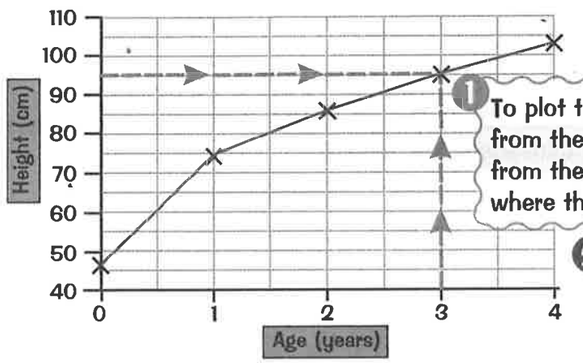
Line Graphs

Drawing Line Graphs

A line graph is a good way to show how something changes.

EXAMPLE: Kev's height each year is recorded in this table. Draw a line graph to show the data.

Age (years)	Height (cm)
0	47
1	74
2	86
3	95
4	103

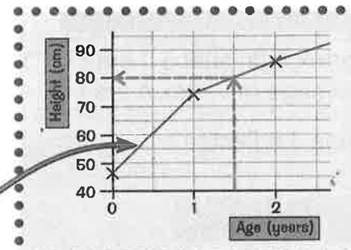


1. To plot the points, read up from the age and then across from the height. Mark a cross where the two lines meet.
2. When you've plotted all the points, join them up with straight lines.

You can use the graph to answer questions about Kev's height.

EXAMPLE: How tall was Kev when he was 1½ years old?

The graph is steepest between 0 and 1 year old. That means Kev was growing fastest then.

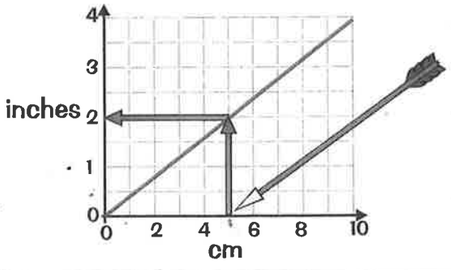


Find 1½ years old on the age axis and read up to the line, then across to find Kev's height when he was that age.

So when Kev was 1½ years old he was 80 cm tall.

Conversion Graphs Swap Between Units

EXAMPLE: This graph converts between cm and inches. Approximately how many inches is 5 cm?



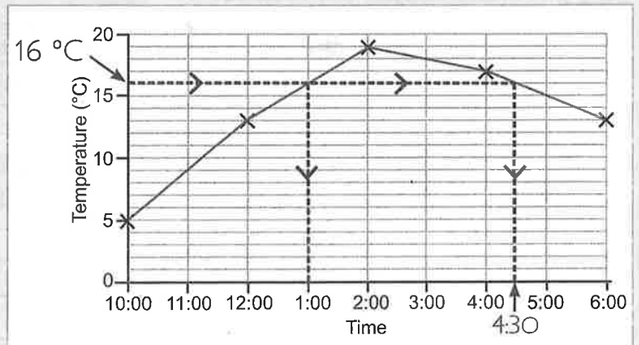
1) Find 5 cm on the cm axis, then read up to the line.
2) Change direction and read across to the other axis.
3) Read off the number of inches. So 5 cm is about 2 inches.

"I can read and draw line graphs."

Worked Examples

1 Karen measured the **temperature** on her patio every two hours one day. She plotted a **line graph** of her results. Use the graph to estimate the **two times** when the temperature was **16 °C**.

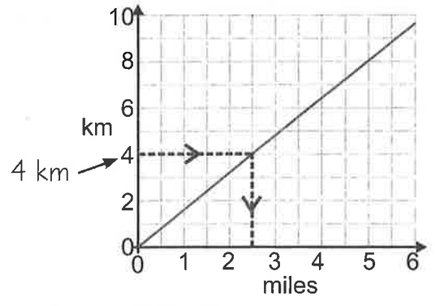
1) Find 16 °C on the temperature axis.
2) Draw a line across until you meet the red line. Then go down to the time axis. This gives you the first time the temperature was 16 °C.
3) Continue your line until it meets the red line again. Read down to find the second time the temperature was 16 °C.



So the temperature was 16 °C at 1:00 and 4:30

2 Neil ran **4 km** and Beth ran **3 miles**. Use the graph to find approximately how many **miles** further Beth ran than Neil.

1) First convert 4 km to miles using the graph. Find 4 km on the km axis and draw a line across until you meet the red line.
2) Now change direction and go down to the 'miles' axis. Read off how many miles are equivalent to 4 km.
3) Subtract the distance Neil ran from the distance Beth ran in miles.



4 km ≈ 2.5 miles

3 − 2.5 = 0.5 miles

So Beth ran 0.5 miles further than Neil

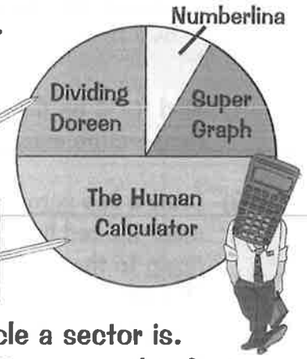
Don't lose the plot — it's just a little cross...

With conversion graphs, make sure you find the number on the correct axis. E.g. don't find a distance in miles on the kilometre axis. Check and double check.

Pie Charts

Pie Charts Show Things as Proportions

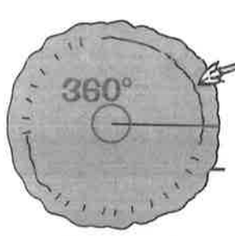
72 children voted for their favourite act on 'Maths Factor'.
This pie chart shows the results.



A quarter of the children voted for Dividing Doreen.
This is 72 ÷ 4 = 18 children.

The winning act was The Human Calculator — half of the children voted for it. This is 72 ÷ 2 = 36 children.

Sometimes it's tricky to tell what fraction of the whole circle a sector is.
You have to measure it with a protractor and find the fraction using this fact:



Total of everything = 360°

(because there are 360° in a whole circle)

The Numberlina sector measures 30°
As a fraction of the whole pie chart this is $\frac{30}{360} = \frac{1}{12}$
$\frac{1}{12}$ of 72 children is 72 ÷ 12 = 6 children

Work Out Angles Using a Multiplier

To draw a pie chart, you need to turn numbers of things into angles.

EXAMPLE: A fisherman caught 60 fish. This table shows how many of each type he caught.

Plaice	Cod	Salmon
10	30	20

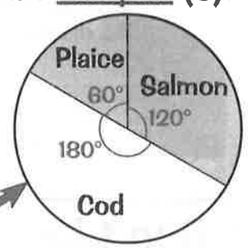
1) Everything = 360° so find the multiplier that turns the total number into 360°.

Multiplier = 360 ÷ total number
= 360 ÷ 60 = 6
(so each fish is represented by 6°)

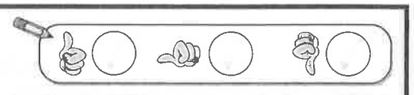
2) To find the angle for each sector, multiply every number by the multiplier (6):

	Plaice	Cod	Salmon
	10	30	20
Angle	10 × 6 = 60°	30 × 6 = 180°	20 × 6 = 120°

3) Draw your pie chart accurately using a protractor and label each sector.



"I can draw and read pie charts."



Worked Examples

1 A fireman wants to make a **pie chart** showing how he spent his shift.
He makes a table showing **how long** he spent on each activity.

Draw a pie chart showing how the fireman spent his shift.

Activity	Time (Hours)
Rescuing cats	1
Fighting fires	4
Fitting smoke alarms	2
Training sessions	3

Total = 1 + 4 + 2 + 3 = 10 hours

Multiplier = 360 ÷ 10 = 36

1) Find the total number of hours in the shift.

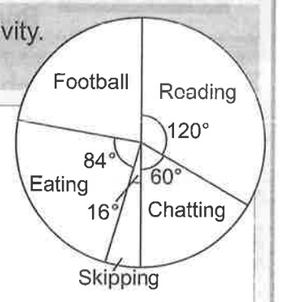
2) Find the multiplier that turns the total into 360°.

Activity	Time (Hours)	Angle
Rescuing cats	1	1 × 36 = 36°
Fighting fires	4	4 × 36 = 144°
Fitting smoke alarms	2	2 × 36 = 72°
Training sessions	3	3 × 36 = 108°

3) Multiply each number by the multiplier to get the angles.

4) Use a compass to draw a circle, then a protractor to draw the sectors. Remember to label your pie chart.

2 This pie chart shows **90** children's favourite playground activity.
How **many** children said they like **football** best?



1) The angles must all add up to 360°. Find the 'Football' angle by subtracting the total of the others from 360°.

2) Turn the angle into a fraction of the whole pie chart.

3) Find this fraction of the total number of children.

120° + 60° + 16° + 84° = 280°
360° − 280° = 80°

$\frac{80}{360} = \frac{8}{36} = \frac{2}{9}$

$\frac{2}{9} \times 90 = 20$

20 children like football best.

Fish pie chart — tasty AND full of Maths...

Pie charts are all about fractions. Each sector is a fraction of the whole circle, and the whole circle is 360°. Remember that number. It's super-important.

Line Graphs

1 Ava has two pet hamsters called Billy and Fred.
She weighs each hamster every month.

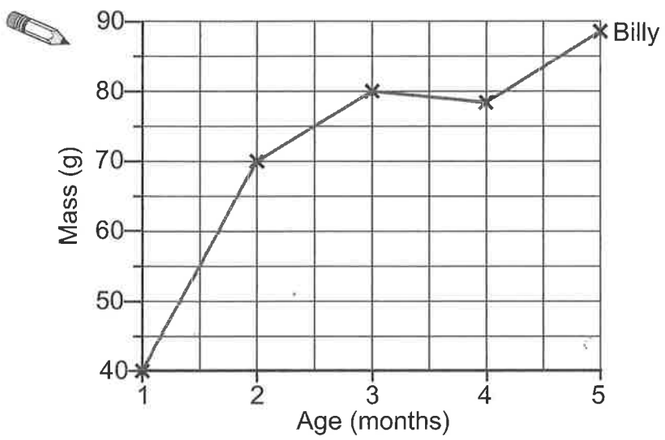
She records their masses in a table.

Billy's mass at 2 months is missing from the table.
Use the graph below to fill in the table.

Age (months)	1	2	3	4	5
Billy's mass (g)	40		80	78	88
Fred's mass (g)	40	60	70	75	75

1 mark

Use the information in the table to plot Fred's mass on the line graph.



2 marks

Estimate the mass of Billy at two and a half months old.

g

1 mark

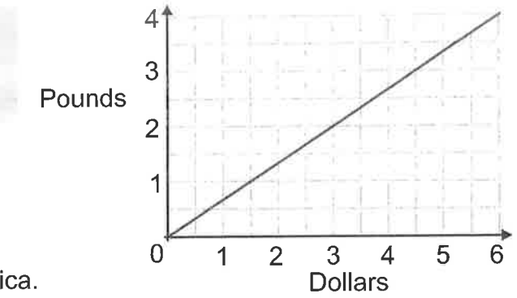
Billy was ill for a few weeks and didn't eat properly.
When do you think this was? Tick the correct box.

☐ Between 1 and 2 months.
☐ Between 3 and 4 months.
☐ Between 2 and 3 months.
☐ Between 4 and 5 months.

1 mark

Line Graphs

2 This graph converts between British pounds (£) and American dollars ($).



Connor is on holiday in America.
He spends 3 dollars on an ice cream.
Approximately how much is this in pounds?

£

1 mark

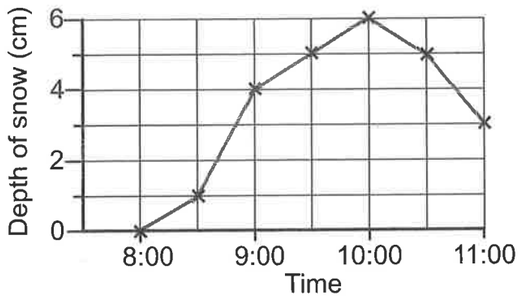
How much is £4 in dollars?

$

1 mark

3 Max measures the depth of snow outside his front door one morning.

His results are shown on this graph.



At what time was the snow deepest?

: am

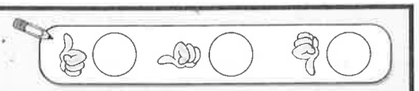
1 mark

How much deeper did the snow get between 8:30 am and 9 am?

cm

1 mark

"I can read and draw line graphs."

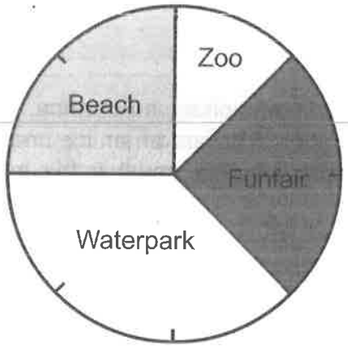


Pie Charts

1 48 children vote on where they should go for a trip.

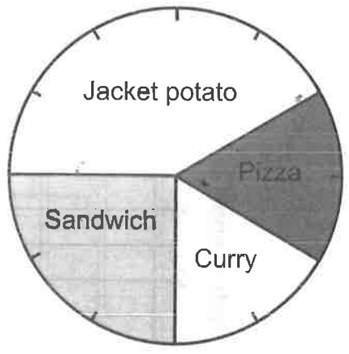
The results of the vote are shown in the pie chart.
Use the pie chart to complete the table of results.

Trip destination	Number of votes
Zoo	
Funfair	
Waterpark	
Beach	



2 marks

2 The school lunch choices of the children in Year 6 are shown in the pie chart below.



20 children chose pizza.
How many children are in Year 6?

children

1 mark

How many more children chose a sandwich than curry?

children

1 mark

3 10 children in a Healthy Eating Club have dressed up as fruit.

Kyle wants to draw a pie chart of their costume choices.
How many degrees will represent each child?

° 1 mark

2 children dressed as bananas.
How many degrees are needed for this sector?

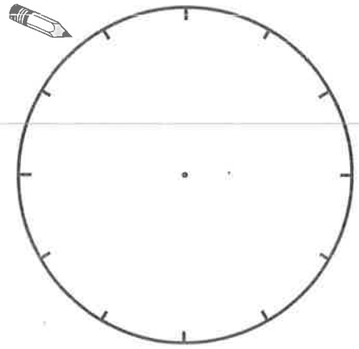
° 1 mark

Pie Charts

4 The table shows the favourite superheroes of 60 children.

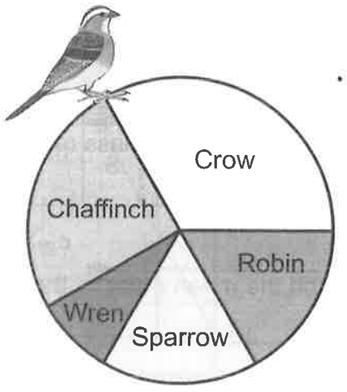
Work out the angle for each superhero and use it to draw a pie chart.

Superhero	Number of children	Angle
Turnip Man	15	
Thunder Smash	30	
Magic Mary	10	
Bolt Girl	5	



2 marks

5 Holly recorded the number of each type of bird that visited her garden one day. She counted 120 birds in total.



Her results are shown in this pie chart.

How many sparrows and wrens did she see?
Measure the angles with a protractor.

Sparrows

Wrens

1 mark

Holly has made a mistake. Four of the birds she thought were crows were actually jackdaws, so her pie chart is wrong.

What size should the jackdaw sector be?

° 1 mark

"I can draw and read pie charts."