**Planning Overview**
Year 6 Statistics

Interpret and construct pie charts and line graphs and use these to solve problems
Calculate and interpret the mean as an average.
6NPV−4 Divide powers of 10, from 1 hundredth to 10 million, into 2, 4, 5 and 10 equal
parts, and read scales/number lines with labelled intervals divided into 2, 4, 5 and 10
equal parts.

Objective	Teaching and Learning
Interpret and construct and line graphs and use these to solve problems	Recap line graphs from the Year 5 curriculum. give children a range of line graphs and ask them to read the labels on each axis to determine what the two criteria are that the data has been plotted against. SATs Question **17** This graph shows how the weight of a baby changed over twelve months. 'This graph is showing the age of a baby and the weight of a baby. The line shows what a baby weighed at a certain age' Ask children to explain why this data hasn't been presented as a bar chart? How is this data different to data that is presented in a bar chart. Recap continuous and discreet data. Ask children to read the line graph to be able to tackle questions like these. Model the process of reading along both axis to find where the line relates to both pieces of information. From the graph, what was the weight of the baby at **10 months**? kg How much **more** did the baby weigh at 5 months than at birth? kg
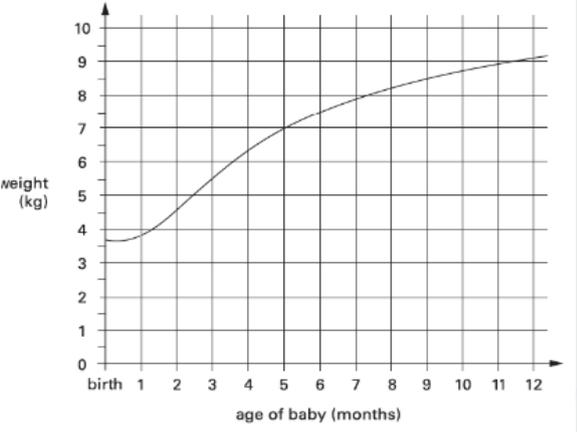
Ask children to tackle a range of line graph questions

19 Carol went on a **40-kilometre** cycle ride.
This is a graph of how far she had gone at different times.

distance travelled in km

time in minutes
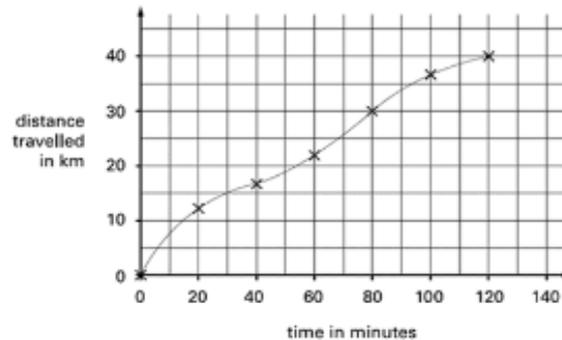
How many minutes did Carol take to travel the
last 10 kilometres of the ride?

✎ _____ minutes

19a

1 mark

Use the graph to estimate the distance travelled
in the **first 20 minutes** of the ride.

✎ _____ km

19b

1 mark

Ask children to collect data on the length of a shadow during the school day.

Ask children to construct an appropriate table to collect this data and how frequently they should go out and measure this shadow.

Ask the children to consider what they should label their axis with, what the scale should be and how they should place their data on the axis.

When they have constructed their graphs ask them to write some questions that someone in another year 6 class could use their graph to answer and some statements about the data that they have collected.

Look at a line graph where more than one set of continuous data is displayed.

Lexi's Floral Shop sells a variety of popular flowers in bouquets
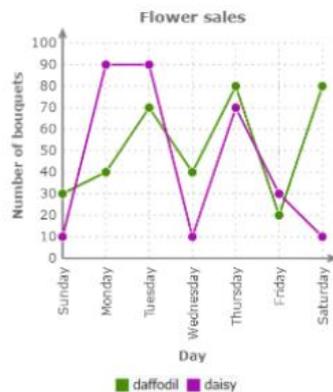

IXL– 'interpret line graphs'

What can children elicit from the information in the graph? What are the 2 pieces of data that the axis are referring to? Why are there 2 lines on this chart and not 1?

Ask children questions relating to the chart such as
- On what days were daffodils more popular?
- On what days were daisys more popular?
- Which flower type was more popular overall?
- How many daisys bouquets were sold across the week?
- How many daffodils bouquets were sold across the week?

Now present children with a graph and ask them to use statements about the graph to decide what the lines are representing.

A pizzeria in Oakland makes pizzas with a variety of different toppings
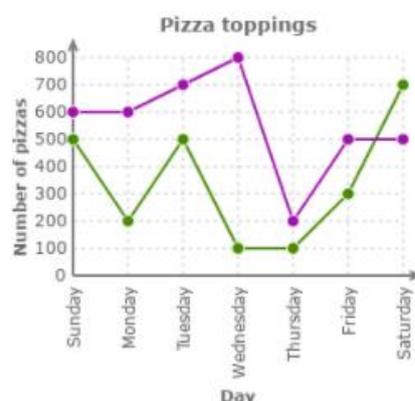
*IXL– 'interpret line graphs'*

Mushrooms were only more popular than tomatoes for $\frac{1}{7}$ of the week.
Which line is representing mushrooms and which line is tomatoes?
Ask the children to create some statements about the data on this line graph similar to the one above.

SATs questions relating to 2 data sets on one line graph

10 This graph shows the cost of phone calls in the daytime and in the evening.
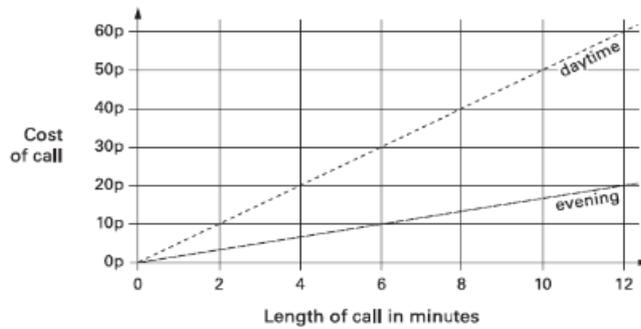
How much does it cost to make a **9 minute** call in the **daytime**?

✎ ☐ p

How much **more** does it cost to make a **6 minute** call in the **daytime** than in the **evening**?

✎ ☐ p

Mastery

Three mobile phone companies each have different monthly pay-as-you-go contracts.

Phil's Phones: £5 fee every month and 2p for each Mb of data you use.

Manish's Mobiles: £7 fee every month and 1p for each Mb of data you use.

Harry's Handsets: £7 fee every month and 200Mb of free data, then 3p for each Mb of data after that.

Amir, Selma and Fred have mobile phones and they have recorded for one month how much data they have used (in Mb) and how much they have paid (in £). They have represented their data on this graph.
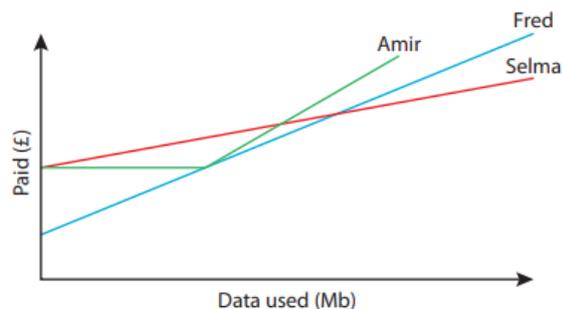

With which company do you think Amir has his contract?
With which company do you think Selma has her contract?
With which company do you think Fred has his contract?

Explain each of your choices.

	Mastery with Greater Depth
	Three taxi companies each work out the cost of a journey in different ways. I have taken lots of journeys with each of the companies, and have recorded each time how long the journey was (in km) and the cost of the journey (in £). I have represented these data on this graph. Tina's Trips — Joe's Jaunts — Vishal's Visits. Cost of journey (£) vs Length of journey (km). What's the same and what's different about the ways in which the three companies work out the cost of a journey? Which might you choose if you wanted to book a taxi to make a journey? Explain your reasoning.
Interpret and construct pie charts and use these to solve problems	Collect data on children's favourite meal and create a bar chart using multilink cubes. Use a different colour for each category. Clip all the towers together to make a long line of multilink. On a strip of paper that has squares on it, colour the matching number of squares for each colour on the strip. Once you have coloured all the colours pick up the strip of paper and turn it into a circle. Images taken from http://missaugello.blogspot.com/
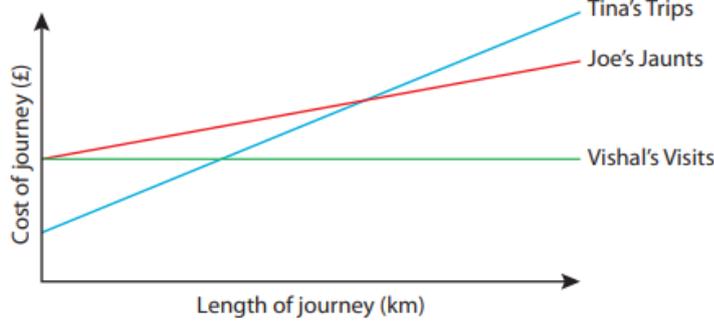
Mark the centre of the circle and ask the children to mark from the centre to the edge of each colour band to turn their paper strip pie chart into a more traditional looking pie chart.

Discuss how each part of the circle is a different proportion depending on how many people liked a certain meal.

The proportion of the pie chart is smaller if less people liked the meal.

Which is the smallest section on our pie chart?

'The smallest section is _____ this means that the fewest people like _____'

What is the largest section?
The largest section is _____ this means that the most people like _____'

Ask children to interpret simple proportional pie chart by writing statements about what they can see
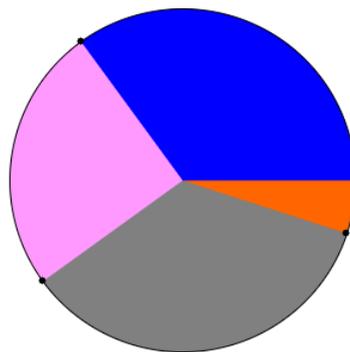
Show the children a pie chart with some simple fractions in e.g. $\frac{1}{4}$.
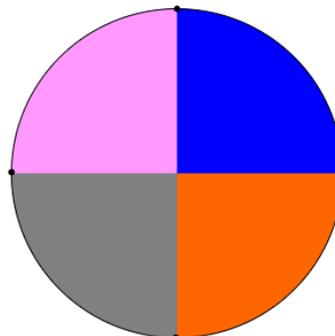
Can they discuss what does the whole pie chart represent? What does each colour represent? Do you recognise any of the fractions? How can you use this to help you?

Give the children some simple fractional pie charts and ask them to interpret them.

20 Class 6 did a survey of the number of trees in a country park.

This pie chart shows their results.
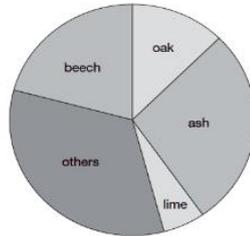
Estimate the **fraction** of trees in the survey that are **oak** trees.

Now look at a table where the data is out of 36. Discuss how each person is 10 degrees of the pie chart because 36 x 10 = 360°

Game	Number of votes	Number of degrees to allocate to date
Football	7	7 x 10
Netball	10	10 x 10
Rugby	9	9 x 10
Tennis	2	2 x 10
Hockey	8	8 x 10
Total number of degrees (should be 360		

Give the children a template for a pie chart where 360 increments form a circular number line. Children to use and apply their number line skills
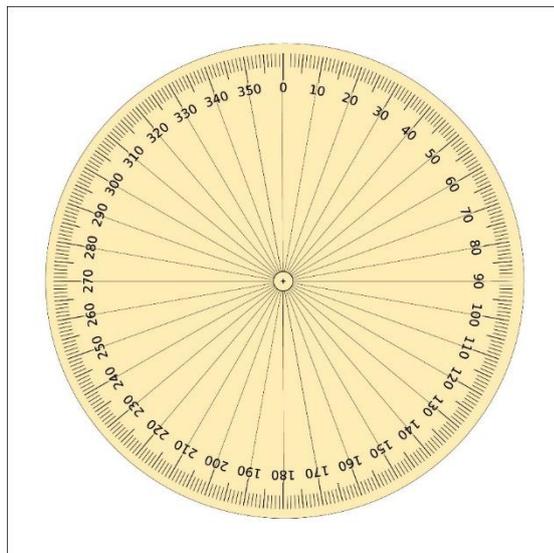
Model how to plot the data onto this template
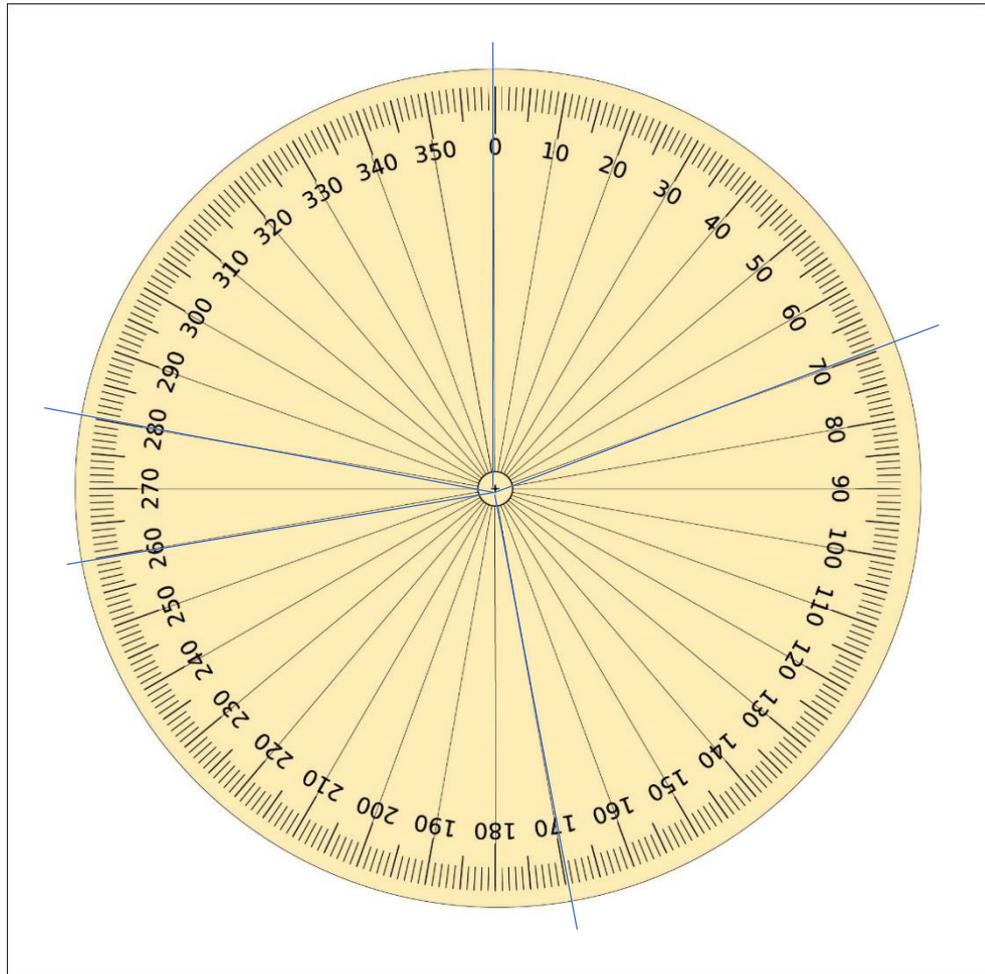
Can the children discuss what proportion of the pie chart is each sport?

Ask children to create a second pie chart independently. This time give them a data set that totals either 36 or 72 – if their data set totals 72 can they establish how many degrees each vote will take up?

Ask children to use this learning to interpret pie charts with a set number of total votes

6 This chart shows the number of different types of big cat in a zoo.

There are **20** big cats in the zoo altogether.
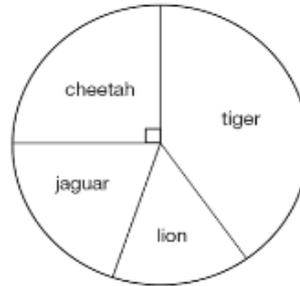
Here are some statements about the chart.

Tick the statements that are **true**.

There are more cheetahs than jaguars. ☐

The total number of lions and tigers is 10 ☐

One-quarter of the big cats are cheetahs. ☐

There are more than 5 jaguars. ☐

2 marks

1

[2005]

This pie chart shows how the children in Class 6 best like their potatoes cooked.
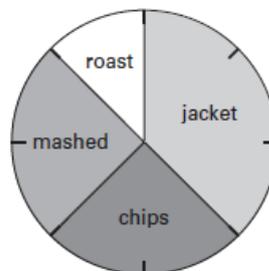
32 children took part in the survey.

Look at the four statements below.

For each statement put a tick (✓) if it is **correct**.
Put a cross (✗) if it is **not correct**.

10 children like chips best. ☐

25% of the children like mashed potatoes best. ☐

$\frac{1}{5}$ of the children like roast potatoes best. ☐

12 children like jacket potatoes best. ☐

| Applying percentage to pie charts | Talk to the children about how lots of pie charts have the data shown as a percentage of the whole.

We now need to think about each section as being a part out of 100. What percentage of the whole would each of these sections be?

22 This pie chart shows the ingredients to make a food mixture for wild birds.

suet
millet
dried bread crumbs
sunflower seeds
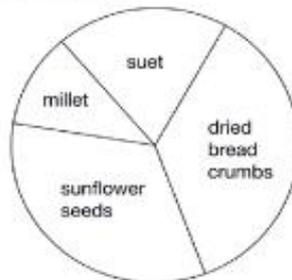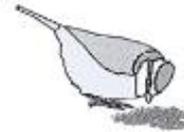
Make sure that children understand that the total of all of their sections needs to be 100%.

Mastery
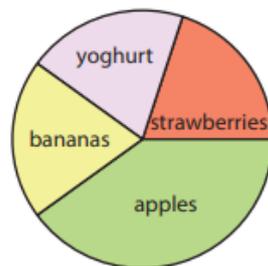
yoghurt
bananas
strawberries
apples

The pie chart represents the proportions of the four ingredients in a smoothie drink.
The sector representing the amount of strawberries takes up 22% of the pie chart.
The sector representing the amount of apple is twice as big as the sector representing the amount of strawberries.
The sectors representing the amount of yoghurt and the amount of banana are identical.

Calculate the percentage of bananas needed to make a smoothie drink.
What percentage of bananas would be needed to make two smoothie drinks?

Explain your reasoning.

A bar model might help children to show their thinking

| S = 22% | | | |
| Whole = 100% | | | | |

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The sectors representing the amount of yoghurt and the amount of banana are identical.

Estimate the angle of the sector representing the amount of banana.

Explain your reasoning.

Children will need to apply their fractions and percentages relationship understanding

Calculate and interpret the mean as an average	Mean = Total ÷ number of items. Give children some simple data and ask them to find the mean average of this data e.g. – Here are **three** numbers. 7 8 3

Seven children measured their heights.

Children	Height (cm)
Stefan	144
Lara	136
Olivia	142
Chen	143
Maria	152
Dev	148
Sarah	150

What is the mean height of the children?

Here are **three** numbers.

$$4 \quad 8 \quad 9$$

Show that the mean of these numbers is 7

Allow children to do some more complex problem solving involving the mean average.

Two numbers have a mean of 12

One of the numbers is 9

What is the other number?

A blank number line may help some children to solve this problem

9   (difference of 3)   12   (difference of 3)   15
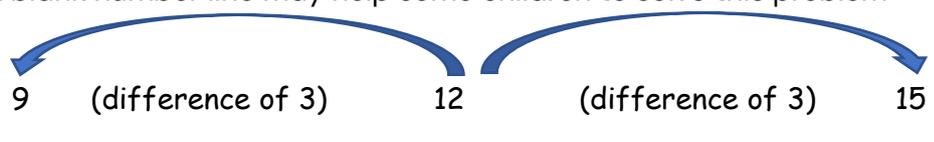
Mastery

Ten pupils take part in some races on Sports Day, and the following times are recorded.

Time to run 100 m (seconds): 23, 21, 21, 20, 21, 22, 24, 23, 22, 20.

Time to run 100 m holding an egg and spoon (seconds): 45, 47, 49, 43, 44, 46, 78, 46, 44, 48.

Time to run 100 m in a three-legged race (seconds): 50, 83, 79, 48, 53, 52, 85, 81, 49, 84.

Calculate the mean average of the times recorded in each race.

For each race, do you think that the mean average of the times would give a useful summary of the ten individual times?

Explain your decision.

Now allow them time to investigate missing data when given the mean.

e.g., The mean of these 5 numbers is 5. What is the missing number?

4, 6, 7, ? , 3

Ask the children what do you know? If the mean is 5 and there are 5 numbers, what must the total be?

Three numbers have a mean of 13

Two of the numbers are 8 and 12

What is the other number?

Mastery with Greater Depth

Three teams are taking part in the heats of a 4×100 m relay race competition on Sports Day. If the mean average time of the four runners in a team is less than 30 seconds, the team will be selected for the finals.

At the start of the last leg of the relay race, the times (in seconds) of each teams' first three runners are:

Team Peacock: 27, 29, 31

Team Farah: 45, 43, 37

Team Ennis: 29, 30, 25

Which of the teams have the best chance of being selected?

Explain your reasoning.

Substantial problem	NRICH – Match the Matches
	# Match the Matches
	Age 7 to 11 **Challenge Level** ★★
	Two football teams, Alpha United and Beta Rovers have each played fifteen games in their league.
	The data below show how many goals the teams scored in their matches.
	There are six different collections of data, three show the results for Alpha United and three show Beta Rovers' goals. Can you match the data to the teams?

Alpha United box:
The mode of the number of goals scored by Alpha United is one more than the mean number of goals they scored

The mean number of goals scored by Alpha United is equal to the median number of goals they scored

Number of goals	Tally
0	III
1	III
2	II
3	IIII
4	II

Pie chart:
0 goals
1 goal
2 goals
4 goals
3 goals

A pie chart to show the number of goals scored in fifteen football matches

Frequency bar chart:
Frequency
6
5
4
3
2
1
0 1 2 3 4
Number of goals scored

Beta Rovers box:
The mode of the number of goals scored by Beta Rovers is one less than the mean number of goals they scored

The mean number of goals scored by Beta Rovers is equal to the median number of goals they scored

Pictogram:
A pictogram to show the number of goals scored in fifteen football matches
0 goals
1 goal
2 goals
3 goals
4 goals
represents 2 matches