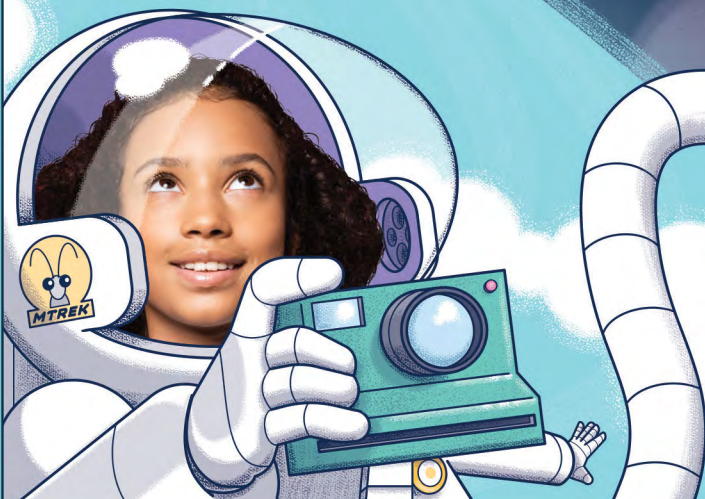
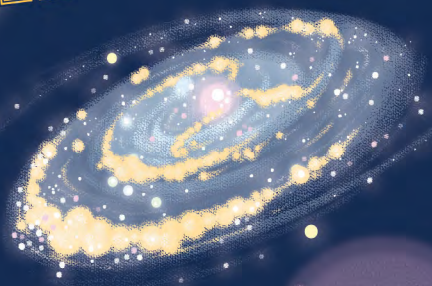
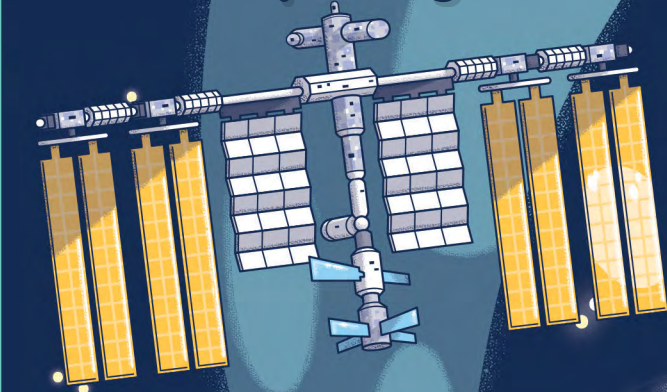


Maths Trek

Exploring maths in the real world



Take a look inside!

As you explore these sample pages, look out for these handy notes which point out the important information and exciting features of Maths Trek.

Sample Student Book Pages
(NSW Syllabus Edition)

firefly
EDUCATION

Your Maths Trek Teacher Guide

- Maths Trek is a whole-school numeracy program that provides everything you and your students need to explore maths in real-world contexts.

To maximise the benefits of the program, use the Student Book with the explicit teaching resources at Maths Trek Online to build, develop and strengthen each student's ability to work mathematically.

An adventure in maths for every student from Kindergarten to Year 6!

Maths Trek Online

Maths Trek Online is home to lesson guides, teaching slides, interactive teaching tools, videos, printable differentiation tasks and mid-term assessments.

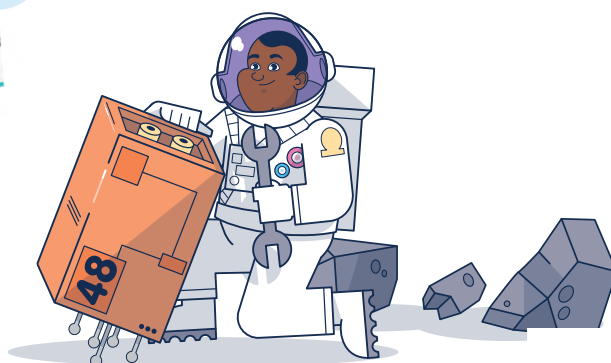
You will also find investigation notes, Student Book answers, and preparation and planning documents at Maths Trek Online.



Maths Trek Student Book

The Student Book is packed with modelled examples, as well as teacher-guided and independent activities for every topic and problem-solving strategy.

Students will also find plenty of practice problems, revision activities, application questions and investigation pages in the Student Book.



Using the Student Book with Online

Topics

Use the online lesson guides and teaching slides to explicitly teach each topic.

Discuss any modelled examples and complete the *Work together* activities with your students. Then students move on to the *Your turn* activities for independent practice.

The Student Book is an integral part of the consolidation process. Once you have explicitly taught each concept, it is essential that students apply what they have learned to the activities.

Revision

Use the revision activities throughout the Student Book to consolidate each student's learning and identify strengths and weaknesses.

Problem-solving

Use the teaching slides and modelled examples in the Student Book to teach each problem-solving strategy.

Students consolidate their skills throughout the year by independently completing practice problems. These build confidence in choosing appropriate strategies to solve a variety of unfamiliar problems.

Download the *Problem-Solving Progress Checklist* to record each student's progress throughout the year.

Investigations

Investigations provide students with opportunities to apply maths concepts learned in previous weeks to unfamiliar, extended mathematical problems.

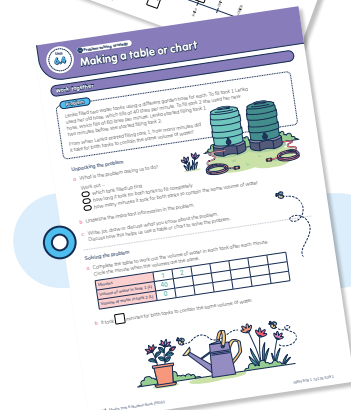
Use the online teaching notes, exemplars, videos and printable resources to introduce and guide students through each step of the investigation.

Use the online critical thinking lessons to ensure students can reflect, reason and communicate their understanding of what they have discovered.

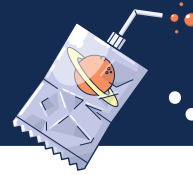
Download the *Cover sheet* and use the formative assessment checklist to record each student's progress.

Assessment



Download the four mid-term assessments at Maths Trek Online to assess each student's understanding of the preceding topics. Each assessment includes graded C to A level questions.





Contents





Term 1

Unit 1	1.1	Maths is everywhere	6
	1.2	Positive and negative numbers	8
	1.3	Comparing and ordering fractions	10
Unit 2	2.1	Fractions as division	12
	2.2	Fractions as division	14
	2.3	Rotational symmetry	16
	2.4	PS strategy: Working backwards	18
Unit 3	3.1	Properties of angles	20
	3.2	Multiplication	22
	3.3	Division with remainders as fractions	24
	3.4	PS strategy: Drawing a picture or diagram	26
Unit 4	4.1	Investigating patterns	28
	4.2	Patterns in a table of values	30
	4.3	Inverse operations to check calculations	32
	4.4	Revision: Units 1–4	34
Unit 5		Investigation: Lilja's locked level	36
Unit 6	6.1	Percentages	38
	6.2	Renaming fractions as percentages	40
	6.3	Multi-step problems – add and subtract	42
	6.4	PS strategy: Making a table or chart	44
	6.5	Assessment*	
Unit 7	7.1	Estimation strategies	46
	7.2	Metric system of measurement	48
	7.3	Perimeter of rectangles	50
	7.4	PS strategy: Finding a pattern or using a rule	52
Unit 8	8.1	Area of rectangles	54
	8.2	Area of composite rectangles	56
	8.3	Area and perimeter	58
	8.4	Revision: Units 6–8	60
Unit 9		Investigation: Happy Hippos	62

Term 2

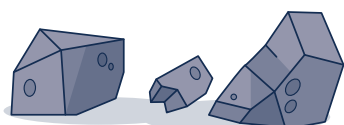
Unit 10	10.1	Reading timetables	64
	10.2	Modelling to solve problems	66
	10.3	Timelines	68
	10.4	PS strategy: Making an organised list	70
Unit 11	11.1	Equivalent fractions	72
	11.2	Side-by-side column graphs	74
	11.3	Line graphs	76
	11.4	PS strategy: Guessing and checking	78
Unit 12	12.1	Stacked line graphs	80
	12.2	Mode and range	82
	12.3	Comparing graphs	84
	12.4	Revision: Units 10–12	86
Unit 13		Investigation: Unique you	88
Unit 14	14.1	Function machines	90
	14.2	Order of operations	92
	14.3	Balancing equations	94
	14.4	Assessment*	
Unit 15	15.1	Equivalent fractions	96
	15.2	Adding and subtracting fractions	98
	15.3	Fractional parts build to the whole	100
	15.4	PS strategy: Solving a simpler problem	102
Unit 16	16.1	Decimal addition to tenths	104
	16.2	Decimal subtraction to tenths	106
	16.3	Decimal addition to hundredths	108
	16.4	PS strategy: Finding smaller parts of a larger problem	110
Unit 17	17.1	Decimal subtraction to hundredths	112
	17.2	Misleading data and graphs	114
	17.3	Causes of bias	116
	17.4	Revision: Units 14–17	118
Unit 18		Investigation: Record breaker	120

Term 3

Unit 19	19.1	Coordinates in one quadrant	122
	19.2	Area of parallelograms	124
	19.3	Area of triangles	126
	19.4	PS strategy: Acting out the problem	128
Unit 20	20.1	Percentages	130
	20.2	Renaming fractions as percentages	132
	20.3	Discount	134
	20.4	Problem-solving practice	136
Unit 21	21.1	Multi-step problems	138
	21.2	Reading and interpreting timetables	140
	21.3	Calculating duration	142
	21.4	Revision: Units 19–21	144
Unit 22		Investigation: Fantasy flight	146
Unit 23	23.1	Skeletal models of pyramids	148
	23.2	Measuring with tonnes and kilograms	150
	23.3	Inverse operations to solve problems	152
	23.4	Assessment*	
Unit 24	24.1	Adding and subtracting fractions	154
	24.2	Properties of shapes	156
	24.3	Tessellations	158
	24.4	Problem-solving practice	160
Unit 25	25.1	Decimal addition to thousandths	162
	25.2	Decimal subtraction to thousandths	164
	25.3	Multiply decimals by 10, 100, 1000	166
	25.4	Problem-solving practice	168
Unit 26	26.1	Division with remainders to tenths	170
	26.2	Division with remainders to hundredths	172
	26.3	Volume	
	26.4	Revision	
Unit 27		Investigation: Shopping	

Want more investigations?




You'll find extra investigations at Maths Trek Online – a great way to round off a year of maths!



Planning made easy

Maths Trek guides you and your students through a sequence of topics, problem-solving, revision and investigations. As the year progresses, your students consolidate their learning and revisit concepts. They also have ample opportunity to apply what they've learned to unfamiliar, extended maths problems.

You'll find four assessments in the Yearly Plan too – one for each term. They assess each student's understanding of the preceding topics and are available to print at Maths Trek Online.

	29.2	Expected probability	190
	29.3	Observed probability	192
	29.4	Problem-solving practice	194
<hr/>			
Unit 30	30.1	Repeated probability experiments	196
	30.2	Fair and unfair outcomes	198
	30.3	Transformations	200
	30.4	Revision: Units 28–30	202
<hr/>			
Unit 31		Investigation: Practice makes perfect	204
<hr/>			
Unit 32	32.1	Positive and negative numbers	206
	32.2	Coordinates in four quadrants	208
	32.3	Transformations with coordinates	210
	32.4	Assessment*	
<hr/>			
Unit 33		Investigation: Curious coordinates	212
<hr/>			
Unit 34		Maths puzzles and games	214

Extra investigations

Why not conclude the year with an extra investigation? Teachers can log in to Maths Trek Online to access the printable pages and resources.



Investigation: Clever containers



Investigation: Educational entrepreneur



Investigation: Octi-origami







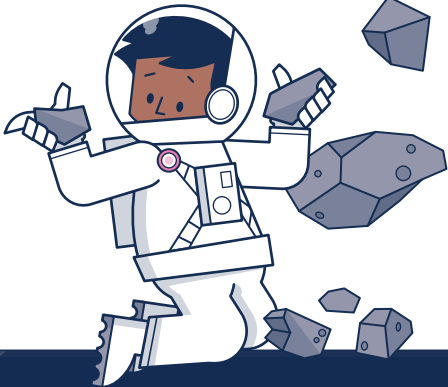
Investigation: Weird or wonderful weather

* Log in to Maths Trek Online to download and print assessments.

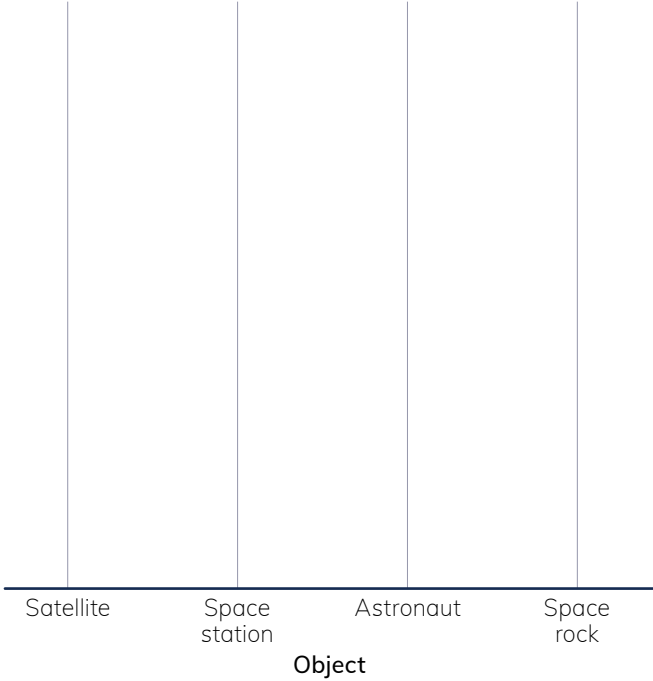
Cover hunt

Look at the front cover of your book. Count the number of objects you can see in Earth’s orbit, then write the totals.

Count of objects in orbit	
Object	Total
 Satellite	
 Space station	
 Astronaut	
 Space rock	

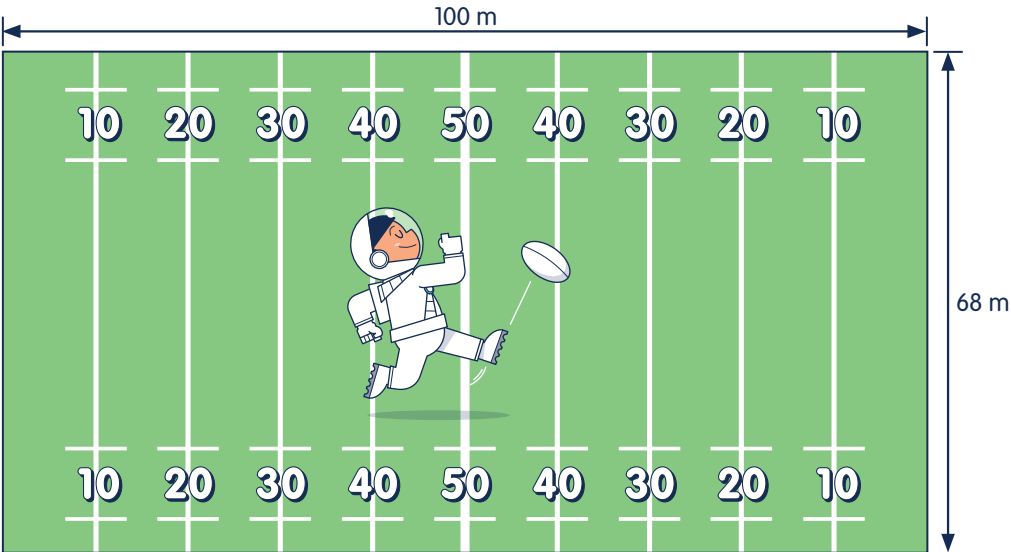
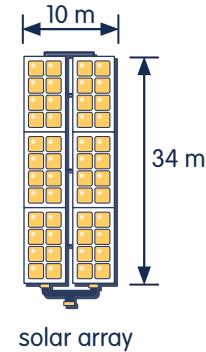
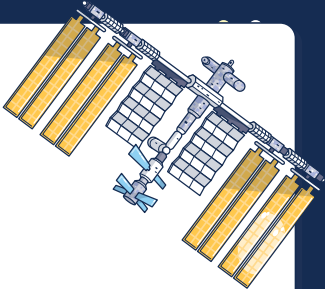


Use the data from the table to complete the dot plot.



A football field of solar panels!

The International Space Station is powered by eight massive solar arrays. If all eight solar arrays were placed on a rugby league field, what fraction of the field would they cover? Write your answer in twentieths.



20

would be covered.

Engaging activities from day one

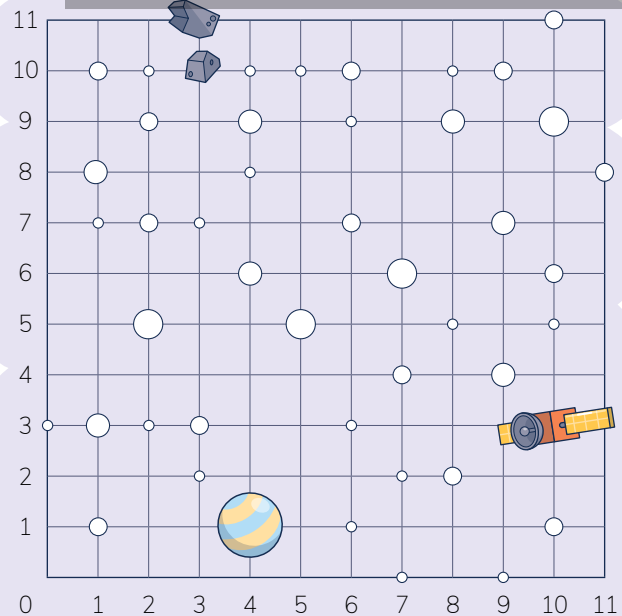
Get your students excited about maths as they apply skills learned in the previous year to these fun activities – all cleverly inspired by the art on the cover.

Mapping stars

These stars form a mystery constellation. Colour each star and connect them as you go.

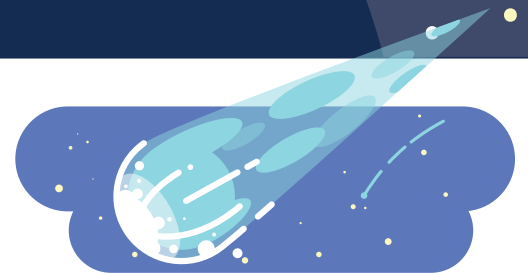
Work
down the
columns

START (9, 7)
(1, 3) (7, 6)
(3, 3) (4, 6)
(5, 5) (2, 5)
(6, 7) (1, 3)
(8, 9) **STOP**
(10, 9)



Meteor shower

During a meteor shower, you saw three shooting stars in two minutes. Predict how many shooting stars you will see in one hour.

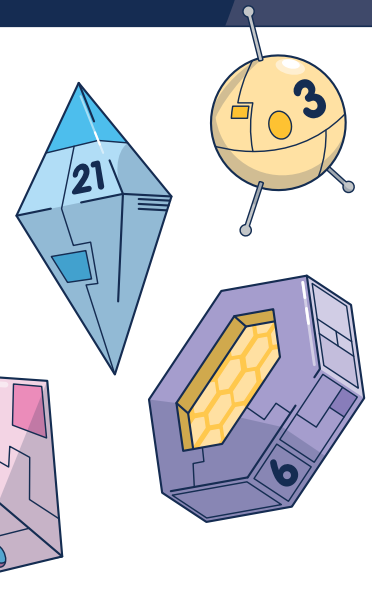


shooting stars

Speedy satellites

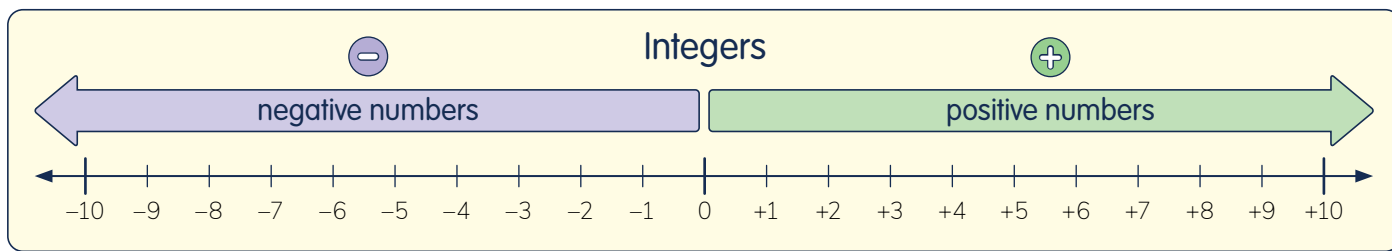
A satellite orbiting Earth can travel 410 km every minute!
How far will it travel in 5 minutes?

Time (minutes)	1	2	3		
Distance travelled (kilometres)	410				

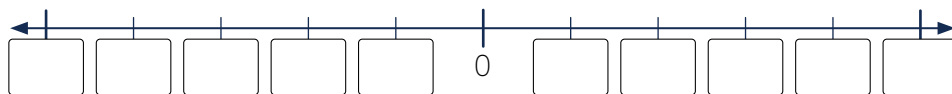


Positive and negative numbers

Work together



- 1 Label the number line from -5 to $+5$.



- 2 Use the number line in question 1 to count the jumps between each pair.

a -1 to -2 b -3 to 0 c $+5$ to -4 d 0 to $+2$ e $+3$ to -4

f -1 to $+1$ g $+4$ to -1 h $+5$ to -5 i 0 to -3 j -2 to $+2$

Reminder

We read $+4$ as **positive four**.

We read -4 as **negative four**.

Positive and negative whole numbers and zero are called **integers**.

Your turn

- 3 Colour the bubble to show the larger number in each pair.

a ☐ -3 b ☐ -5 c ☐ $+1$ d ☐ $+2$ e ☐ -2
☐ $+3$ ☐ $+3$ ☐ -4 ☐ -5 ☐ -1

f ☐ $+1$ g ☐ -5 h ☐ -4 i ☐ -3 j ☐ 0
☐ -1 ☐ $+5$ ☐ -5 ☐ -2 ☐ -1

- 4 Use the *Seabreeze Apartments* lift panel to answer the questions.

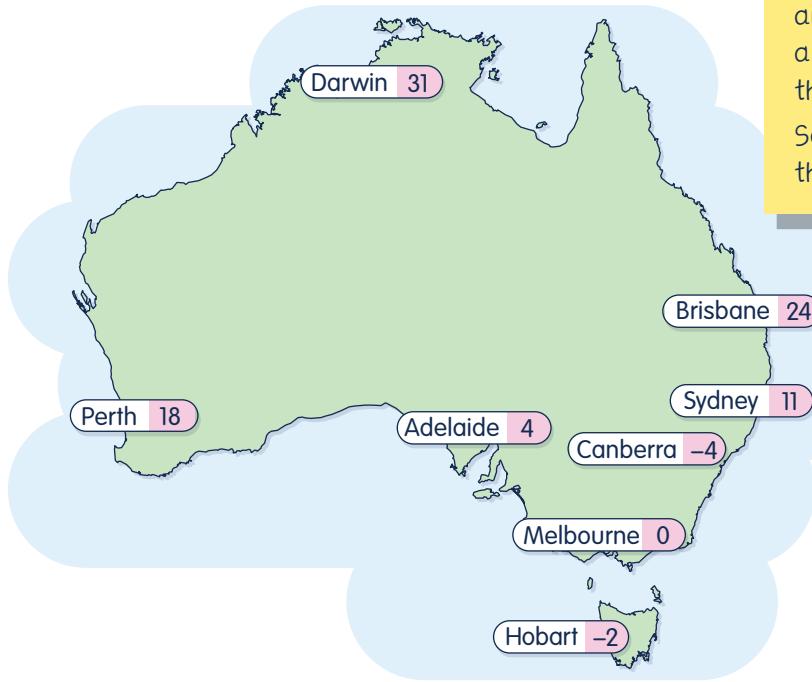
- a Jin parks at -2 . She lives on the 5th floor. How many floors does she travel?
- b Zane lives on the 3rd floor. He parked his car on -3 . How many floors does he travel?
- c How many floors would Zane travel from car park -3 to the 3rd floor and back to car park -3 ?
- d How many floors does the lift travel from car park -3 to the top floor?

Seabreeze Apartments

- 5 Apartments 501–504
 4 Apartments 401–404
 3 Apartments 301–304
 2 Apartments 201–204
 1 Apartments 101–104
 0 Ground floor
 -1 Car park
 -2 Car park
 -3 Car park



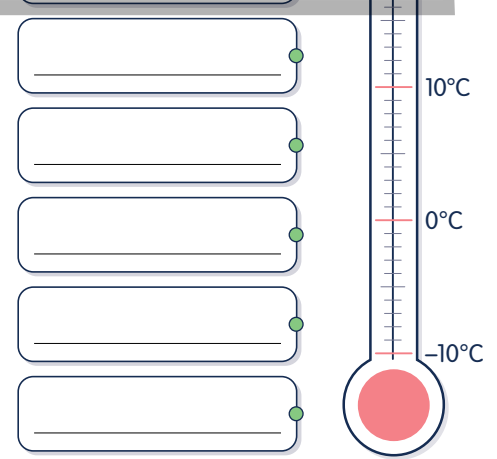
- 5 Write the Australian capital cities in order from hottest to coldest to its temperature on the thermometer. The first one is done.



70+ topics in every year

From number and algebra to statistics and probability, your students complete a wide variety of activities to apply what they've learned in each lesson.

Some concepts are revisited throughout the year to consolidate learning.

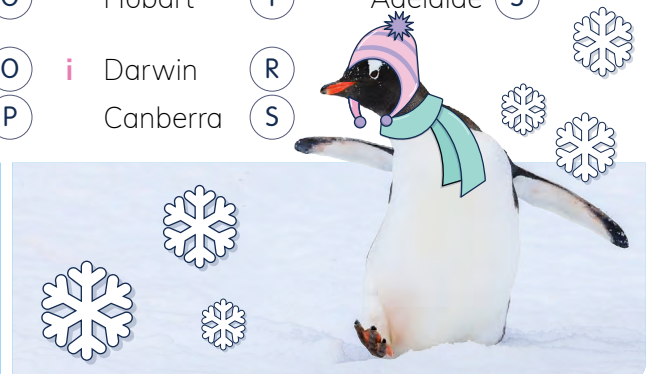


- 6 **Riddle time:** Use the map and thermometer in question 5 to find the city in each pair with the colder temperature. To solve the riddle, write the matching letters in the boxes below. The first one is done for you.

- a Perth (E) b Canberra (O) c Hobart (N) d Melbourne (S) e Sydney (R)
 Sydney (F) Adelaide (P) Canberra (O) Hobart (T) Adelaide (S)
 f Brisbane (T) g Melbourne (E) h Adelaide (O) i Darwin (R)
 Darwin (U) Sydney (F) Hobart (P) Canberra (S)

The more you make, the more you leave behind. What are they?

a	b	c	d	e	f	g	h	i
F								



- 7 Use the map and the thermometer in question 5 to work out the temperatures of the capital cities if the temperature dropped by 5 °C.

- a Perth b Melbourne c Hobart d Canberra e Adelaide

Reminder

To abbreviate 10 degrees Celsius, write 10°C.

Challenge

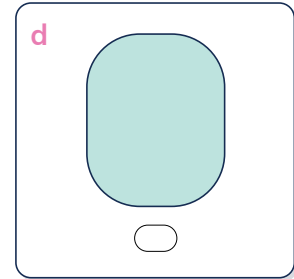
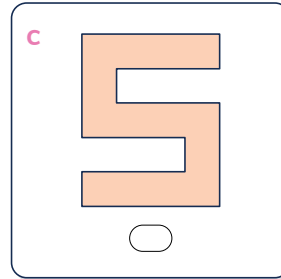
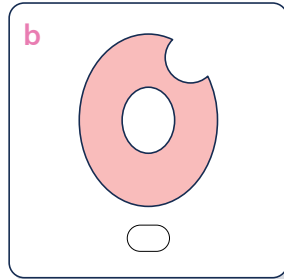
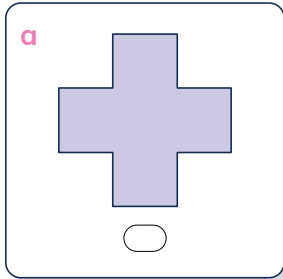
What is the difference in temperatures between each pair of cities in question 6?

- a b c d e
 f g h i

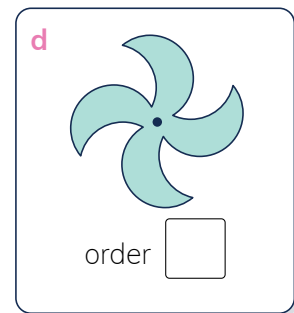
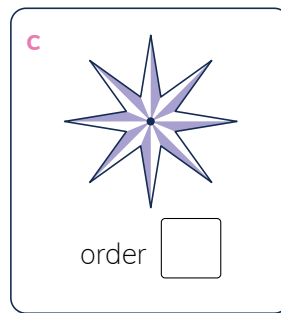
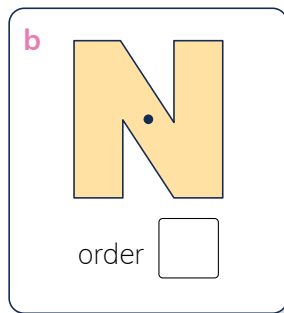
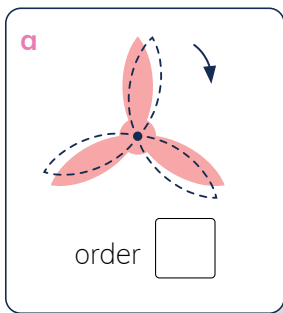
What is the greatest difference in temperatures between any pair of cities?

Work together

- 1 Colour the bubble to show which shapes have rotational symmetry.

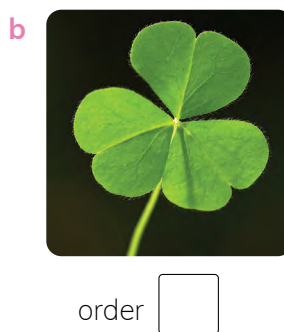


- 2 The number of times that a shape fits inside its own outline during one rotation is called its **order of rotation**. Write the order of rotation of each shape.

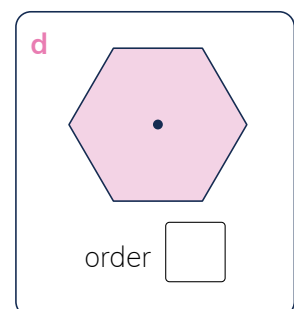
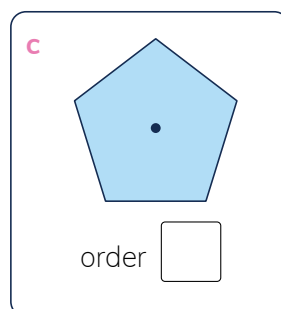
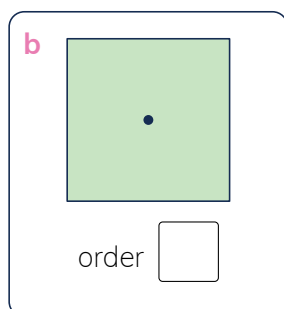
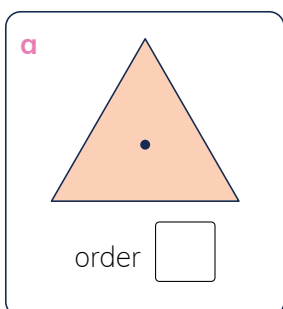


Your turn

- 3 Write the order of rotation of the shapes in the natural and built environment.



- 4 Write the order of rotation of each regular shape.



- 5 Mark all lines of symmetry on the 26 letters of the alphabet. Colour the letters with rotational symmetry.

Hint: Some letters have both line and rotational symmetry.



line
symmetry

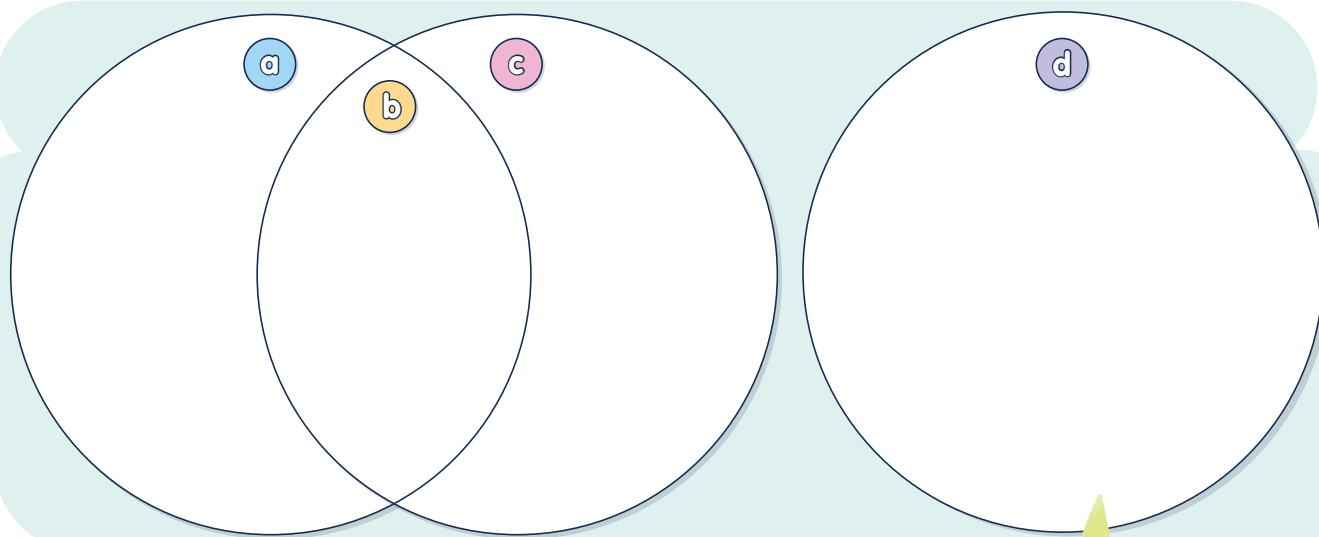


rotational
symmetry



- 6 Sort the letters from question 5 into the four groups.

- a 12 letters with line symmetry only
- b 4 letters with both line and rotational symmetry
- c 3 letters with rotational symmetry only
- d 7 letters with no symmetry



Challenge

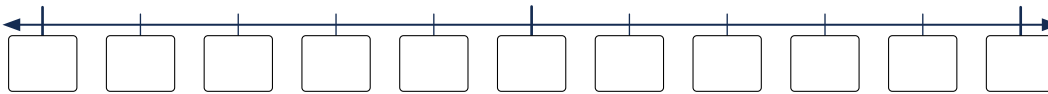
Research how to make a paper pinwheel. You will need a square piece of paper, scissors, a thumbtack and a stick or straw. Follow the instructions to make your own pinwheel.

You will need

- square piece of paper
- scissors
- thumbtack
- stick or straw



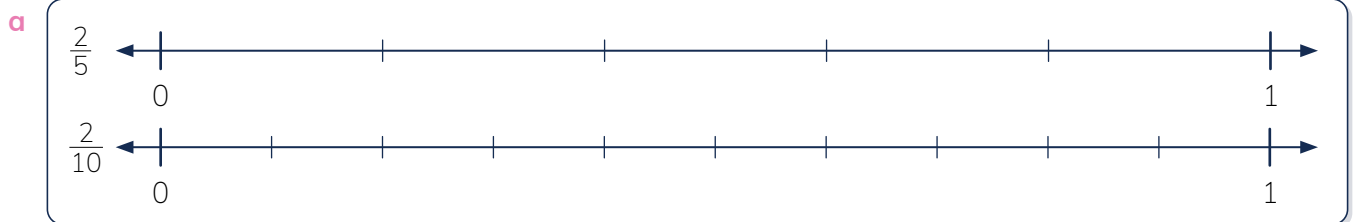
- 1 Label the number line from -5 to $+5$.



- 2 Use the number line in question 1 to count the jumps between each pair.

a -1 to $+2$ b -5 to $+5$ c -3 to $+4$ d $+5$ to -1 e $+1$ to -3

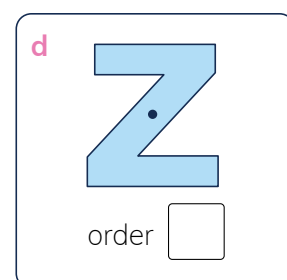
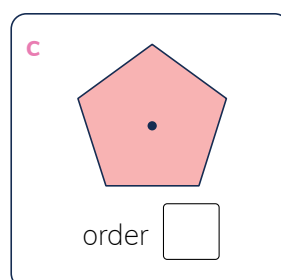
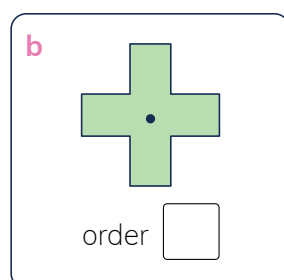
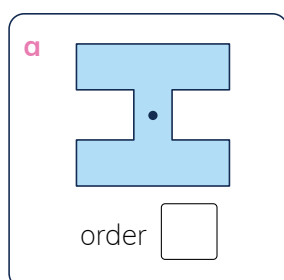
- 3 Mark the fractions on the number lines. Circle the larger fraction in each pair.



- 4 Complete the table.

	We say	We write	Answer
a	one-third of 21	or $\frac{21}{3}$ or	
b		$\frac{1}{6}$ of 30 or or $30 \div 6$	
c	one-fifth of 40	or or $40 \div 5$	
d	two-tenths of 60	or $(\frac{1}{10} \text{ of } 60) \times 2$	
e	four-fifths of 25	or $(\frac{1}{5} \text{ of } 25) \times 4$	
f	five-sixths of 12	$\frac{5}{6}$ of 12 or	

- 5 Write the order of rotation of each shape.



6



Regular revision

Every 4–5 weeks, your students complete revision activities based on the preceding topics. This regular revision is great for consolidating learning and identifying each student's strengths and weaknesses.

7

a

[illegible]

b

--

C

--	--	--

--	--	--

8

$1 \times 9 + 2 =$

$12 \times 9 + 2 =$

$123 \times 9 + 2 =$

$1234 \times 9 + 2 =$

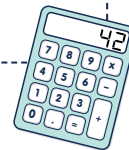
$12\,345 \times 9 + 2 =$

$123\,456 \times 9 + 2 =$



You will need

a calculator



9

[illegible]

Rule based on the previous term \longrightarrow

10

a $(\Delta + 8) \div 2 = 10 \Rightarrow (10 \times 2) - 8 = \Delta = 12$

b $(\Delta - 30) \times 6 = 18 \Rightarrow$ =

c $(\Delta + 1) \times 10 = 90 \Rightarrow$ =

Lilja's locked level

Lilja needs your help to solve a puzzle to enter the next level of her favourite game. To unlock the level, Lilja must create four different number patterns from 20 numbers given to her.

She must use every number, so there will be five numbers in each of the four patterns.

Help Lilja by finding the four patterns, then investigate a way to create your own number pattern puzzle for your classmates.



Topics

Use what you learned in these topics to complete the investigation.

- Unit 1.2 Positive and negative numbers..... p 8
- Unit 3.2 Multiplication..... p 22
- Unit 3.3 Division with remainders as fractions..... p 24
- Unit 4.1 Investigating patterns p 28
- Unit 4.2 Patterns in a table of values p 30
- Unit 4.3 Inverse operations to check calculations p 32

Items to submit

At the end of this investigation you will need to submit:

- Cover sheet
- Patterns for Lilja's locked level
- New puzzle and clues



Investigation steps

1 Study the numbers

Look carefully at all 20 numbers. Can you see obvious relationships between pairs or groups of numbers? Are any numbers multiples of other numbers? Can you see any addition, subtraction, multiplication or division patterns?

Puzzle numbers

1 2 2 3 4 6
8 9 10 11 14
16 18 22 27 32
34 47 81 243

2 Solve the puzzle

You must use all 20 numbers to find four patterns with five numbers in each. The patterns might involve addition, subtraction, multiplication or division. For example, the number pattern 1 4 7 10 13 is created by adding 3 to each previous number. However, you might find a pattern that adds consecutive numbers such as +2, then +3, then +4 and so on.

Use a growth mindset to find the four patterns. If you find three patterns and have leftover numbers that don't make a pattern, don't give up. Try swapping numbers.

You might prefer to work in pairs or in a group to crack the puzzle. Stick at it and you will find the patterns to unlock the level for Lilja.

Rules for solving the puzzle

- Create four number patterns with five numbers in each.
- Use all 20 numbers in your patterns.
- Each number can only be used once.
- Patterns might include addition, subtraction, multiplication or division.

3 Create a new puzzle

Investigate a way to create a tricky puzzle of your own for your classmates to solve.

You might like to create a similar puzzle or use other types of number patterns. You could include clues related to prime and composite numbers, factors or negative integers.

Bring maths to life

Designed to be conducted over a week, every investigation is packed with opportunities for your students to apply their maths skills to unfamiliar, extended problems.

4 Swap puzzles

Test your puzzle on your classmates. Did they solve it very quickly or was your puzzle far too difficult?

Get some feedback and amend your numbers if you need to.

5 Critical thinking

Describe the method you used to solve Lilja's puzzle.

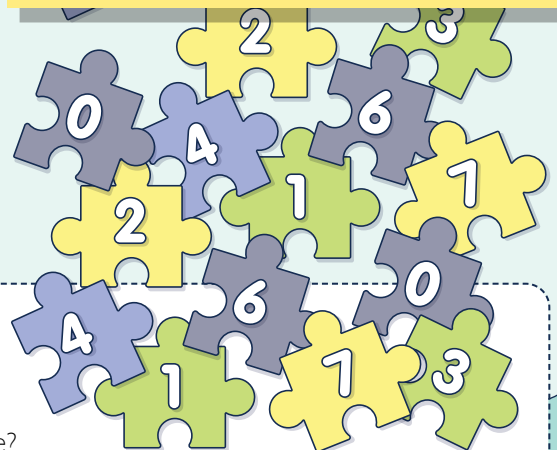
Prove that one of the patterns in your puzzle uses addition, subtraction, multiplication or division.

Develop critical thinking skills

Critical thinking is an integral part of every investigation. At Maths Trek Online, you'll find critical thinking lessons, cognitive verb definitions, examples and hints – all designed to help your students craft well-reasoned responses when sharing and discussing results.

Inquiry

Write the number 1. Double the number and write it underneath the number 1. Triple the last recorded number and write it underneath. Then quadruple the last recorded number and write it underneath. If you continue in this way, what will the 8th number in the pattern be?



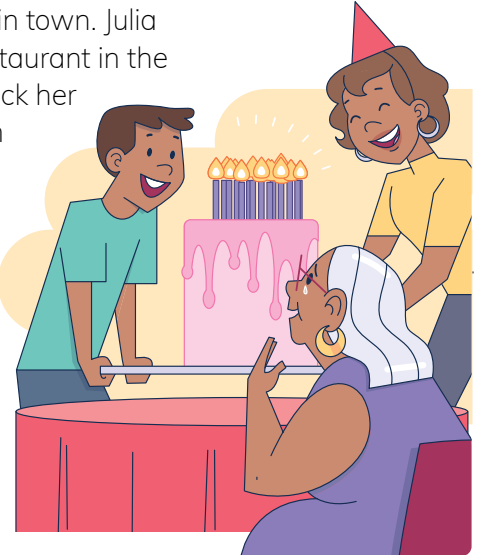
Drawing a picture or diagram

Work together

Problem

Julia is taking her Nan to her surprise birthday party at a restaurant in town. Julia lives 14.5 km from the restaurant, and Nan lives 9.5 km from the restaurant in the opposite direction. Julia will drive from her home to Nan's house to pick her up and take her to the restaurant. After the party, Julia will drive Nan home before driving home herself.

How many kilometres will Julia drive?



Unpacking the problem

- What is the problem asking us to do?
 - ☐ calculate the distance from Julia's house to Nan's house
 - ☐ calculate the total distance Julia will drive
 - ☐ work out how many candles Nan will have on her cake
- Underline the important information in the problem.
- Write, jot, draw or discuss what you know about the problem.
Discuss how this helps us draw a picture or diagram to solve the problem.

Solving the problem

- Complete the diagram by drawing Julia's house and Nan's house, and labelling the known distances.



restaurant

- Draw arrows on the diagram to indicate Julia's journey.
- Calculate the total distance Julia will drive.

=

- Complete the statement.

Julia will drive a total of .

Problem A

Riley lives 8.2 km from the surf club. The pier is 7.5 km from the surf club in the opposite direction. To train for an upcoming cycling event, Riley rides from home to the pier and then to the surf club. After this, Riley rides back to the pier and then rides home.

How many kilometres does Riley cycle in his training loop?

Nine problem-solving strategies

Use the online teaching resources and scaffolded *Work together* problem to explicitly teach each strategy. Then give your students independent practice at applying the strategy as they complete the *Your turn* problems.

Riley cycles in his training loop.

Problem B

Every day from Monday to Friday, Pop walks from his house to the post office to check his post office box. Pop always stops at the lake, which is 400 m west of his house, along the way. The post office is 300 m south of the lake.

On Friday Pop took a parcel to the post office. When he realised he had left the parcel at the lake, he walked back to the lake to retrieve the parcel before returning to the post office to send it.

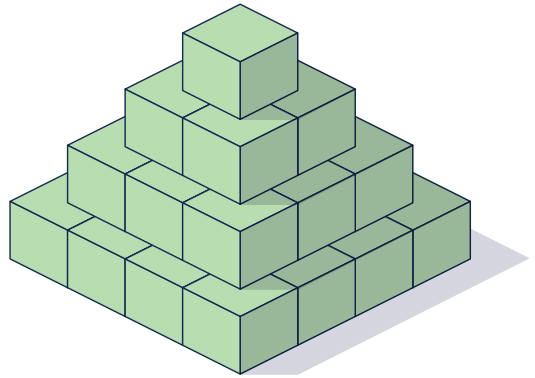
If Pop always walks directly from the post office back to his house, which is 500 m away in a straight line, how far did he walk this week?



Pop walked (or km).

Problem A

Marnie built a pyramid with 4 layers using cubes. Then she built a second pyramid with 6 layers using the same pattern. How many cubes are in Marnie's second pyramid?



There are cubes in Marnie's second pyramid.

Think critically

a How did you solve the problem? Tick the strategy or strategies you used.

- | | |
|--|--|
| <input type="checkbox"/> Guessing and checking | <input type="checkbox"/> Making an organised list |
| <input type="checkbox"/> Acting out the problem | <input type="checkbox"/> Making a table or chart |
| <input type="checkbox"/> Solving a simpler problem | <input type="checkbox"/> Finding smaller parts of a larger problem |
| <input type="checkbox"/> Drawing a picture or diagram | <input type="checkbox"/> Working backwards |
| <input type="checkbox"/> Finding a pattern or using a rule | |

b What if Marnie's second pyramid had 8 layers instead of 6? How would the answer change?

Problem B

Anton has a set of domino tiles. The number of dots on each end of a tile ranges from 0 to 6. Every tile in Anton's set has a different combination of dots.

If all possible dot combinations are included, how many domino tiles are in Anton's set?



Plenty of problem-solving practice

As the year progresses, your students practise choosing appropriate problem-solving strategies to solve a variety of unfamiliar problems.

Share and discuss

Encourage your students to share their solutions and explain how they used their chosen strategies.

Then discuss the extra related problem with your students to further develop their critical thinking skills.

There are domino tiles in Anton's set.

Think critically

a How did you solve the problem? Tick the strategy or strategies you used.

- | | |
|--|--|
| <input type="checkbox"/> Guessing and checking | <input type="checkbox"/> Making an organised list |
| <input type="checkbox"/> Acting out the problem | <input type="checkbox"/> Making a table or chart |
| <input type="checkbox"/> Solving a simpler problem | <input type="checkbox"/> Finding smaller parts of a larger problem |
| <input type="checkbox"/> Drawing a picture or diagram | <input type="checkbox"/> Working backwards |
| <input type="checkbox"/> Finding a pattern or using a rule | |

b What if the number of dots on each end of a domino tile ranged from 0 to 9? Is there an efficient way to work out how many tiles Anton's set would contain?

The Maths Trek Program

Maths Trek is a whole-school numeracy program for Kindergarten to Year 6 that develops mathematical understanding, fluency, reasoning and problem-solving skills.

The Student Book together with the explicit teaching resources at Maths Trek Online build, develop and strengthen each student's ability to work mathematically.

Use the comprehensive online teaching resources to explicitly teach each concept before students apply their learning in the Student Book.



In this book students will find ...

- shared *Work together* activities
- modelled examples
- independent activities to develop and master maths skills
- concepts revisited throughout the year
- scaffolded problems to learn key problem-solving strategies
- practice problems to build confidence in applying the strategies
- real-world investigations where students apply maths skills to unfamiliar, extended mathematical problems to strengthen connections between concepts
- regular revision to consolidate learning

At Maths Trek Online teachers will find ...

- explicit teaching slides and lesson guides for every topic and problem-solving lesson
 - engaging visuals and hands-on activities in lessons
 - differentiation tasks
 - interactive teaching tools
 - investigation videos
 - digital and printable resources to guide students through every investigation
 - critical thinking lessons
 - formative and summative assessments
- Maths Trek Online includes the teaching resources for all year levels and complimentary access to the student site.

Head to www.fireflyeducation.com.au/mathstrek to:

- view Maths Trek sample pages from other year levels
- download NSW Syllabus Match and Yearly Plan documents
- sign up for a free trial of the online teaching resources
- book a free professional learning workshop for your school.

