Year 8
Mathematics
Unit 9

Name: ______________________________

Class: ______________________________

Contents

1 Proportion

1.1 Direct Proportion

In this section you will look at direct proportion.

Worked Example	Your Turn
At a steady speed, a car uses 30 litres of petrol to travel 90 km. At the same speed, what distance could be travelled on 10 litres?	At a steady speed, a car uses 10 litres of petrol to travel 40 km. At the same speed, what distance could be travelled on 40 litres?

1.2 Recipes

In this section you will look at recipes.

Worked Example	Your Turn
This is a list of ingredients for making a cake for 8 people. Ingredients for 8 people: 70 g flour 120 g fruits 150 g rolled oats 100 ml water 70 g butter Work out the amount of each ingredient needed to make a cake for 20 people.	This is a list of ingredients for making a cake for 6 people. Ingredients for 6 people: 100 g flour 190 g chocolate 7 eggs 180 g fruits Work out the amount of each ingredient needed to make a cake for 15 people.

1.3 Best Buys

In this section you will look at best buys.

Proportion calculations can be used to decide which items in a shop offer the best value. Many items sold in supermarkets show a price per item and a price per 100g or per kg. This lets people compare products and get the best value for money.

Worked Example	Your Turn
Plants are sold in three different sizes of tray. A small tray of 20 plants costs £4.20. A medium tray of 40 plants costs £7.20. A large tray of 70 plants costs £13.30. Which size tray of plants is the best value for money?	Plants are sold in three different sizes of tray. A small tray of 20 plants costs £4.00. A medium tray of 40 plants costs £10.80. A large tray of 90 plants costs £9.00. Which size tray of plants is the best value for money?

1.4 Exchange Rates

In this section you will look at exchange rates.

The currency of the United Kingdom is the British pound, or pound sterling. When we refer to foreign currency, we mean the money that a different country uses such as baht in Thailand or rupees in India.

Not all currencies have the same value. We use exchange rates to convert from one currency to another.

Exchange rates are published in newspapers and online where the pound is matched against various currencies.

Worked Example	Your Turn
a) Phil goes on holidays. Phil changes £640 to euros. The exchange rate is £1 = 1.14 euros. How many euros should Phil get?	a) Alice hired a car in Greece. The cost of hiring the car was £700. The exchange rate is £1 = 1.1 euros. Work out the cost of hiring the car in euros.
b) Dave hired a car in Germany. The cost of hiring the car was 429 euros. The exchange rate is £1 = 1.1 euros. Work out the cost of hiring the car in pounds.	b) Nina goes on holidays. Nina changes 147.60 euros to pounds. The exchange rate is £1 = 1.23 euros. How many pounds should Nina get?

1.5 Inverse Proportion

In this section you will look at inverse proportion.

Worked Example	Your Turn
In a school, 8 classrooms are required if each class has 27 pupils. How many classrooms would be required if the class size has reduced to 18?	In a school, 4 classrooms are required if each class has 21 pupils. How many classrooms would be required if the class size has reduced to 14?

2 Averages

2.1 Range

In this section you will look at working out the range from listed data.

The range is the difference between the largest and smallest values in a list.

Note: The range is not an average but a measure of spread.

Advantages:
- Easy to calculate.

Disadvantages:
- Affected by outliers (extreme values).

Worked Example	Your Turn
Find the range of: $3, 5, 9, 13, 18$	Find the range of: $1, 3, 7, 11, 16$

2.2 Mode

In this section you will look at working out the mode from listed data.

The mode is the most common item in a set of data.

Advantages:

- Is not affected by outliers (extreme values).
- Can be used with words.
- Always a possible value (e.g., an integer if the data must be integers).

Disadvantages:

- May be more than one mode or no mode.
- Does not include all the data.

Worked Example	Your Turn
Find the mode of: a) $5, 3, 2, 9, 13, 3$ b) $9, 13, 5, 2, 3, 18$	Find the mode of: a) $3, 2, 19, 14, 10, 2$ b) $10, 19, 5, 3, 14, 4$

2.3 Median

In this section you will look at working out the median from listed data.

The median is the value at the middle of a numerically ordered list of values.

- Position of the median found by $\frac{n+1}{2}$ where n is the number of values, for a list.

Advantages:
- Unaffected by outliers (extreme values).

Disadvantages:
- Does not include all the data.
- Cannot be used with words.

Worked Example	Your Turn
Find the median of: a) $5, 3, 2, 9, 13$ b) $9, 13, 5, 2, 5, 18$	Find the median of: a) $3, 2, 19, 14, 10$ b) $10, 19, 5, 3, 14, 4$

2.4 Mean

In this section you will look at working out the mean from listed data.

Then mean can be found by sharing the total of all the numbers in the list equally between them.

Advantages:

- Includes all the data.

Disadvantages:

- Affected by outliers (extreme values).
- Cannot be used with words.
- Not always a possible value.

Worked Example	Your Turn
Find the mean of: $2, 4, 5, 6, 13$	Find the mean of: $2, 4, 5, 6, 13, 30$

2.5 Using Totals

In this section you will look at using the total given the mean.

$$\textbf{Total} = \textbf{Mean} \times \textbf{Number of Items}$$

Worked Example	Your Turn
Find the missing number: $5, 1, 10, ?$ $\text{Mean} = 6$	Find the missing number: $6, 2, 11, ?$ $\text{Mean} = 6$

Worked Example	Your Turn
Four numbers have a mean of 10. Three of the numbers are $8, 15, 7$. What is the fourth number?	Five numbers have a mean of 10. Four of the numbers are $8, 15, 7, 8$. What is the fifth number?

Worked Example	Your Turn
The mean height of 14 players is $172\ cm$. A player with a height of $197\ cm$ leaves the team. What is the new mean height of the team?	The mean height of 14 players is $127\ cm$. A player with a height of $142\ cm$ leaves the team. What is the new mean height of the team?

Worked Example	Your Turn
The mean score after six tests is 5. One more test is taken. After this test the mean score is 6. What was the score on the final test?	The mean score after five tests is 6. One more test is taken. After this test the mean score is 7. What was the score on the final test?

2.6 Combined Mean

In this section you will look at working out the combined mean given multiple sets of listed data.

Worked Example	Your Turn
A group of students take a test. The group consists of 24 boys and 16 girls. The mean mark for the boys is 36. The mean mark for the girls is 33. Calculate the mean mark for the whole group.	A group of students take a test. The group consists of 12 boys and 8 girls. The mean mark for the boys is 18. The mean mark for the girls is 16.5. Calculate the mean mark for the whole group.

Worked Example	Your Turn
A group of men, women and children take a test. The mean score for women is 31.2. The mean score for children is 18.4. The mean score for all 80 people is 22.4. Work out the mean score for men.	A group of men, women and children take a test. The mean score for women is 15.6. The mean score for children is 9.2. The mean score for all 40 people is 11.2. Work out the mean score for men.

2.7 Determining List of Numbers

In this section you will look at determining list of numbers given information on the range, mode, median and mean.

Worked Example	Your Turn
Write a list of five numbers with:	Write a list of five numbers with:
$\text{Mean} = 4$	$\text{Mean} = 5$
$\text{Median} = 4$	$\text{Median} = 5$
$\text{Mode} = 4$	$\text{Mode} = 5$
$\text{Range} = 4$	$\text{Range} = 5$

Worked Example	Your Turn
Write a list of four numbers with: $\text{Mean} = 4$ $\text{Median} = 4$ $\text{Mode} = 4$ $\text{Range} = 4$	Write a list of four numbers with: $\text{Mean} = 5$ $\text{Median} = 5$ $\text{Mode} = 5$ $\text{Range} = 5$

2.8 Comparing Data

In this section you will look at comparing data.

You compare two sets of data using a measure of central tendency (usually the mean) and a measure of spread (usually the range).

Worked Example

Zayd plants two different types of tomato plant. He record the number of tomatoes that he picks from each plant every day for 10 days. His records are shown below:

Plant A: $4 \quad 6 \quad 7 \quad 3 \quad 5 \quad 2 \quad 1 \quad 3 \quad 6 \quad 5$

Plant B: $5 \quad 6 \quad 7 \quad 6 \quad 8 \quad 9 \quad 6 \quad 7 \quad 8 \quad 9$

Compare the two plants and recommend which type he should buy next year.

2.9 Deciding which Average to Use

In this section you will look at deciding which average is the best to use.

Advantages and Disadvantages

Choosing an Appropriate Average to Use

Can you think of an example of a data set for each point?

Average	Advantages	Disadvantages
Mean		
Median		
Mode		

Easy to find in tallied data.

Usually most representative.

Can be used with non-numerical data.

Not distorted by extreme values.

Less useful for small groups of data.

Always one of the data values.

Sometimes not a good representation.

Time consuming if a large data set.

Sometimes doesn't exist.

Sometimes not a good representation.

Takes account of all the data.

Distorted by extreme values.

Easily presented graphically.

Not always one of the data values.

Cannot be used with qualitative data.

Sometimes more than one.

Easy to find in ordered data.

Not always one of the data values.

Worked Example

Charlie keeps a record of the number of carrier bags that he is given when he does his weekly shopping. The data he collects over 10 weeks is listed below:

9, 8, 5, 9, 12, 8, 7, 6, 5, 9

a) Calculate: (i) the mean (ii) the median (iii) the mode
b) Explain why the mean is not very useful in this context.
c) Which value might be used by an environmental group who thinks that supermarkets cause pollution by giving out too many carrier bags?
d) Which value might be used by a shopper who thinks that the supermarket doesn't give him enough carrier bags for his shopping?

3 Coordinates

3.1 Plotting Coordinates

In this section you will look at plotting coordinates.

Coordinates are pair of numbers written in the form (x, y) where x is the amount moved horizontally, and y the amount moved vertically from the origin on a graph. The two values are referred to, in order, as the x-coordinate and the y-coordinate.

Worked Example

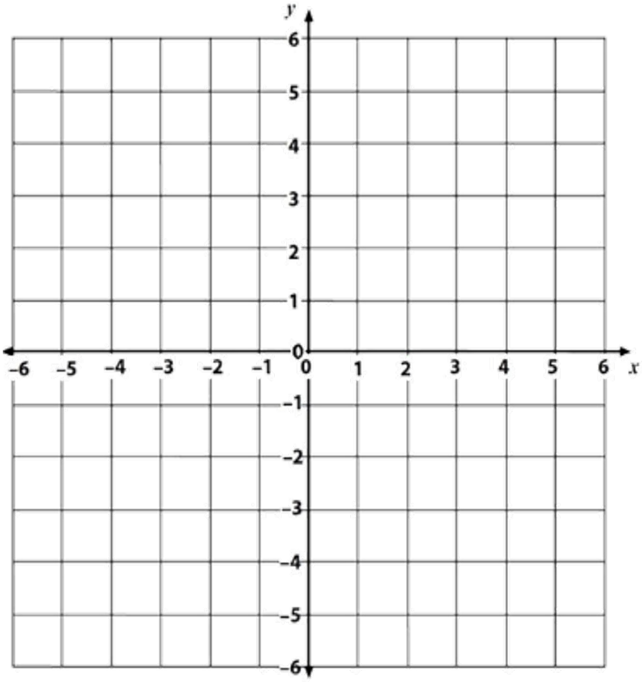
Plot the coordinates:

$(2, 5)$

$(2, -5)$

$(-2, 5)$

$(-2, -5)$



Your Turn

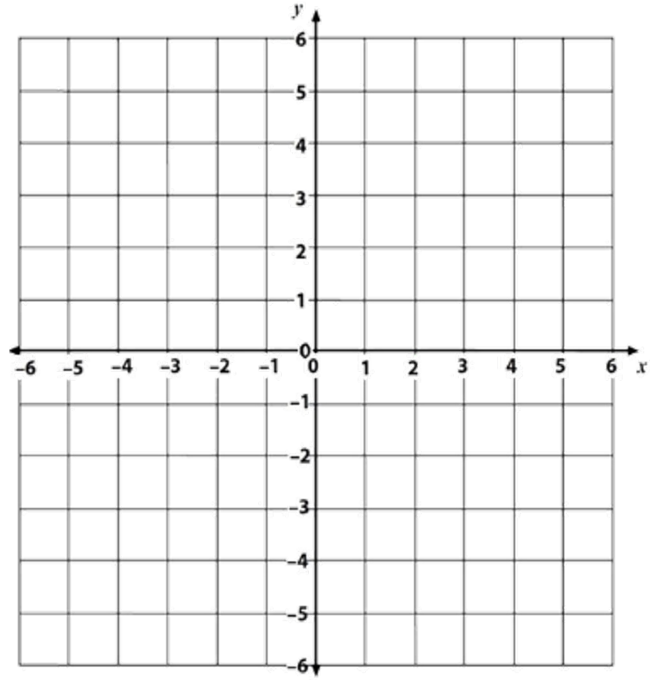
Plot the coordinates:

$(3, 4)$

$(3, -4)$

$(-3, 4)$

$(-3, -4)$



3.2 Reading Coordinates

In this section you will look at reading coordinates.

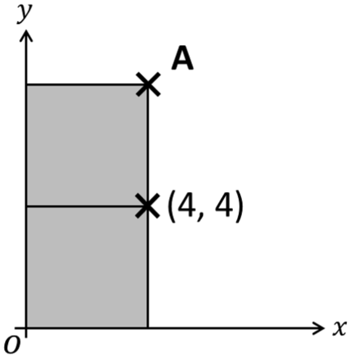
Coordinates are pair of numbers written in the form (x, y) where x is the amount moved horizontally, and y the amount moved vertically from the origin on a graph. The two values are referred to, in order, as the x-coordinate and the y-coordinate.

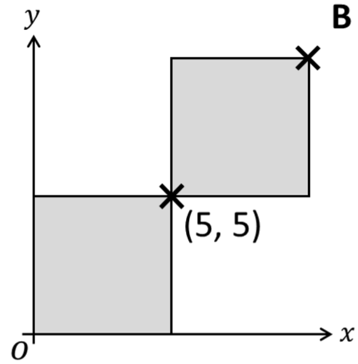
3.3 Coordinates with Shapes

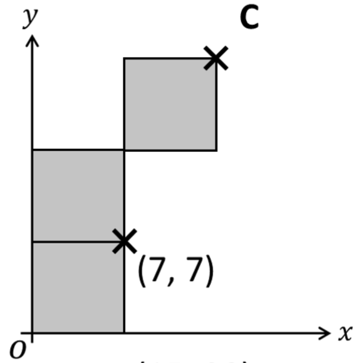
In this section you will look at coordinates with shapes.

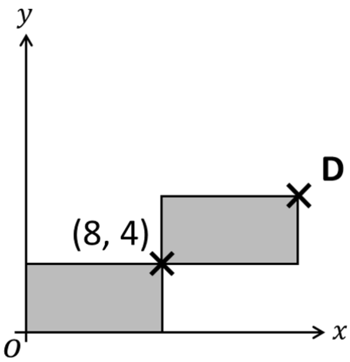
Fluency Practice

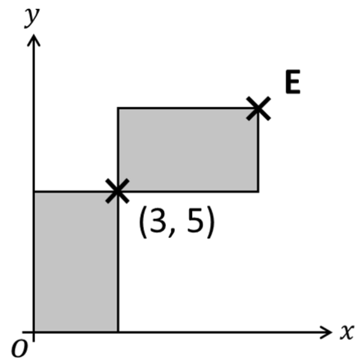
The shapes for each question are **congruent**. Calculate the coordinates of points **A** to **F**.

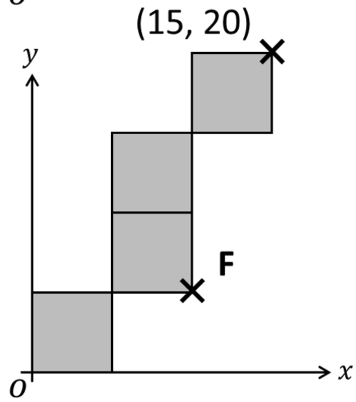




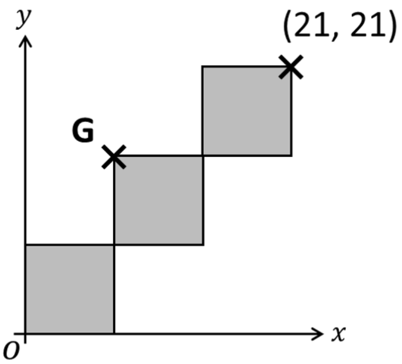


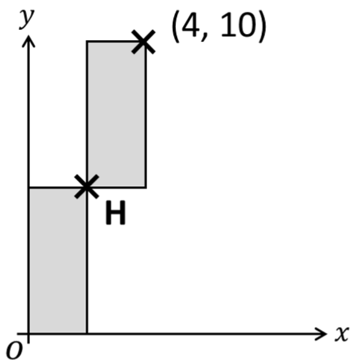


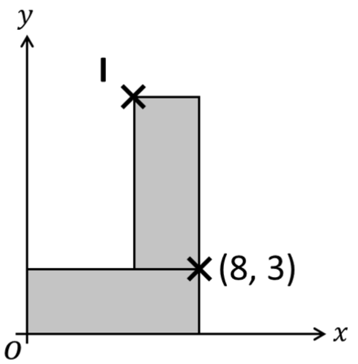


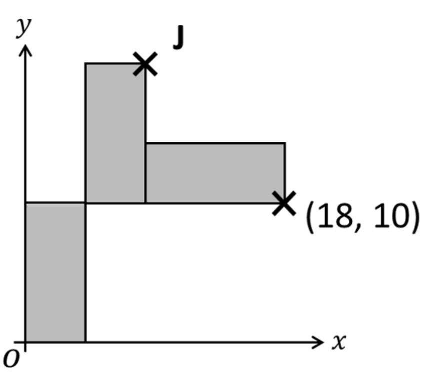


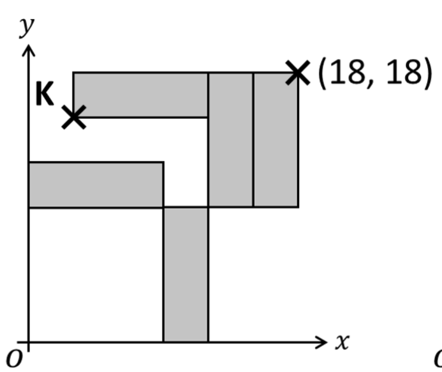
The shapes for each question are **congruent**. Calculate the coordinates of points **G** to **L**.

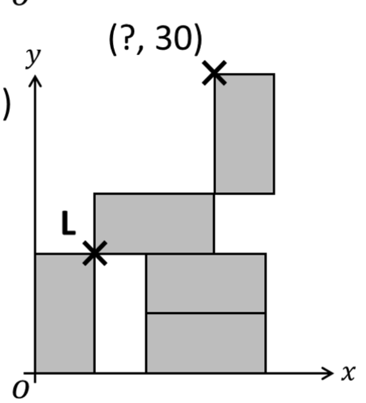








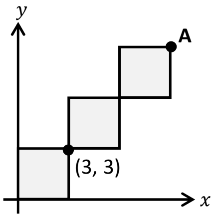




Fluency Practice

Coordinates & Shape

Find the **labelled coordinates, or coordinate**. For each diagram, the shapes are **congruent**.



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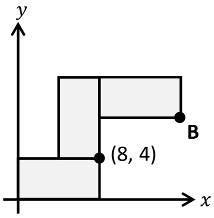
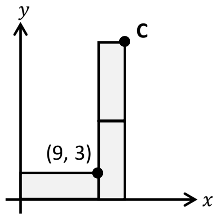


Point B =



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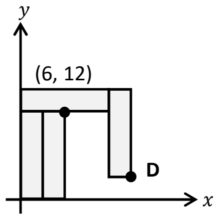
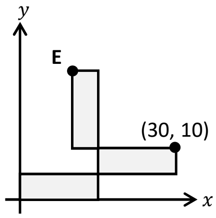


Point D =



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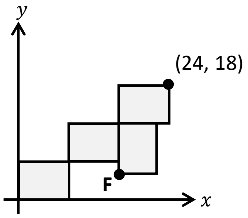

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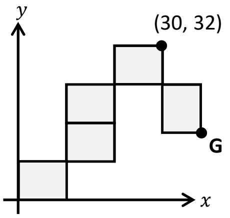
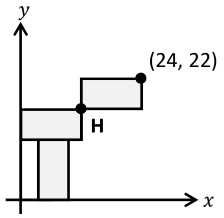
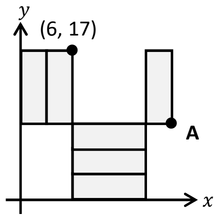


Point G =



Point H =



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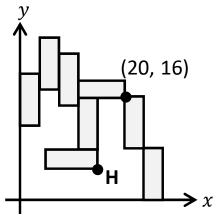

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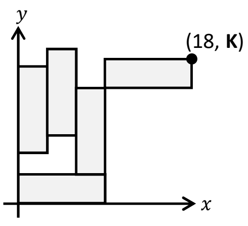

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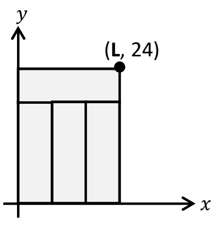

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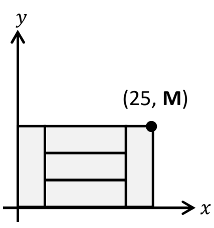

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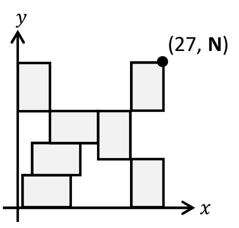

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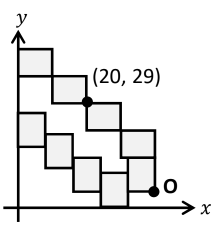
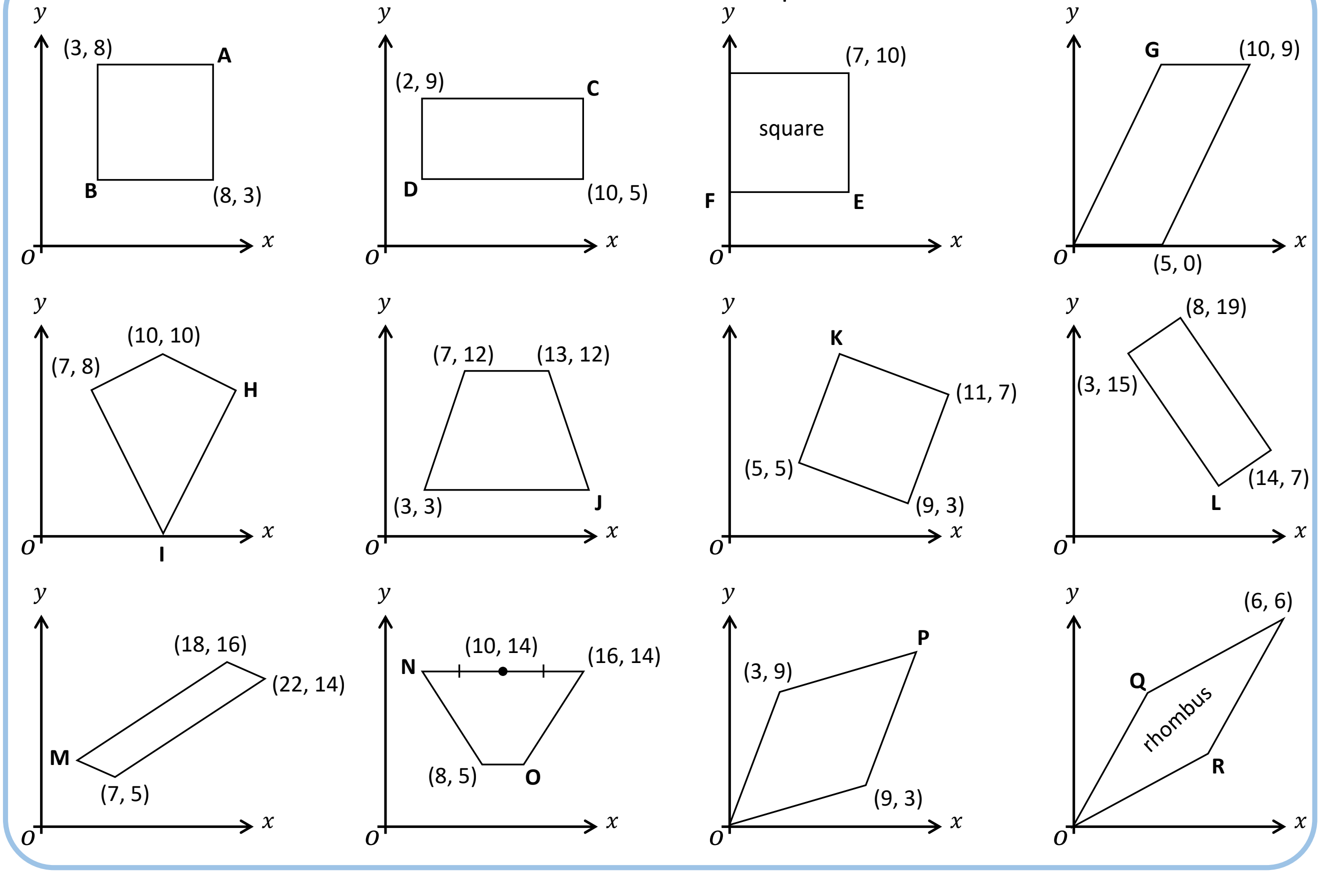


Point O =

Fluency Practice

What are the coordinates of the points **A** to **F**?



4 Charts

4.1 Bar Charts

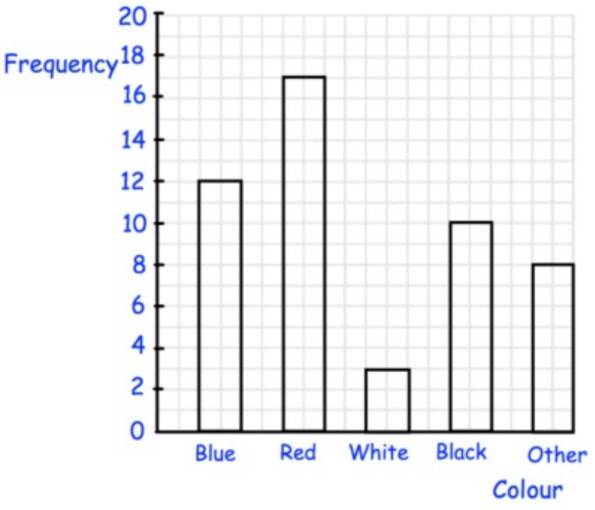
In this section you will look at bar charts.

A bar chart is a chart that uses the heights of rectangles to represent the frequency of qualitative data (data that can only be written in words and not numbers).

- Each rectangle should be of equal width.
- The rectangles should be separated by gaps of equal width.
- The frequency axis should start from 0.
- Each axis should have a title.

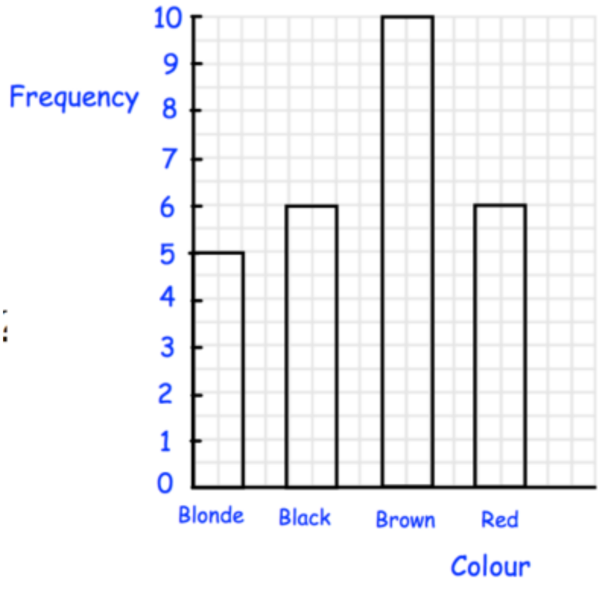
Worked Example	Your Turn
The bar chart shows the colour of cars in a car park:	The bar chart shows the hair colour of students in a class:

The bar chart shows the colour of cars in a car park:



- What is the most common colour?
- How many cars were blue?
- How many cars were white?
- How many more cars were red than other?
- How many cars were there in total?
- What fraction of the cars are black?

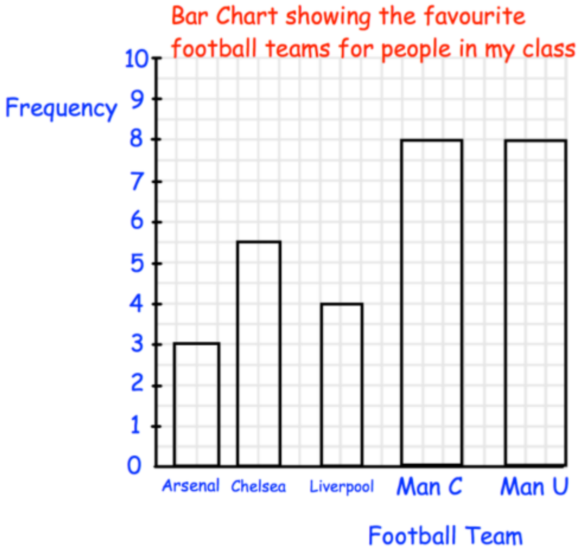
The bar chart shows the hair colour of students in a class:



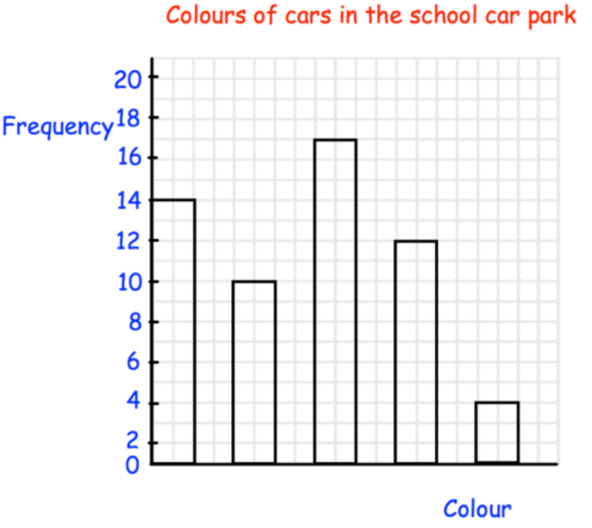
- What is the most common hair colour?
- How many students had black hair?
- How many more students had red hair than blonde hair?
- How many students are in the class?
- What fraction of the students have brown hair?

Worked Example	Your Turn
Spot the mistakes in the bar chart:	Spot the mistakes in the bar chart:

Football Team	Frequency
Arsenal	3
Chelsea	5
Liverpool	4
Man City	8
Man United	8



Colour	Frequency
Blue	14
Red	9
Silver	17
White	12
Green	4



Worked Example	Your Turn
Draw a bar chart for the data:	Draw a bar chart for the data:

Sport	Frequency
Cricket	4
Football	3
Hockey	6
Rugby	1

Colour	Frequency
Blue	15
Green	8
Red	21
Yellow	3

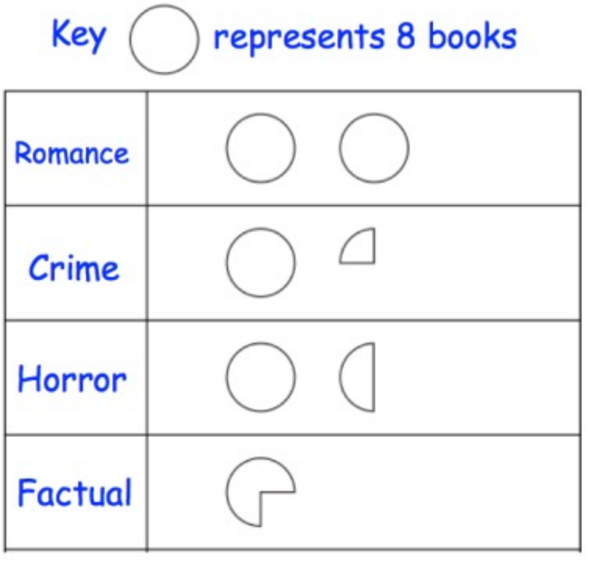
4.2 Pictograms

In this section you will look at pictograms.

A pictogram is a chart that uses a number of icons to represent the frequency of qualitative data

- Only one labelled axis, which shows the categories.
- The size of each icon should be roughly the same.
- The icons should line up.
- A key is required to show the frequency.
- The same symbol needs to be used for all categories.

Worked Example	Your Turn
The pictogram shows the type of books a person read last year.	The pictogram shows the number of hours of sunshine in a day across various cities



How many books were:

Romance

Crime

Horror

Factual

How many hours of sunshine were there in:

Dublin

Belfast

Glasgow

Worked Example	Your Turn
Students were asked their favourite subject. The results were: Maths Maths Maths English Science English French PE PE English Maths Maths Maths Maths Maths Draw a pictogram for the results.	A person asked their friends for their favourite sport. Rugby Football Rugby Hockey Cricket Football Football Rugby Hockey Football Rugby Cricket Hockey Football Football Football Rugby Football Football Rugby Draw a pictogram for the results, where a circle represents 2 people

4.3 Pie Charts

In this section you will look at pie charts.

A pie chart is a chart that uses sectors of a circle to represent the relative frequency of different categories, values or groups.

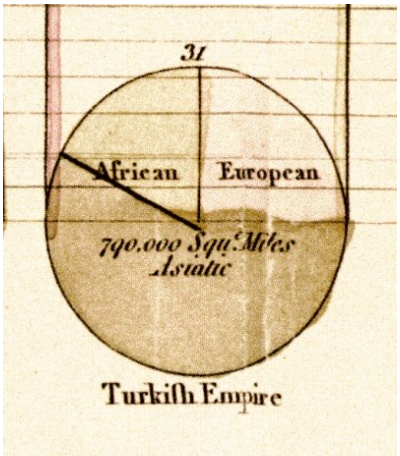
Pie charts should be used when we interested in proportions/percentage/fractions of some total and are less concerned with the frequencies.

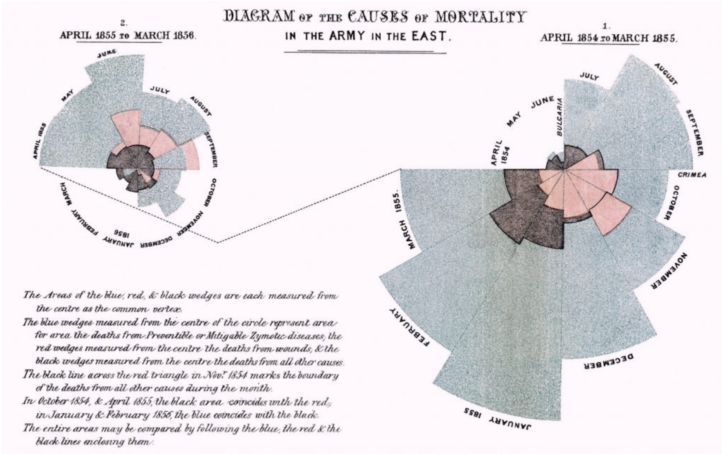
- The fraction of $\frac{\text{frequency of category}}{\text{total of frequencies}}$ is equivalent to the fraction $\frac{\text{sector angle}}{360°}$.

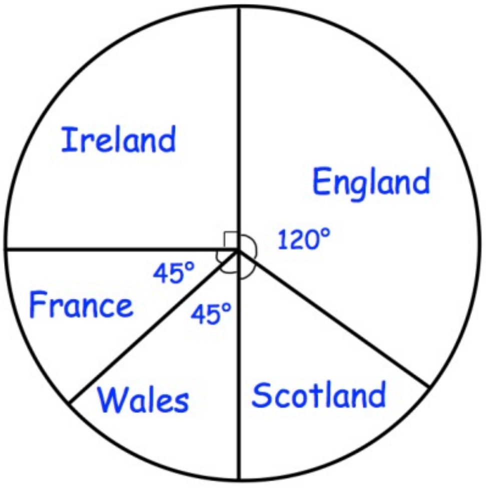
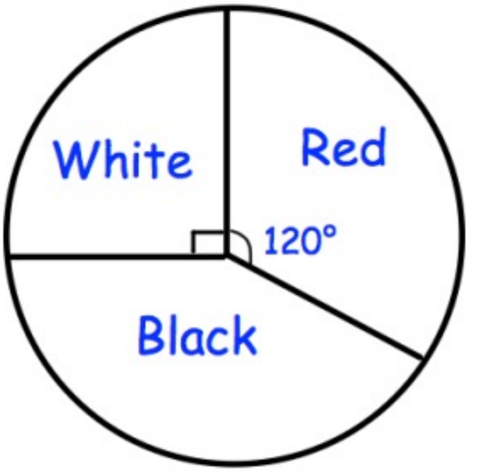
- Each sector should be labelled, or a key used.

- It is conventional to draw the first slice of a pie from 12 o'clock and the slices are then arranged clockwise.

Pie charts have been around since William Playfair created his Statistical Breviary of 1801. They were later popularised by Florence Nightingale.



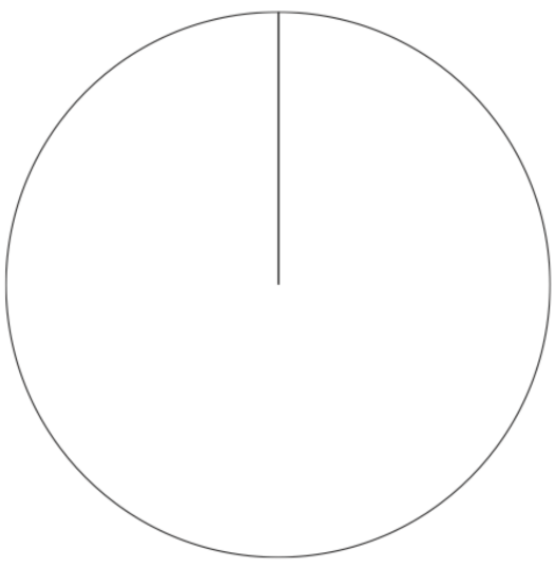


Worked Example	Your Turn
A group of 720 people were asked which rugby team they support.	There are 1440 counters in a bag. Each is white, red or black.
	
How many supported:	How many counters are:
Ireland	White
England	Red
Wales	Black
Scotland	

Worked Example

The table shows the number of ice creams sold in a day. In total 120 were sold. Draw a pie chart for the data.

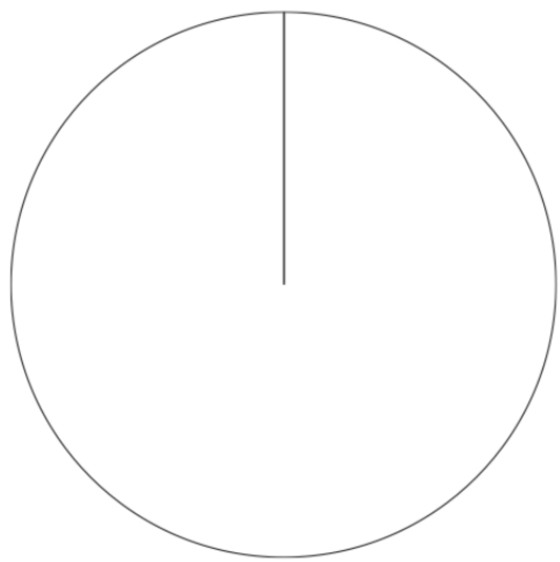
Flavour	Number sold
Vanilla	20
Chocolate	40
Strawberry	24
Honeycomb	24
Mint	12



Your Turn

The table shows the holiday destinations of 60 people. Draw a pie chart for the data.

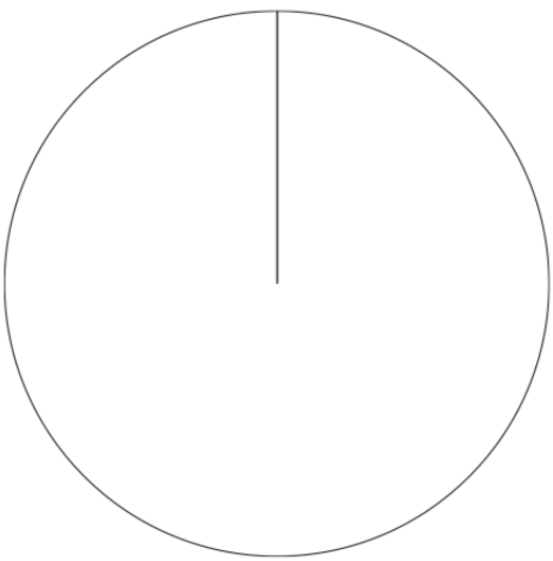
Destination	Number of people
Italy	15
Portugal	10
Spain	12
France	23



Worked Example

Draw a pie chart for the data.

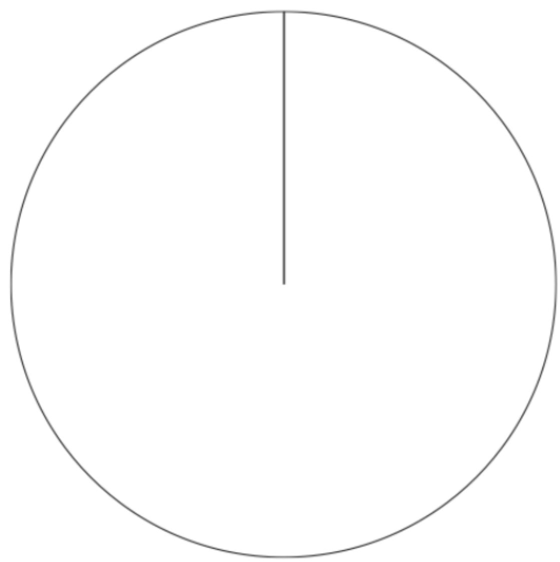
Flavour	Percentage
Vanilla	20%
Chocolate	10%
Strawberry	50%
Honeycomb	5%
Lemon	15%



Your Turn

Draw a pie chart for the data.

Drink	Percentage
Cola	10%
Water	50%
Lemonade	40%



4.4 Stem and Leaf Diagrams

In this section you will look at stem and leaf diagrams.

A stem and leaf diagram is a simple but effective way of showing data. It puts the data into order, puts it into classes (groups) and we can quickly see patterns. As the data is in order it is also useful for finding averages and the range.

Suppose this “stem and leaf diagram” represents the lengths of beetles.

The key tells us how two digits combine.

1	4
2	1 2 4 5
3	2 5 6 6 6 7 7 8 8
4	0 1 2 2 4 5 6 7 7 7 7 8
5	0 1 1 2

Key:
2 | 1 means 2.1cm

Value represented = 4.5cm

These numbers (known as the ‘stems’) represent the first digit of the number.

The ‘leaves’ must be in order.

These numbers (the ‘leaves’) represent the second.

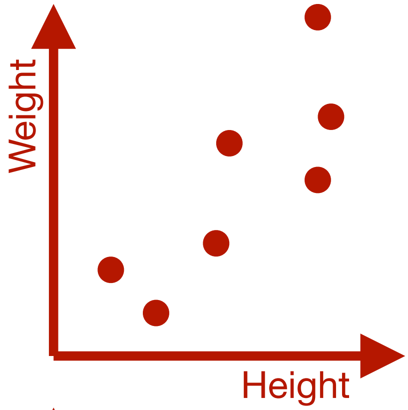
Worked Example	Your Turn
Draw an ordered stem and leaf diagram for this data: 12 21 13 31 53 47 29 21 18 46 21 53 45	Draw an ordered stem and leaf diagram for this data: 55 23 48 29 41 47 36 35 40 35 44 34 35
Work out the mode	Work out the mode
Write down the median	Write down the median
Work out the mean (1dp)	Work out the mean (1dp)
Work out the range	Work out the range

Worked Example	Your Turn
Draw an ordered stem and leaf diagram for this data: 12 21 13 31 53 47 29 21 18 46 21 53 45 21	Draw an ordered stem and leaf diagram for this data: 42 35 56 39 40 51 47 38 42 55 42 48 49 41
Work out the mode	Work out the mode
Write down the median	Write down the median
Work out the mean (1dp)	Work out the mean (1dp)
Work out the range	Work out the range

4.5 Scatter Diagrams

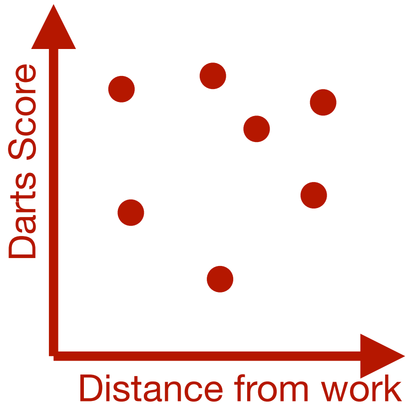
In this section you will look at scatter diagrams

Scatter Graphs can show a relationship between two variables.



…such as people's height and weight.

…or the number of staff working in KFC and the wait time for food.



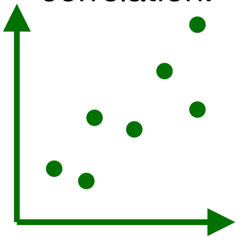
…or the distance people live from work and their best score in darts.

Correlation

If the two variables have a relationship we call it correlation.

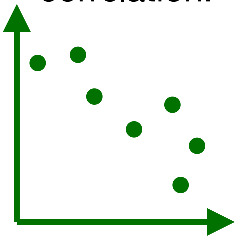
There are different types of correlation:

Positive correlation:



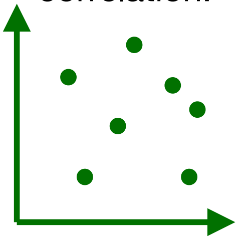
As one value goes up, so does the other.

Negative correlation:



As one value goes up, the other goes down.

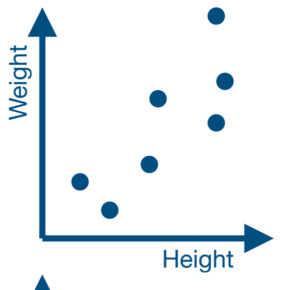
No correlation:



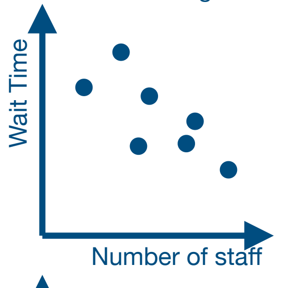
There is no obvious relationship.

Sometimes you might be asked to explain the correlation in context.

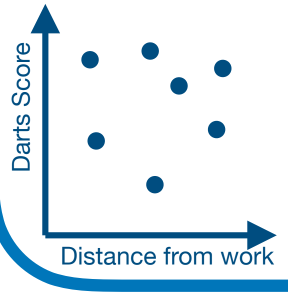
This means describing what is actually happening. eg:



"Taller people are usually heavier."



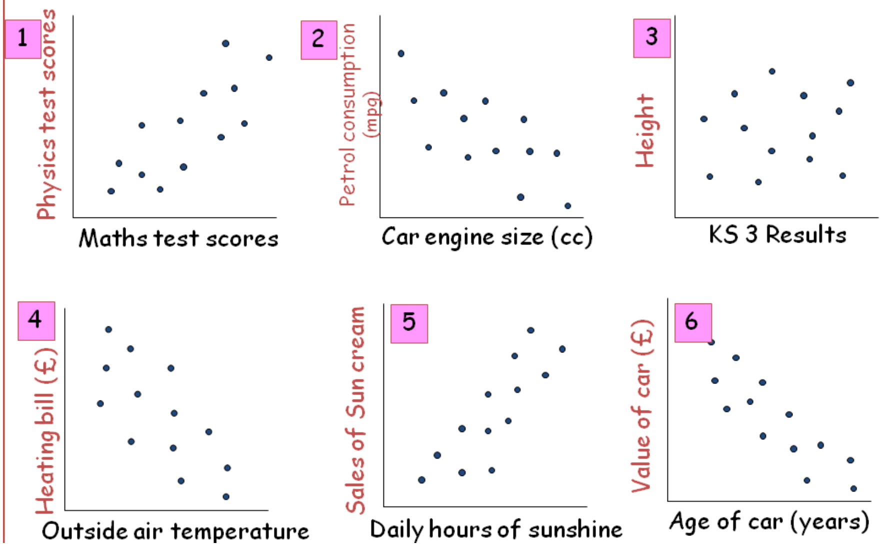
"When there are more staff working, you wait less."



"There is no relationship between how far people live from work and their darts ability."

Fluency Practice

State the type of correlation for the scatter graphs below and write a sentence describing the relationship in each case.



Compete the sentences using **positive/negative/no** and then **increase/decrease/not affected.**

1. There is a .... correlation between Physics and Maths test scores. As the Maths test results increase the Physics test results ....

2. There is a .... correlation between car engine size and petrol consumption.. As the car engine size increases the petrol consumption ....

3. There is .... correlation between KS3 results and height. As the KS3 results increase the height of the person is ....

4. There is a .... correlation between outside air temperature and the heating bill. As the air temperature increases the heating bill ....

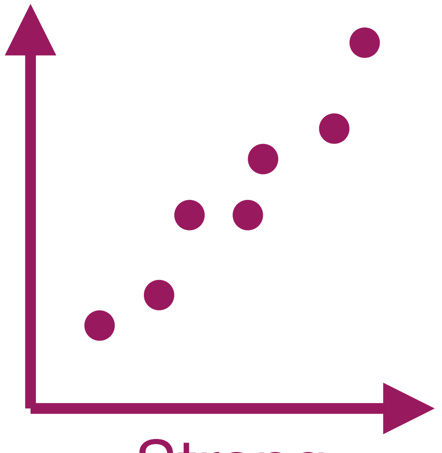
5. There is a .... correlation between the daily hours of sunshine and sales of sun cream. As the hours of sunshine increase sales of sun cream ....

6. There is a .... correlation between the age of a car and its value. As the car gets older its value ....

Correlation Strength

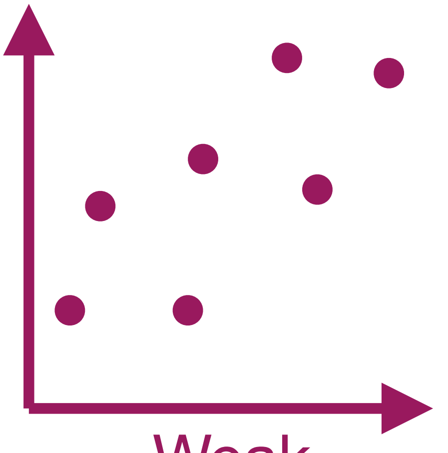
Correlation can be strong or weak.

If the correlation is strong, all the points will closely follow a straight line.



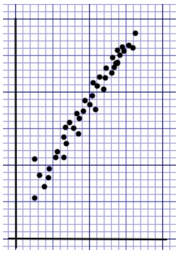
Strong correlation

If the correlation is weak, the points will follow the line more loosely.



Weak correlation

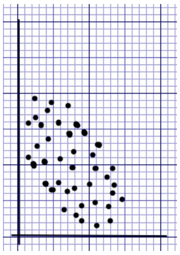
Fluency Practice



Strong

Moderate

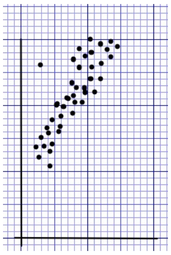
Weak



Strong

Moderate

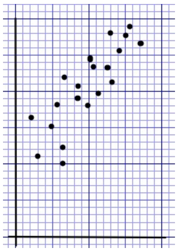
Weak



Strong

Moderate

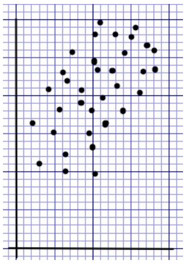
Weak



Strong

Moderate

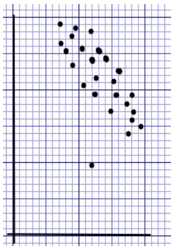
Weak



Strong

Moderate

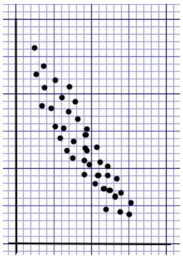
Weak



Strong

Moderate

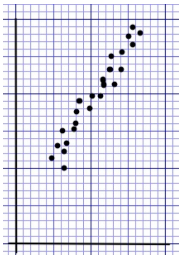
Weak



Strong

Moderate

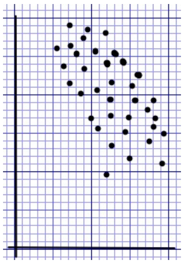
Weak



Strong

Moderate

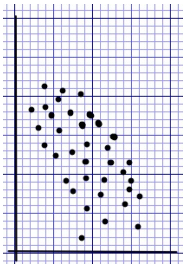
Weak



Strong

Moderate

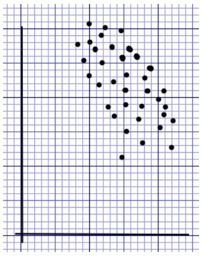
Weak



Strong

Moderate

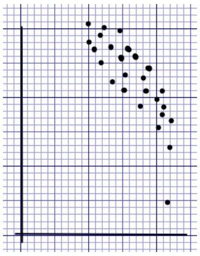
Weak



Strong

Moderate

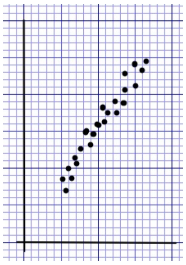
Weak



Strong

Moderate

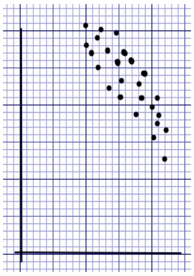
Weak



Strong

Moderate

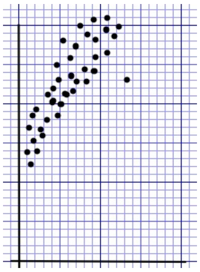
Weak



Strong

Moderate

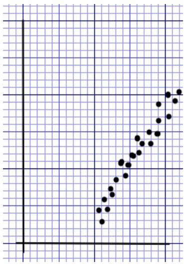
Weak



Strong

Moderate

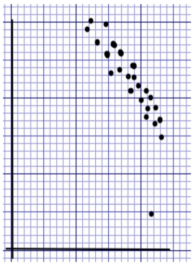
Weak



Strong

Moderate

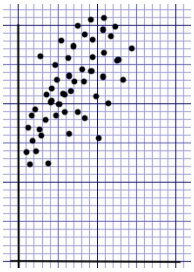
Weak



Strong

Moderate

Weak



Strong

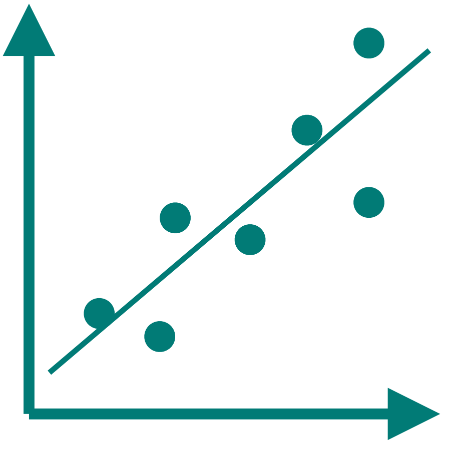
Moderate

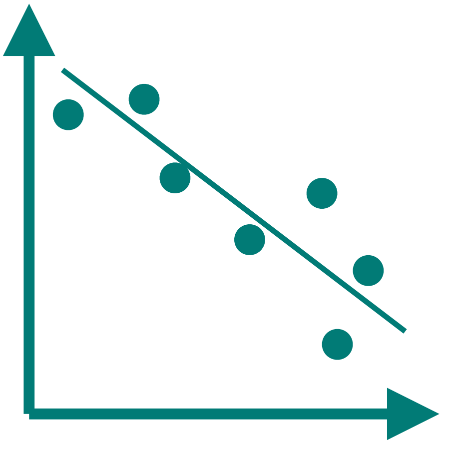
Weak

Line of Best Fit

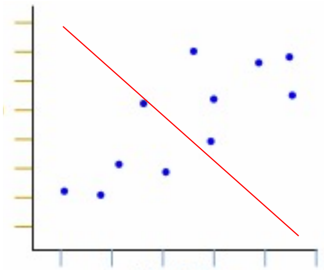
We can show the correlation more clearly by drawing a Line of Best Fit.

This should pass through the middle of all the points (but does not have to touch any of the points).

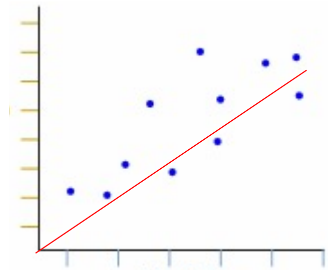




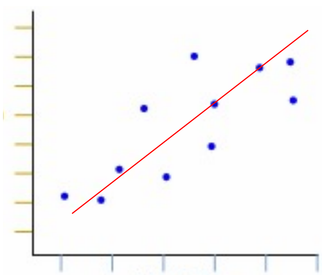
Fluency Practice



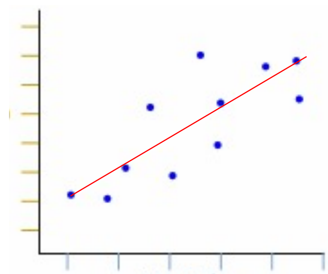
Yes / No



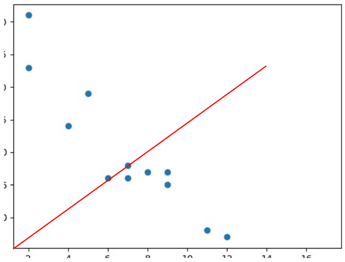
Yes / No



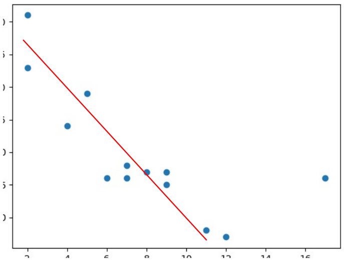
Yes / No



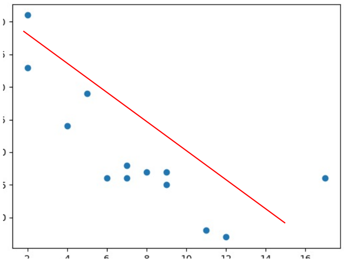
Yes / No



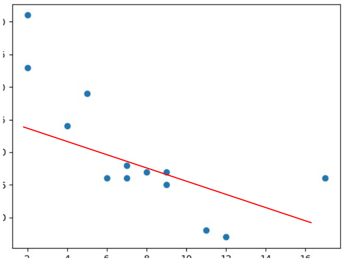
Yes / No



Yes / No



Yes / No



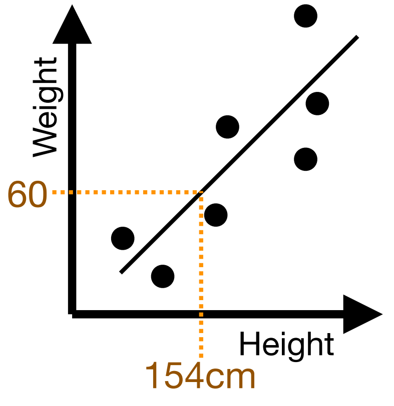
Yes / No

Drawing and Interpreting Scatter Graphs

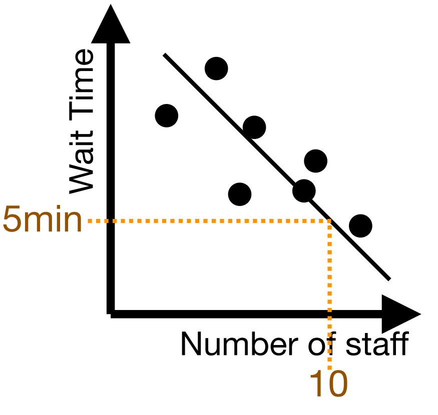
We can use the Line of Best Fit to make predictions of other results.

For example, we can estimate:

...someone's height if we know their weight is 60kg.

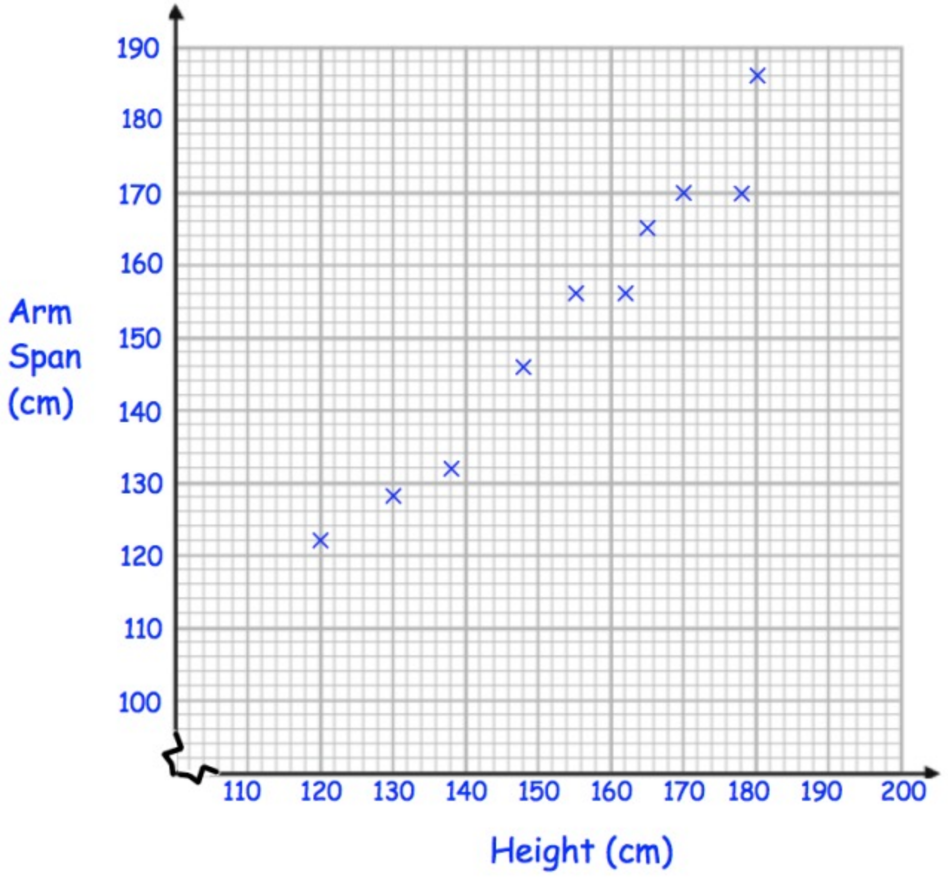


...or the wait time in KFC if we know they have 10 staff on today.



Worked Example

The scatter graph shows the height and arm span of ten students.



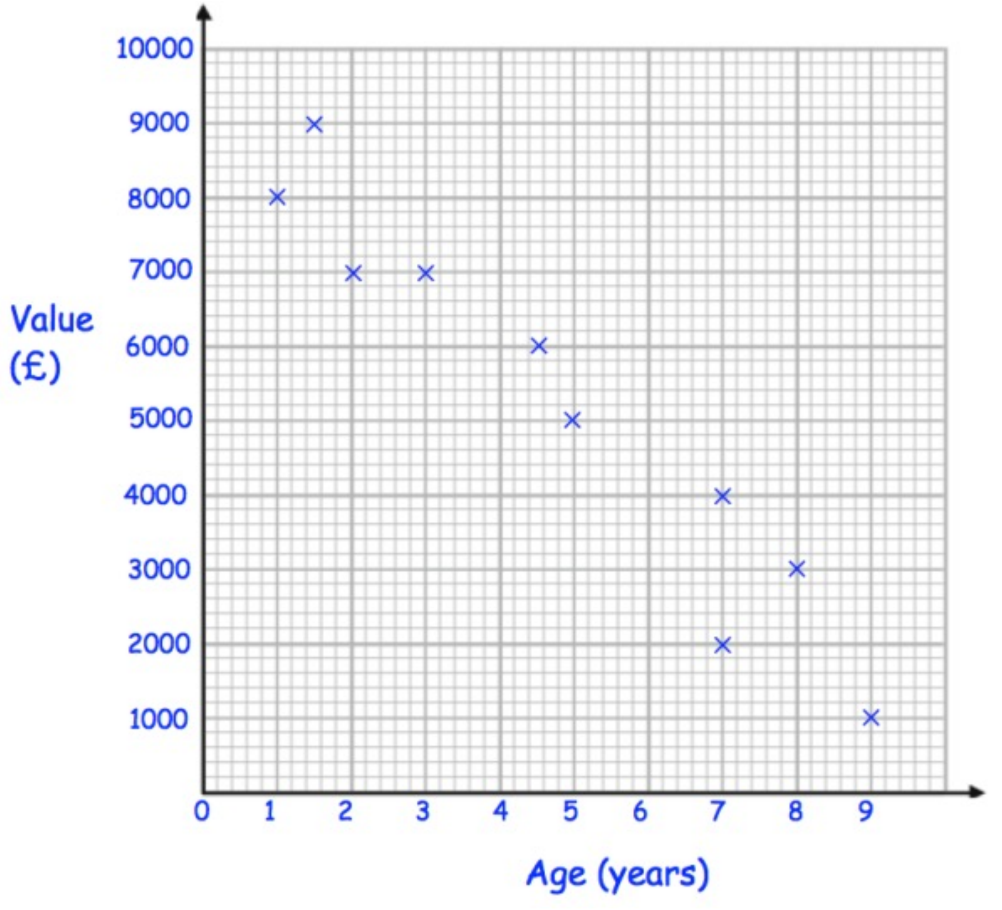
a) Describe the correlation.

b) Another student is $174\ cm$ tall and has an arm span of $180\ cm$. Plot this on the graph.

c) Another student is $142\ cm$ tall. Estimate the arm span of this student.

Your Turn

The scatter graph shows the value of cars and their age.



a) Describe the correlation.

b) Another car is 6 years old and worth £1500. Plot this on the graph.

c) Another car is 4 years old. Estimate its value.

Fluency Practice

Question 1: Plot the following information as scatter graphs

(a)

Maths score	9	13	6	18	11	4	15	10
Physics score	10	13	5	20	8	5	12	14

(b)

Age, years	4	7	2	4	1	9	3	6
Cost, £	6000	3000	7500	5000	8000	1500	6000	4000

(c)

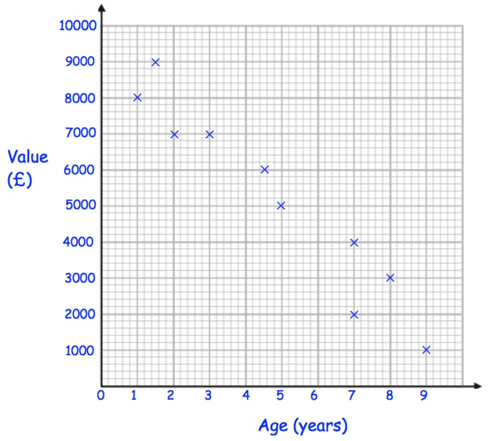
Height, cm	157	160	148	160	177	156	166	170
Weight, kg	53	60	44	53	54	60	54	70

(d)

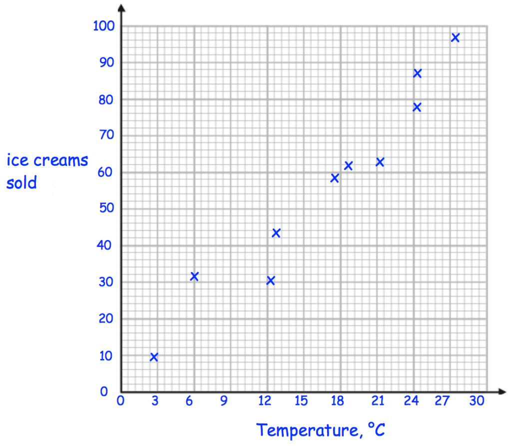
Distance, miles	2.5	0.8	1.2	4.1	2.8	3.3	3.7	1.5
Cost	£3.20	£1.40	£1.80	£4.40	£3.00	£3.60	£4.80	£2.40

Question 2: What type of correlation does each scatter graph show below

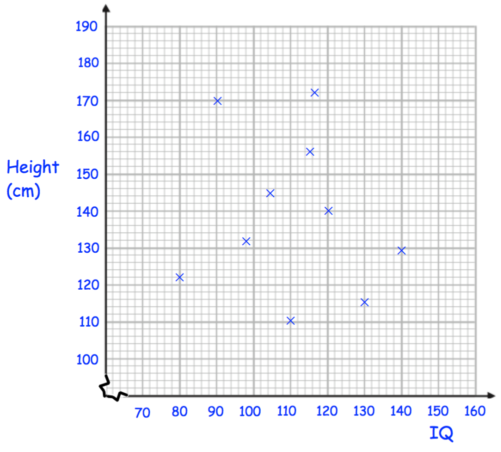
(a)



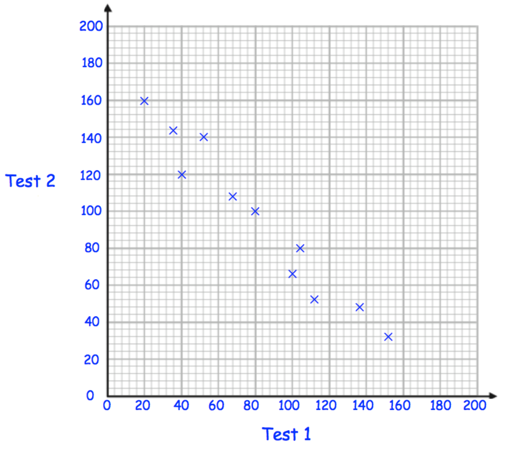
(b)



(c)

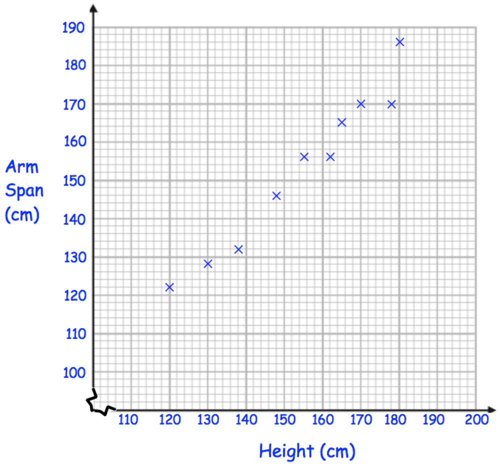


(d)

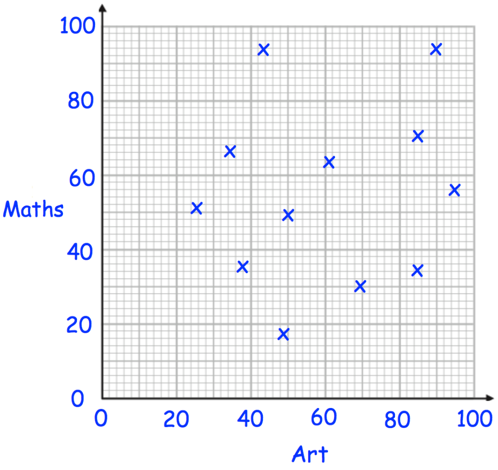


Fluency Practice

(e)



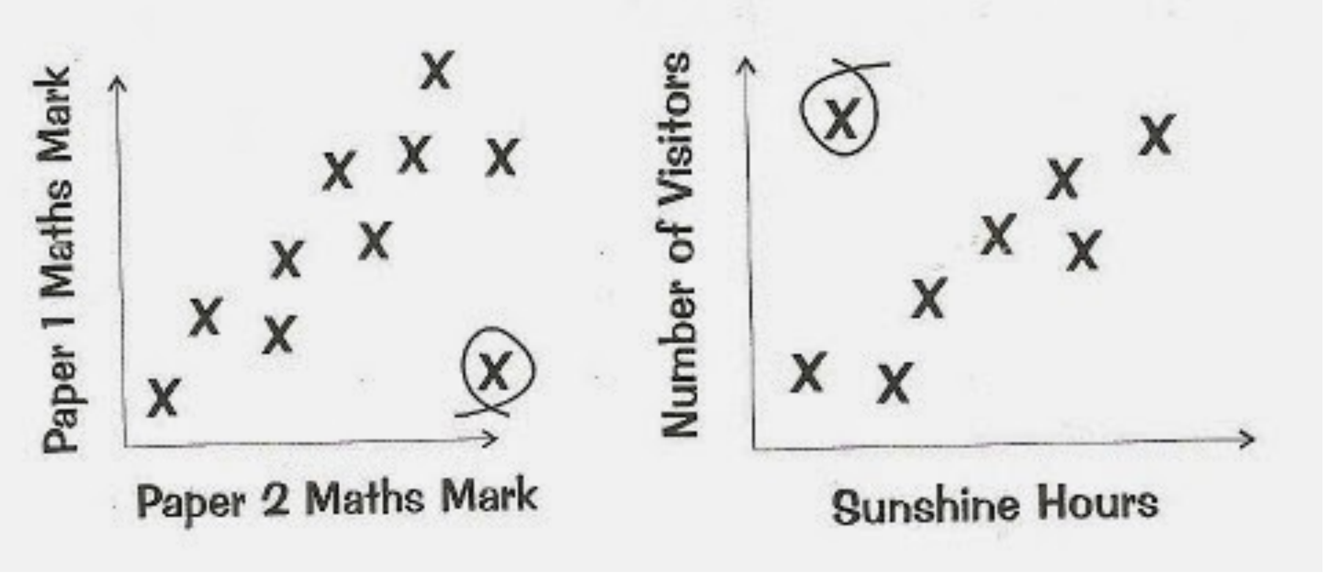
(f)



Question 3: Describe the relationships shown in each scatter graph in Question 2.

Outliers

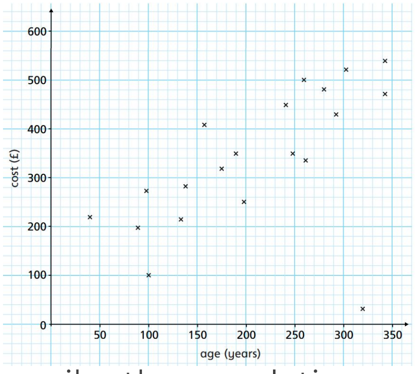
Scatter plots often have a pattern. We call a data point an **outlier** if it doesn't fit the pattern.



Fluency Practice

1. The scatter graph shows the cost and age of some rare books.

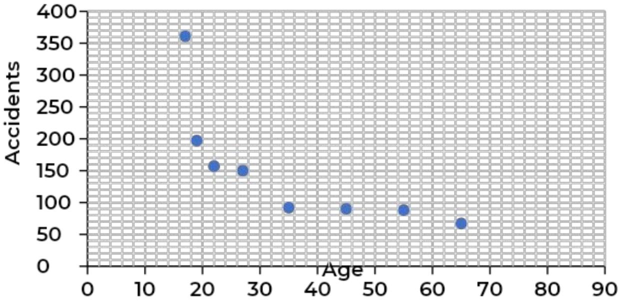
a)Circle the outlier.



b) Describe the correlation.

2. The scatter graph shows the number of accidents per million miles for drivers of different ages.

a)Circle the outlier.

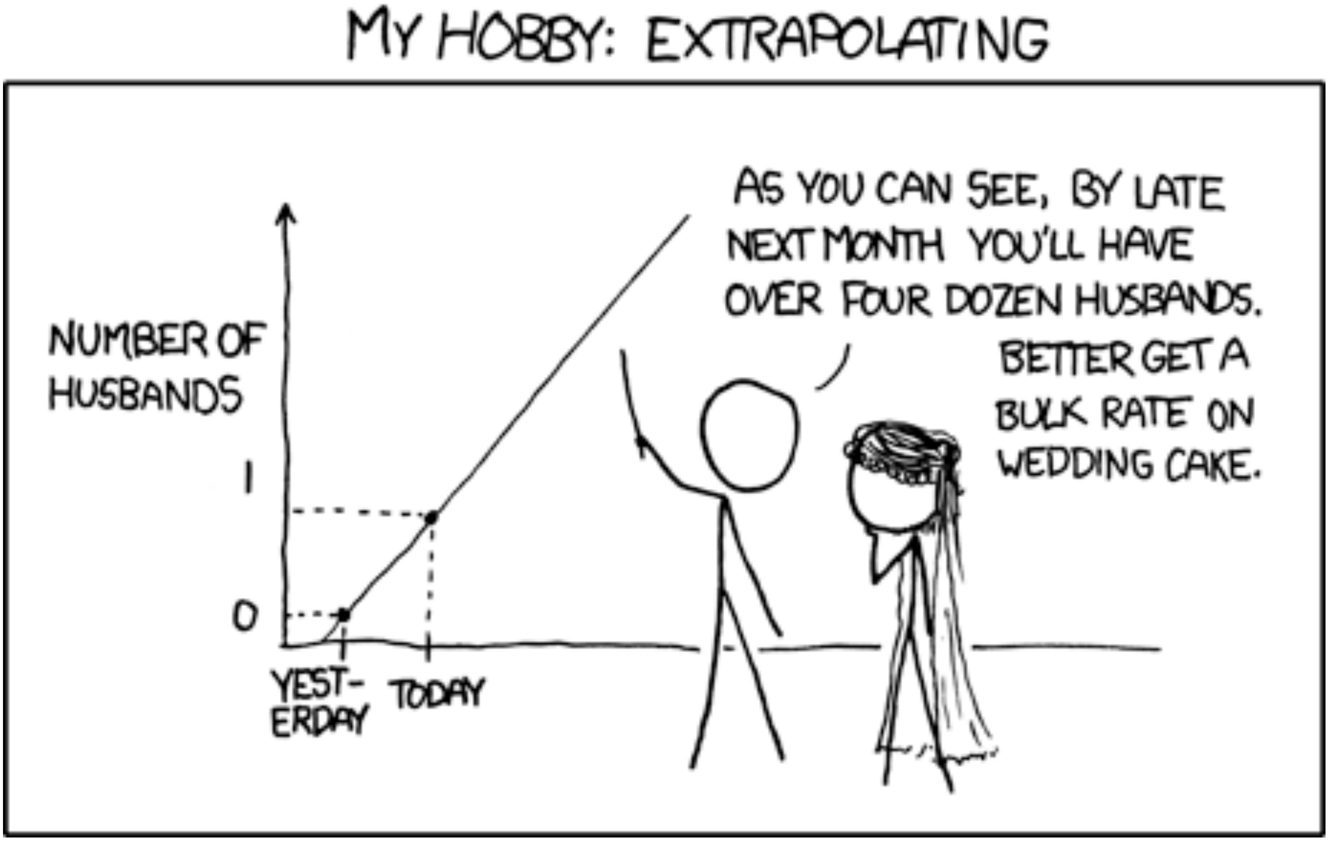


b)Describe the correlation.

Interpolation vs Extrapolation

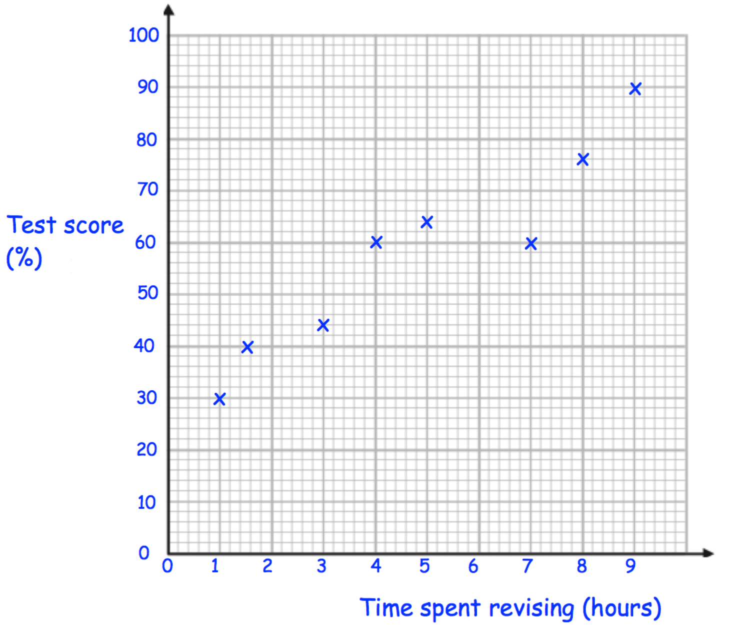
When we use our line of best fit to estimate a value **inside** the range of our data, this is known as **interpolation**.

When we use our line of best fit to estimate a value **outside** the range of our data, this is known as **extrapolation**.



Fluency Practice

Question 1: The scatter graph below shows information about the number of hours spent revising for a test and the test result for a group of 8 students.



(a) Daisy spent 7 hours revising for the test. What is Daisy's test score?

(b) Harry's test score was 30%. How many hours did Harry spend revising?

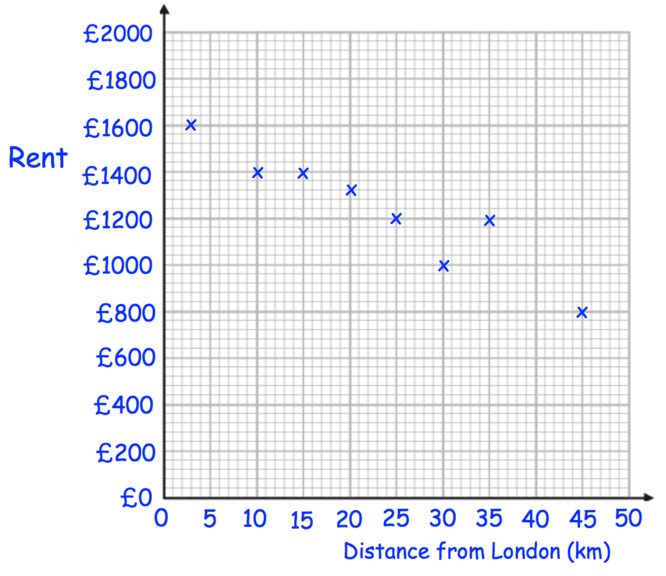
(c) Draw a line of best fit.

(d) Another student spent 6 hours revising for the test.
Find an estimate of their test score.

(e) Explain why it might not be sensible to use the scatter graph to estimate the score for a student that spent 15 hours revising.

Fluency Practice

Question 2: The scatter graph shows information about the cost of renting apartments and their distance from London.



(a) Describe the relationship shown in the scatter graph.

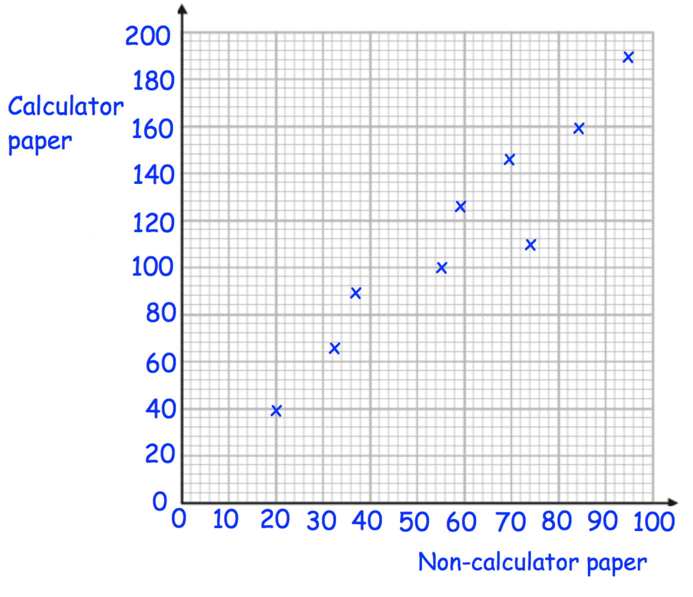
(b) Draw a line of best fit on the diagram.

(c) Estimate the cost of renting an apartment 40km from London.

(d) Victor has £1100 to spend on rent. Estimate how close he could live to London.

(e) Explain why it might not be sensible to use the scatter graph to estimate the price of rent for a property that is 250km from London.

Question 3: The students in a class sit a non-calculator and a calculator maths paper.



Fluency Practice

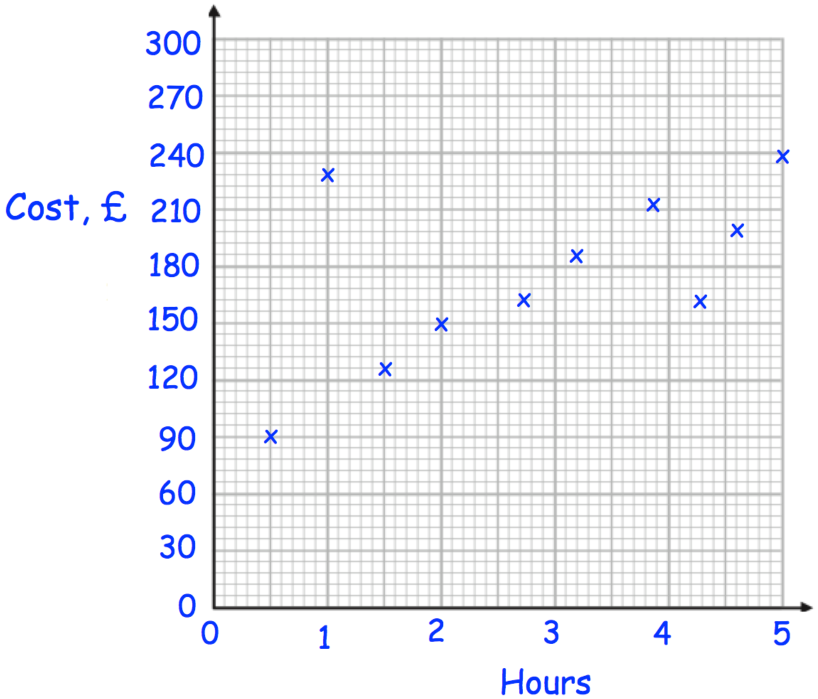
(a) What type of correlation does the scatter graph show?

(b) Draw a line of best fit.

(c) Philip was absent for the calculator paper, but he scored 80 in the non-calculator paper. Use your line of best fit to predict his calculator paper score.

(d) Neil was absent for the non-calculator paper, but he scored 60 in the calculator paper. Use your line of best fit to predict his non-calculator paper score.

Question 4: Mr Hughes is a plumber.
The scatter graph shows the cost and the length of his last 10 jobs.



(a) Draw a line of best fit

(b) For one job Mr Hughes needed to replace an expensive part that he fitted quickly.
How long did that job last?

(c) Estimate the cost of a job lasting 3.5 hours.

(d) A job costs £120, estimate the length of the job.