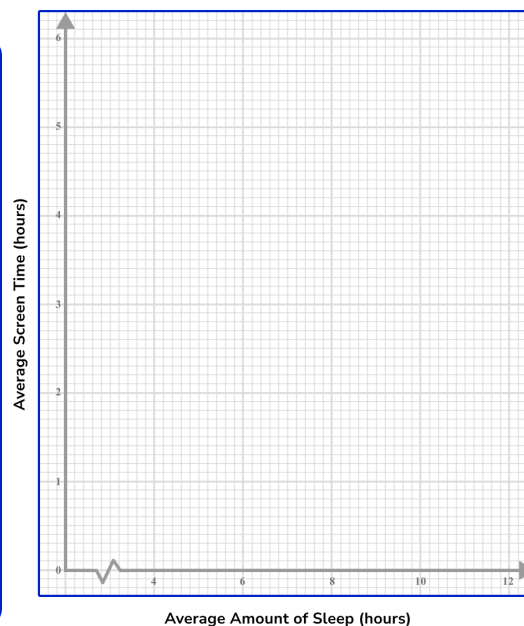
- (a) Another available flight takes 3 hours 18 minutes and costs £415. Plot this information on the scatter graph.
- (b) What is the cost of the longest flight?
- (c) What is the length of the flight which costs £220? Give your answer in hours and minutes.
- (d) Describe the correlation shown on the scatter graph.
- (e) Draw an estimated line of best fit on the scatter graph.
- (f) Estimate the cost of a flight with a journey time of 3 hours.
- (g) Estimate the length of a flight which costs £170. Give your answer in hours and minutes.

## Scatter Graphs - Worksheet

- 2) A scientist wanted to investigate how much time students slept compared to their hours of screen time.

They asked seven students to use applications on their smartphones to monitor their daily average screen time and their average hours of sleep per night over the course of a week. The table shows the results in hours and minutes.

Average amount of sleep per night	Average screen time per day
6:00	4:30
7:12	3:30
9:00	2:54
6:00	3:42
5:00	4:15
4:00	5:30
9:24	2:06



- Plot the data from the table on a scatter graph using the axes provided.
- Describe the correlation shown on the scatter graph.
- Draw an estimated line of best fit on the scatter graph.
- Estimate the average amount of sleep someone gets if their average screen time is 3 hours 12 minutes. Give your answer in hours and minutes.
- Estimate the average screen time for someone who gets an average of 11 hours sleep per night. Give your answer in hours and minutes.
- Comment on the reliability of your answer to part (e).
- "More screen time causes you to have less sleep"*

Does the scatter graph provide evidence to support this statement?

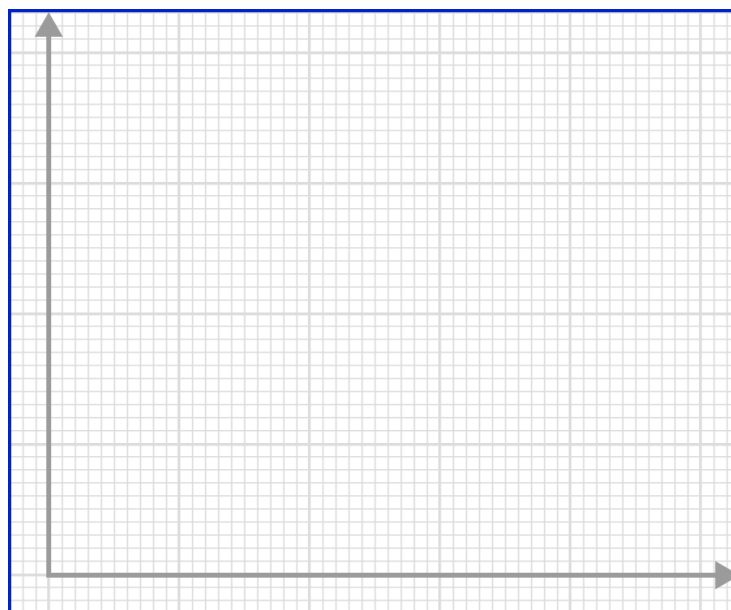
## Scatter Graphs - Worksheet

- 3) In an experiment, participants are asked to press a button when they hear a noise. Their ages and reaction times are recorded. All participants have good hearing. The results are shown in the table.

The research team conducting the experiment has the following hypothesis.  
*"The older the person, the slower their reaction time".*

Participant	1	2	3	4	5	6	7	8	9	10
Age (Years)	94	76	50	14	25	63	32	26	44	81
Reaction Time (Seconds)	3.2	2.5	2.1	0.9	1.3	1.9	1.1	3.2	1.6	2.9

- (a) Plot the data from the table on a scatter graph using the axes provided. Think carefully about your choice of scale.

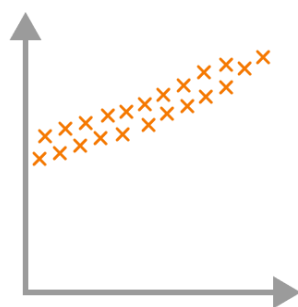


- (b) One participant reported to the research team that they experienced a problem with the button. Which participant do you think this was and why?
- (c) Does the correlation on the graph support the hypothesis? Explain your answer.
- (d) Draw an estimated line of best fit on the scatter graph.
- (e) Estimate the reaction time of someone aged 48 years.
- (f) Comment on the reliability of your answer to part (e).

## Scatter Graphs - Exam Questions

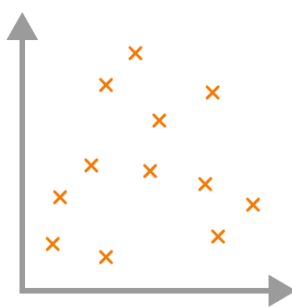
- 1) (a) Here are three scatter graphs and three statements. Choose the statement which best describes each scatter graph.

- A Positive Correlation  
B Negative Correlation  
C No Correlation



Scatter Graph 1

Statement \_\_\_\_



Scatter Graph 2

Statement \_\_\_\_



Scatter Graph 3

Statement \_\_\_\_

(2)

- (b) Hassan wants to investigate the relationship between the temperature outside and the number of people who choose hot soup from the menu in his café.

Hassan predicts that “*the colder the temperature outside, the greater the number of soup sales*”.

Hassan collects data on temperature and soup sales and plots these on a scatter graph. What type of correlation would support Hassan’s prediction?

.....  
(1)  
(3 marks)

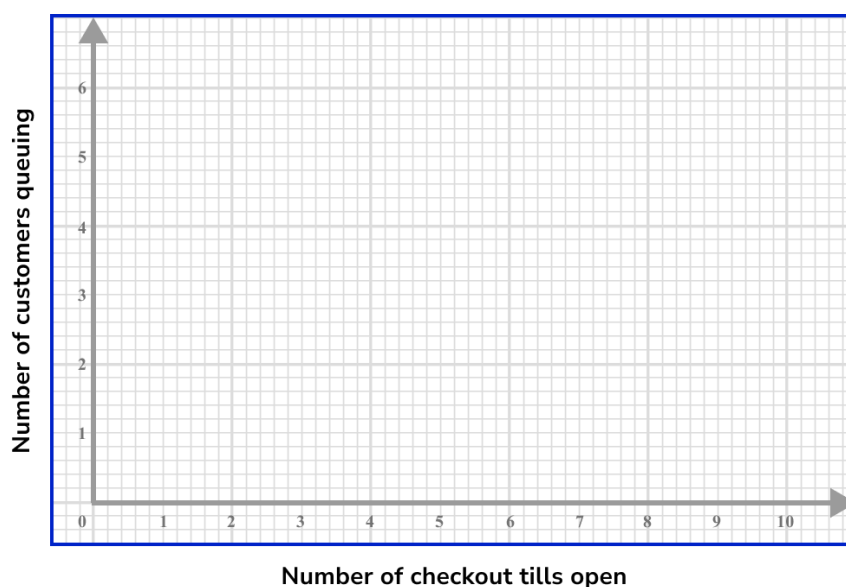


## Scatter Graphs - Exam Questions

- 2) The table shows information recorded by a supermarket at noon each day for a week.

Day	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
Number of checkout tills open	5	1	2	3	2	6	4
Number of customers queuing	2	4	3	4	5	3	3

- (a) Represent the data from the table on a scatter graph using the axes below.



- (b) Draw an estimated line of best fit on your scatter graph.

- (c) Use your line to estimate the number of customers queuing if 9 check out tills are open.

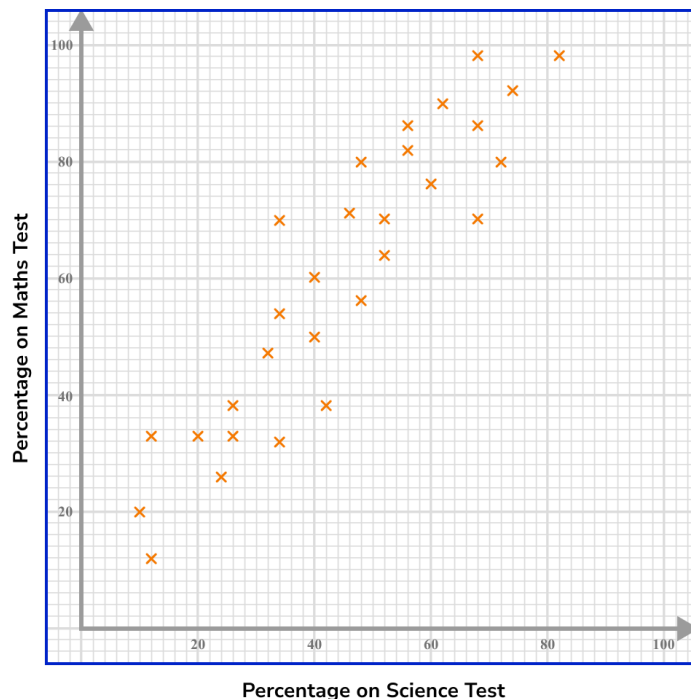
.....  
(1)

- (d) Explain why your answer to part (c) may be unreliable.

.....  
(1)  
(5 marks)

## Scatter Graphs - Exam Questions

- 3) Ms Tuttle's tutor group took tests in Maths and Science. She decided to plot their results on a scatter graph as shown below.



- (a) How many students scored higher than 60% in the Science test?
- .....
- (1)
- (b) Draw an estimated line of best fit on the scatter graph.
- (1)
- (c) One student was absent for the Maths test but scored 57% on the Science test. Use your line of best fit to estimate this student's mark on the Maths test.
- .....
- (1)
- (d) Ms Tuttle says  
"A high score on the Science test causes a high score on the Maths test".

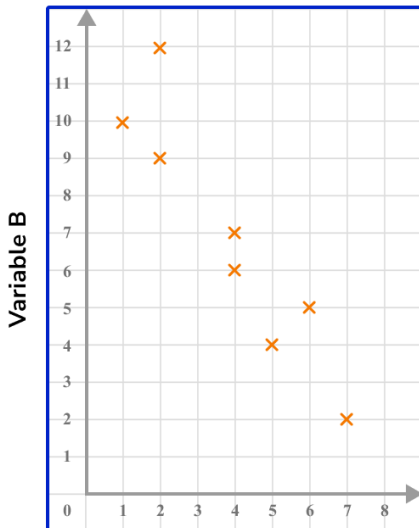
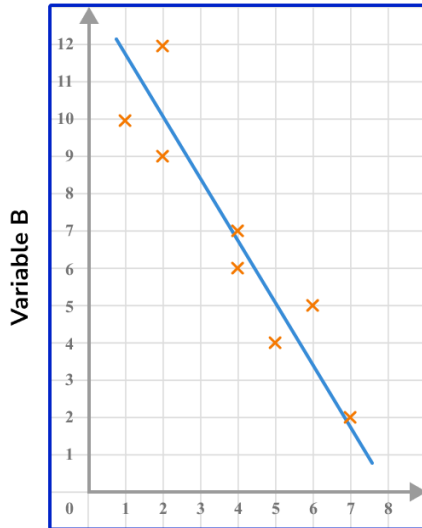
Do you agree with Ms Tuttle? Give reasons for your answer.

.....

(2)

(5 marks)

# Scatter Graphs - Answers

	Question	Answer																											
	Skill Questions																												
Group A	<p><b>1)</b> Here is a table containing bivariate data.</p> <table border="1"><thead><tr><th>Subject</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th></tr></thead><tbody><tr><td>Variable A</td><td>7</td><td>2</td><td>5</td><td>6</td><td>2</td><td>4</td><td>1</td><td>4</td></tr><tr><td>Variable B</td><td>2</td><td>9</td><td>4</td><td>5</td><td>12</td><td>6</td><td>10</td><td>7</td></tr></tbody></table> <p><b>a)</b> Plot a scatter graph for the data in the table using the axes provided.</p> <p><b>b)</b> Draw an estimated line of best fit on your scatter graph.</p>	Subject	1	2	3	4	5	6	7	8	Variable A	7	2	5	6	2	4	1	4	Variable B	2	9	4	5	12	6	10	7	<p><b>a)</b> A scatter graph showing the relationship between variable A and variable B</p>  <p><b>b)</b> A scatter graph showing the relationship between variable A and variable B</p> 
Subject	1	2	3	4	5	6	7	8																					
Variable A	7	2	5	6	2	4	1	4																					
Variable B	2	9	4	5	12	6	10	7																					

# Scatter Graphs - Answers

Group A  
contd

c) Describe the relationship between variable A and variable B.

2) Here is a table containing bivariate data.

Subject	1	2	3	4	5	6	7	8
Variable A	6	11	14	2	11	4	1	10
Variable B	7	5	8	1	8	4	5	10

a) Using squared paper, plot a scatter graph for the data in the table.

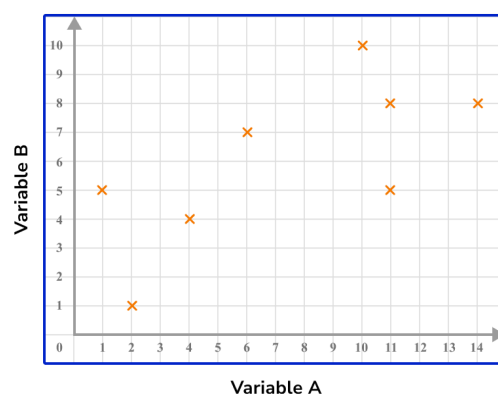
b) Draw an estimated line of best fit on your scatter graph.

c) Describe the relationship between variable A and variable B.

c) As variable A increases, variable B decreases **OR** a negative correlation.

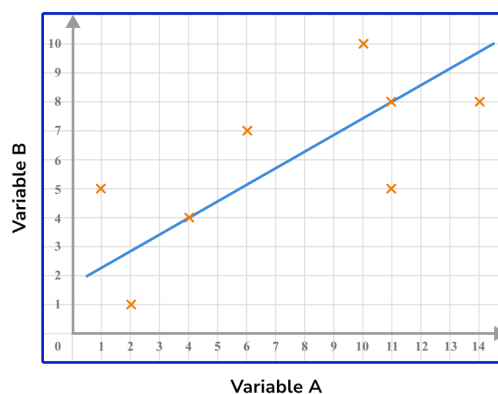
a)

A scatter graph showing the relationship between variable A and variable B



b)

A scatter graph showing the relationship between variable A and variable B



c) As variable A increases, variable B increases **or** a positive correlation.

# Scatter Graphs - Answers

Group A  
contd

**3)** Here is a table containing bivariate data.

Subject	1	2	3	4	5	6	7	8
Variable A	2	6	10	4	7	9	4	9
Variable B	4	10	14	6	12	15	7	11

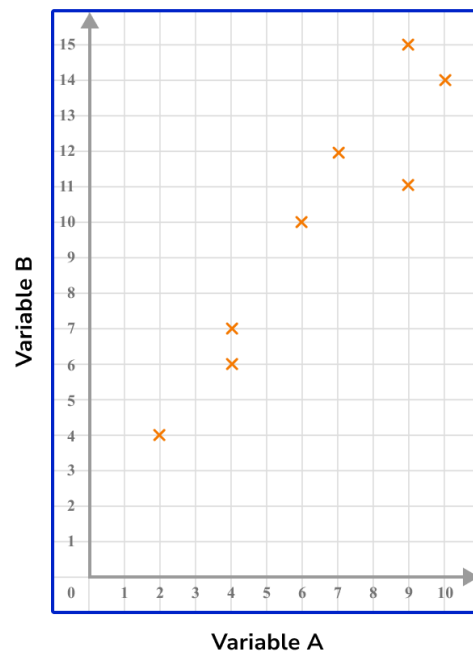
**a)** Using squared paper, plot a scatter graph for the data in the table.

**b)** Draw an estimated line of best fit on your scatter graph.

**c)** Describe the relationship between variable A and variable B.

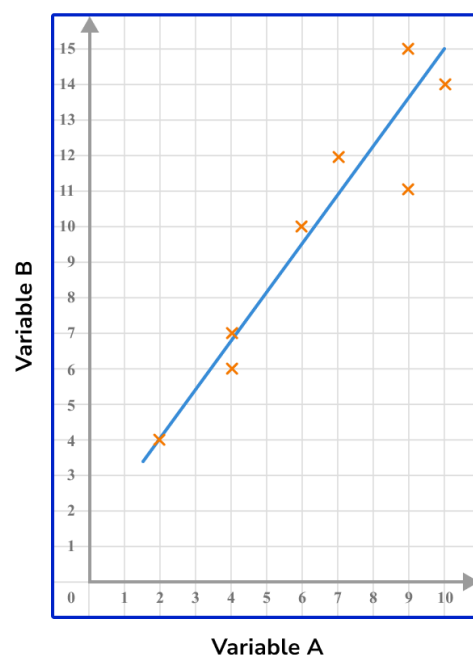
**a)**

A scatter graph showing the relationship between variable A and variable B



**b)**

A scatter graph showing the relationship between variable A and variable B



**c)** As variable A increases, variable B increases **or** a positive correlation.

# Scatter Graphs - Answers

Group B

1) Here is a table containing bivariate data.

Subject	1	2	3	4	5	6	7	8
Variable A	9	2	5	10	9	1	7	7
Variable B	65	30	30	55	70	15	50	40

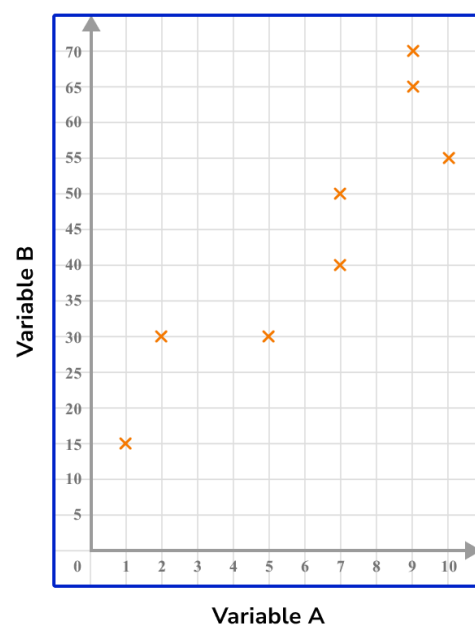
a) Plot a scatter graph for the data in the table using the axes provided.

b) Draw an estimated line of best fit on your scatter graph.

c) Describe the relationship between variable A and variable B.

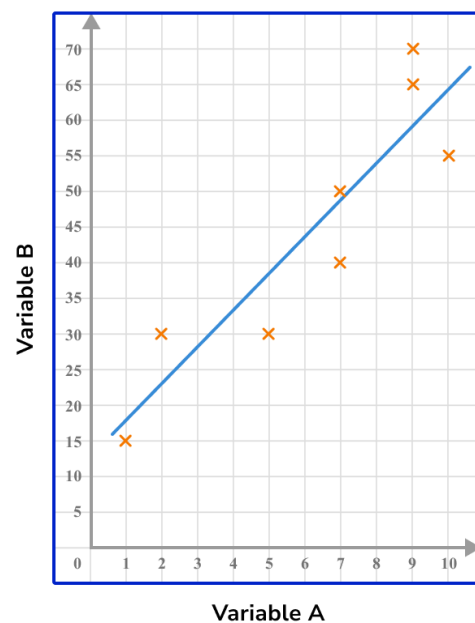
a)

A scatter graph showing the relationship between variable A and variable B



b)

A scatter graph showing the relationship between variable A and variable B



c) As variable A increases, variable B increases **or** a positive correlation.

# Scatter Graphs - Answers

Group B  
contd

2) Here is a table containing bivariate data.

Subject	Variable A	Variable B
1	35	6
2	160	19
3	110	24
4	95	17
5	10	9
6	20	16
7	90	21
8	55	14

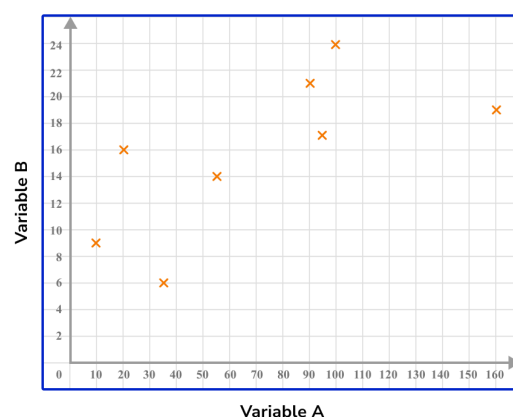
a) Using squared paper, plot a scatter graph for the data in the table.

b) Draw an estimated line of best fit on your scatter graph.

c) Describe the relationship between variable A and variable B.

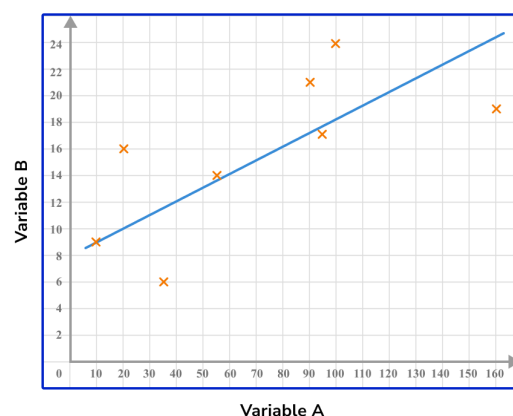
a)

A scatter graph showing the relationship between variable A and variable B



b)

A scatter graph showing the relationship between variable A and variable B



c) As variable A increases, variable B increases **or** a positive correlation.

# Scatter Graphs - Answers

Group B  
contd

**3)** Here is a table containing bivariate data.

Subject	1	2	3	4	5	6	7	8
Variable A	18	24	20	23	17	16	25	20
Variable B	65	10	35	45	45	70	20	50

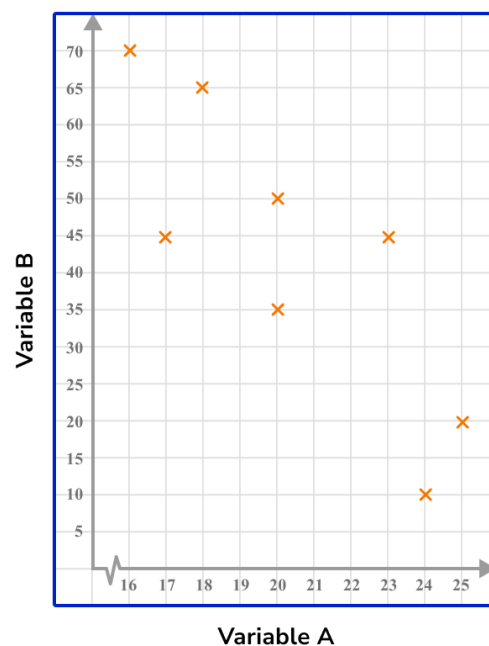
**a)** Using squared paper, plot a scatter graph for the data in the table.

**b)** Draw an estimated line of best fit on your scatter graph.

**c)** Describe the relationship between variable A and variable B.

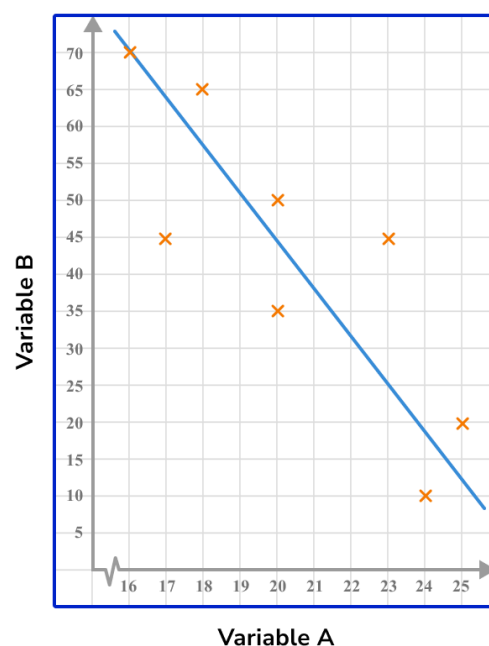
**a)**

A scatter graph showing the relationship between variable A and variable B



**b)**

A scatter graph showing the relationship between variable A and variable B



**c)** As variable A increases, variable B decreases **or** a negative correlation.



# Scatter Graphs - Answers

Group C

**1)** Here is a table containing bivariate data.

Subject	1	2	3	4	5	6	7	8
Variable A	5	25	19	8	13	19	23	15
Variable B	2.8	0.4	1.5	3.8	2.6	3	1.4	1.1

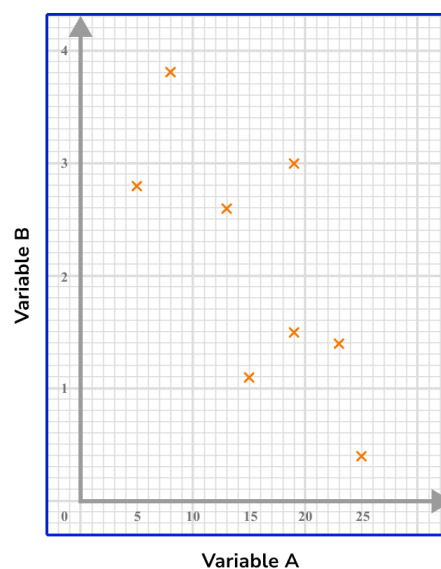
**a)** Plot a scatter graph for the data in the table using the axes provided.

**b)** Draw an estimated line of best fit on your scatter graph.

**c)** Describe the relationship between variable A and variable B.

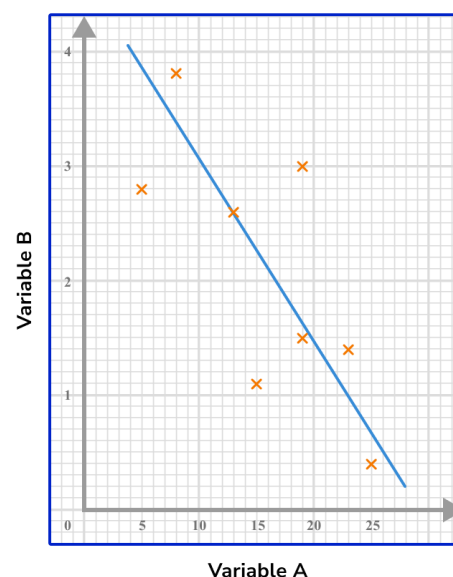
a)

A scatter graph showing the relationship between variable A and variable B



b)

A scatter graph showing the relationship between variable A and variable B



**c)** As variable A increases, variable B decreases **or** a negative correlation.

# Scatter Graphs - Answers

Group C  
contd

2) Here is a table containing bivariate data.

Subject	1	2	3	4	5	6	7	8
Variable A	4.4	7.9	1.4	3.6	0.7	7.0	2.5	5.3
Variable B	46	60	40	49	37	53	44	52

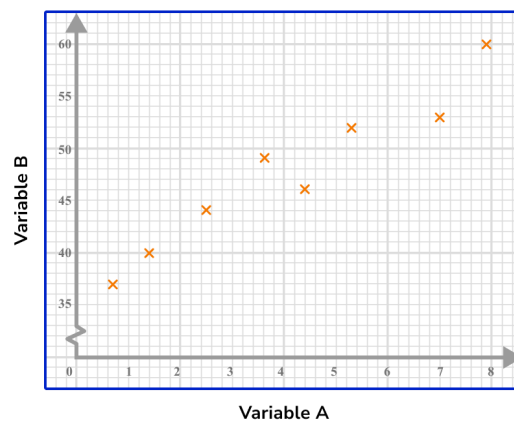
a) Using graph paper, plot a scatter graph for the data in the table.

b) Draw an estimated line of best fit on your scatter graph.

c) Describe the relationship between variable A and variable B.

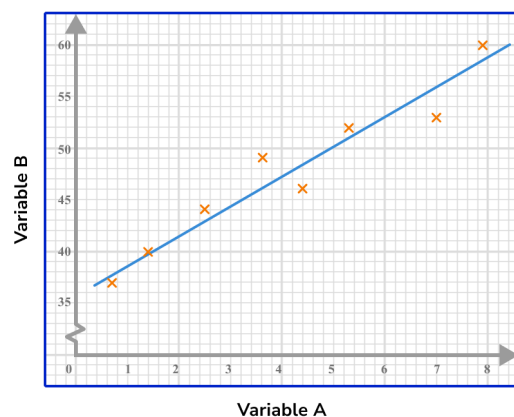
a)

A scatter graph showing the relationship between variable A and variable B



b)

A scatter graph showing the relationship between variable A and variable B



c) As variable A increases, variable B increases or a positive correlation.

# Scatter Graphs - Answers

Group C  
contd

3) Here is a table containing bivariate data.

Subject	Variable A	Variable B
1	11	30
2	15	82
3	17	69
4	13	34
5	19	100
6	14	57
7	13	59
8	19	84

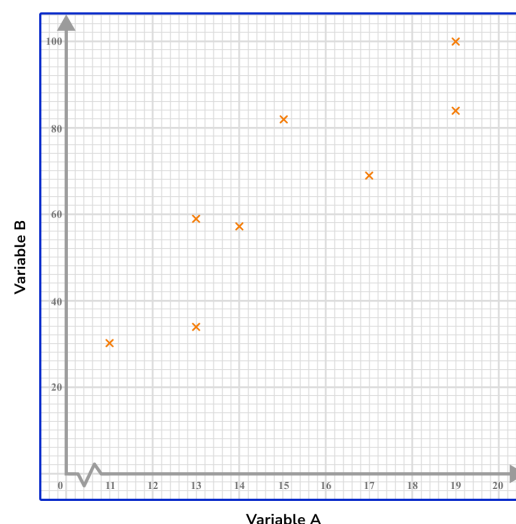
a) Using graph paper, plot a scatter graph for the data in the table.

b) Draw an estimated line of best fit on your scatter graph.

c) Describe the relationship between variable A and variable B.

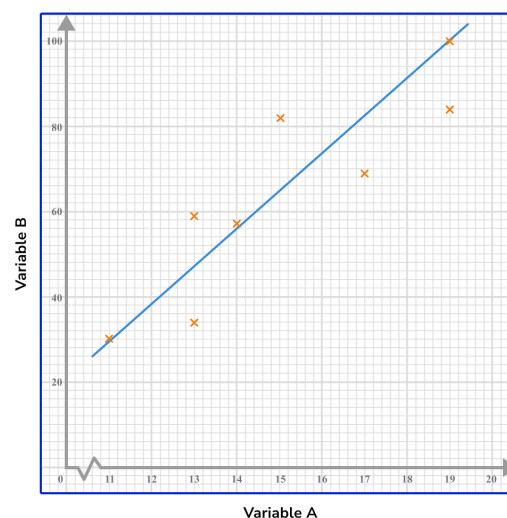
a)

A scatter graph showing the relationship between variable A and variable B



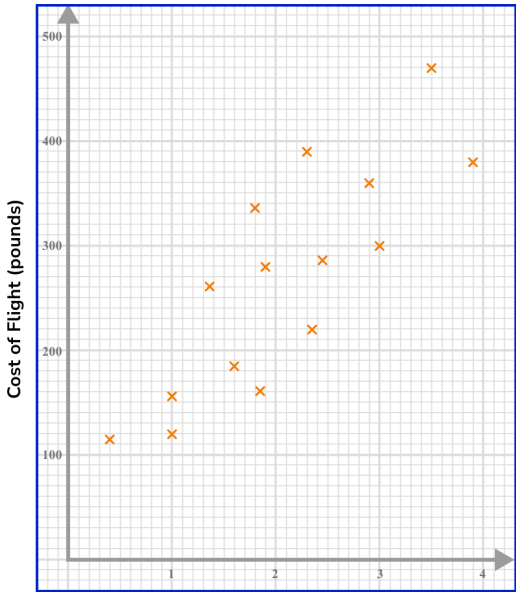
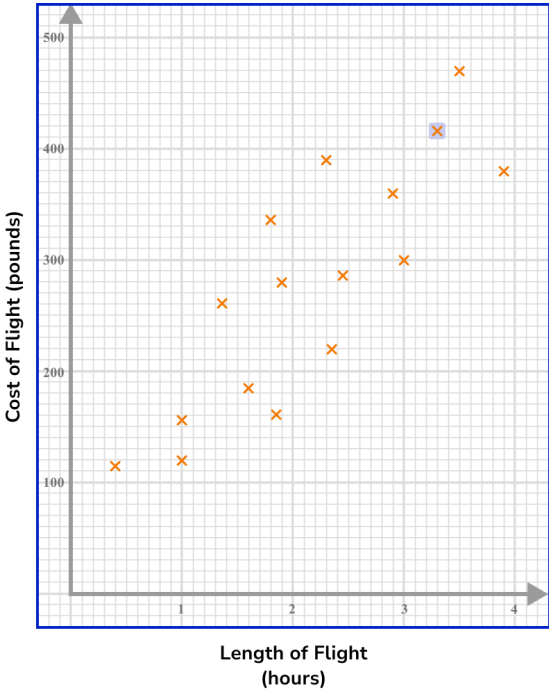
b)

A scatter graph showing the relationship between variable A and variable B



c) As variable A increases, variable B increases **or** a positive correlation.

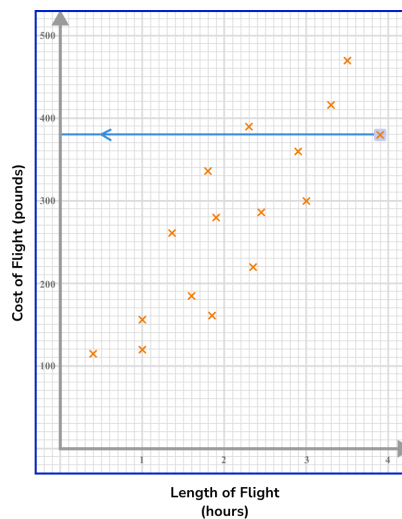
# Scatter Graphs - Answers

	Question	Answer
	Applied Questions	
1)	<p>The scatter graph shows the cost and length of 15 flights available to purchase from a budget airline.</p>  <p>a) Another available flight takes 3 hours 18 minutes and costs £415. Plot this information on the scatter graph.</p>	<p>a)</p> 

# Scatter Graphs - Answers

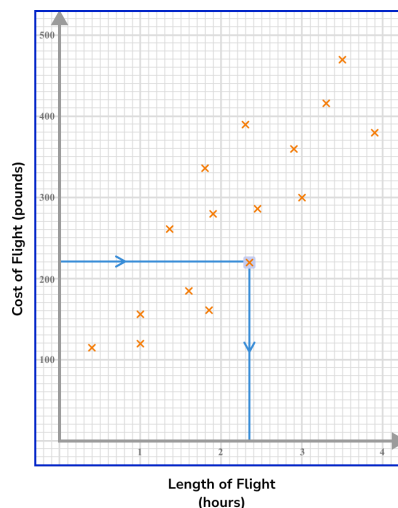
**b)** What is the cost of the longest flight?

**b)** £380



**c)** What is the length of the flight which costs £220? Give your answer in hours and minutes.

**c)** 2 hours 21 minutes

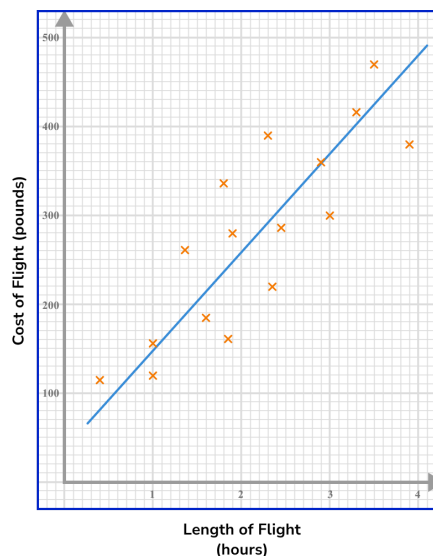


**d)** Describe the correlation shown on the scatter graph.

**d)** Positive correlation

**e)** Draw an estimated line of best fit on the scatter graph.

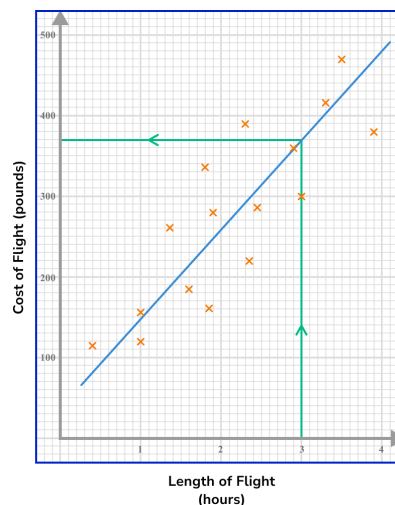
**e)**



# Scatter Graphs - Answers

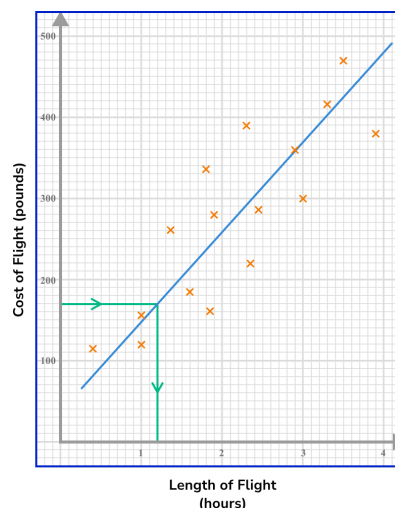
**f)** Estimate the cost of a flight with a journey time of 3 hours.

**f)** £370



**g)** Estimate the length of a flight which costs £170. Give your answer in hours and minutes.

**g)** 1 hour 12 minutes



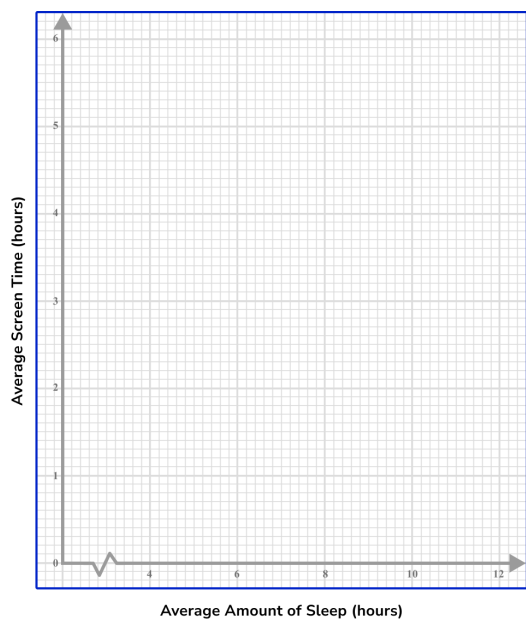
**2)** A scientist wanted to investigate how much time students slept compared to their hours of screen time.

They asked seven students to use applications on their smartphones to monitor their daily average screen time and their average hours of sleep per night over the course of a week. The table shows the results in hours and minutes.

*(Continued on next page)*

# Scatter Graphs - Answers

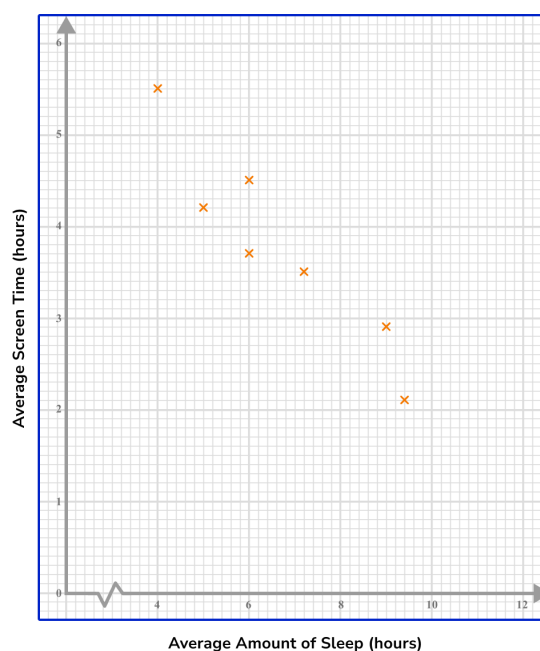
Average amount of sleep per night	Average screen time per day
6:00	4:30
7:12	3:30
9:00	2:54
6:00	3:42
5:00	4:15
4:00	5:30
9:24	2:06



- a)** Plot the data from the table on a scatter graph using the axes provided.

- b)** Describe the correlation shown on the scatter graph.

**a)**

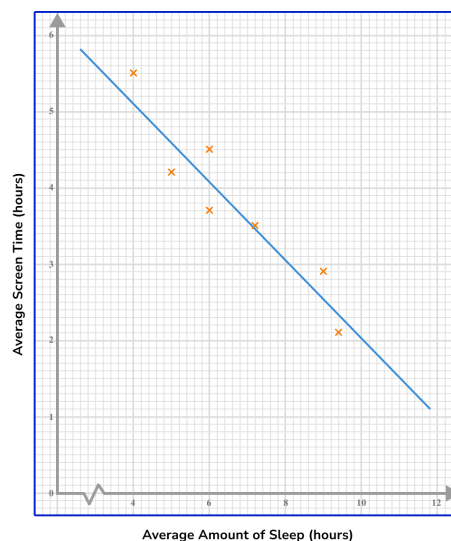


- b)** Negative correlation.

# Scatter Graphs - Answers

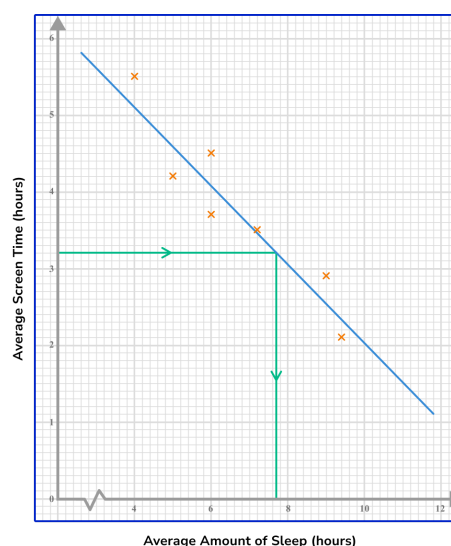
**c)** Draw an estimated line of best fit on the scatter graph.

**c)**



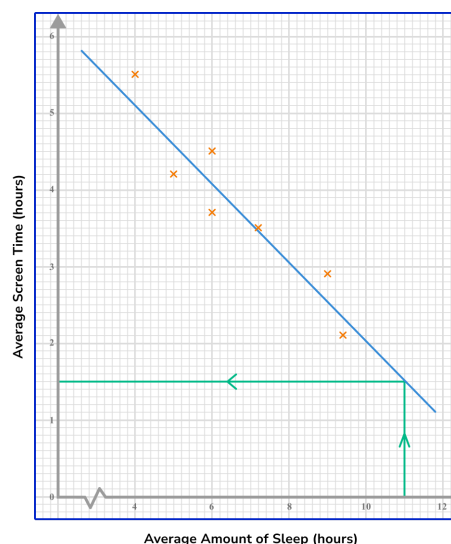
**d)** Estimate the average amount of sleep someone gets if their average screen time is 3 hours 12 minutes. Give your answer in hours and minutes.

**d)** 7 hours 42 minutes



**e)** Estimate the average screen time for someone who gets an average of 11 hours sleep per night. Give your answer in hours and minutes.

**e)** 1 hour 30 minutes





# Scatter Graphs - Answers

**f)** Comment on the reliability of your answer to part (e).

**g)** *"More screen time causes you to have less sleep"*

Does the scatter graph provide evidence to support this statement?

**f)** This estimate may be unreliable because the line of best fit has been extended beyond the data set **oe**

**g)** No. Correlation does not imply causation

**3)**

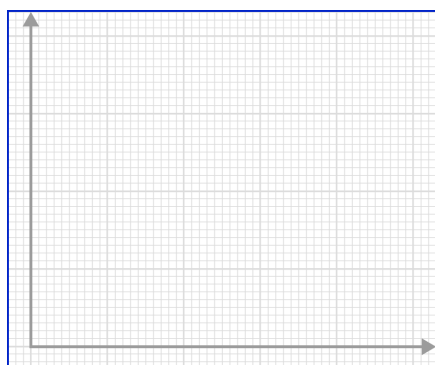
In an experiment, participants are asked to press a button when they hear a noise. Their ages and reaction times are recorded. All participants have good hearing. The results are shown in the table.

The research team conducting the experiment has the following hypothesis.

*"The older the person, the slower their reaction time".*

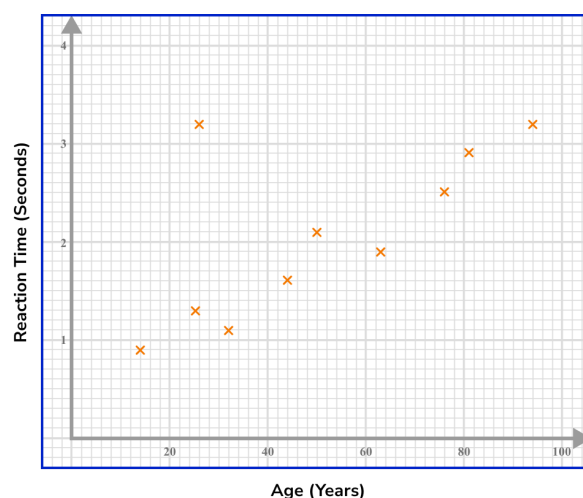
Participant	1	2	3	4	5	6	7	8	9	10
Age (Years)	94	76	50	14	25	63	32	26	44	81
Reaction Time (Seconds)	3.2	2.5	2.1	0.9	1.3	1.9	1.1	3.2	1.6	2.9

**a)** Plot the data from the table on a scatter graph using the axes provided. Think carefully about your choice of scale.



**b)** One participant reported to the research team that they experienced a problem with the button. Which participant do you think this was and why?

**a)**



**b)** Participant 8 because their result is an outlier **oe**

## Scatter Graphs - Answers

**c)** Does the correlation on the graph support the hypothesis? Explain your answer.

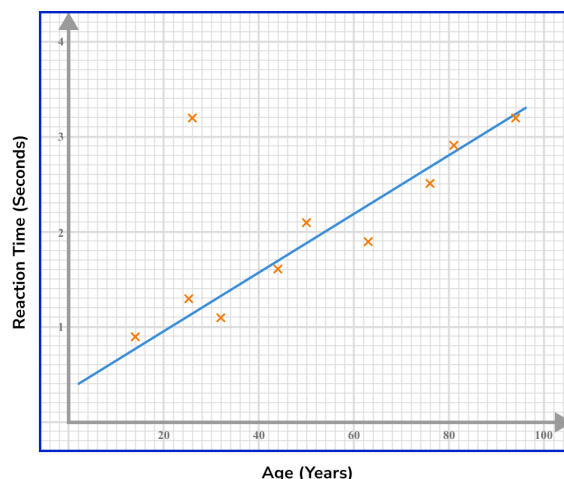
**d)** Draw an estimated line of best fit on the scatter graph.

**e)** Estimate the reaction time of someone aged 48 years.

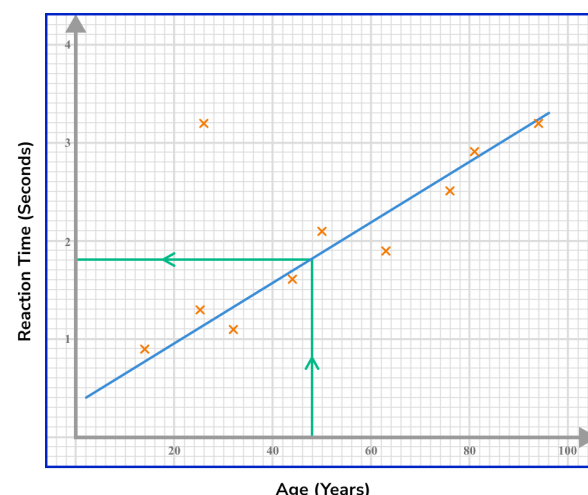
**f)** Comment on the reliability of your answer to part (e).

**c)** Yes, because the graph shows there is a strong positive correlation between age and reaction time.

**d)**



**e)** 1.8 seconds

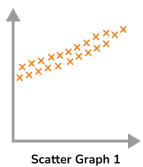
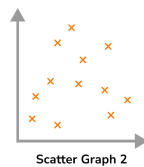
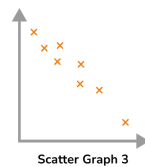
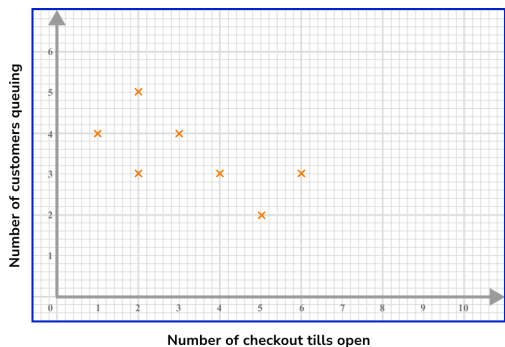


**f)** As there is a strong correlation and the estimate has been taken within the data set then this answer could be considered reliable.

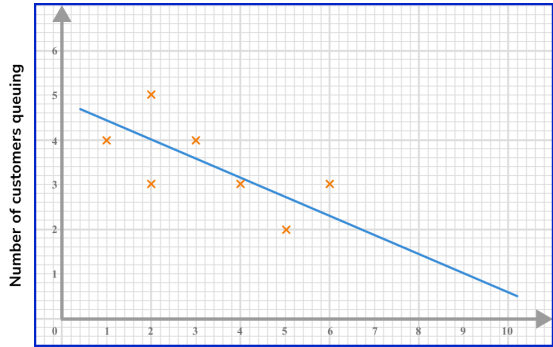
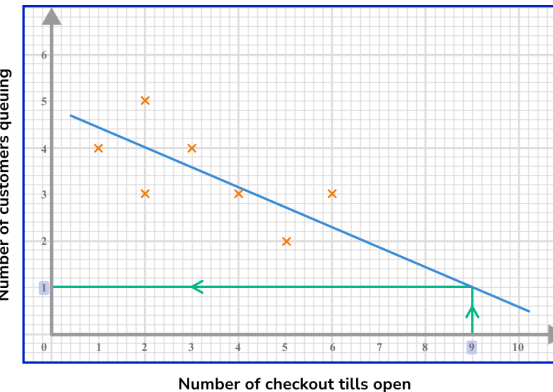
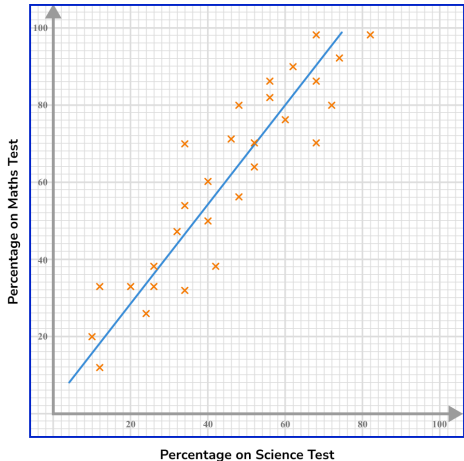
**or**

The sample size of only ten participants is not enough to consider estimates from this graph to be reliable.

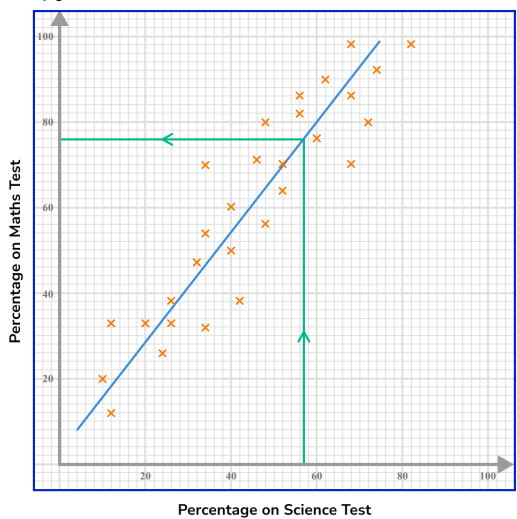
# Scatter Graphs - Mark Scheme

	Questions	Answer	
	Exam Questions		
1) (a)	<p>Here are three scatter graphs and three statements. Choose the statement which best describes each scatter graph.</p> <p>A Positive Correlation B Negative Correlation C No Correlation</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;">    </div> <p>Statement ____    Statement ____    Statement ____</p>	<p>(a) Scatter Graph 1 = A Scatter Graph 2 = C Scatter Graph 3 = B</p> <p>Two statements correctly matched All three statements correctly matched</p>	<p>(1) (1)</p>
(b)	<p>Hassan wants to investigate the relationship between the temperature outside and the number of people who choose hot soup from the menu in his café.</p> <p>Hassan predicts that “<i>the colder the temperature outside, the greater the number of soup sales</i>”.</p> <p>Hassan collects data on temperature and soup sales and plots these on a scatter graph. What type of correlation would support Hassan’s prediction?</p>	<p>(b) Negative correlation</p>	<p>(1)</p>
2) (a)	<p>Represent the data from the table on a scatter graph using the axes below.</p>	<p>(a)</p>  <p>All but one point plotted correctly All points plotted correctly</p>	<p>(1) (1)</p>

# Scatter Graphs - Mark Scheme

	<p><b>(b)</b> Draw an estimated line of best fit on your scatter graph.</p>	<p><b>(b)</b></p>  <p>Number of customers queuing</p> <p>Number of checkout tills open</p>	<b>(1)</b>
	<p><b>(c)</b> Use your line to estimate the number of customers queuing if 9 checkout tills are open.</p>	<p><b>(c)</b></p>  <p>Number of customers queuing</p> <p>Number of checkout tills open</p> <p>1</p>	<b>(1)</b> <b>(1)</b>
	<p><b>(d)</b> Explain why your answer to part (c) may be unreliable.</p>	<p><b>(d)</b> Possible answers include:</p> <p>This estimate may be unreliable because the line of best fit had to be extended beyond the data set.</p> <p>-This estimate may be unreliable because no results were recorded for more than 6 checkout tills being open.</p> <p>-This estimate may be unreliable because extrapolation has been used.</p>	<b>(1)</b>
<p><b>3) (a)</b></p>	<p>How many students scored higher than 60% in the Science test?</p>	<p><b>(a)</b> 7 students</p>	<b>(1)</b>
	<p><b>(b)</b> Draw an estimated line of best fit on the scatter graph.</p>	<p><b>(b)</b></p>  <p>Percentage on Maths Test</p> <p>Percentage on Science Test</p>	<b>(1)</b>

## Scatter Graphs - Mark Scheme

(c)	One student was absent for the Maths test but scored 57% on the Science test. Use your line of best fit to estimate this student's mark on the Maths test.	<p>(c) 76%</p> 	(1)
(d)	<p>Ms Tuttle says “A high score on the Science test causes a high score on the Maths test”.</p> <p>Do you agree with Ms Tuttle? Give reasons for your answer.</p>	<p>(d) No.</p> <p>Possible reasons include:</p> <ul style="list-style-type: none"> <li>-A scatter graph does not show causation, it shows correlation.</li> <li>-High scores in Science do not cause high scores in Maths, but there is a positive correlation between high scores in Science and high scores in Maths.</li> <li>-Ms Tuttle is wrong because she says one variable causes another. A better statement would be “the higher the score on the Science test, the higher the score on the Maths test”.</li> <li>-There is a relationship between the scores on the Science test and the scores on the Maths tests, but they do not cause each other.</li> </ul>	(1) (1)

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