MATHLETICS

Data Representation

Series G – Data Representation

Contents

Series Authors:

Rachel Flenley

Nicola Herringer

Types of graphs 1 – picture graphs

Picture graphs use symbols to represent information in the graph. Picture graphs must include a key to show the value of the symbol. Another name for a picture graph is a pictogram.

Easter Eggs found at the Egg Hunt

Brandon	🥚🥚🥚🥚🥚
Lauren	🥚🥚🥚
Charlie	🥚🥚🥚🥚🥚
Yasmin	🥚🥚🥚🥚

🥚 = 10 Easter eggs

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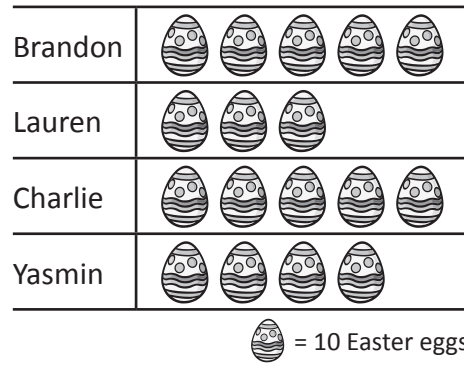
1 Mr Gain, the principal of Mathletics Primary School – the school for Mathletes – likes to show off to other principals at meetings by showing a picture graph of his school's Live Mathletics ranking.

a How many students are at the school? *400*

b How many Human Calculators are there? *160*

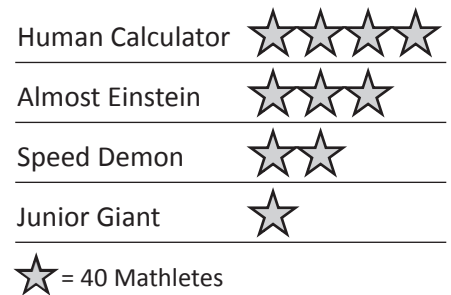**c** How many Speed Demons are there? *80*

d How many more Human Calculators are there than Junior Giants? *120*

e If all the Almost Einsteins moved up a rank, how many Human Calculators would there be? *280*

Mathletics Ranking

Human Calculator	⭐⭐⭐⭐
Almost Einstein	⭐⭐⭐
Speed Demon	⭐⭐
Junior Giant	⭐

⭐ = 40 Mathletes

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2 Last term, Years 5 and 6 raised money for World Aid, a charity that sponsors underprivileged children around the world. They were asked to present how much money they'd raised to the school assembly.

a Complete a picture graph for them to present as a poster in assembly. To make it clear to see from a distance, you should only put one or part of a symbol in each part of the grid. This clue should help you decide on the key.

> **Give your picture graph a title.**

Class	Amount
5H	$1 200
5F	$1 600
6S	$900
6P	$1 100

Key: ($) = ___*$200*___

REMEMBER

World Aid Fund-raiser

	($)		
	($)		
($)	($)		($)
($)	($)	($)	($)
($)	($)	($)	($)
($)	($)	($)	($)
($)	($)	($)	($)
($)	($)	($)	($)
5H	5F	6S	6P
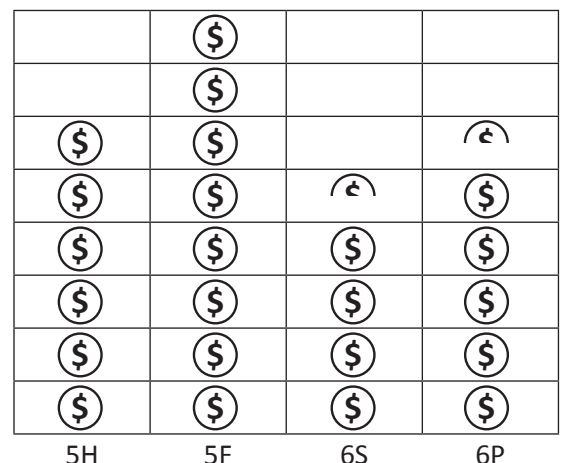
Types of graphs 1 – picture graphs

3 Mr Gain was preparing to take Years 5 and 6 away on camp. He asked each class to create a picture graph to show their lolly preference. He wanted to make sure he bought lots of lollies that the kids liked so he could bribe them to sleep at 'lights out'.

Lollies for 5G

Marshmallows	☺☺
Mint chews	☺☺
Chocolate frogs	☺☺☺☺
Fruity stix	☺☺☺☺

☺ = 2 people

Lollies for 5F

Marshmallows	☺☺
Mint chews	☺☺☺
Chocolate frogs	☺☺☺
Fruity stix	☺☺

☺ = 4 people

Lollies for 6P

Marshmallows	☺☺
Mint chews	☺
Chocolate frogs	☺☺☺☺☺
Fruity stix	☺☺☺

☺ = 3 people

Lollies for 6S

Marshmallows	☺☺
Mint chews	☺
Chocolate frogs	☺☺
Fruity stix	☺

☺ = 6 people
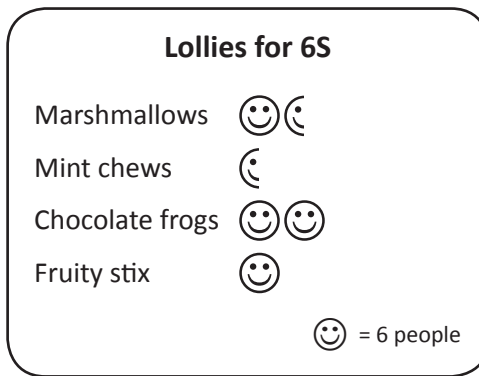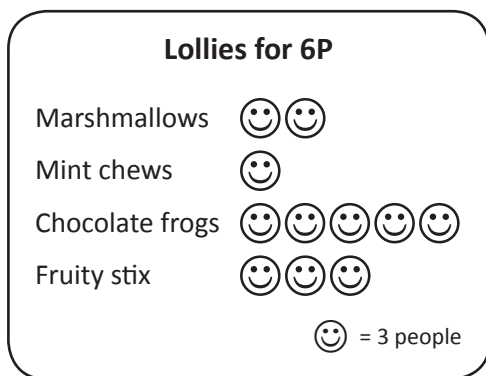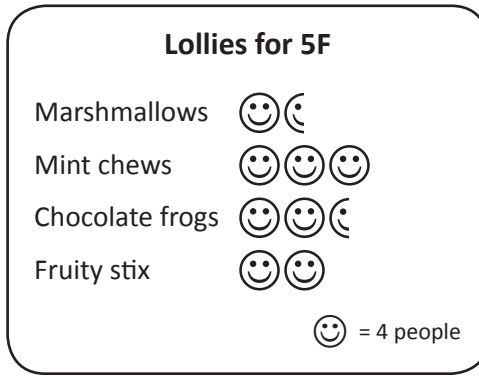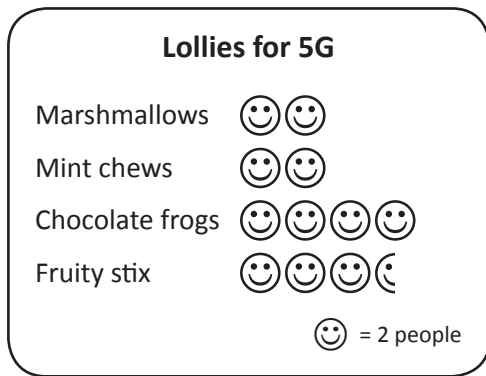
a In which class did 15 students choose chocolate frogs? | *6P*

b Which was a more popular choice in Year 6, mint chews or marshmallows? | *Marshmallows*

c How many students are there in Year 5? | 59

d What was the most popular lolly in Year 5? | *Chocolate frogs*

e Complete the table to show how many voted for each type of lolly:

	5G	5F	6P	6S	Total
Marshmallows	4	6	6	9	25
Mint chews	4	12	3	3	22
Chocolate frogs	8	10	15	12	45
Fruity stix	7	8	9	6	30

f The lolly that Mr Gain should buy the most of, due to it being the most popular is: | *Chocolate frogs*

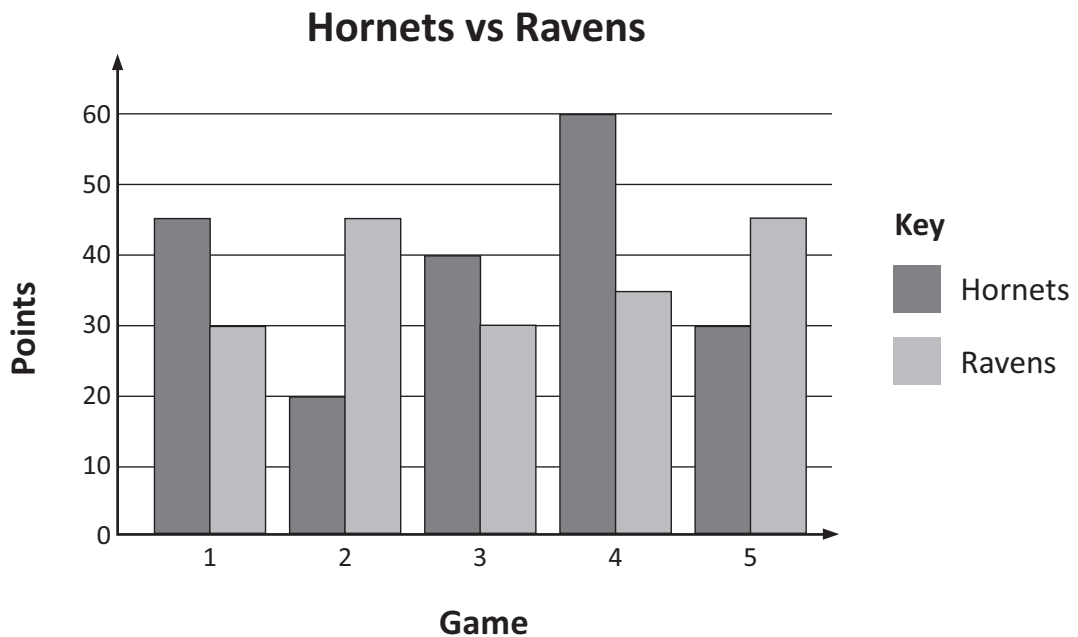**Data Representation**

G 1

SERIES TOPIC

Types of graphs 1 – double column graphs

Double column graphs make it easy to compare 2 sets of data against the same scale.

They must have a key so it's easy to see which column is which.

Our Favourite Sport
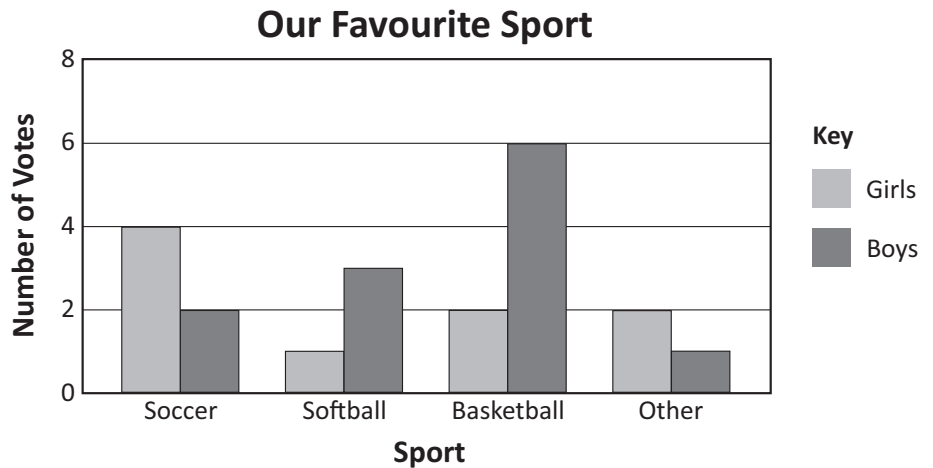
1 This double column graph shows the total number of points scored by 2 rival netball teams over 5 games:

Hornets vs Ravens

a In which game did the Hornets beat the Ravens by 15 points?

Game 1

b In which game did the Hornets beat the Ravens by the most points?

Game 4

c Calculate the total points scored by the Ravens in 5 games.
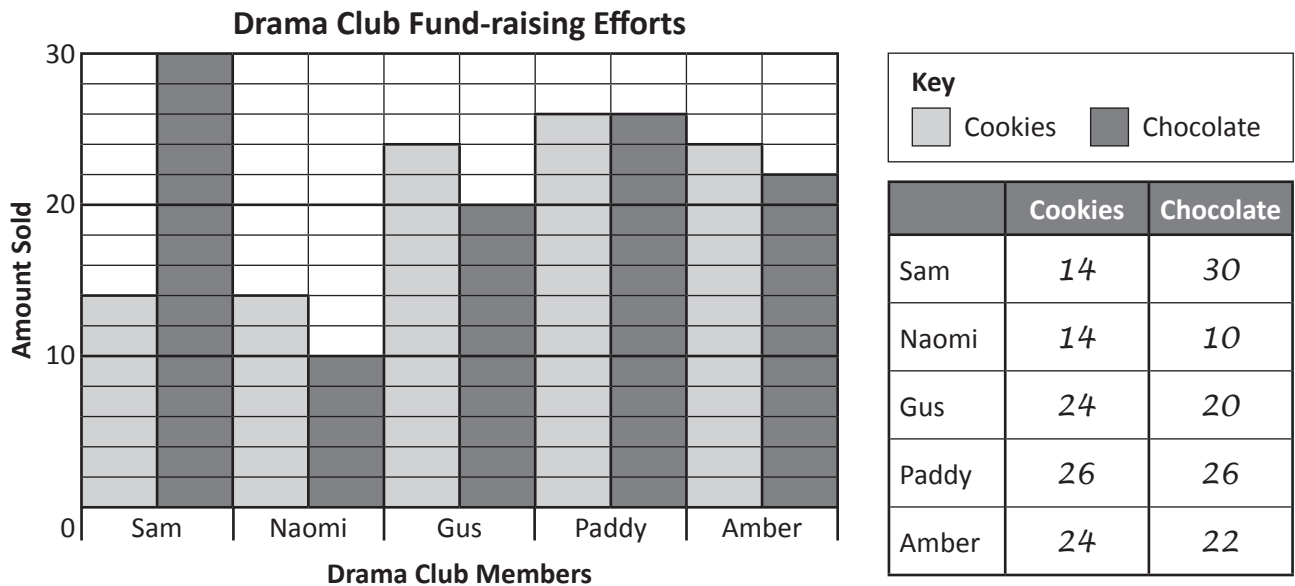
185

d How many more points did the Hornets score in 5 games?

10

Types of graphs 1 – double column graphs

2 The Year 6 Drama Club at Hallowfield Primary hopes to raise enough money to fund their end of term concert. The students were each given 30 bars of chocolate and 30 boxes of gourmet cookies to sell. Use the double column graph to complete the data table.

Drama Club Fund-raising Efforts

Key
Cookies   Chocolate

	Cookies	Chocolate
Sam	14	30
Naomi	14	10
Gus	24	20
Paddy	26	26
Amber	24	22

a Which sold better, the cookies or the chocolate?

Chocolate

b Who sold the most altogether?

Paddy

c If the cookies were $2.50 a packet and the chocolate was $1.50 a bar, how much money did the top seller raise?

$2.50 + $1.50 = $4

26 × $4 = $104
(of each)

3 Read the clues to complete the double column graph:

- Three times as many boys play basketball than girls.
- Ten fewer boys play soccer than basketball.
- Twice as many girls play soccer than boys.
- Five times the number of girls who play basketball play hockey.
- Half as many boys play hockey than girls.
- Double the number of boys who play hockey play waterpolo.
- 20 fewer girls than boys play waterpolo.

School Sports

Key
Boys   Girls
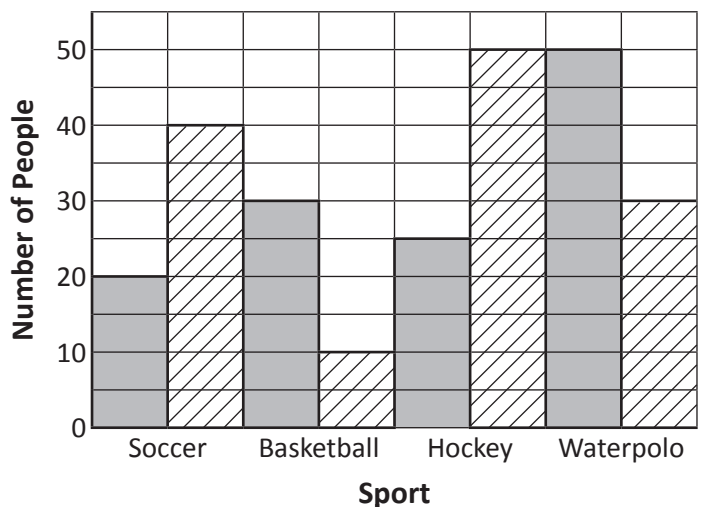
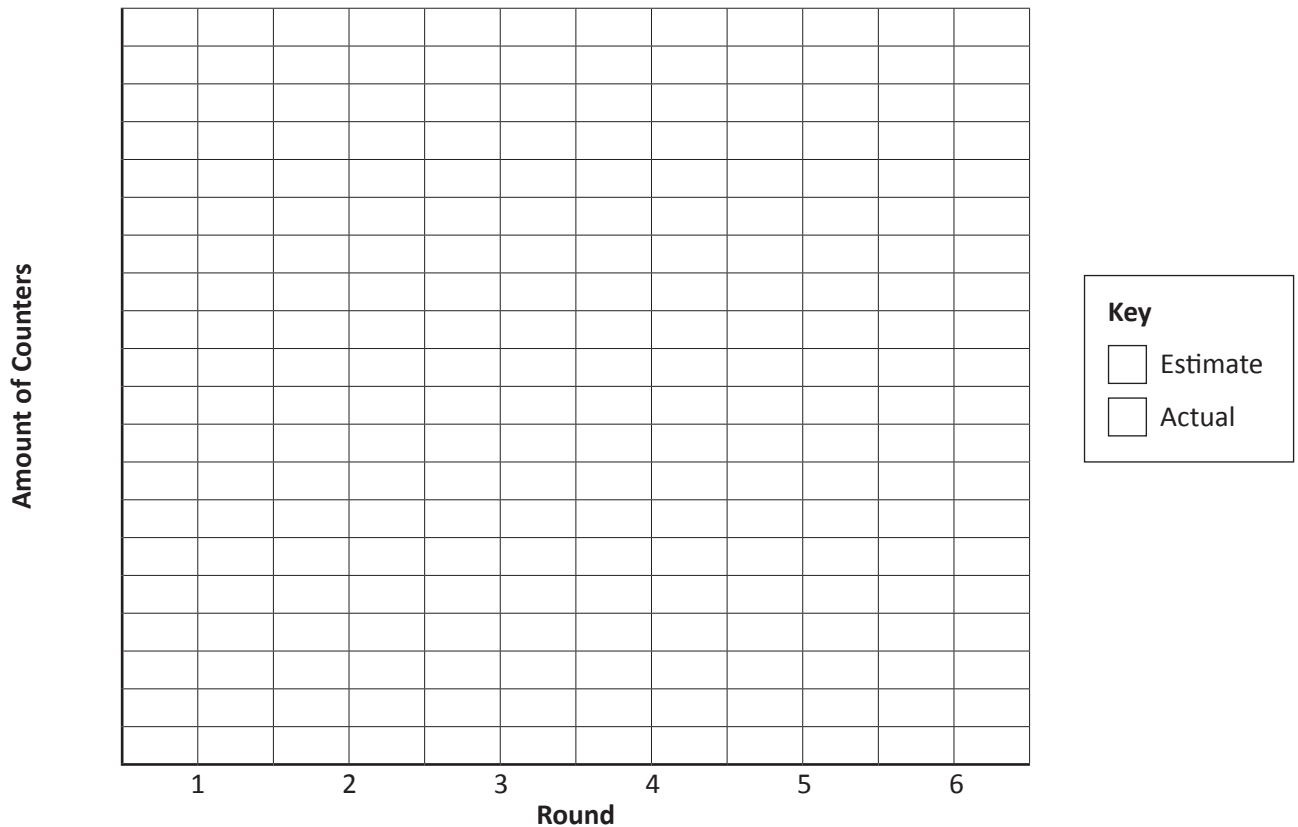# Types of graphs 1 – double column graphs

4 Test your estimation skills! Grab a handful of counters and estimate how many are in your hand. Then count them. Repeat this for 6 rounds. Record both your estimates and the actual numbers in the table. Then show your results in a double bar graph. You'll need to come up with your own scale.

Round	Estimate	Actual
1		
2		
3		
4		
5		
6		

Answers will vary.

My Estimations

Amount of Counters

Round

Key

☐ Estimate

☐ Actual

a Which was your best round?

b Write 2 questions about your graph for someone else to answer:

Types of graphs 1 – double column graphs

5 A once popular fast food chain of hamburger restaurants called Juicy Burgers is looking at how they can boost sales. Things have not been the same since the trendy new burger joint Eataburger moved into the same block. They decide to experiment with music over 2 weeks. During the first week, they play slow music and record the sales of different types of meals. During the second week, they play fast music and record the sales of different types of meals. What they hope to find out is which type of music will lead to more sales.

a Will it be that slow music will make people choose more expensive items that take longer to eat such as an adult meal deal that includes a burger, fries, drink and a dessert? Or will it be that fast music will encourage people to eat faster, spend less time at the tables and let more people through the restaurant?

Music Experiment at Juicy Burger

Key
- Slow music
- Fast music
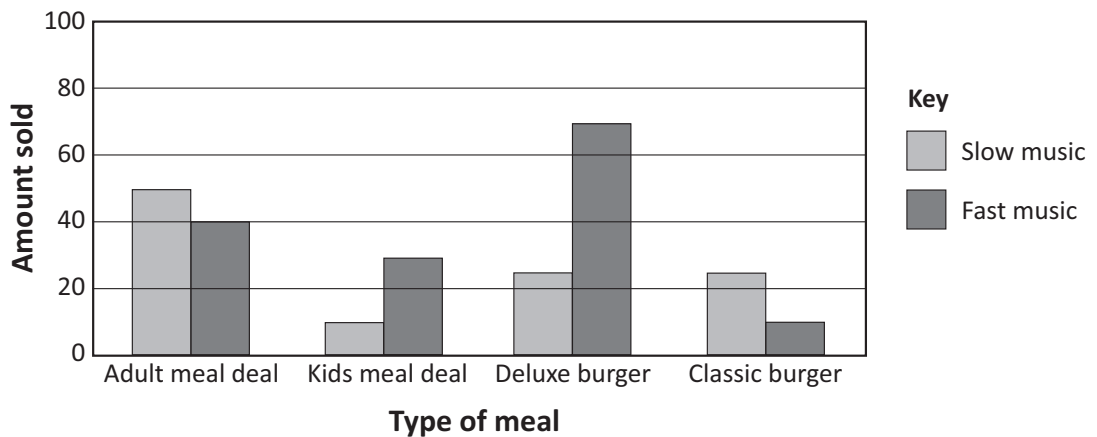
b This graph above shows the results after the 2 week experiment. Look carefully at the graph and complete the table below. Start by entering in the amount of each meal that was sold for each music type. Then, calculate the sales of each type of meal (including the total of each column). You may use a calculator.

Meals	Slow music		Fast music	
	Amount sold	Sales	Amount sold	Sales
Adult meal deal ($7)	50	$350	40	$280
Kids meal deal ($5)	10	$50	30	$150
Deluxe burgers ($6)	25	$150	70	$420
Classic burgers ($3)	25	$75	10	$30
Total	110	$625	150	$880

50 adult meal deals were sold when the slow music was playing. This is $350 in sales. 40 adult meal deals were sold when the fast music was playing. This is $280 worth of sales. Hmm … this looks like slow music is better … or is it?

c To sell more kids meal deals, which type of music is better?

Fast music

d Is playing slow music good for selling adult meal deals?

Yes

e Looking at the totals in the table, which type of music generated the most sales overall?

Fast music

G 1

SERIES   TOPIC

Data Representation

Types of graphs 2 – pie charts

A pie chart is a circle divided into sectors. It's also known as a sector graph.

The circle represents the whole of the data and the sectors show how the total is divided.

This pie chart is divided into 10 equal parts. It shows what a group of children did on Saturday night.
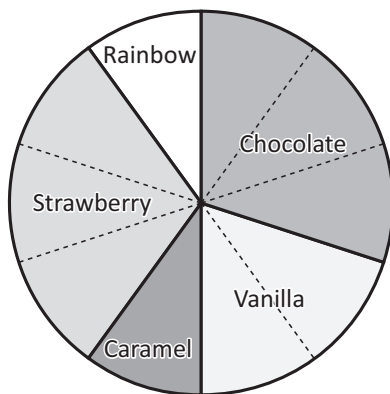
Saturday Night Activities

Category	Amount	Fraction	%
Went to the movies	3	$\frac{3}{10}$	30%
Party	2	$\frac{2}{10}$	20%
Stayed home	1	$\frac{1}{10}$	10%
Sleepover	4	$\frac{4}{10}$	40%
Total	10	$\frac{10}{10}$	100%

1 This pie chart shows the favourite smoothie flavours of 100 children. Use the information from the graph to complete the table:

Smoothie Flavours

Category	Amount	Fraction	%
Chocolate	30	$\frac{3}{10}$	30%
Vanilla	20	$\frac{2}{10}$	20%
Caramel	10	$\frac{1}{10}$	10%
Strawberry	30	$\frac{3}{10}$	30%
Rainbow	10	$\frac{1}{10}$	10%
Total	100	$\frac{10}{10}$	100%

2 500 students voted on their next fund-raising activity. The pie chart shows the most popular responses. Complete the table:

Fund-raising Activities

Activity	Amount	Fraction	%
Raffle	50	$\frac{1}{10}$	10%
Pet Day	100	$\frac{2}{10}$	20%
Talent Quest	100	$\frac{2}{10}$	20%
Mufti Day	150	$\frac{3}{10}$	30%
Bike Day	100	$\frac{2}{10}$	20%
Total	500	$\frac{10}{10}$	100%
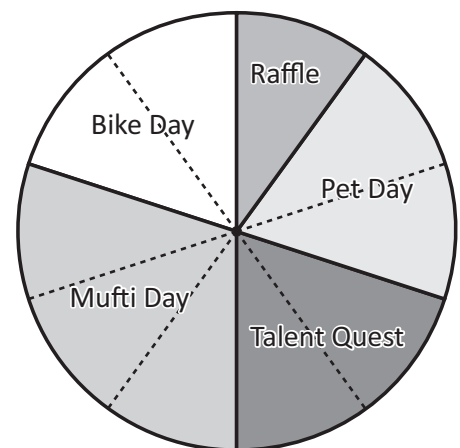
Types of graphs 2 – pie charts

3 This pie chart shows the television shows children in Year 6 prefer to watch.
Look carefully to see how the pie chart is divided and answer the following questions:

a What percentage of children prefer to watch comedy? | 50% |

Favourite TV Shows

b What fraction like game shows best? | $\frac{1}{4}$ |

c Which types of shows were chosen by the same number of children?

TV Series and News & Current Events

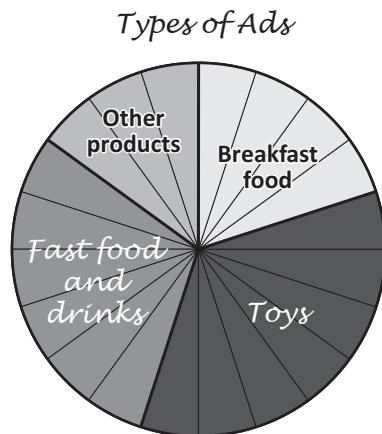What percentage was chosen by the same number of children? | 12.5% |

d There are 64 children in Year 6. How many prefer comedy? | 32 |

e How many like news and current events? | 8 |

f How many more children like watching game shows than a TV series? | 8 |

....

4 Complete the pie chart and the table so that the information is the same on both. Label and colour the pie chart. Give the pie chart a title.

Types of Ads

Types of Ads on Children's TV Shows	
Type of Product	**Number of Ads**
Fast food and drinks	60
Toys	70
Breakfast food	*40*
Other products	30

a What is the total number of ads represented on the pie chart? | *200* |

b How many ads does each sector on the graph represent? | *10* |

c What percentage of ads are about breakfast food? | *20%* |

What fraction is this? | $\frac{1}{5}$ |

d Which two types of ads together make up half the number of ads on children's TV shows?

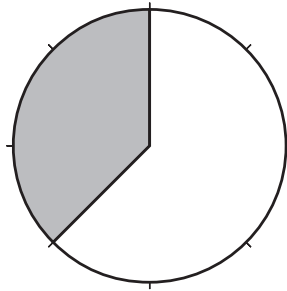*Fast food and drinks and breakfast food OR other products and toys.*

G **2**

SERIES   TOPIC

Data Representation

Types of graphs 2 – pie charts

5 Three students surveyed people to see if they could taste the difference between blue smarties and yellow smarties. Sam surveyed 64 people, Kia surveyed 80 people and Kate surveyed 96 people.
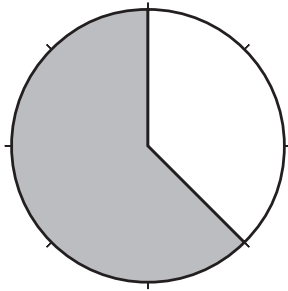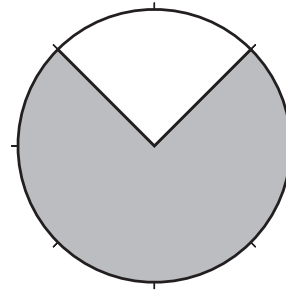
Sam's Pie Chart   **Kia's Pie Chart**   **Kate's Pie Chart**

Key

⬜ (grey) Can taste the difference

⬜ (white) Can't taste the difference

a Complete the table from the pie charts:

	Number who can taste the difference	Number who can't taste the difference
Sam	40	24
Kia	30	50
Kate	72	24
Total	142	98

b Write one statement that you can tell from this data:

More people can taste the difference than can't taste the difference.

_____

_____

_____

6 A study was conducted into the breakfast habits of Year 6 students at 3 different schools. Remarkably, the same pie chart was used to summarise the findings even though the numbers at each school were different. Answer the following:

a How many students are in Year 6 at Hogwart's Academy if 35 children have nothing for breakfast?
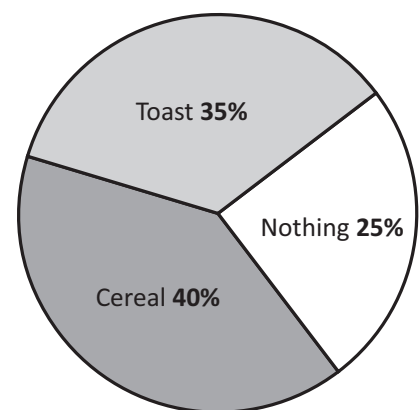
140

b At Summer Bay Primary, if 16 children have cereal, how many have nothing for breakfast?
Hint: Start by finding out what 10% is.

10

Year 6 Breakfast Habits

Toast **35%**

Nothing **25%**

Cereal **40%**

Types of graphs 2 – divided bar graphs

A divided bar graph is used to show how a total is divided.

It's similar to a pie chart except it's a rectangle divided into parts that represent the information.

This divided bar graph shows the results of a lolly hunt at a party. 20 lollies were hidden.

Liam **10**	Alex **6**	Kate **4**

1 This divided bar graph shows how 6F spent the morning at the zoo. Answer the questions below about how much time each category represents:

Reptiles	Pandas	Lunch at the seal show	Lions
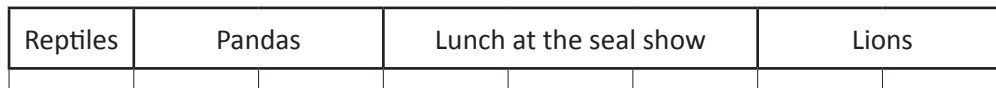
a If 15 minutes were spent at the reptiles section, how long was spent watching the pandas?

> *30 minutes*

b How long was lunch at the seal show?

> *45 minutes*

c How much time in total was spent at the zoo?

> *2 hours*

2 Marley is planning her 16th birthday party. Turning 16 is a special birthday, so she wants to spare no expense.

DJ Roxy	Makeup artist	Bubble machine	Magician	Food	Drinks
$250	$150	$150	$150	$200	$100

a Show the information in this table as a divided bar graph. Each space represents $100.

DJ Roxy		Makeup artist	Bubble machine	Magician	Food	Drinks
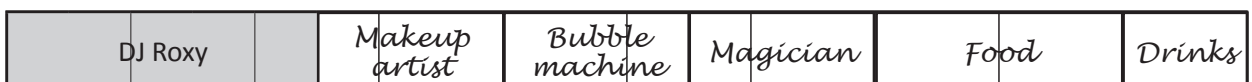
b How much is Marley planning to spend on her party?

> *$1 000*

c What percentage is she planning to spend on DJ Roxy?

> *25%*

d Marley's dad has decided she's being too extravagant and he's instructed her to reduce the budget to $500 or pay the extra money herself. Show the revised budget below. You must have some form of entertainment and both food and drinks. The cost of everything is fixed except for food and drinks. This time, each space will equal $50.

Answers will vary.

Data Representation
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Types of graphs 2 – divided bar graphs

3 Callum, Lauren and Ali are on the verge of having their mobile phone plans cancelled by their parents. At $100 each, the monthly bills are just too expensive! Look at these divided bar graphs of each person's bill. Each segment is $10.

Lauren's last bill   **Plan A**

Ali's last bill   **Plan B**

Callum's last bill   **Plan C**

Key

■	Text messages
▨	Peak calls
□	Off peak calls
▤	Internet

Help Callum, Lauren and Ali to keep their mobile phones by answering the questions and then working out a cheaper plan for each of them.

a Whose bill had $50 worth of text messages?

Callum

b Who made the most peak time calls?

Lauren

c Who spent the least amount of time on the internet?

Lauren

d What fraction of Ali's bill was spent on internet connection?

$$\frac{4}{10} = \frac{2}{5}$$

Part of Bill	Plan A (¢)	Plan B (¢)	Plan C (¢)
Text messages per unit	15	20	50
Peak call per minute	35	20	20
Off peak call per minute	30	15	20
Internet per minute	25	40	15

e Circle the best plan for each person:

Callum (Plan A) / Plan B / Plan C   Reason: *Cheapest for text messages.*

Lauren Plan A / (Plan B) / Plan C   Reason: *Cheapest for peak and off peak calls.*

Ali Plan A / Plan B / (Plan C)   Reason: *Cheapest for internet.*

Types of graphs 3 – reading line graphs

Line graphs can show how something changes over time in relation to something else.

In this topic we are going to look at many different examples of line graphs.

Here is an example of a temperature line graph.

Temperature for the Day
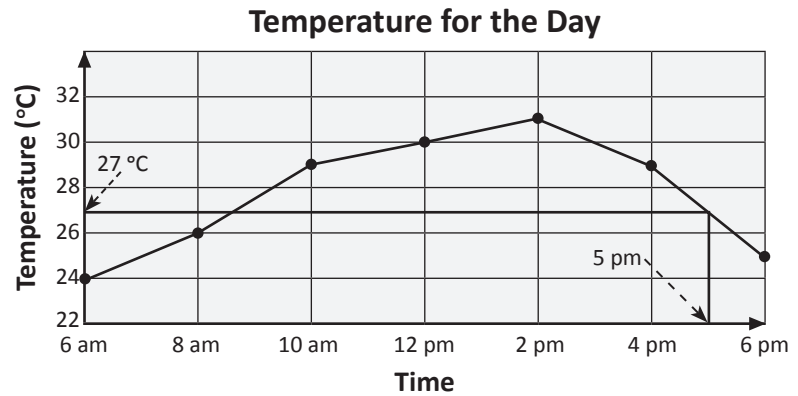
1 **The line graphs below show the average temperatures in degrees Celsius (°C) in Sydney, London and Dubai for the first 6 months of the year.**
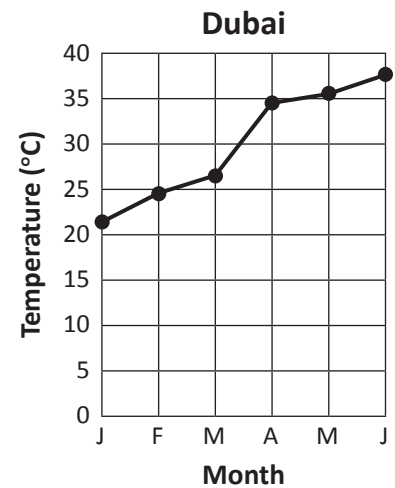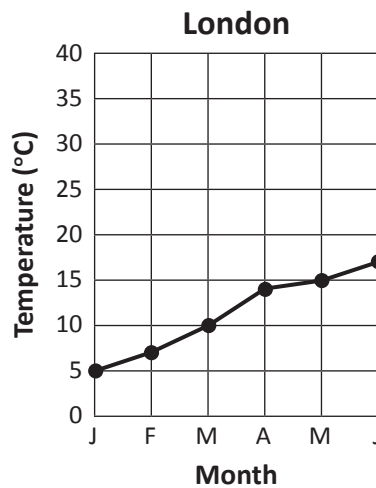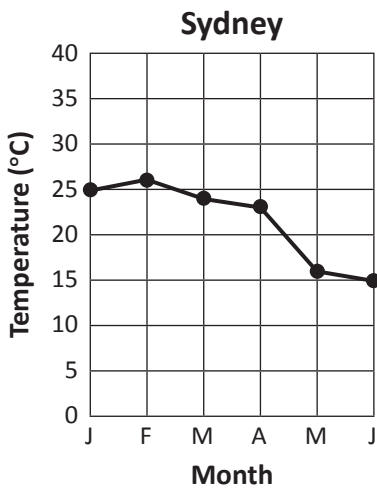
a Study the graphs carefully and complete the table:

	January	February	March	April	May	June
Sydney	25	26	24	23	16	15
London	5	7	10	14	15	17
Dubai	22	25	27	35	36	38

b Are these statements true or false? Circle one:

In January, the difference between Dubai and Sydney is 4 °C.   True   /   (False)

In February, the difference between Dubai and London is 18 °C.   (True)   /   False

In May, Dubai is 21 °C warmer than London.   (True)   /   False

Data Representation

Types of graphs 3 – reading line graphs

2 Jenna bought a new car in 2001 for $25 000. The dollar value of her car changed each year as shown in line graph below:

a Transfer the data from the graph into the table.
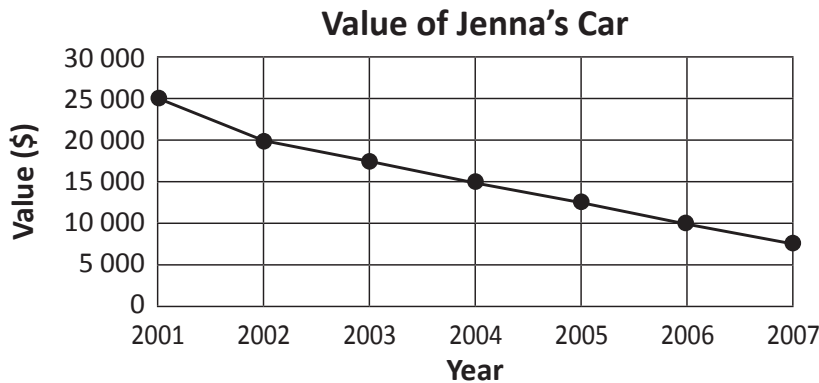
Value of Jenna's Car

Value of Jenna's Car

Year	Value
2001	$25 000
2002	$20 000
2003	$17 500
2004	$15 000
2005	$12 500
2006	$10 000
2007	$7 500

b What was the value of Jenna's car in 2003?

$17 500

c By how much did the car's value drop between 2002 and 2005?

$7 500

d Between which years was the greatest drop in value?

2001 – 2002

3 Ivan, a very inventive ice cream manufacturer, is analysing sales of his new range of ice cream flavours. He wants to find out if his latest creations such as Chocolate Garlic Ripple, Caramel Squid Ink or Crunchy Seaweed Swirl are taking off or not. Help him find out by comparing his 2 stores. One store sells the crazy new flavours and the other sells regular flavours.

Ivan's Ice Cream Parlour
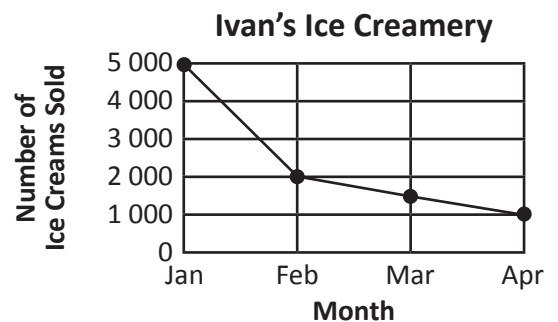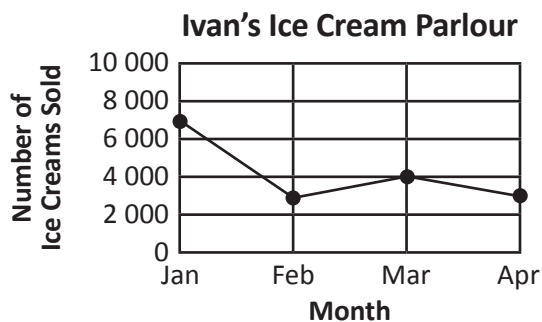
Ivan's Ice Creamery

a How many ice creams were sold over January at Ivan's Ice Cream Parlour?

7 000

b How many ice creams were sold over January at Ivan's Ice Creamery?

5 000

c What was the difference in the number of ice creams sold at each store in March?

2 500

d Which of Ivan's stores do you think sells his latest crazy creations and why?

Ivan's Ice Creamery because the crazy flavour combinations would not sell as well as regular flavours.

Types of graphs 3 – constructing line graphs

To construct a line graph, we carefully plot the data from the table. If a change occurs between dots, then we join them. If not, we don't.

1 Jamie wrote down his pulse rate each hour from 8 am to 1 pm. Complete the line graph from the data. Plot the points carefully and then join the dots with a ruler. Label each axis and give the graph a heading.

Time	Pulse Rate (beats per minute)
8 am	62
9 am	66
10 am	60
11 am	76
12 pm	104
1 pm	70

Did you know that measuring your pulse rate after exercise is a good measure of fitness? The fitter you are, the lower your pulse rate. You can easily measure your heart rate by feeling your pulse on your neck.

Pulse Rate

Pulse Rate or Beats per minute

Time
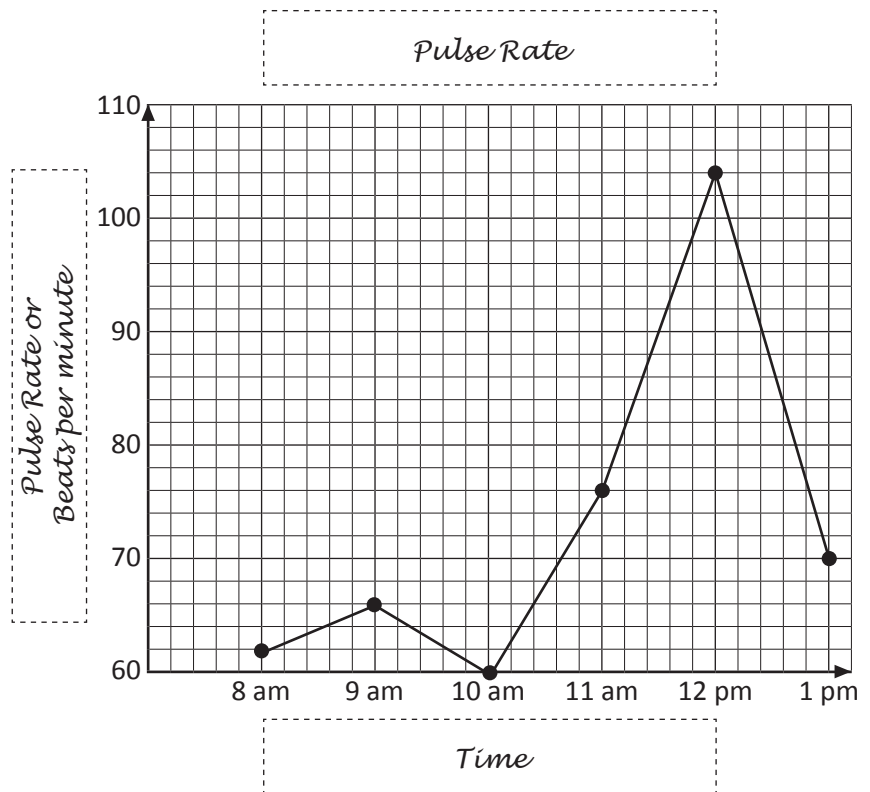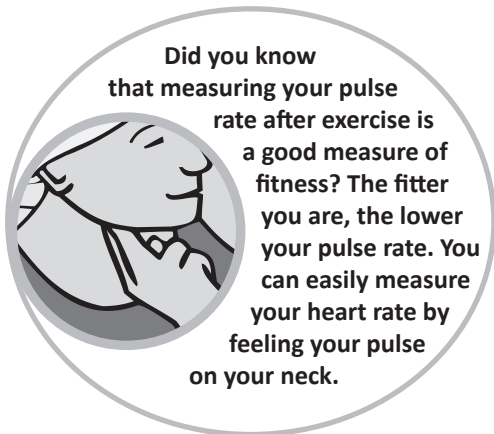
2 In pairs, test your pulse rate for 5 minutes after exercise and construct a line graph to show the results. Find a partner and stopwatch. Your partner counts as you do 100 star jumps. Feel the pulse on the side of your neck and count for 1 minute – your partner will tell you when 1 minute is up by using a stopwatch. Do this 5 times and record the data in the table below. Then it's time for your partner to do 100 star jumps as you time them.

Time (in minutes)	Pulse Rate (beats per minute)
1	
2	
3	
4	
5	

Pulse Rate

Pulse Rate or Beats per minute

Answers will vary.

Time (in minutes)

Data Representation
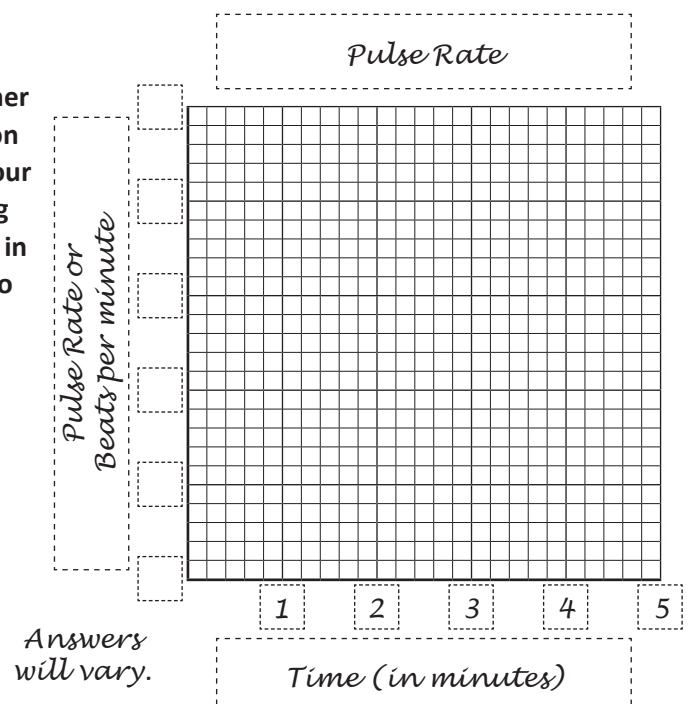
Types of graphs 3 – double line graphs

When we want to compare 2 sets of data in relation to the same thing, we use a double line graph. Double line graphs are the same as regular line graphs except they show 2 sets of data.

1 This double line graph shows the sales of two of Dr Fun's most popular toys over the last 5 months.

> Because there is no data to show below 50 but we need the intervals to go up in tens, we use a break in the scale. We show this by having a crooked line between zero and 50 then use intervals of 10 each time.

THINK

Dr Fun's Toy Emporium

Key
- - - Xray Spex
──── Combat Copter
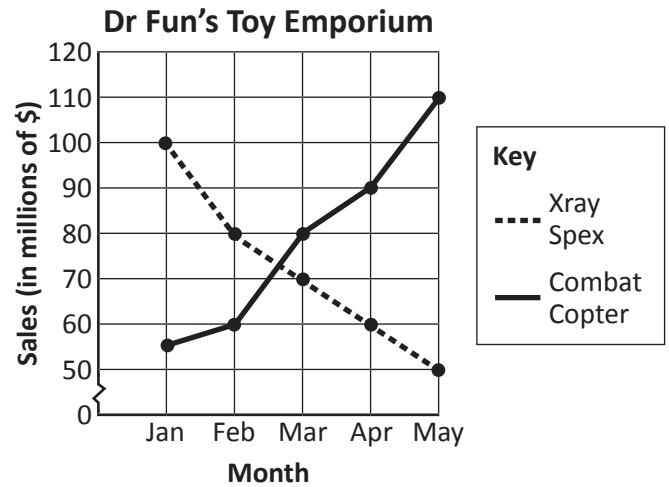
a Why is there a break in the scale from 0 to 50?

Because there is no data.

b Molly described this graph in the next paragraph. Correct her errors.

The vertical axis is showing us the year of the sale. The scale of this graph is going up by 50 each time. This graph shows that the sales of Xray Spex have been increasing rapidly while sales of Combat Copter have been decreasing over the same amount of time.

Corrections:

1 *The vertical axis shows us the money.*

2 *The scale is going up by 10.*

3 *Sales of Combat Copter have been increasing. Sales of Xray Spex have decreased.*

2 Create a double line graph from the table below by plotting both sets of data and connecting the dots. You should use a solid line for one set of data and a dotted line for the other. You must label each axis and provide a key. There is a break in the scale, so where should the scale start? In what intervals should the scale go up by?

Live Mathletics Scores

Key
── *Level 4*
- - - *Level 5*

Live Mathletics Scores					
Game	1	2	3	4	5
Level 4	85	90	100	105	110
Level 5	50	55	70	85	90
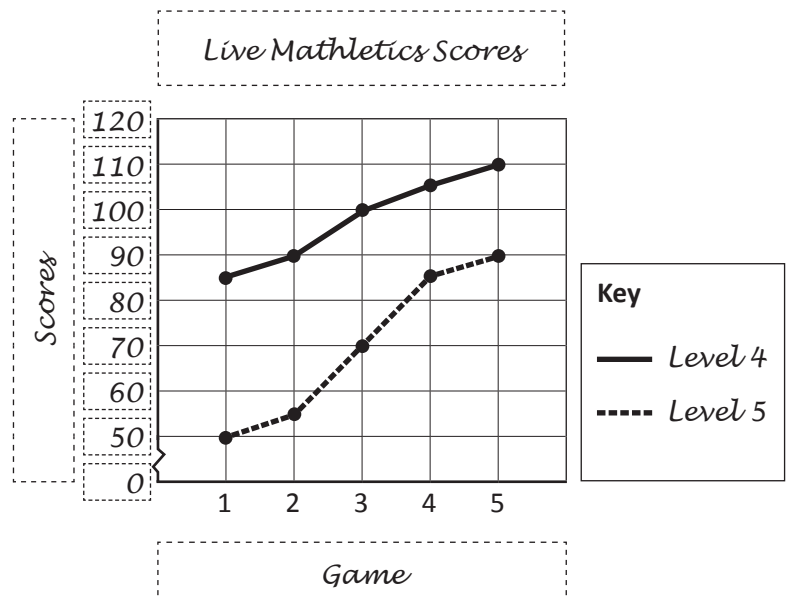
Types of graphs 3 – double line graphs
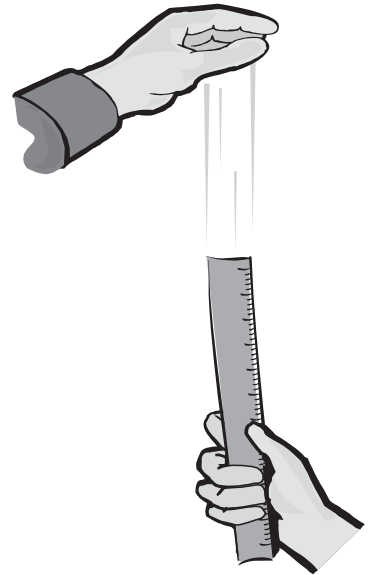
3 **In this activity you and your partner are going to test each other's reaction times with a 30 cm ruler.**

How to test reaction time:

1 Place your arm or elbow on a desk, ready to catch the ruler.

2 Your partner hangs the ruler so that the tip near the 0 cm mark is close to your catching hand.

3 Your partner drops the ruler without warning you. You must try to catch the ruler as quickly as possible.

4 Read the cm marking closest to your finger where you caught the ruler and record it in the tables below.

5 Swap roles.

Answers will vary.

Name:					
Trial	1	2	3	4	5
Catch distance					

Name:					
Trial	1	2	3	4	5
Catch distance					

4 **Graph the results by completing a double line graph.**

Answers will vary.

Data Representation
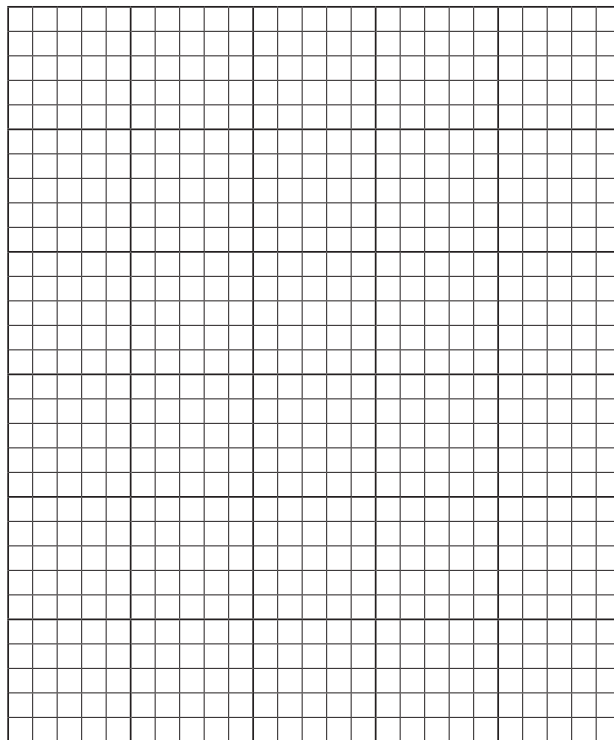
Types of graphs 3 – double line graphs

5 How did you go? Who was faster – you or your partner? What does the graph show? Find out your reaction rating. Work out the average of your catch distances and use the table below:

Catch Distance (in cm)	Reaction Time (in milliseconds)	Rating
1	50	
2	60	
3	70	
4	80	
5	90	
6	100	
7	120	
8	130	
9	140	
10	140	
11	150	
12	160	
13	160	
14	170	
15	170	
16	180	
17	190	
18	190	
19	200	
20	200	
21	210	
22	210	
23	220	
24	220	
25	230	
26	230	
27	230	
28	240	
29	240	
30	250	

Key to Rating

Greased lightning!

Dangerously dexterous

Reasonable reaction time

Room for improvement

Wakey wakey

Types of graphs 3 – travel graphs

A travel graph is a type of line graph that shows the distance travelled and the time taken to travel that distance. We can tell a lot about a journey just by the shape of a line. Here's an example:

Here it's travelling at 50 km per hour between 8 am and 10 am.

This flat line shows it stops for $\frac{1}{2}$ an hour. We know this because it stays at 150 km away from home between 12 and 12:30 pm.

Between 12:30 pm and 2:30 pm the car travels 50 km. So we can see that it travels more slowly in the afternoon than in the morning.

This car is just leaving home at 8 am. It's still at home so it's zero km from home.

Car Trip

At 2:30 pm, it turns back for home. It's home by 4:30 pm.

1 Examine this travel graph and answer the questions:

Trip to the Vet
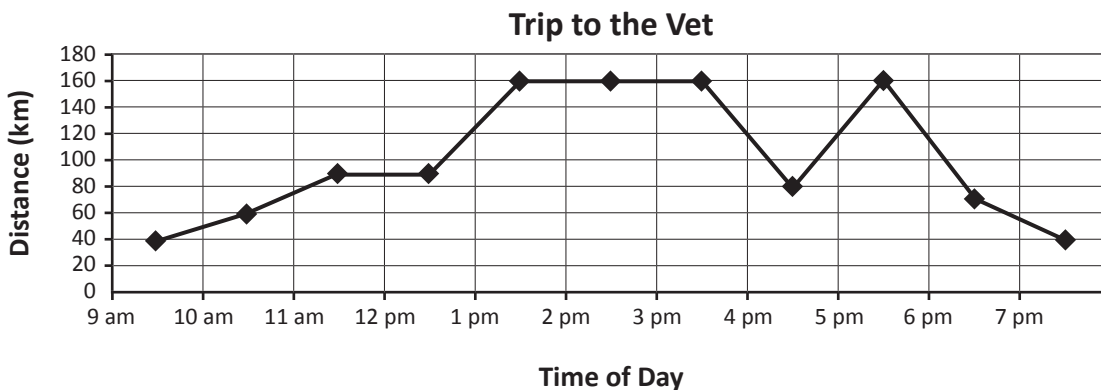
a How long did they spend at the vet?

2 hours

b How far did they travel between 9 am and 1:30 pm?

160 km

c How far did they travel between 3:30 pm and 4:30 pm?

80 km

d For how long did they drive home before realising they had left something at the vet?

1 hour

Data Representation

Types of graphs 3 – travel graphs

2 **Study this motorcyclist's journey and fill in the blanks.**
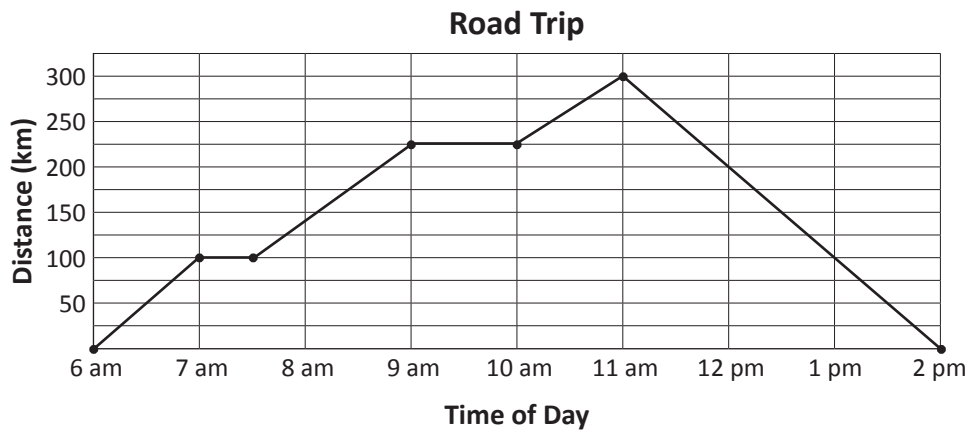
Road Trip

a He left for his road trip at ____*6 am*____.

b He stopped for breakfast at ____*7 am*____ and continued at ____*7.30 am*____.

c By 9 am, he'd ridden ____*225*____ km.

d He stopped to stretch his legs at ____*9 am*____.

e He turned round to ride home at ____*11 am*____.

f He rode at a speed of ____*100*____ km/h all the way home.

....

3 **Link each travel graph to the matching statement by drawing a line:**
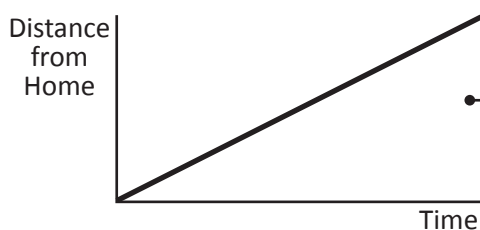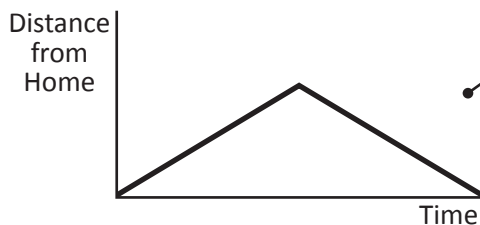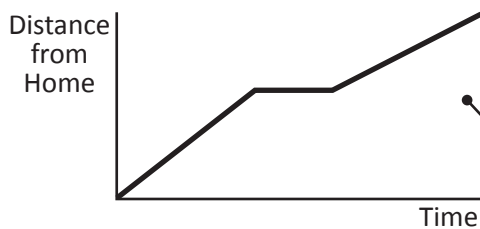
I was on my way to a party when I realised I'd forgotten the present, so I turned round and went home again.

On the way to the beach, we stopped to buy sunscreen.

We travelled at the same speed, not stopping until we got there.

Collecting and analysing data – grouped data

If a large amount of data is gathered in a survey then it needs to be grouped. This makes it much easier to read and make sense of. In this example, 97 people were surveyed to find out the age of people entering a public swimming pool. Notice how the ages were organised into group intervals of similar amounts.

Age of Swimmer

1	11	29	31	40	55	60	77
1	11	22	32	44	51	61	77
3	14	25	39	49	52	62	78
5	16	23	30	44	53	60	71
2	12	22	31	41	55	69	79
7	15		32	40	54	68	76
3	14		39	42	55	61	77
3			36	44	58	66	70
1			39	41	56	60	71
2			30	47	51	65	72
			31	40	50	60	74
			32	48	50	65	73
			32		51	61	70
			37		50	60	
					57	66	
					56	67	
					59	66	
						67	
						69	

Public Swimming Pool Survey

Age	Tally	Frequency
0–9	ЖЖ ЖЖ	10
10–19	ЖЖ ‖	7
20–29	ЖЖ	5
30–39	ЖЖ ЖЖ ‖‖‖	14
40–49	ЖЖ ЖЖ ‖	12
50–59	ЖЖ ЖЖ ЖЖ ‖	17
60–69	ЖЖ ЖЖ ЖЖ ‖‖‖‖	19
70–79	ЖЖ ЖЖ ‖‖‖	13

Public Swimming Pool Survey
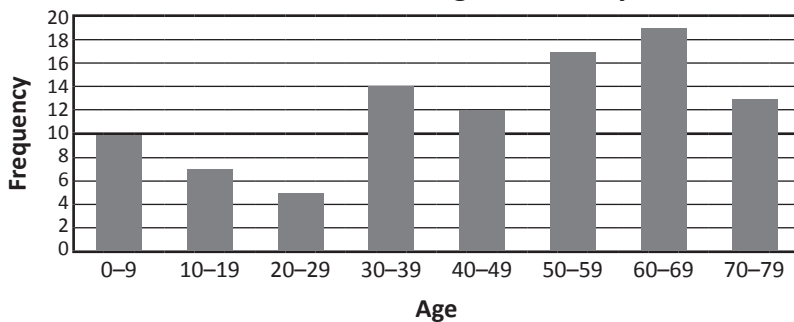
From the grouped data we can create a column graph that clearly shows the frequency of each age range.

What do you think this graph would look like if the data wasn't grouped? Yes, it would be a very wide graph.

---

1 Your school holds a disco every year. You 5/6 students feel too mature to be surrounded by younger students while strutting your stuff on the dance floor. You petition for 3 separate discos: one for 5–8 year olds, one for 9–10 year olds and one for 11–13 year olds. Your principal wants a breakdown of numbers to see if it is worth all the extra planning and effort. He gives you a 50 student sample from the last disco:

a Sort it into the appropriate sections on the frequency table:

Student Ages				
7	10	11	5	11
11	9	6	5	12
12	12	6	5	7
12	13	7	11	6
13	7	8	10	8
8	5	9	11	11
9	8	13	9	12
5	9	12	8	13
7	11	11	6	13
12	11	10	7	12

Attendance at Previous Disco		
Age	Tally	Frequency
5–8	ЖЖ ЖЖ ЖЖ ЖЖ	20
9–10	ЖЖ ‖‖	8
11–13	ЖЖ ЖЖ ЖЖ ЖЖ ‖	22

Data Representation
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Collecting and analysing data – grouped data

2 These are your class average scores for Level 2 Live Mathletics. Your school maths committee wants to see whether Level 2 is appropriate for your class but doesn't want individual students to be identified in the meeting.

Mia	45	Amber	50	Jamie	46	Paige	30	Max	59
Omar	22	Phoebe	47	Jacob	50	Nicole	43	Dylan	39
Pablo	36	Natasha	45	Ethan	36	Abbie	42	Sara	47
Sean	39	Niamh	23	Charlie	23	Mia	39	Sophie	13
Thanh	43	Zoe	13	Bradley	20	Imogen	9	Yasmin	50

a Decide how you will group the data.

b Tally the data in the frequency table. Remember to give it a title and category labels.

Level 2 Live Mathletics Scores		
Scores	**Tally**	**Frequency**
9 – 19	|||	3
20 – 29	||||	4
30 – 39	卌		6
40 – 49	卌 |||	8
50 – 59	||||	4

Sample answer.

Score groupings may vary.

3 Now take the grouped data from the table above and represent it on a column graph for the committee. Give the graph the appropriate title and labels.

Level 2 Live Mathletics Scores
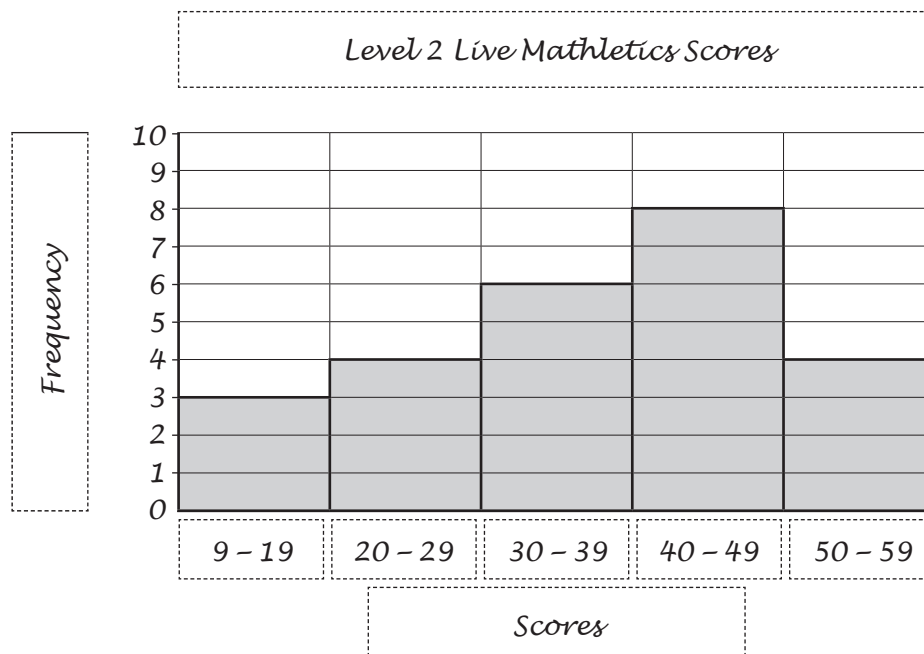
If a score between 20 and 30 means that the challenge level is about right, what recommendations would you make to the committee for this class?

Level 2 is too easy for most of the students in this class.

Collecting and analysing data – range

The **range** is the spread of data. To find it, we subtract the lowest value from the highest value.

Look at these sets of test scores from 2 different Maths groups. The tests were out of 20.

Group 1	**Group 2**
20, 19, 15, 11, 18, 4, 3	15, 13, 12, 11, 10
20 − 3 = 17	15 − 10 = 5
Range = 17	Range = 5

Group 1 has a far wider range of abilities. Their teacher will have to plan for kids who get the topic, kids who kind of get it, and kids who need lots of support.

Group 2's range is much smaller. No one has really mastered the concept and no one has really struggled. The teacher will have fewer different needs to meet.

1 Warm up with these. Find the range for each set of numbers:

a   22, 14, 17, 13, 2, 33

33 − 2 = 31

Range = 31

b   123, 148, 55, 89, 94, 131

148 − 55 = 93

Range   = 93

c   4.5, 9.2, 10.7, 11.2

11.2 − 4.5 = 6.7

Range   = 6.7

2 This table shows weekly rental prices for 3 bedroom houses in 2 suburbs:

Suburb 1	Suburb 2
$755 pw	$980 pw
$364 pw	$150 pw
$195 pw	$1 235 pw
$645 pw	$780 pw
$820 pw	$525 pw

a   What is the price range for Suburb 1?

$820 − $195 = $625

b   What is the price range for Suburb 2?

$1 235 − $150 = $1 085

c   What do these ranges tell you about the kinds of housing in these suburbs?

In Suburb 2, there is a wider variety of houses.

G 4

SERIES   TOPIC

Data Representation

Collecting and analysing data – mean

When we say we are finding the average, we are finding the mean. To do so, we find the sum of all the values and then divide by the number of values:

For example, the mean of 2, 3, 4, 5, 6 $= \dfrac{2 + 3 + 4 + 5 + 6}{5} = 4$

The mean is just like fair shares. If all the values were shared out fairly, how many would each group receive?

1 **Warm up with these. Find the mean for each set of numbers:**

a 20, 6, 18, 4

$$\dfrac{20 + 6 + 18 + 4}{4}$$

$= 12$

b 13, 7, 5, 8, 3, 2, 4

$$\dfrac{13 + 7 + 5 + 8 + 3 + 2 + 4}{7}$$

$= 6$

c 45, 46, 47, 50, 57

$$\dfrac{45 + 46 + 47 + 50 + 57}{5}$$

$= 49$

2 **Sean wanted to buy new soccer boots and priced the same boots in 4 different stores.**

Steve's Sports $45   Sport Stars $54   Soccer City $48   Sports First $53

a What is the average or mean price of the boots?   *$50*

b If Sean buys the cheapest option, how much less than the mean does he spend?   *$5*

3 **Imagine these people are all members of a basketball team.**

Tom Cruise	1.73 m
Katie Holmes	1.75 m
Will Smith	1.88 m
David Beckham	1.8 m
Kevin Rudd	1.79 m
Paris Hilton	1.73 m
Hugh Jackman	1.89 m
Nicole Kidman	1.81 m
Nicole Richie	1.55 m

a Calculate the mean height: *1.77 m*

b If you wanted your tallest 5 players on court at the same time, who would they be and what is their mean height?

Will Smith, Nicole Kidman, David Beckham, Kevin Rudd and Hugh Jackman

Mean height: 1.834 m

c Tom Cruise pulls rank and subs himself for Hugh Jackman and subs Nicole Richie for Nicole Kidman. What is the mean height of the group on court now?   *1.75 m*

Collecting and analysing data – median

Another statistic we use to analyse data is the median. The median is the middle number when the data is put in order. Look at:

17   12   3   5   25   33   12   14   36   22   23   29   37

We reorder the numbers and count in from either end:

3   5   12   12   14   17   (22)   23   25   29   33   36   37

22 is the median or middle number. There are 6 numbers on either side of it.

1   **Order these sets of numbers and find the median for each:**

> If we have an odd number of values in the set, there is 1 median.
> If we have an even number of values, there will be 2 median numbers. Or we can find the average of the two numbers and call that the median.

a   13, 7, 5, 8, 3, 2, 4

2, 3, 4, 5, 7, 8, 13

5

b   22, 6, 18, 4, 7, 23

4, 6, 7, 18, 22, 23

7 + 18 or 12.5

c   4.5, 8.2, 3.6, 4.1, 2.3, 3.7, 7.3

2.3, 3.6, 3.7, 4.1, 4.5, 7.3, 8.2

4.1

d   45, 46, 47, 50, 59, 102

These were already ordered.
Median 48.5

THINK

2   **Remember your all-stars basketball team?**

Tom Cruise	1.73 m
Katie Holmes	1.75 m
Will Smith	1.88 m
David Beckham	1.8 m
Kevin Rudd	1.79 m
Paris Hilton	1.73 m
Hugh Jackman	1.89 m
Nicole Kidman	1.81 m
Nicole Richie	1.55 m

a   Put the players in order from shortest to tallest.

Nicole Richie   1.55 m
Tom Cruise   1.73 m
Paris Hilton   1.73 m
Katie Holmes   1.75 m
Kevin Rudd   1.79 m
David Beckham   1.8 m
Nicole Kidman   1.81 m
Will Smith   1.88 m
Hugh Jackman   1.89 m

b   Which player has the median height?

Kevin Rudd   1.79 m

3   **There are 7 values in a set of mystery numbers. 9 is the median. What could the set be?**

Answers will vary.

Data Representation

Collecting and analysing data – mode

Another statistic we use when analysing data is the **mode**. The mode is the number that occurs most frequently in a set. Look at:

17   12   4   5   25   33   12   14   4   36   22   23   29   37   26   4   34

When working with a lot of numbers, it is a good idea to organise the data into a stem and leaf plot. This makes it easy to identify the mode. The stem and leaf plot below has all the tens on the left as the stem, and the units on the right as the leaves.

We organise this as:

tens	units				
3	3	6	7	4	
2	5	2	3	9	6
1	7	2	2	4	
0	**4**	5	**4**	**4**	

When we look at the numbers this way it is easy to see that 4 is the mode. It occurs 3 times.

A set of numbers can have 1 mode such as the one above. It can have no modes if no numbers are repeated or 2 or more modes if more than one value occurs with the same frequency.

1 Organise these sets of numbers into stem and leaf plots and identify the modes. The stems have been done for you:

a 29, 17, 17, 18, 19, 11, 13, 19, 20, 17, 17, 13

tens	units									
2	9	0								
1	7	7	8	9	1	3	9	7	7	3
0										

The mode is: *17*

b 24, 18, 27, 13, 16, 25, 32, 26, 31, 18, 17, 23, 16

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

The mode is: *18 and 16*

c 1.7, 2.2, 1.6, 1.8, 1.6, 1.5, 0.4, 1.6, 1.7, 2.1, 2.3

units	tenths						
2·	2	1	3				
1·	7	6	8	6	5	6	7
0·	4						

The mode is: *1.6*

In this example we are working with units and tenths.
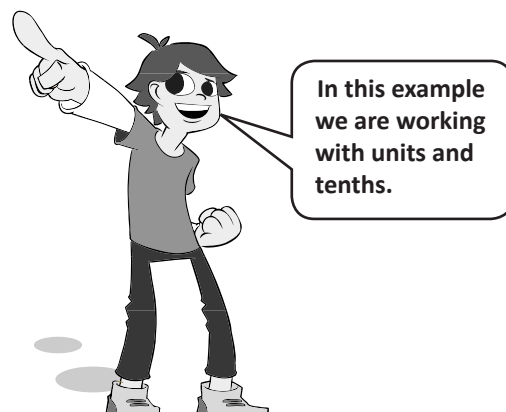
Collecting and analysing data – mode

When we collect and analyse data, we often use frequency tables. These also tell us the mode.
Look at this table. It shows the jumper sizes worn by the students in 6A.

Jumper Size	Tally	Frequency
10	ЖЖ ЖЖ	10
12	ЖЖ |	6
14	ЖЖ ЖЖ ЖЖ	15

Q: What size jumper is worn most frequently?

A: Size 14 jumpers.

14 is the mode as it's the number that occurs most often.

2   Complete the frequency tables below and identify the mode for each:

a

No. of Children in the Family	Tally	Frequency
1	ЖЖ ||	7
2	ЖЖ ЖЖ ЖЖ	15
3	ЖЖ ЖЖ |	11

The mode is: 2

b

Shoe Size	Tally	Frequency
5	ЖЖ ||	7
6	ЖЖ	5
7	ЖЖ ЖЖ	10
8	ЖЖ |||	8

The mode is: 7

3   **Wally is trying out for the Work Experience Boy Olympics. His favourite event is the Coffee Dash when he races to the local coffee shop and back for the morning lattes. Here are his times so far, rounded to the nearest minute:**

12 min	11 min	13 min	9 min	8 min	14 min	16 min
11 min	14 min	19 min	10 min	11 min	15 min	22 min
17 min	23 min	22 min	12 min			

a   Choose a method to find the mode of this set of data and record it below:

Students may choose to present data on a stem and leaf plot or on a frequency table.

The mode is 11 min.

Data Representation

Collecting and analysing data – range, mean, median and mode

When we analyse data we can look at the range, mean, median and mode. We most commonly use mean or average in our daily lives. It does have one drawback though – it is affected by outliers. These are numbers that might be much larger or smaller than the others in the set, and can drag the average up or down.

When there are outliers, the median can be more useful than the mean. The mode is most useful when we want to know which category or value is most popular.

1 **Look at the table on the right. It shows the money raised by 6G each week in their cork drive.**

Week	Money Raised
1	$15
2	$12
3	$9
4	$13
5	$59
6	$14
7	$11

a What is the mean (average) amount of money raised?

$19

b What is the median amount of money raised?

$13

c Which do you think better reflects the weekly figures? Why?

The median as most figures are closer to $13 than to $19.

d Does this set of data have a mode?

No

e What is the range?

$50

2 **Survey your classmates on their shoe size. Find a way to record the data and present it below. Calculate the mean, median, mode and range of your data set.**

Answers will vary.

Collecting and analysing data – range, mean, median and mode

3 **Cupcake Creations has asked you to analyse their sales figures. Look at the table below.**
It represents cupcake sales over a 4 week period:

Type	Week 1	Week 2	Week 3	Week 4	TOTAL
Strawberry Kiss	155	150	125	146	576
Mud Angel	207	185	167	193	752
Vanilla Cream	25	95	33	143	296
Blueberry Bubble	75	50	65	22	212
TOTAL	462	480	390	504	1 836

a Use a calculator to find the total sales of each cupcake type over the 4 weeks and the total sold each week. Enter this data into the table above. Total each set of totals – they should match in the bottom right box. If you can do this, you have a future as an accountant.

b Calculate the weekly mean sales for each type:

Type	Mean
Strawberry Kiss	144
Mud Angel	188
Vanilla Cream	74
Blueberry Bubble	53

c Calculate the range of the weekly sales for each type:

Type	Range
Strawberry Kiss	30
Mud Angel	40
Vanilla Cream	118
Blueberry Bubble	53

d On average, how many cupcakes sold each week?

459

e Which type sold best over the 4 weeks?

Mud Angel

f Which type sold least and may need to be changed?

Blueberry Bubble

g If the bakers bought their ingredients weekly, which type would be hardest to plan for and why?

Vanilla Cream — it has the widest range.

h The bakers want to add a novelty flavoured cupcake for a short special. Sketch or describe an idea for them:

Answers will vary.

G 4
SERIES TOPIC

Data Representation
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Collecting and analysing data – surveys

A survey is a way of gathering information on a certain topic. Companies use surveys to find out people's likes and dislikes so they can sell more of their product. Governments use surveys to work out how many schools, hospitals and roads they need to build.

It's not practical to ask everyone in the country every question, so a sample is chosen. This must be small enough to be practical but large and diverse enough to provide a reasonable spread of answers.

When planning a survey we need to ask:

- What do we want to find out?
- How will we collect the answers?
- What questions will give us this information?
- Once we have our answers, how will we represent the data?

1 **The Yummy Food Company recently added peanut butter to their range and want to research their customers' opinions on their new products. They want to know what types of peanut butter they should make and in what proportions. They also want to know who they should aim their marketing at. Here are two possible surveys:**

Survey 1

1 What kind of peanut butter do you like?

2 How often do you eat peanut butter?

3 How old are you?

4 Are you male or female?

Survey 2

	0–9	10–19	20–39	40 +
1 My age range	☐	☐	☐	☐

	Daily	Weekly	Rarely	Never
2 I eat peanut butter	☐	☐	☐	☐

	Smooth	Crunchy	Super Crunchy	Whichever
3 I prefer	☐	☐	☐	☐

a Would one survey give you more useful information than the other? Why?

Survey 2 — the questions are direct, requiring specific answers.

b Would one survey's data be easier to represent in graphs and if so, why?

Survey 2 — the categories are already clearly set.

c If the Yummy Food Company conducted their survey in the school playground, would this be a reasonable sample of people to use? Why or why not?

No, because they just get kids' opinions and they don't usually buy the peanut butter.

d Design some survey questions that would tell you what different types of peanut butter people preferred if you wanted tally marks for answers:

Answers will vary.

Collecting and analysing data – surveys

When we design surveys we have to think about the number and the variety of the different kinds of possible responses. We can't make the questions open ended or we will receive too many different answers that could be open to interpretation.

We can limit the options by asking closed questions that require specific answers. We must be careful though, that we don't limit the choices too much, with the respondents unable to give a true response. It's a fine balance!

2 Look at these surveys. They want to know about favourite after school activities. Comment on their usefulness. Think about the data they give you and whether you could graph the answers easily:

Survey 1	**Survey 2**
What do you like doing after school?	*After school do you prefer to play sport, watch TV or go shopping?*
Answers will vary.	*Answers will vary.*

3 Design your own survey to find out which after school activities are preferred by your classmates. Design it so that you receive one response from each student – so they can't say, 'Well, on Monday I like to ... but on Tuesday ...". Test it out on 10 students. Do your questions work?

What are you trying to find out?
What questions do you need to ask?
How will you collect responses?

Answers will vary.

CHECK

4 If the principal wanted you to research preferred school starting times within the school community and asked you to survey 100 people, who would you ask and in what proportions? Explain your reasoning.

Answers will vary.

Data Representation

Collecting and analysing data – surveys

5 **Chloe and her twin sister Zoe were planning their birthday party for 10 people. Chloe wanted to serve pizza and garlic bread, while Zoe wanted hamburgers or hotdogs. Zoe couldn't decide but knew there was no way she was going to let Chloe get her own way … Their mother grew tired of all the bickering and threatened to cancel the party unless they decided once and for all. Zoe and Chloe decided to conduct a survey amongst their friends and then go with the favourite. Pretend that you are Zoe and Chloe and survey 10 people.**

a Design your question:

Answers will vary.

b How should you collect the data? Set it up in this space:

Answers will vary.

c Zoe presented her findings in a pie chart and Chloe decided to do a column graph. Create each graph here:

Answers will vary.

> A pie chart visually shows the 'parts of the whole' better than a column graph. However, it may be easier to compare categories using a column graph.
>
> *REMEMBER*

d Is one style of graph more effective than the other? And most importantly, what are they eating at the party?

Answers will vary.

Collecting and analysing data – misleading graphs

Graphs can be seen everywhere. Companies, governments and all kinds of organisations use graphs to communicate to the world. You can see graphs on TV, on the internet and in advertisements.

Graphs can often be misleading. The way a graph looks does not always match the data it is representing. In this topic, we are going to look at some examples of misleading column and line graphs and show you how to not fall for any tricks!

What is it about each of these graphs that gives a false impression? Look closely at each one with a partner and discuss before you look at the answers.

Graph 1

Asthma on the Rise

| | 2004 | 2005 | 2006 | 2007 |
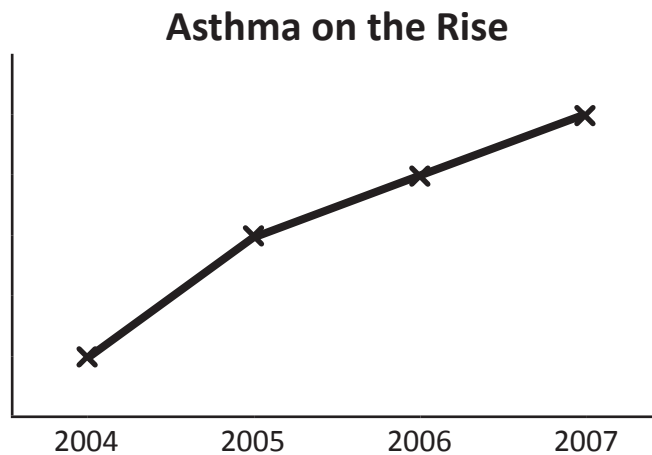
This line graph shows that the number of people who get asthma every year has risen sharply. Because it has no scale, we can't really tell how much it has risen. You might see this in a newspaper next to a report about how bad pollution is and that pollution is causing asthma to rise.

Graph 2

Borato – the best value car by far
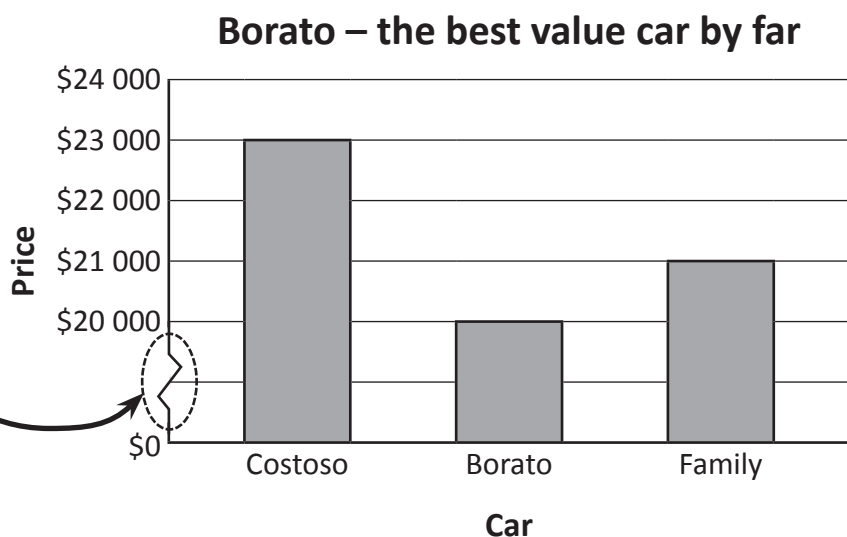
Did you know that it is ok to use a zig zag along the scale? This is to show that the scale is 'broken' and is used when the data starts at a high number. In this graph, none of the cars cost less than $20 000, so we do not need to show that part of the scale.

This column graph is an advertisement for a brand of car. It is misleading because the column on the left looks more than twice as big as the Borato. When you look closely, you can see that the price difference is not half, it is much closer in price. This is due to the broken scale.

Collecting and analysing data – misleading graphs

Scale makes a big difference to how data is perceived.

A graph should always have a scale, but did you know that it doesn't always have to start at zero and that a broken scale can be used? This is how advertisers, reporters and politicians often get away with exaggerating the truth. They want you to see things as cheaper, worse or better than they really are, depending on the situation.

Let's examine some misleading graphs.

1 Zoom car dealers sell second hand cars. The sales manager is preparing a graph to show her boss the sales figures for the last 3 months of the year. She wants to make the sales figures look good so she can get her bonus.

Month	October	November	December
Number of cars sold	65	71	79

These column graphs show the same information but each graph looks different. Can you see why? Look at the scales carefully.

Graph 1
Zoom Sales Figures

Graph 2
Zoom Sales Figures

Graph 3
Zoom Sales Figures
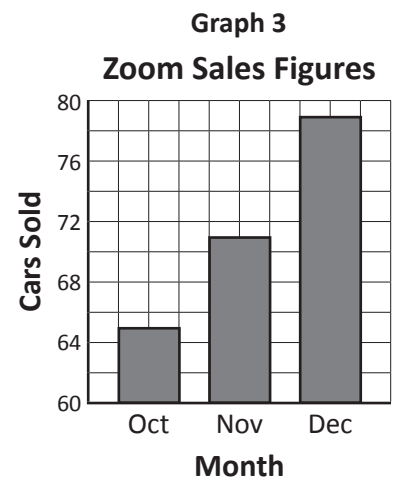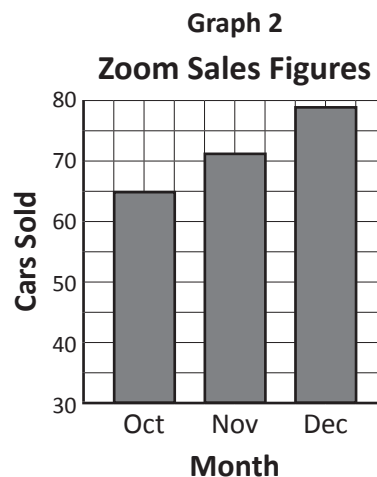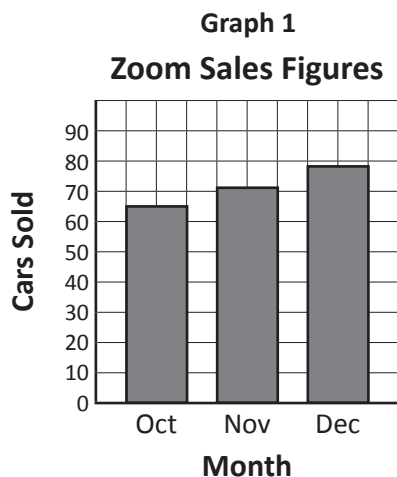
The sales manager started work at Zoom car dealers in November. Which graph do you think she will show her boss? Why?

Graph 3.

The scale used emphasises the increase in sales since she started in November.

HINT: She started in November so she would want to show an improvement in sales figures.

Collecting and analysing data – misleading graphs

2 The bar graph on the right compares the fuel efficiency of three different types of vehicles. They are manufactured by 2 different car manufacturers – Automotive Group and Union Cars. Answer the questions about this misleading graph.

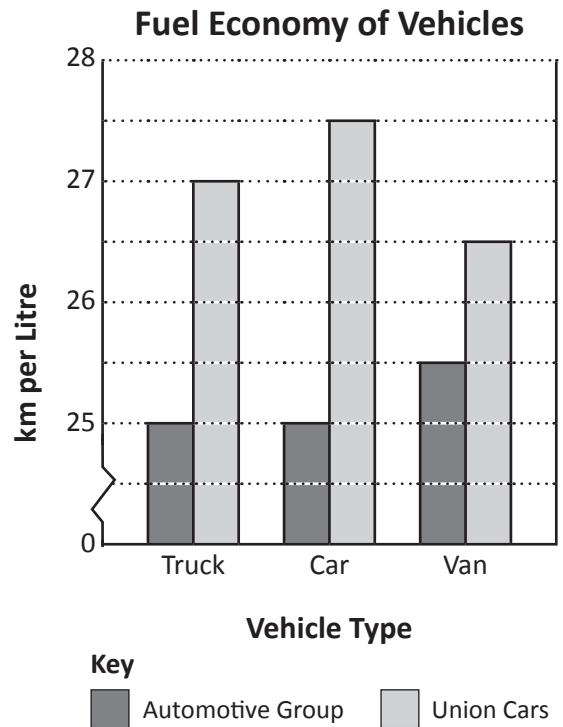**a** What is the difference in fuel efficiency between the 2 brands of trucks?

2 km per litre.

b What do you notice about the length of the two bars for the trucks?

Union Cars is 3 times longer.

c What makes this graph misleading?

The broken scale and the way the scale is numbered.

Fuel Economy of Vehicles

km per Litre (y-axis): 28, 27, 26, 25, 0

Vehicle Type (x-axis): Truck, Car, Van

Key
- ▪ Automotive Group
- ▫ Union Cars

---

3 Monique gets $5 a week pocket money from her parents, provided she completes all of her chores. This includes: making her bed, feeding the dogs, keeping her room tidy, doing her homework, cleaning out the guinea pigs' cages and doing the washing up after dinner! Monique suspected she was due for a pay rise so she asked her friends how much pocket money they each got per week. The results are in the table.

Name	Weekly pocket money ($)
Monique	$5
Tash	$7
Bec	$8
Troy	$8
Matt	$9
Will	$10

a Help Monique to make a column graph to show her parents that she is underpaid compared with her friends. Monique's parents are quite strict, so they will need a lot of convincing. How can you present this data in a way that will make them take notice? You should look over the graph in question 2 for some ideas.

Answers will vary.

G 4
SERIES TOPIC

Data Representation
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Critically endangered   create
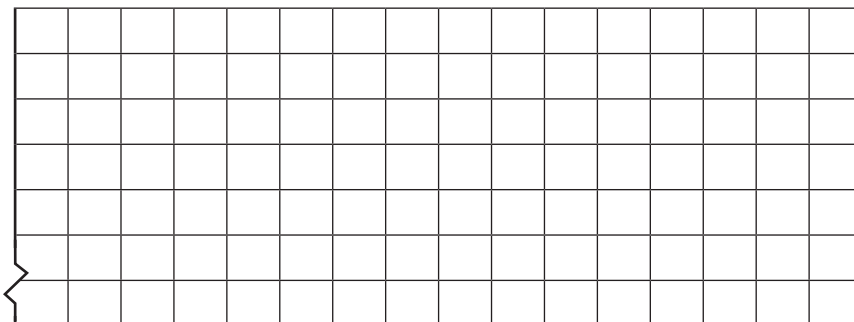
Your class is hoping to raise money to donate to the World Wildlife Fund to help them in their fight to save endangered animals.

You want to show your fellow students how many of each type of animal is left in the world and decide to convey the information in a picture graph. This will hang in the office foyer next to a donations jar.

What to do

Work in a small group to design your graph. Remember it needs:

• A scale
• To be eye catching and clear
• To have a heading and labels

Think about how you will represent the numbers. They range from 2 000 to 172 000.

| Animal	Estimated Numbers Left (Source: WWF 2009)
Chimpanzee	172 000
African rhino – white	14 000
Giant panda	2 000
Polar bear	20 000
Orangutan	50 000
Asian elephant	26 000
Tiger	4 000

Answers will vary.

What to do next

Create your picture graph. Make sure it is bright and eye catching and that it conveys your message well.

Answers will vary.

a There are 5 people in a family and the average age is 22. How old might each member be?
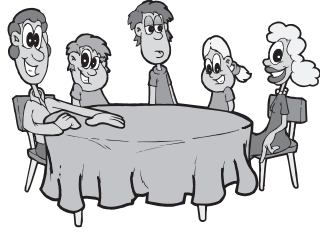
Answers will vary but must add up to 110.

b To make the District Diving Team, Dan must have an average of 7.2. His last five dives have scored: 8.3 6.7 9.2 4.5 6.8. What must he score in his last dive to achieve this? Do you think this is likely considering his previous dives?

To score an average of 7.2, all 6 dives must add to 43.2.

His 5 dives add to 35.5 so his final dive must score 7.7. 7.7 + 35.5 = 43.2

It is likely as he has scored 8.3 and 9.2, so we know he can do it.

c The average attendance at Mr G's Experimental Dance Expo over 5 consecutive days was 24. On the last day, a huge crowd of 32 turned up. What could the attendances have been on the other days?

5 × 24 = 120. The total attendance is 120.

120 – 32 = 88. If 32 people came on the last day, the attendances on the other 4 days add to 88.

There are many different combinations. One could be 22 on each of the days.

d 7 students were playing soccer at lunch time. The mean number of goals scored by each player was 5. The median was 4 and the mode was 3. What could the scores have been?

One possible answer is:

9 7 6 4 3 3 3

The values add to 35. The mean is 5. 35 ÷ 7 = 5

4 is the median number and 3 occurs most frequently.

Get up and go   create

Getting ready

The Australian Bureau of Statistics has statistics on seemingly *everything*. Did you know that in 2008, there were over 3.4 million students in 9 612 schools across Australia, with just over 270 000 teaching staff? (Schools, ABS Cat. No 4221.0)

They also have data on when kids go to bed at night and get up in the morning. Here is a sample from the 2006 census at school:

Sex	Age	Get up time when the student has school that day	Get up time when the student does not have school that day	Go to bed time when the student does have school the next day	Go to bed time when the student does not have school the next day
Female	15	7:30 am	9:00 am	10:30 pm	11:30 pm
Male	12	Before 6:00 am	9:30 am	9:30 pm	10:00 pm
Female	16	6:30 am	9:00 am	9:30 pm	11:00 pm
Female	14	7:30 am	8:00 am	9:30 pm	10:00 pm
Female	10	7:00 am	9:30 am	9:30 pm	10:00 pm
Male	11	8:00 am	7:30 am	7:30 pm	9:00 pm
Male	12	8:00 am	10:00 am	10:30 pm	11:00 pm
Male	13	6:30 am	8:30 am	9:30 pm	11:30 pm

What to do

Using the ABS table as a guide, design and conduct your own survey about the times that the students at your school get up and go to bed. Work in a small group. Make your sample size 50 students but decide which age students you will survey. Will you keep it a Y6 project? Or will it be an across the school study?

What to do next

Find a way to present your data in graphical form. You have lots to think about:

• What information do you want to compare and analyse?

• What style(s) of graph(s) will you use?

• How many graphs will you need to create?

• Will you group the data?

• Will you use a spreadsheet program to help you or will you draw the graphs by hand?

Present your findings to the class. Compare your representation with that of others. Are they similar? If not, do other representations look clearer than yours?

Answers will vary.

Ice cream dreams   create

Getting ready

An ice cream company decides to run a new competition to encourage more people to buy their ice creams. Their previous competition had failed badly. The major prize was a year's worth of free ironing. Yawn ...

The company decides to offer a range of prizes to the value of $2 000 and they want you to conduct a survey to find out the kinds of prizes people want.

Kids under the age of 16 are the main consumers so their campaign will be aimed at them.

What to do

Work as part of a team to design and conduct a survey to find out the kinds of prizes (to the value of $2 000) that will appeal to people under the age of 16.

Think about:

• Your sample size – how many people will you ask?

• Your sample range – how will you know you have asked a range of students that give a balanced picture?

• How you will phrase your questions? Remember open-ended questions are harder to handle than closed questions.

• How you will record the answers?

• When you will conduct your survey?

Practise your questions on each other to make sure they give you the information you are looking for and can record. When you are happy, conduct your survey.

What to do next

Once you have your data, your challenge is to now present it in a graph. Think about:

• What style of graph will best suit the data?

• Will you group the data or present individual responses? This may depend on your sample size.

• How will you create it – will you use a spreadsheet program or hand draw it?

Once you have created your graph, present your findings to the rest of the class.

Answers will vary.

Data Representation

Line it up   create

What to do

Add a title, axis labels and values to this line graph to make it a believable representation of a set of data. Think about:

- When do we use line graphs?

- What will line A represent?

- What will line B represent?

- What values are realistic for my chosen subject matter?
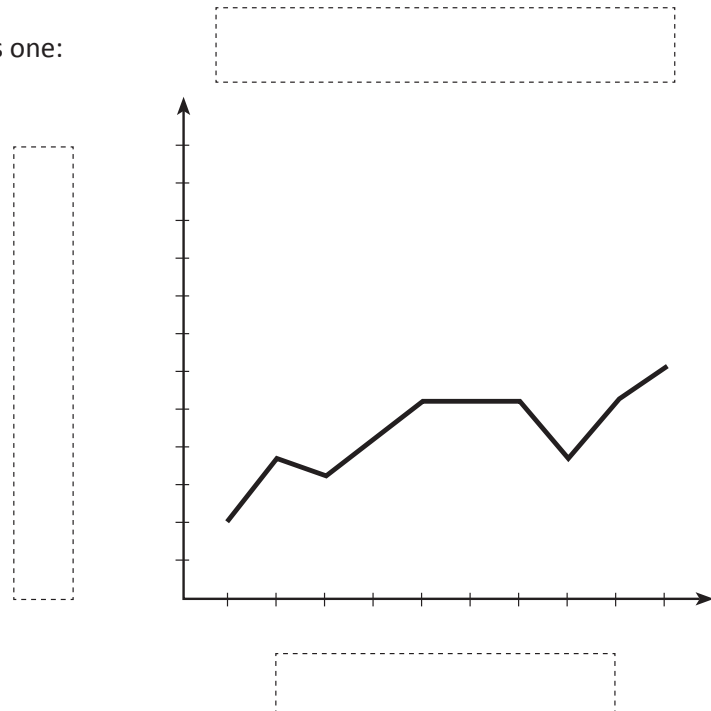
Answers will vary.

A

B
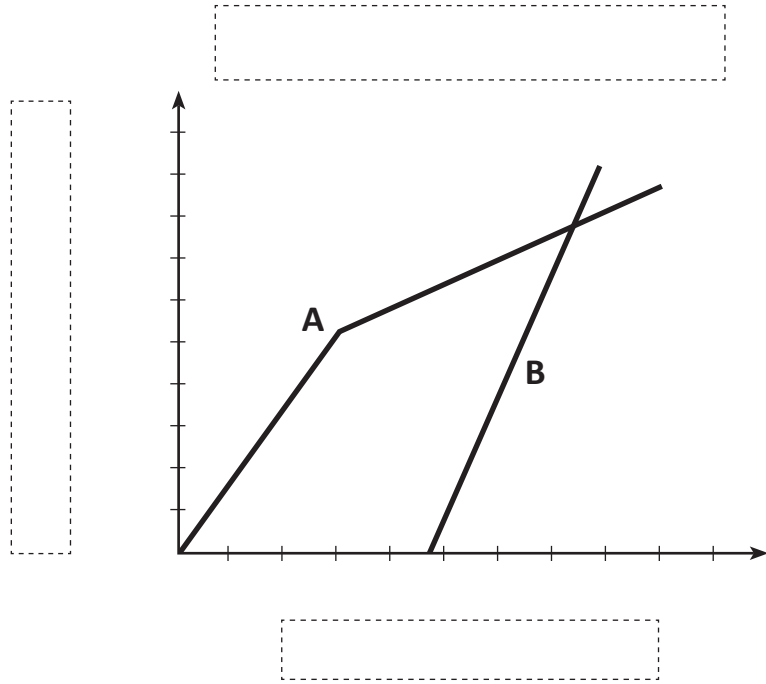
What to do next

Now try this one:

Answers will vary.

Data Representation

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G 5

SERIES   TOPIC

39

Displaying data 1

1 Here are tallied results from five teams that competed in a general knowledge quiz. A point is scored for every correct answer.

Team	Tally	Total
Smarties	ЦНТ ЦНТ ЦНТ III	
Knowitalls	ЦНТ I	
Superstars	ЦНТ ЦНТ II	
Brainiacs	ЦНТ ЦНТ ЦНТ ЦНТ IIII	

a Complete the total column.

b How many points did the teams score altogether?

2 Draw a picture graph of the information shown in the table. Don't forget the key. Use a tick for the symbol.

Team	Points
Smarties	
Knowitalls	
Superstars	
Brainiacs	
Key: =	

3 Now create a divided bar graph that shows the same information as the table at the top of the page.

Skills	Not yet	Kind of	Got it
• Displays data as a picture graph labelled correctly using a key			
• Creates a divided bar graph			

Displaying data 1

Name _____

1 Here are tallied results from five teams that competed in a general knowledge quiz. A point is scored for every correct answer.
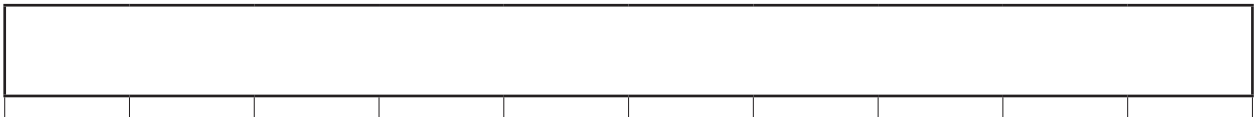
Team	Tally	Total
Smarties	ЖЖ ЖЖ ЖЖ |||	18
Knowitalls	ЖЖ		6
Superstars	ЖЖ ЖЖ ||	12
Brainiacs	ЖЖ ЖЖ ЖЖ ЖЖ ||||	24

a Complete the total column.

b How many points did the teams score altogether?

> 60

....

2 Draw a picture graph of the information shown in the table. Don't forget the key. Use a tick for the symbol.

Team	Points
Smarties	✔ ✔ ✔
Knowitalls	✔
Superstars	✔ ✔
Brainiacs	✔ ✔ ✔ ✔
	Key: ✔ = 6 points

....

3 Now create a divided bar graph that shows the same information as the table at the top of the page.

Smarties	Knowi-talls	Superstars	Brianiacs

....

Skills	Not yet	Kind of	Got it
• Displays data as a picture graph labelled correctly using a key			
• Creates a divided bar graph			

Double column graphs

Name _____

1 The following table shows admissions to a theme park called Magic Town.

Admission Numbers to Magic Town				
	January	**February**	**March**	**April**
Adults		75		200
Kids	200		75	100

Complete the table and graph so they display the same data:
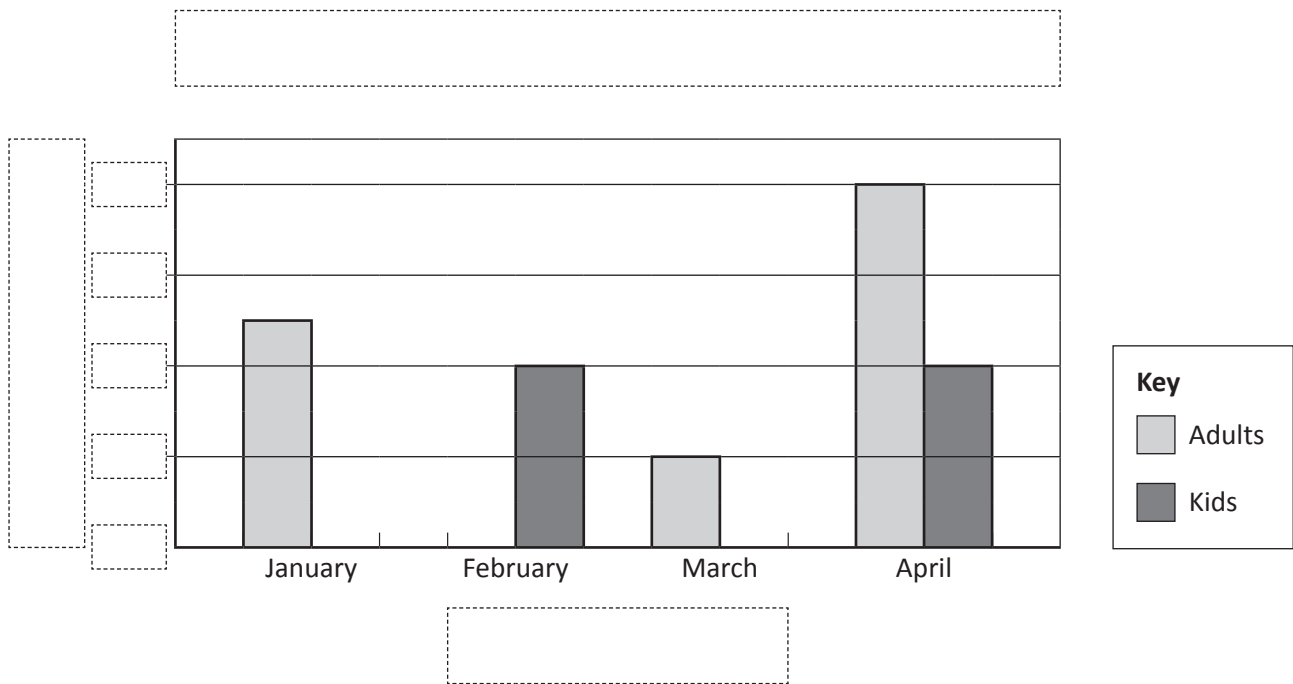
		Key
		☐ Adults
		☐ Kids

January   February   March   April

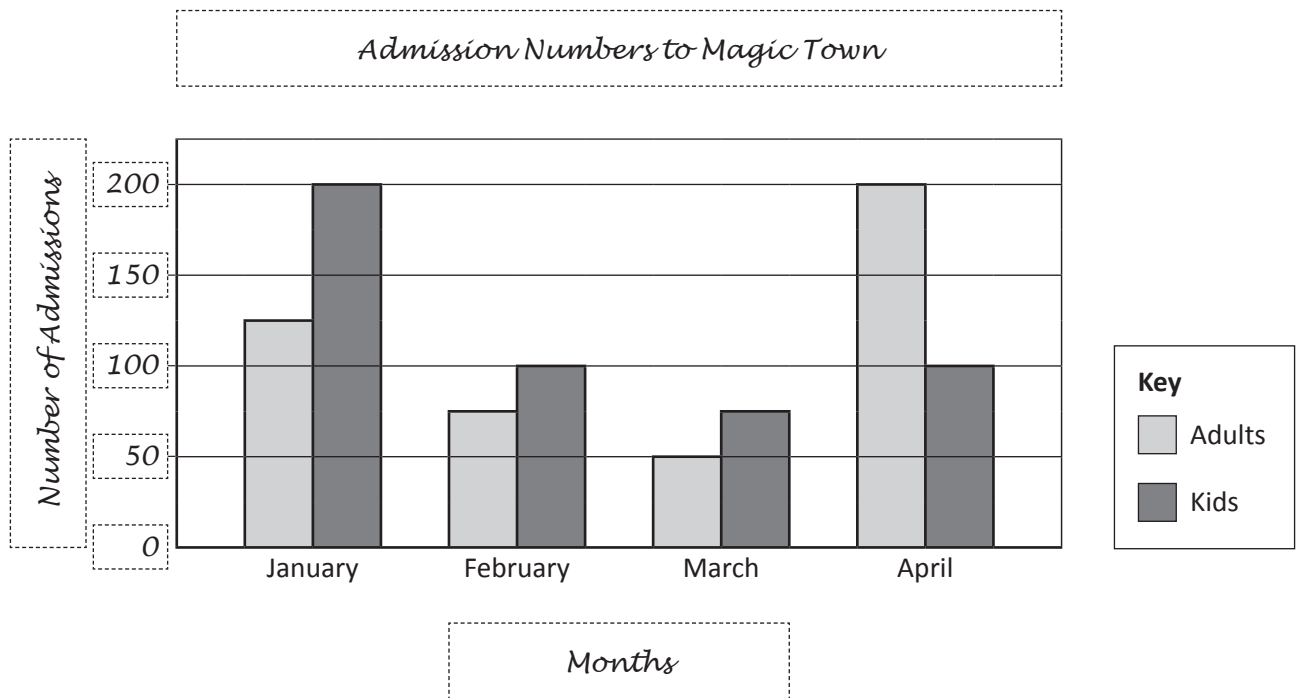**2** Use the information in the table (at the top) to answer these questions:

a Which month was the most popular for kids' birthday parties?

b Which month were the owners concerned about admission numbers?

c Which month do you think the theme park had a promotion of half price adult tickets?

d Why do you think the promotion was in this month? (**Hint:** look at the numbers for March.)

_____

Skills	Not yet	Kind of	Got it
• Displays data as a double column graph labelled correctly using a scale			
• Interprets information from a double column graph			

Double column graphs

1 The following table shows admissions to a theme park called Magic Town.

Admission Numbers to Magic Town				
	January	**February**	**March**	**April**
Adults	*125*	75	*50*	200
Kids	200	*100*	75	100

Complete the table and graph so they display the same data:

Admission Numbers to Magic Town

2 Use the information in the table (at the top) to answer these questions:

a Which month was the most popular for kids' birthday parties?　　　*January*

b Which month were the owners concerned about admission numbers?　　*March*

c Which month do you think the theme park had a promotion of half price adult tickets?　　*April*

d Why do you think the promotion was in this month? (**Hint:** look at the numbers for March.)

Because the previous month (March) was low. _____

Skills	Not yet	Kind of	Got it
• Displays data as a double column graph labelled correctly using a scale			
• Interprets information from a double column graph			

Pie charts

Name _____

1 **Show the information given on the pie charts.**

a Jo won $1 000 in a radio competition. This is how she spent it:

$300   mp3 player

$200   Savings

$400   Holiday

$100   Running shoes

b 500 kids in Year 6 voted on their next fund-raising activity. These are the results:

50   Raffle

150   Pet Day

100   Bike Day

200   Talent Quest

c Year 6 at Grange Grammar School organised a cake stall to raise money for new books for the school library. They made $360 profit like this:

$36   Chocolate cakes

$72   Cookies

$108   Lamingtons

$144   Cream cakes

2 **Look carefully at the last pie chart (in Question 1 c). Use the information to answer the following questions.**

a What fraction of the profit came from lamingtons?

b What percentage of the profit came from chocolate cakes?

c What percentage of the profit came from cookies?

d How much profit (in dollars) came from cream cakes and chocolate cakes together?

Skills	Not yet	Kind of	Got it
• Creates pie chart from data by calculating proportions			
• Interprets the data on a pie chart as fractions, percentages and whole numbers			

Pie charts

Name _____

1 **Show the information given on the pie charts.**

a Jo won $1 000 in a radio competition. This is how she spent it:

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$108   Lamingtons

$144   Cream cakes

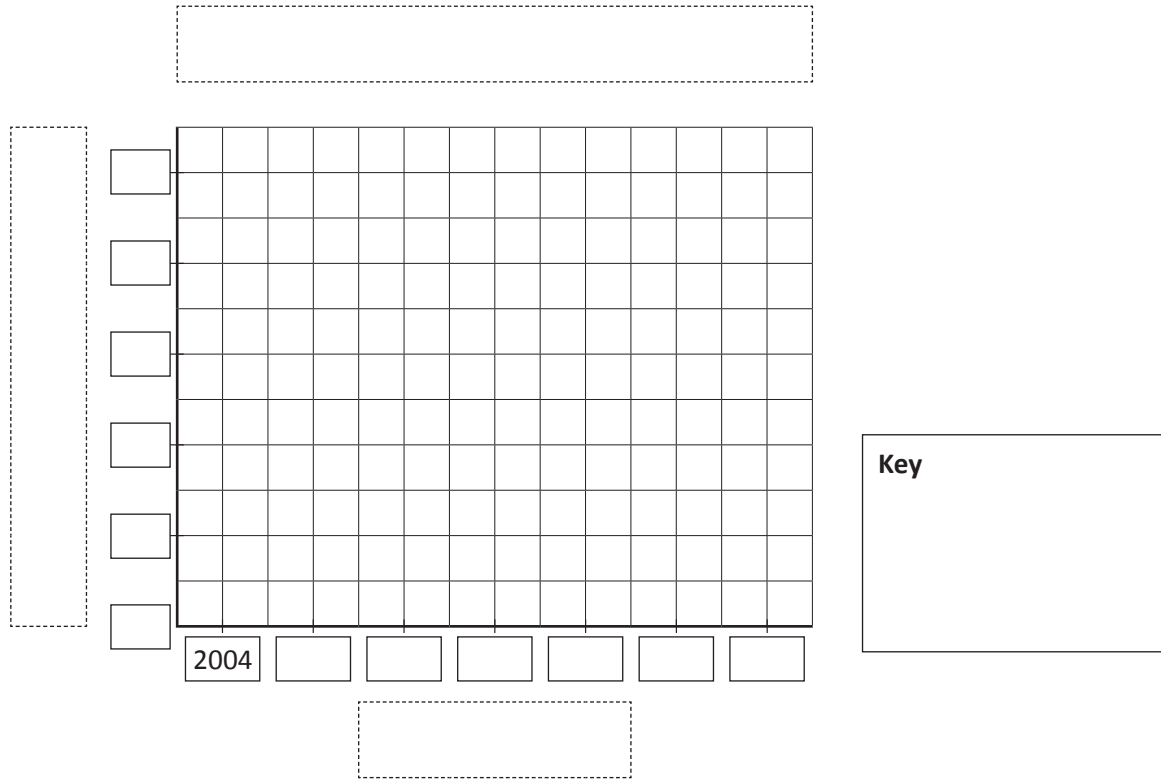**2** **Look carefully at the last pie chart (in Question 1 c). Use the information to answer the following questions.**

a What fraction of the profit came from lamingtons?

$$\frac{3}{10}$$

b What percentage of the profit came from chocolate cakes?

10%

c What percentage of the profit came from cookies?

20%

d How much profit (in dollars) came from cream cakes and chocolate cakes together?

$180

Skills	Not yet	Kind of	Got it
• Creates pie chart from data by calculating proportions			
• Interprets the data on a pie chart as fractions, percentages and whole numbers			

Line graphs

Name _____

1 This table shows the number of cancelled gym memberships at the end of each calendar year for males and females at Fitbods Gym.

	2004	2005	2006	2007	2008	2009	2010
Males	30	20	40	45	10	50	30
Females	25	30	20	20	15	35	45

Create and label a double line graph to show this data:

Key

2004

2 Answer the questions about the data above:

a How many cancelled gym memberships in 2006 altogether?

b In 2007, how many more males cancelled their memberships than females?

c In which year do you think Fitbods Gym had free child minding services?

d Estimate the number of females who cancelled midway through 2008.

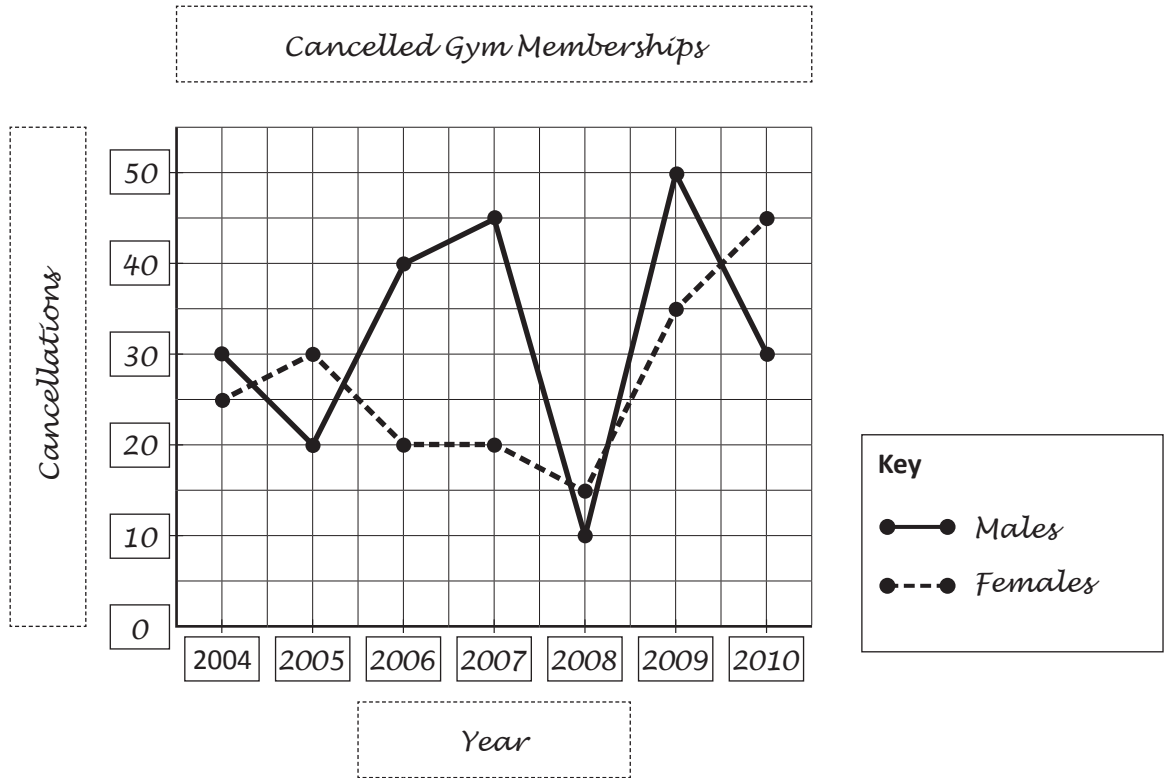| Skills	Not yet	Kind of	Got it
• Constructs a line graph that shows continuous change			
• Uses an appropriate scale			
• Interprets data based on information shown between plotted points			

Line graphs

Name _____

1 This table shows the number of cancelled gym memberships at the end of each calendar year for males and females at Fitbods Gym.

	2004	2005	2006	2007	2008	2009	2010
Males	30	20	40	45	10	50	30
Females	25	30	20	20	15	35	45

Create and label a double line graph to show this data:

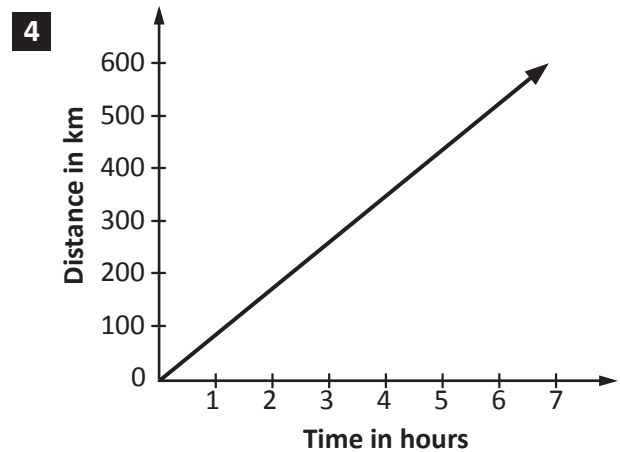Cancelled Gym Memberships

Key
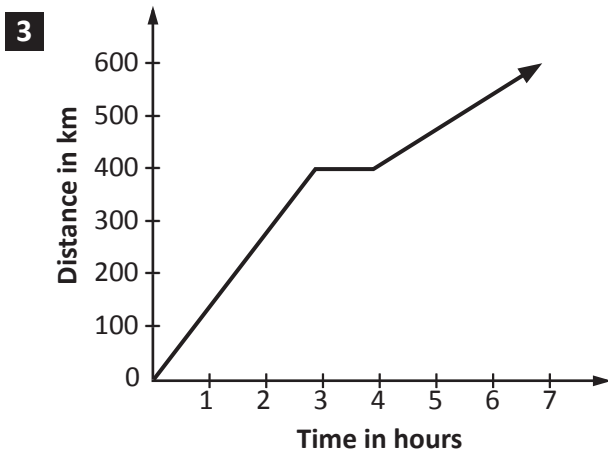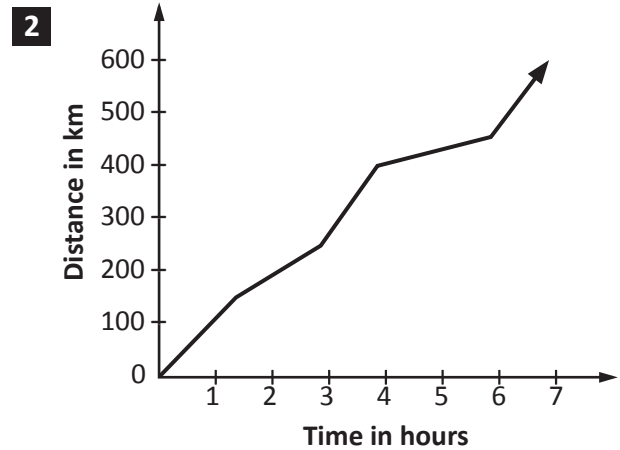
●——● Males

●---● Females

2 Answer the questions about the data above:

a How many cancelled gym memberships in 2006 altogether?   *60*

b In 2007, how many more males cancelled their memberships than females?   *25*

c In which year do you think Fitbods Gym had free child minding services?   *2008*

d Estimate the number of females who cancelled midway through 2008.   *25*

Skills	Not yet	Kind of	Got it
• Constructs a line graph that shows continuous change			
• Uses an appropriate scale			
• Interprets data based on information shown between plotted points			

Travel graphs

1 Look carefully at the following travel graphs:

1

Distance in km

Time in hours

2

Distance in km

Time in hours

3

Distance in km

Time in hours

4

Distance in km

Time in hours
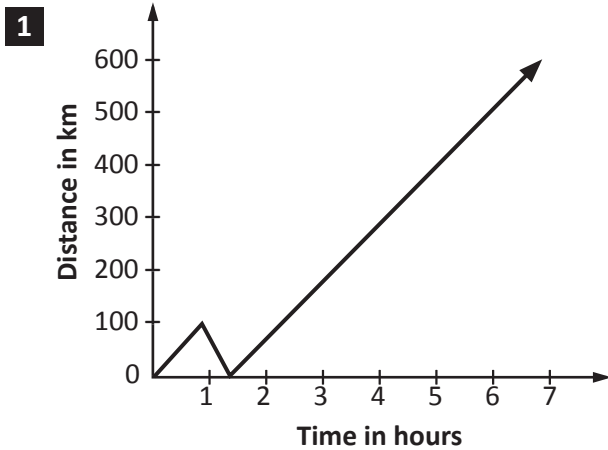
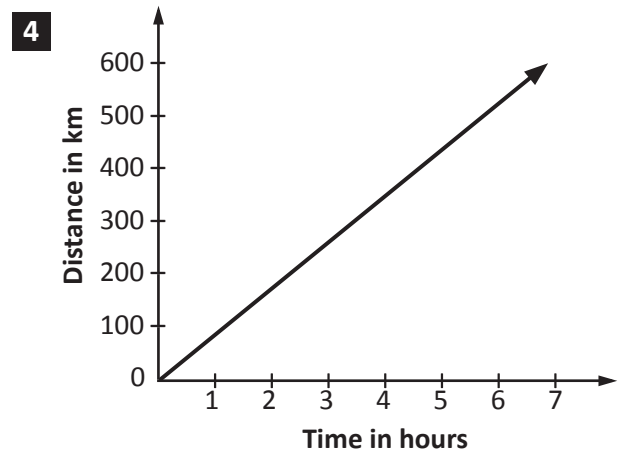**Match each travel graph to one of the following stories by writing the graph number.**

a The Devlin family travelled from Sydney to Albury in NSW by car. There was not much traffic at the start of their journey but they slowed down after 4 hours of travelling.

b Yasmin left the coffee shop and started her long car ride to her holiday home down south. After awhile, she realised she'd left her mobile phone in the coffee shop and had to return to collect it.

c Michelle drove at a constant speed to her holiday home. In 6 hours she had driven 500 km.

d Sara and Zoe had driven for 400 km when they decided to stop for a break before resuming their journey.

Skills	Not yet	Kind of	Got it
• Reads and interprets travel graphs			

Travel graphs

1 **Look carefully at the following travel graphs:**

1

Distance in km (y-axis): 0, 100, 200, 300, 400, 500, 600
Time in hours (x-axis): 1, 2, 3, 4, 5, 6, 7

2

Distance in km (y-axis): 0, 100, 200, 300, 400, 500, 600
Time in hours (x-axis): 1, 2, 3, 4, 5, 6, 7

3

Distance in km (y-axis): 0, 100, 200, 300, 400, 500, 600
Time in hours (x-axis): 1, 2, 3, 4, 5, 6, 7

4

Distance in km (y-axis): 0, 100, 200, 300, 400, 500, 600
Time in hours (x-axis): 1, 2, 3, 4, 5, 6, 7

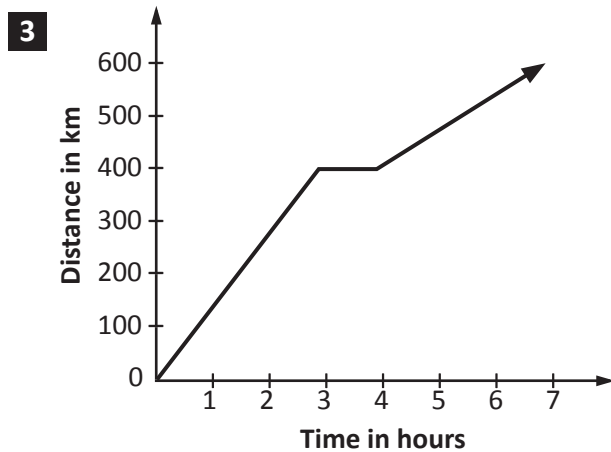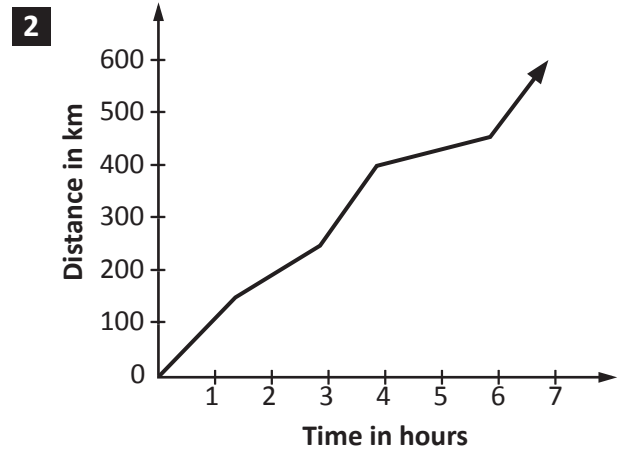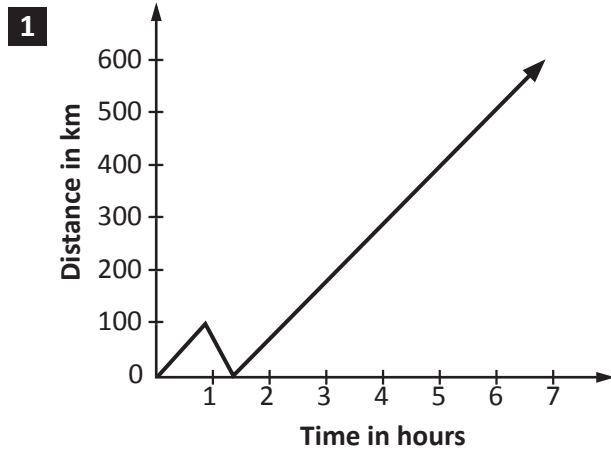**Match each travel graph to one of the following stories by writing the graph number.**

a The Devlin family travelled from Sydney to Albury in NSW by car. There was not much traffic at the start of their journey but they slowed down after 4 hours of travelling.

2

b Yasmin left the coffee shop and started her long car ride to her holiday home down south. After awhile, she realised she'd left her mobile phone in the coffee shop and had to return to collect it.

1

c Michelle drove at a constant speed to her holiday home. In 6 hours she had driven 500 km.

4

d Sara and Zoe had driven for 400 km when they decided to stop for a break before resuming their journey.

3

Skills	Not yet	Kind of	Got it
• Reads and interprets travel graphs			

Collecting and analysing data   Name _____

1   **Find the mean of each set of scores. You may use a calculator if you wish.**

    a 8, 4, 7, 6, 5, 3, 2, 1, 9   Mean ☐   **b** 24, 12, 16, 28, 32, 46, 52, 30   Mean ☐

    c 12, 15, 19, 26, 28   Mean ☐   **d** 158, 172, 159, 164, 167   Mean ☐

2   **Find the mode for each set of scores:**

    a 5, 6, 6, 7, 7, 7, 7, 8, 9   Mode ☐

    b 22, 35, 35, 28, 20
       28, 29, 19, 20, 20, 19   Mode ☐
       32, 32, 36, 40, 21, 20

3   **Find the range for each set of numbers:**

    a 23, 15, 18, 12, 2, 39   **b** 231, 148, 192, 223, 84, 139   **c** 3.2, 9.7, 13.5, 1.8, 8.4, 3.9

    Range ☐   Range ☐   Range ☐

4   **Find the median for each set of numbers:**

    a 14, 15, 16, 17, 23, 25, 28, 30, 31   **b** 37, 38, 42, 43, 44, 45, 48, 50, 53

    Median ☐   Median ☐

5   **Colour match each term on the left with its example:**

mean	The teacher studied the HW test results and found the most common score.
mode	The real estate agent subtracted the lowest house price from the highest house price to get a better idea of the suburb's housing values.
median	Tim added up the goals he scored in each soccer game of the season and then divided this total by the number of games.
range	The photographer wrote down the students' heights in order from shortest to tallest to find who should be in the centre of the photo.

Skills	Not yet	Kind of	Got it
• Recognises and finds mean			
• Recognises and finds mode			
• Recognises and finds median			
• Recognises and finds range			

MATHLETICS

Collecting and analysing data

Name _____

1 **Find the mean of each set of scores. You may use a calculator if you wish.**

    a 8, 4, 7, 6, 5, 3, 2, 1, 9   Mean | 5 | **b** 24, 12, 16, 28, 32, 46, 52, 30   Mean | 30 |

    c 12, 15, 19, 26, 28   Mean | 20 | **d** 158, 172, 159, 164, 167   Mean | 164 |

2 **Find the mode for each set of scores:**

    a 5, 6, 6, 7, 7, 7, 7, 8, 9   Mode | 7 |

    b 22, 35, 35, 28, 20
       28, 29, 19, 20, 20, 19   Mode | 20 |
       32, 32, 36, 40, 21, 20

3 **Find the range for each set of numbers:**

    a 23, 15, 18, 12, 2, 39   **b** 231, 148, 192, 223, 84, 139   **c** 3.2, 9.7, 13.5, 1.8, 8.4, 3.9
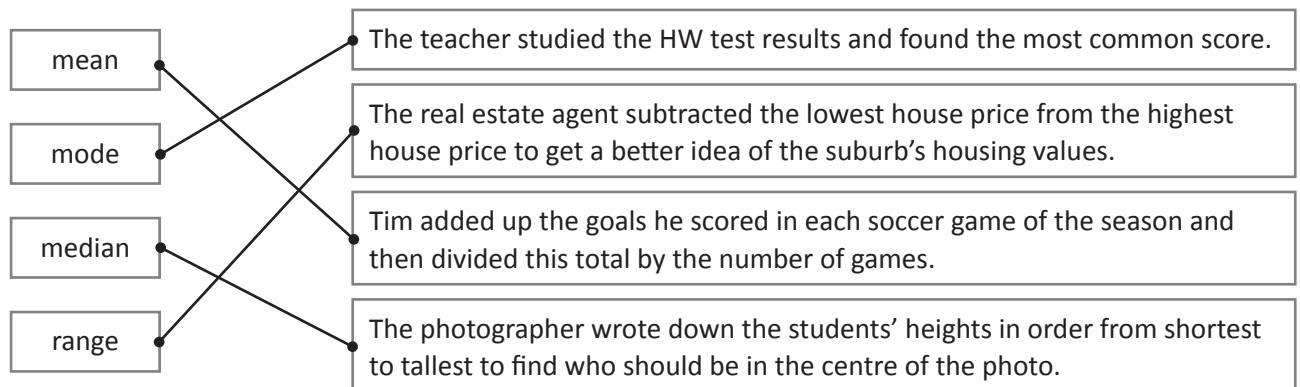
    Range | 37 | Range | 147 | Range | 11.7 |

4 **Find the median for each set of numbers:**

    a 14, 15, 16, 17, 23, 25, 28, 30, 31   **b** 37, 38, 42, 43, 44, 45, 48, 50, 53

    Median | 23 | Median | 44 |

5 **Colour match each term on the left with its example:**

mean	The teacher studied the HW test results and found the most common score.
mode	The real estate agent subtracted the lowest house price from the highest house price to get a better idea of the suburb's housing values.
median	Tim added up the goals he scored in each soccer game of the season and then divided this total by the number of games.
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Skills	Not yet	Kind of	Got it
• Recognises and finds mean			
• Recognises and finds mode			
• Recognises and finds median			
• Recognises and finds range			

Name _____

1 Here are 3 different sets of data. Look at each table and decide which is the most appropriate graph to use for each one.

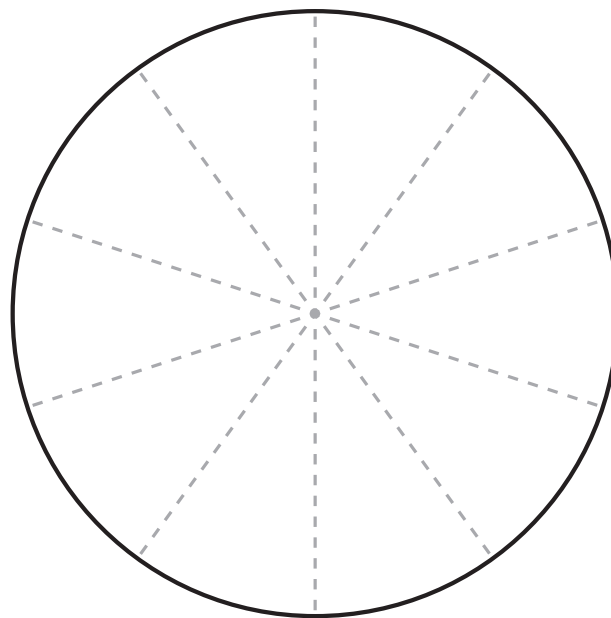| Name	Number of Ribbons
Adrian	12
Omar	5
Paige	8
Imogen	4

Week	Height of Plant (in cm)
1	7
2	10
3	14
4	15

Item	Profit
Fiction books	$40
Non-fiction books	$30
Picture books	$20
Bookmarks	$10

Construct the graphs using the templates below and on the next page. Don't forget to work out the scale, label the axes and add a heading.

a Show how many ribbons each person won at the school swimming carnival. It should be clear who won the most and who won the least.

b Show the growth of the plant over 4 weeks.

c Show what made up the library sale's $100 profit.

Name _____

2

....

Skills	Not yet	Kind of	Got it
• Selects most appropriate graph for data			

Displaying data 2

1 Here are 3 different sets of data. Look at each table and decide which is the most appropriate graph to use for each one.

Name	Number of Ribbons
Adrian	12
Omar	5
Paige	8
Imogen	4

Week	Height of Plant (in cm)
1	7
2	10
3	14
4	15

Item	Profit
Fiction books	$40
Non-fiction books	$30
Picture books	$20
Bookmarks	$10

Construct the graphs using the templates below and on the next page. Don't forget to work out the scale, label the axes and add a heading.

a Show how many ribbons each person won at the school swimming carnival. It should be clear who won the most and who won the least.

b Show the growth of the plant over 4 weeks.

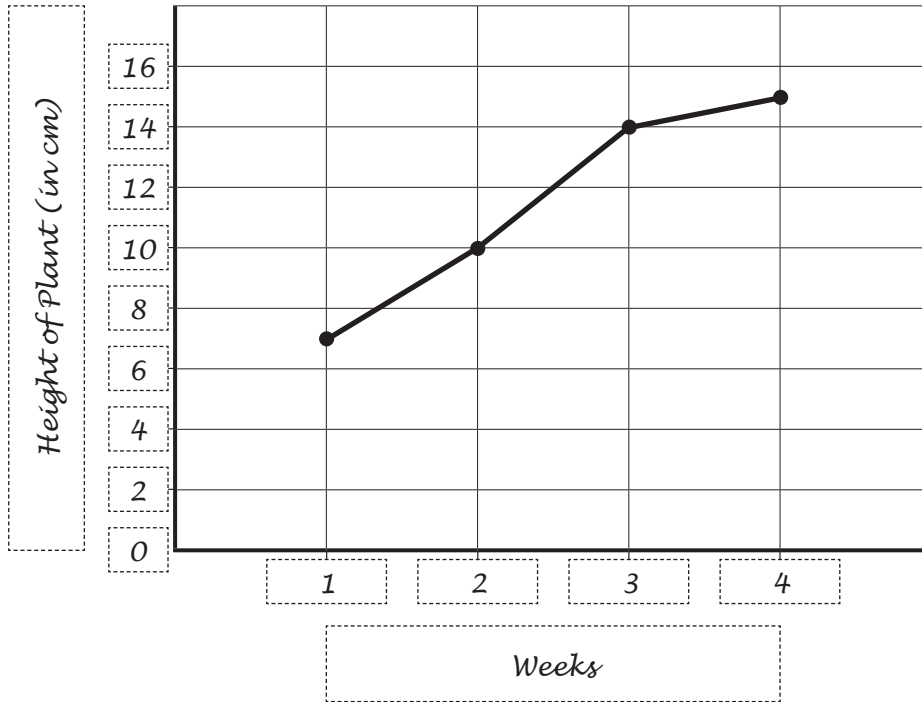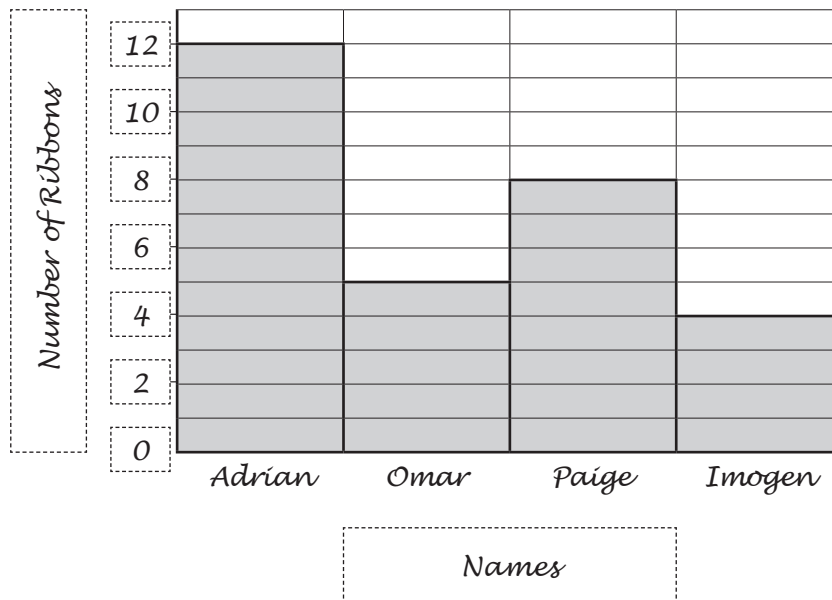**c** Show what made up the library sale's $100 profit.

School Library Sale

2

Growth of Plant

Height of Plant (in cm)

Weeks
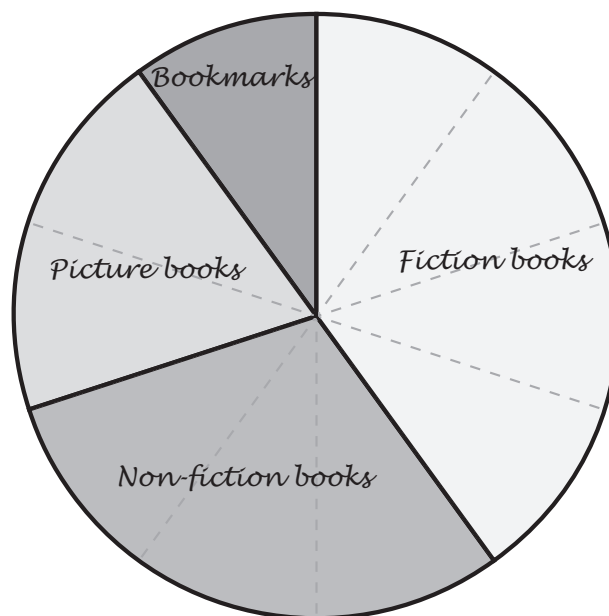
School Swimming Carnival Ribbons

Number of Ribbons

Adrian   Omar   Paige   Imogen

Names

Skills	Not yet	Kind of	Got it
• Selects most appropriate graph for data			

Series G – Data Representation

Region	Topic – Data Representation
NSW	**DS3.1** – Display and interpret data in graphs with scales of many-to-one correspondence
	• determine a suitable scale for data and recording the scale • draw and interpret a picture or column graph using a key or scale • name a divided bar graph or sector (pie) graph and name the category represented by each section • interpret divided bar graphs and sector (pie) graphs • name and label horizontal and vertical axes • draw a line graph to represent any data that demonstrates a continuous change (e.g. temperature) • determine a suitable scale for the data and recording the scale on the vertical axis • use the scale to determine the placement of each point when drawing a line graph • interpret a given line graph using the scales on the axes • determine what type of graph is the best one to display a set of data • determine the mean (average) for a small set of data • identify misleading representations of data
VIC	**Number VELS Level 4**
	• recognise and give consideration to different data types in forming questionnaires and sampling • distinguish between categorical and numerical data • present data in appropriate displays (for example, a pie chart for eye colour data and a histogram for grouped data of student heights) • calculate and interpret measures of centrality (mean, median, and mode) and data spread (range)
QLD	**CD 4.2** – Students plan and carry out data collections using their own data record templates, choose and construct appropriate displays and make comparisons about the data based on the displays and measures of location
	• draw frequency tables to assist with the analysis of the data • plan for the collection of data, and design and use data record templates to gather and organise observations or responses • select data displays that best represent the collected data type and use appropriate measures of location when commenting on data displays
SA	**3.1** – Poses questions, determines a sample, collects and records data including related data, represents sample data in order to investigate the world around them
	• interrogate self and others about related data and discuss how it could be different • choose, in teams, whether to collect data from the population or a representative sample • analyse data in terms of bias and ethics • plan, record, sort, appropriately organise and communicate related data • tabulate data in different ways on paper or by spreadsheet to communicate appropriately • represent data graphically (e.g. line and bar graphs, pie charts, Venn diagrams) on paper or electronically

Series G – Data Representation

Region	Topic – Data Representation
WA	**Level 4** The student displays frequency and measurement data using simple scales on axes and some grouping, and summarises data with simple fractions; highest, lowest and middle scores and means. The student reads and makes sensible statements about the information provided in tables, diagrams, line and bar graphs, fractions and means, and comments on how well the data answer questions. • display data in bar graphs where the axis is labelled with discrete categories including separate numbers • produce a graph using the vertical scale to help them plot data points, given a horizontal axis showing the progression of time • find the mean where there is sufficient data to make summarising sensible • use fractions to summarise data • read the information provided on axes of bar and line graphs • read frequency and other types of information from a range of tables, histograms and bar graphs
NT	**CD 3.2** – Data • describe the concept of 'average' and calculate the mean of a given data set • create or interpret graphs using scales where the units include unlabelled decimal increments • show both discrete and continuous quantities on graphs through the use of grouped or 'interval' data • display continuous data on a histogram through the creation of intervals by grouping • present and interpret data in a range of formats including stem and leaf plots, bar and column graphs, line graphs and pie charts • present and interpret data on graphs using decimal fractions or multiples of 10 as a scale on the axes • choose an appropriate scale for the axes when representing data graphically • interpret and draw conclusions from data presented as bar graphs, histograms, line graphs, stem and leaf plots and pie charts, connecting the data to the circumstances in which it was collected • use software to generate a variety of graphs including bar graphs and pie charts
ACT	**17.LC.17** select and use a range of ways to collect data, including surveys, observations and experiments, choose suitable tables or graphs to present the information (e.g. using ICT) and use these to support statements or predictions made about the data **17.LC.18** read data from tables and graphs, compare information from related data sets, look for and describe expected or unexpected variation within the sets of data and decide whether additional data should be collected to draw reasonable conclusions

Series G – Data Representation

Region	Topic – Data Representation
TAS	**Standards 3–4, Stages 7–12** • use and create bar graphs and pictographs for recording data and begin to explore line graphs • interpret data collected by others • notice simple relationships in tables and graphs • begin to explore predictions that can be made from data • interpret bar graphs, tallies and tables to answer questions and make predictions, and introduce line graphs, with a focus on accurately reading values from the graph • talk about the shape of a graph and what it means • explore variation in data and possible explanations for it • use technology to create graphs and other data representations and select the most appropriate format for the given context • use a range of ways to collect data, including surveys, observations and experiments • introduce the concepts of data being either continuous or discrete • actively collect, organise, summarise and interpret data • introduce column graphs, line graphs and stem and leaf plots and their uses • focus on discrete data but move towards working with continuous data • introduce mean, median and mode in graphing contexts • use mean, median and mode to represent characteristics of a data set • appreciate that larger samples provide more information than smaller ones • discuss different expectations when different samples are collected