AUSTRALIAN
Signpost
MATHS

NSW

STAGE 2

4

Alan McSeveny   Rachel McSeveny   Diane McSeveny-Foster

AUSTRALIAN Signpost MATHS NSW

STAGE 2

4

Alan McSeveny   Rachel McSeveny   Diane McSeveny-Foster

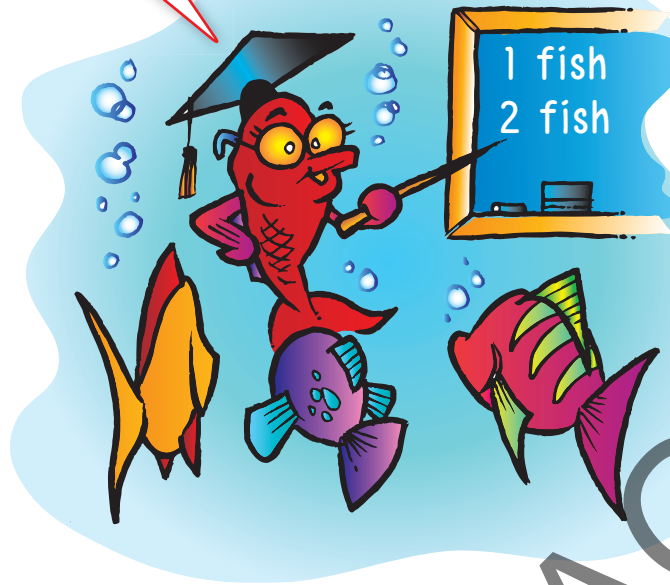Maths is fun with Australian Signpost Maths NSW.

1 fish
2 fish

What is Australian Signpost Maths NSW?

Australian Signpost Maths NSW is a mathematics program providing direction and support for teaching and learning. The series covers the content and skills presented in the NSW Mathematics Syllabus K-6, 2024.

A Student Book and an online Teacher Resource are provided for Kindergarten (Early Stage 1).

For Years 1 to 6, a Student Book, an online Teacher Resource and a Mentals Book are provided for each year level. The online Teacher Resources provide a wealth of support for teachers.

The content has been carefully sequenced within each year level and across the K–6 series to take into account students' expected mathematical development. However, from the rich and varied material provided, teachers can develop individual learning programs to meet the needs of each student.

The Student Books are designed to support explicit teaching methods. Many group activities are provided in Activity, Investigation and Fun spots within the Student Books and the online Teacher Resource.

To maximise the benefits of the program, the Student Book, the online Teacher Resource and the Mentals Book should be used together.

Student Books

Mentals Books

Teacher Resource

This is Australian Signpost Maths NSW.
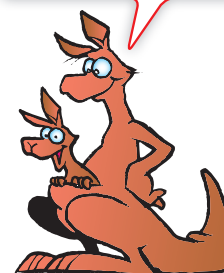
Structure of Australian Signpost Maths NSW

In the Year 3 to 6 books, the worksheet pages cover all three elements: Number sense and algebra, Measurement and geometry, and Statistics and probability.

These are presented in five chapters:
• Number and algebra
• Operations and algebra
• Measurement.
• Space
• Statistics and probability.

This gives teachers flexibility in programming that is more appropriate to Years 3 to 6.

The contents cross-reference allows teachers to quickly find the pages where each concept has been covered.

Within the program, explicit teaching, critical and creative thinking, language development and identification and treatment of weaknesses are given high priority.

Identification and addressing areas of need

Five progress tests are designed to identify each student's areas of need, and the follow-up program after each of the tests is designed to address these needs. A reference to the relevant worksheet page is given for each test question. A remediation record page is used to track the student's progress.

Parallel progress retests are provided for further testing after remediation has taken place.

These testing resources can be found in the online Teacher Resource.

Special features of Australian Signpost Maths NSW

● **The traffic light icons**

These are found on the top right of each worksheet page in the Student Books. They allow students to assess their own progress and give feedback to the teacher.

● ☐ **Green:** I found this work easy.
● ☐ **Orange:** I found some work on the page difficult.
● ☐ **Red:** I don't understand the work on this page.

● **Dictionary**

Terms used in the Student Book and terms that should be understood at this level are recorded here to provide a reference for students and teachers. This is found on pages xiv–xxiv of this book.

● **ID cards (Years 1 to 6)**

These cards review the language of Mathematics by asking students to identify common terms, shapes and symbols. They are designed to be reused and are found in the online Teacher Resource and in the front of the Mentals Books.
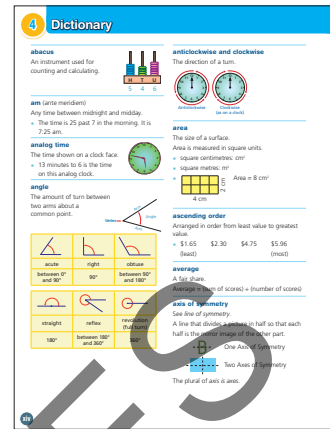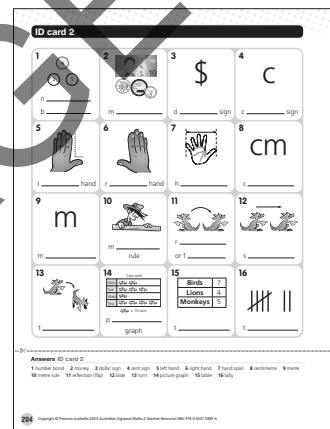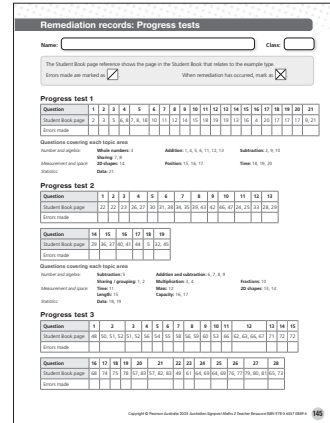
● **Progress tests**

These allow the teacher to identify each student's strengths and needs. Cross-references for each question direct teachers and students to the pages where that work is introduced. Tables are provided to record the follow-up that takes place and parallel tests are provided for retesting. These tests can be found in the online Teacher Resource.

● **Year 3 Consolidation booklet**

This booklet is found in the online Teacher Resource. It is designed to reinforce work completed in class and provides practice of important skills and addition and subtraction facts. The booklet can be used when there is limited supervision or when a student finishes classwork early.

● **Answers**

These are supplied in the Student Book and online Teacher Resource.

● **Blackline masters (BLM)**

References are made to the blackline masters in the teaching suggestions provided for each student work page in the online Teacher Resource.

● **Differentiation**

Each student work page has a Teacher Resource page to support it. Cross-references direct the teacher to pages where the concept is introduced and developed. These references may be from the Student Book for the previous year, the current year or the next year.

The Teacher Resource support pages provide additional learning activities for students who need remediation or extension activities. The Blackline Masters provide activities to support students of various learning abilities.

● **Cartoons**

Cartoons are used to motivate and instruct.

● **Extra support pages**

Addition and subtraction facts, addition strategies, algorithms, measurement and space are reinforced.
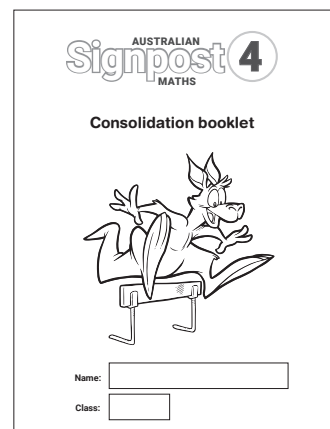
Australian Signpost Maths NSW icons

Signpost icons are used throughout the book as cues to the essential nature of exercises and activities, and as a guide to ways of engaging with them. These icons often indicate alternative or more concrete approaches to dealing with concepts.

CONCEPT
This icon highlights **important rules and concepts** occurring throughout the book. It often appears with worked examples.

ACTIVITY
Activities provide **applications and enrichment**. These activities usually involve the use of concrete materials and partner or group work.

FUN SPOT
These enjoyable activities are used to **motivate and involve** students in mathematical pursuits. They usually involve games and puzzles.

INVESTIGATION
Investigations allow students to **explore and discover** maths concepts.

ICT
These activities involve the use of computers or other technology.

I'm on the top of each page.

Structure of the New South Wales Mathematics K-6

The NSW Mathematics Syllabus content is presented in three strands:

1 Number and algebra   2 Measurement and space   3 Statistics and probability
Working mathematically pervades each of these strands.

Textbook structure
Within the Year 3 **Contents** (pages vi to xi), we show related pages using these categies:

Chapter 1: Number and algebra
• Counting number   • Place value   • Rounding   • Fractions   • Patterns

Chapter 2: Operations and algebra
• Addition   • Subtraction   • Multiplication   • Division   • Mental strategies   • Money   • Problem solving

Chapter 3: Measurement
• Length   • Area   • Volume   • Capacity   • Mass   • Telling the time   • Duration   • Problem solving

Chapter 4: Space
• 2D space   • Angles, lines   • Symmetry, turning   • 3D space   • Position, directions

Chapter 5: Statistics and Probability
• Collecting data   • Surveys   • Creating data displays   • Analysing data displays
• Chance language   • Chance experiments

The **Cross-reference** (pages xii and xiii) give a clear indication of where syllabus content is addressed.
The **Suggested program** is provided in the Contents pages and aligns with the Mentals book, and Progress tests and Re-tests.
Each Mentals unit reviews the previous 2 weeks' content from the Student book suggested program.

Suggested program

The Teacher Resource has a program that aligns with the Mentals book, e.g. Mentals Book, Unit 9 covers work taught in Weeks 7 and 8 of this book

Page	Unit	Title	Counting, number	Place value	Rounding	Fractions	Decimals	Patterns, algebra	Suggested program
		Number and algebra							Term 1
1	1:01	Numbers to 10 000	●	●					
2	1:02	Numbers to 100 000	●	●					Week 3
3	1:03	Rounding off		●	●				
4	1:04	Partitioning large numbers	●						
5	1:05	Fractions				●			Week 4
6	1:06	Comparing fractions				●			
7	1:07	Fractions beyond 1				●			Week 6
8	1:08	Fractions beyond 1				●			
9	1:09	Numbers to 1 000 000	●	●					Week 8
10	1:10	Numbers to 1 000 000	●	●					
11	1:11	Rounding off			●				
12	1:12	Equivalent fractions				●			Week 9
13	1:13	Equivalent fractions				●			
14	1:14	Comparing fractions				●		●	Term 2
15	1:15	Tenths and fifths		●		●	●		Week 11
16	1:16	Place value using tenths				●	●		
17	1:17	Decimals				●	●		
18	1:18	Decimals		●		●	●		Week 12
19	1:19	Decimals and place value		●		●	●		
20	1:20	Comparing decimals					●		
21	1:21	Place value to hundredths		●			●		Week 13
22	1:22	Place value to hundredths		●			●		Week 14
23	1:23	Reading and writing decimals		●			●		

SAMPLE PAGES

The teacher will decide when testing occurs. The Progress Tests are found in the online Teacher Resource.

The first two units of the Mentals Book review the previous year and could be completed in Weeks 1 and 2.

Page	Unit	Title	Content	Addition	Subtraction	Multiplication	Division	Mental strategies	Number patterns	Money	Problem solving	Suggested program	
		Operations and algebra										The Teacher Resource has a program that aligns with the Mentals book, e.g. Mentals Book, Unit 9 covers work taught in Weeks 7 and 8 of this book.	
24	2:01	Number patterns							●			Week 2	Term 1
25	2:02	Multiplication tables revision				●						Week 3	
26	2:03	x 4 tables				●						Week 5	
27	2:04	Times tables review				●						Week 5	
28	2:05	Addition, no trading		●						●		Week 7	
29	2:06	Addition and subtraction, no trading		●						●	●	Week 7	
30	2:07	Addition to 99 with trading		●						●	●	Week 8	
31	2:08	Addition to 99 with trading		●						●	●	Week 8	
32	2:09	Jump strategy, +		●				●				Week 11	Term 2
33	2:10	Jump strategy, –			●			●				Week 11	
34	2:11	x 8 tables				●						Week 12	
35	2:12	x 8 tables				●						Week 12	
36	2:13	Addition, trading 2 tens		●								Week 15	
37	2:14	Addition involving hundreds		●							●	Week 15	
38	2:15	Addition problems to 99		●							●	Week 15	
39	2:16	x 3, x 6 tables				●		●				Week 16	
40	2:17	x 3 and x 6 tables				●						Week 16	
41	2:18	Subtraction with trading			●						●	Week 17	
42	2:19	Subtracting from tens			●					●	●	Week 17	
43	2:20	Subtracting with trading			●					●		Week 17	
44	2:21	x 9 tables				●	●					Week 18	
45	2:22	x 9 tables				●						Week 18	
46	2:23	Addition to 999		●								Week 19	
47	2:24	Addition to 999		●								Week 19	
48	2:25	Writing algorithms		●							●	Week 19	
49	2:26	What's the rule?							●			Week 21	Term 3
50	2:27	Number patterns							●			Week 21	
51	2:28	x 7 tables				●						Week 22	
52	2:29	x 7 tables				●						Week 22	
53	2:30	Multiplication tables review				●						Week 22	
54	2:31	Subtraction without trading to 999			●							Week 23	
55	2:32	Subtraction with trading to 999			●							Week 23	
56	2:33	Subtraction with trading to 999			●							Week 24	
57	2:34	Subtraction with 2 trades to 999			●							Week 24	
58	2:35	Mental strategies, +		●				●				Week 25	
59	2:36	Mental strategies, + and –		●	●			●				Week 25	
60	2:37	Subtraction from hundreds			●						●	Week 26	
61	2:38	Subtraction from hundreds strategy			●					●	●	Week 26	
62	2:39	Division as repeated subtraction					●				●	Week 27	
63	2:40	Understanding division					●					Week 27	
64	2:41	Division facts					●				●	Week 28	
65	2:42	Division facts					●					Week 28	
66	2:43	Odd and even numbers		●	●							Week 29	
67	2:44	Odd and even		●	●	●	●					Week 29	
68	2:45	Division using a grid					●					Week 30	
69	2:46	x and ÷ (by 2, 4, 8)					●	●				Week 30	

* The teacher will decide when testing occurs. The Progress Tests and Re-tests are found in the online Teacher Resource.

SAMPLE PAGES

SAMPLE PAGES

Measurement

Suggested program

The Teacher Resource has a program that aligns with the Mentals book, e.g. Mentals Book, Unit 9 covers work taught in Weeks 7 and 8 of this book.

• The teacher will decide when testing occurs. The Progress Tests and Re-tests are found in the online Teacher Resource.

Suggested program

See the teacher Resource for more information. This program aligns with the Mentals book. Mentals Book, Unit 9 covers work taught in Weeks 7 and 8 of this book.

The teacher will decide when testing occurs. The Progress Tests are found in the online Teacher Resource.

Page	Unit	Title	Content	Collecting data	Surveys	Creating data displays	Analysing data displays	Chance language	Chance experiments	Suggested program	
		Statistics and probability								The Teacher Resource has a program that aligns with the Mentals book, e.g. Mentals Book, Unit 9 covers work taught in Weeks 7 and 8 of this book.	
148	5:01	Drawing Tables		●		●				Week 8	Term 1
149	5:02	Chance						●	●	Week 9	
150	5:03	Chance						●	●		
151	5:04	Using graphs				●	●			Week 15	Term 2
152	5:05	Reading graphs					●				
153	5:06	Ordering events						●	●	Week 20	
154	5:07	Chance used in games						●	●		
155	5:08	Tally marks		●	●	●	●			Week 26	Term 3
156	5:09	Collecting information		●		●	●			Week 27	
157	5:10	Using spinners						●	●	Week 33	Term 4
158	5:11	Unequal outcomes						●			
159	5:12	Surveys		●	●	●				Week 35	
160	5:13	Graphing data		●		●	●			Week 36	
161	5:14	Chance experiments						●	●	Week 37	
162	5:15	Carry out your own survey						●	●		
163	5:16	Chance experiments						●			

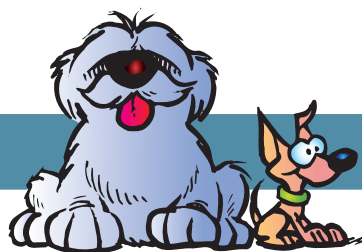| **Extra Support pages**					
164	1	Addition and subtraction facts	2 Building to the next 10	3 Tangrams	
167	4	Flip, slide turn	5 Addition of money	6 Addition to 9999	
170	7	Addition to 9999	8 Addition to 999 999	9 Subtraction of money	
173	10	Subtraction with trading to 9999	11 Four-digit subtraction from 1000s	12 Subtraction to 999 999	
176	13	The calendar	14 The calendar	15 Timelines	
179	16	Comparing decimal measurements	17 Temperature	18 Recording temperature	
182	19	Fraction patterns			

• The teacher will decide when testing occurs. The Progress Tests and Re-tests are found in the online Teacher Resource.

Suggested Program	Term 1	Term 2	Term 3	Term 4
Number and algebra	1:01 - 1:13	1:14 - 1:23	-	-
Operations and algebra	2:01 - 2:08	2:09 - 2:25	2:26 - 2:46	2:47 - 2:59
Measurement	3:01 - 3:11	3:12 - 3:15	3:16 - 3:31	3:32 - 3:38
Space	4:01 - 4:03	4:04 - 4:13	4:14 - 4:19	4:20 - 4:27
Statistics and probability	5:01 - 5:03	5:04 - 5:07	5:08 - 5:09	5:10 - 5:16
Total number of pages:	39	46	45	34

• See the Teacher Resource for a more detailed suggested program.

• The suggested program aligns with the Mentals book, Progress Tests and Re-tests.

Contents cross-reference

Measurement and space

Statistics and probability

abacus

An instrument used for counting and calculating.

H T U
5 4 6

am (ante meridiem)

Any time between midnight and midday.

- The time is 25 past 7 in the morning. It is 7:25 am.

analog time

The time shown on a clock face.

- 13 minutes to 6 is the time on this analog clock.

angle

The amount of turn between two arms about a common point.

Arm
Vertex→
Angle
Arm

acute	right	obtuse
between 0° and 90°	90°	between 90° and 180°

straight	reflex	revolution (full turn)
180°	between 180° and 360°	360°

anticlockwise and clockwise

The direction of a turn.

Anticlockwise   Clockwise (as on a clock)

area

The size of a surface.

Area is measured in square units.

- square centimetres: cm²
- square metres: m²
-

2 cm
4 cm
Area = 8 cm²

ascending order

Arranged in order from least value to greatest value.

- $1.65 $2.30 $4.75 $5.96
  (least)   (most)

average

A fair share.

Average = (sum of scores) ÷ (number of scores)

axis of symmetry

See *line of symmetry*.

A line that divides a picture in half so that each half is the mirror image of the other part.

B   One Axis of Symmetry

Two Axes of Symmetry

The plural of *axis is axes*.

billion

A thousand millions.

- 1 000 000 000

capacity

The amount that a container can hold.

- The capacity of this juice bottle is 250 ml.

centimetre (cm)

A unit of length equal to one hundredth of a metre.

- 100 cm = 1 m, 1 cm = 10 mm

chance

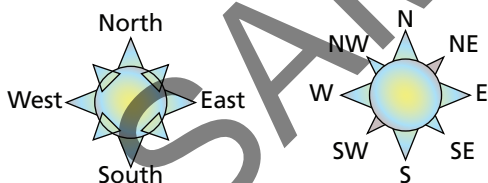The chance (or probability) of something happening is its likelihood of happening.

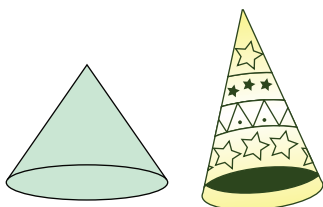- If you toss a coin, there is an even chance of tossing a head.

See also *probability*.

compass directions

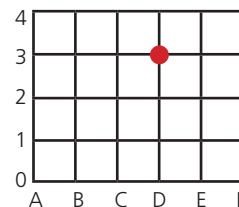The needle of a compass points north (N) .

cone

A three-dimensional object with a circular base that tapers to a point.
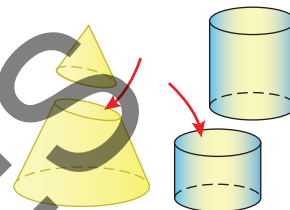
coordinates

Pairs of letters or numbers used to show position on a grid.
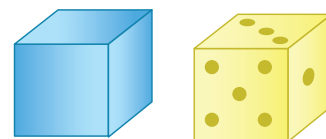
- This position is D3 or (D, 3).

cross-section

A face that is exposed when a 3D object is cut through.

cube

A three-dimensional object that has six equal square faces, eight vertices and twelve equal edges.

cubic centimetre (cm³)

A unit of volume equal to the volume of a cube of side length 1 cm.

cubic metre (m³)

A unit of volume equal to the volume of a cube of side length 1 m.

cylinder

A three-dimensional object with two equal circular faces and one curved surface.
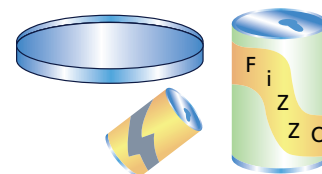
decimal notation

The decimal point separates the whole number part from the fraction part.

7·5

↑
decimal point
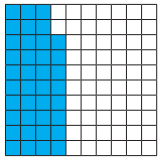
0·7 means 7 tenths.

6·5 means 6 ones and 5 tenths.

3·07 means 3 ones and 7 hundredths.

denominator

The bottom number of a fraction. It tells the number of equal parts there are in the whole.

Numerator $\longrightarrow$ $\dfrac{7}{8}$
Denominator $\longrightarrow$

descending order

Arranged in order from greatest value to least value.

| $5.96 | $4.75 | $2.30 | $1.65 |
| (most) | | | (least) |

diagonal

A line that joins any two non-adjacent corners of a polygon.

Diagonal   Diagonal

digital time

Time expressed using digits.

- This digital clock shows 24 minutes past 10.

digits

Symbols used to write a number.

- 6   Six is a 1-digit number.
- 47   Forty-seven is a 2-digit number.

divisible

To have no remainder when divided.

- 30 is divisible by 3.

division (÷)

Breaking up groups into equal parts.

- 10 ÷ 5

   a How much will each receive if you share between 2?

   b How many groups of 2 can be made?

edge

Two faces of a 3D object meet at an edge.

equivalent fractions

These are equal. They refer to the same part of the whole.

$\dfrac{3}{4} = \dfrac{6}{8}$

estimate (estimation)

A good guess.

even number

Any number that is a multiple of two and can be grouped in twos. They end in 0, 2, 4, 6 or 8.

- 16, 300, 4394

The other counting numbers are **odd**.

expanded notation

A way of writing numerals to show the place value of each digit.

- $137 = (1 \times 100) + (3 \times 10) + 7$

face

A flat surface of a three-dimensional object that is bounded by only straight sides.

Face   Face

factor

A factor of a number divides the number exactly, leaving no remainder.

- The factors of 12 are 1, 12, 2, 6, 3 and 4 .

flip (reflection)

To turn over.

- A mirror image is made.

fraction

A part of a whole or group.

$$\frac{38}{100}$$

Numerator ⟶ 38
Denominator ⟶ 100

Fractions can be shown on a number line.

Equivalent fraction

Fractions of equal size.

- $\frac{1}{2} = \frac{5}{10} = \frac{7}{14} = \ldots$

Improper fraction

A fraction which has a numerator that is bigger than the denominator.

- $\frac{9}{8}$

Mixed numeral

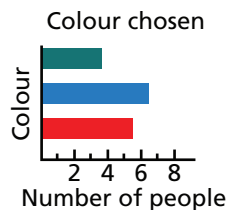A numeral that has a whole number part and a fraction part.

- $1\frac{2}{3}$

gram (g)

A unit of mass.

- 1 kilogram = 1000 grams, 1 kg = 1000 g

graphs

- Bar graph

  A graph which uses horizontal bars to compare the size of groups.

  Colour chosen

- Column graph

  Groups are compared using the lengths of columns or bars. The graph can be vertical or horizontal. A bar graph is a type of column graph.
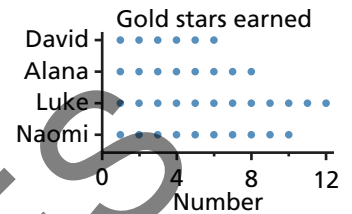
  Colour chosen
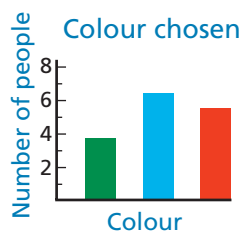
- Divided bar graph
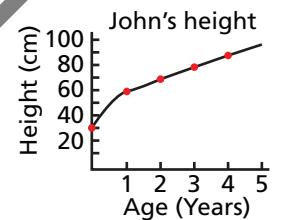
  A bar is divided to show the make-up of the data.

  People present

  Adults | Girls | Boys
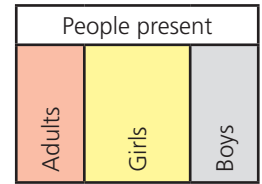
- Dot plot

  A graph which uses dots to compare the size of groups.

  Gold stars earned

- Line graph

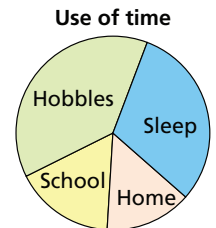 A continuous line shows the connection between variables.

  John's height

- Picture graph

  A picture is used as a unit to show how many.

  Money collected

Mon	🪙🪙🪙🪙
Tues	🪙🪙🪙🪙
Wed	🪙🌙
Thurs	🪙🪙🪙🪙
Fri	🪙🪙🌙

  🪙 Stands for $10

- Sector graph

  A circle is cut into sectors to show the parts of a whole.

  Use of time

greater than (>)

A way of showing that a number is larger than another number.

- 7 > 3 means '7 is greater than 3'.

See also *less than* (<).

horizontal

- Parallel to the horizon
- Level or flat.
- Any direction at right angles to the vertical.

inverse operations

Adding 8 is the opposite (the inverse) of subtracting 8.
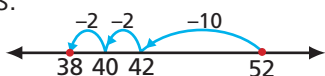
- $100 + 8 - 8 = 100$

Multiplying by 2 is the opposite (the inverse) of dividing by 2.

- $4 \times 2 \div 2 = 4$

jump strategy

Adding or subtracting numbers, jumping by hundreds, tens and ones.

- $52 - 14 = 38$

kilo (k)

Kilo means 1000.

kilogram (kg)

The basic unit of mass, equal to 1000 grams.

- $1\,kg = 1000\,g$

kilometre (km)

A unit of length equal to one thousand metres.

- $1\,km = 1000\,m$

less than (<)

A way of showing that a number is smaller than another number.

- $3 < 7$ means '3 is less than 7'.

See also *greater than (>)*.

line of symmetry

A line that divides something in half so that each half is a mirror image of the other part.
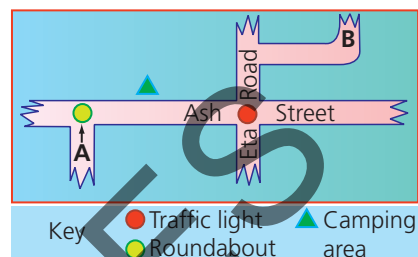
Line of symmetry
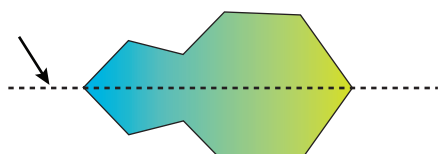
litre (L)

A unit of capacity (or volume) used for the measurement of liquids.

- $1\,L = 1000\,mL$

map or plan

A picture of an area viewed from above.

Key — Traffic light, Roundabout, Camping area

mass

The amount of matter in an object, a measure of how heavy something is.
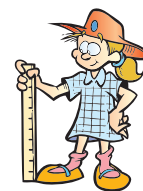
mean

The arithmetic average.

- $mean = \dfrac{sum\ of\ scores}{number\ of\ scores}$

See also *average*.

metre (m)

The basic unit of length, equal to 100 centimetres.

- $1\,m = 100\,cm$

millilitre (mL)

A unit of capacity (or volume) equal to one thousandth of a litre.

- $1000\,mL = 1\,L$

millimetre (mm)

A unit of length equal to one tenth of a centimetre, or one thousandth of a metre.

- $10\,mm = 1\,cm$
- $1000\,mm = 1\,m$

1 mm

million

A thousand thousands

- 1 000 000

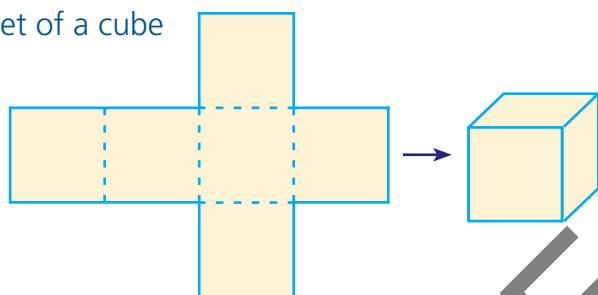## mixed number (or mixed numeral)

A numeral that has a whole number part and a fraction part.
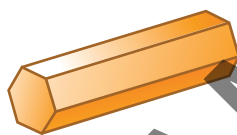
- $4\frac{1}{8}$

net

A flat shape that can be folded to make a three-dimensional object.

Net of a cube

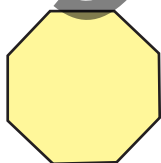## object

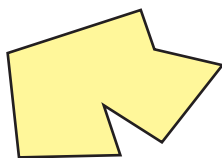The term used to describe a three-dimensional shape.

Hexgonal prism   Cone

octagon

A polygon with eight sides.
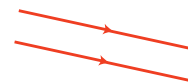

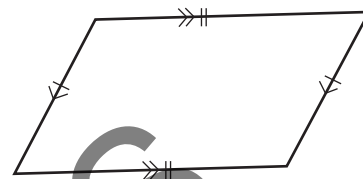Regular octagon   Irregular octagon

See also *polygon*.

parallel lines

Straight lines on the same flat surface that do not meet.

parallelogram

A shape with 4 sides such that the pairs of opposite sides are parallel and equal.

pentagon

A polygon with five sides.

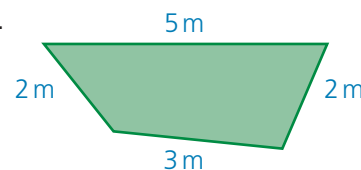

Regular pentagon   Irregular pentagon

See also *polygon*.

per cent (%)

Out of one hundred.

- $\frac{37}{100} = 0{\cdot}37 = 37\%$ or 37 per cent

perimeter

The distance around the outside of a shape; the boundary.

- Perimeter = 2 m + 3 m + 2 m + 5 m
  = 12 m

perpendicular lines
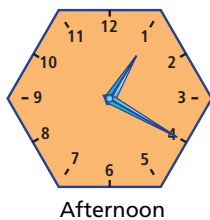
Lines that meet at right angles.

place value

The column value of a digit.

- 396 =

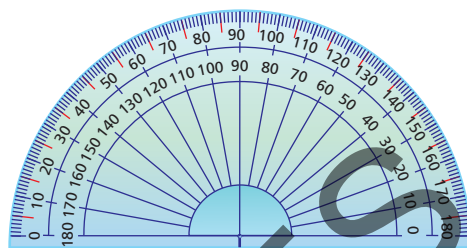| Hundreds	Tens	Ones
3	9	6

pm (post meridiem)

Any time between midday and midnight.

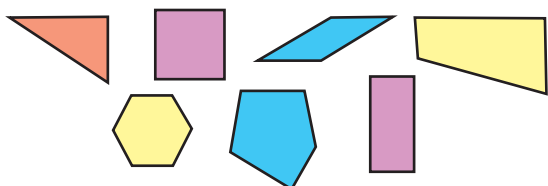- The time is 20 past 1 in the afternoon. It is 1:20 pm.

Afternoon

polygon

A two-dimensional shape with three or more straight sides, such as a triangle, quadrilateral, pentagon etc.
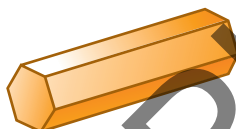
prism

A three-dimensional object with a uniform cross-section. The ends are identical shapes and all other faces are rectangles. Prisms are named by the shape of their ends.
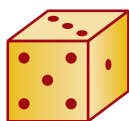
Triangular prism   Hexagonal prism

probability

The probability (or chance) of something happening is its likelihood of happening.

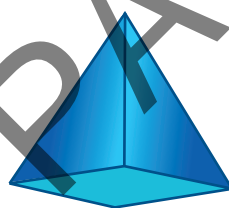- The probability of rolling an even number on a dice is 50%.

product
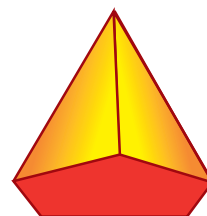
The answer to a multiplication question.

- The product of 8 and 9 is 72.

protractor

An instrument used for measuring and drawing angles

pyramid

A three-dimensional object that has a polygon for a base and triangles for all other faces. Pyramids are named by the shape of their base.
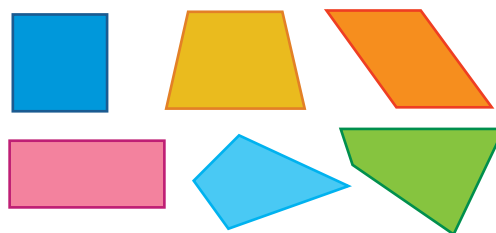
Square pyramid   Pentagonal pyramid

quadrilateral

A two-dimensional shape with four straight sides.

quotient

The answer when one number is divided by another.
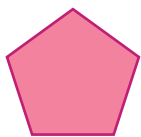
random selection

Choosing without looking.

Each item has an equal chance of being chosen.

reflection

See *flip*.

regular and irregular shapes

Regular shapes have all sides and all angles equal. Irregular shapes do not.

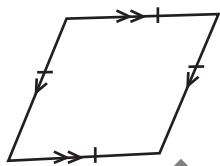Regular shape   Irregular shape

remainder

The number that is left over after sharing or dividing.

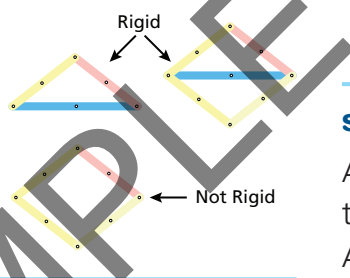- 22 cups shared among 5 people gives 4 cups each, remainder 2.

rhombus

A shape with 4 sides, opposite sides parallel and all sides equal.

rigid shape

A model that cannot be pushed out of shape because triangles have been used in its construction.

Rigid

Not Rigid

Roman numerals

A number system devised by the ancient Romans.

Roman numerals use letters for numbers:

I	V	X	L	C	D	M
1	5	10	50	100	500	1000

- XXVIII = 28.

rounding

Writing a number to the nearest 5, 10, 100, 1000, …

- 3786 rounded to the nearest 100 is 3800.
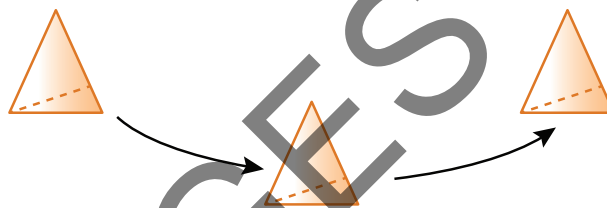- 35 000 rounded to the nearest ten-thousand is 40 000.

skip counting

Counting on, adding the same number each time.

- 5, 10, 15, 20, 25, … is skip counting by 5.

slide (translation)

To move a shape in any direction without changing its orientation.

solid

A term used to describe a three-dimensional shape.
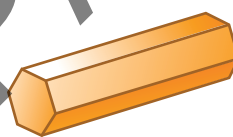
Hexgonal prism   Cone

sphere

A three-dimensional object that is ball-shaped and round. All points on the surface of a sphere are the same distance from its centre.
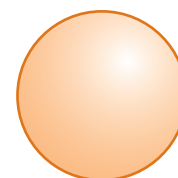
split strategy

Adding numbers by splitting them into their parts.

- $36 + 52 = 30 + 6 + 50 + 2$
  $$= (30 + 50) + (6 + 2)$$
  $$= 80 + 8$$
  $$= 88$$

spreadsheet

A table produced by a computer program used for organising data allowing rapid calculations and the production of graphs.

square centimetre (cm²)

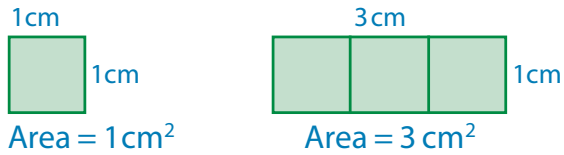A unit for measuring area that is equal to a square with sides of 1 cm.

Area = 1 cm²   Area = 3 cm²

square kilometre (km²)

A unit of area equal to a square with sides of 1 km.

- $1\,km^2 = 1\,000\,000\,m^2$, $1\,km^2 = 100\,ha$

square metre (m²)

A unit of area equal to a square with sides of 1 m.

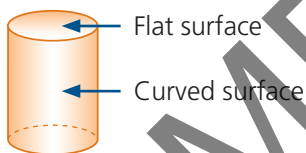## sum

The answer when you add numbers.

surface

The outside layer of a three-dimensional object.

A surface can be flat or curved.

Flat surface

Curved surface

See also *face*.

survey or questionnaire

A list of questions used to discover information.
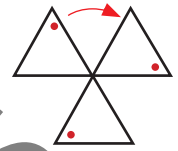
symmetry

A balanced arrangement.

- Line symmetry

  A property of a figure where one half is the mirror image of the other.

- Line (or Axis) of Symmetry

  A line that divides a figure into two parts are mirror images of each other.

- Rotational Symmetry

  A property of a figure where it can be spun about a point so that it repeats its shape more than once in a full turn.

tally

To keep count by making a mark for each item. To make counting easy, the marks are drawn in groups of five, with each fifth mark crossed over the other four marks.

- |||| |||| |||| ||| = 18

tangram

A traditional Chinese puzzle. A square is cut into seven pieces that can be rearranged to make different pictures.
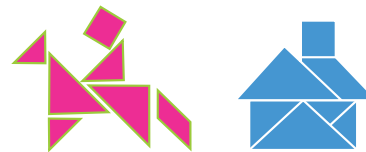
temperature

A measure of how hot or cold something is. Temperature is usually measured in degrees Celsius (°C).

- Water freezes at 0°C.
- Water boils at 100°C.

tessellalion

A pattern of identical shapes that fit together without gaps or overlaps.

thermometer

An instrument used for measuring temperature.

three-dimensional (3D) object

Objects are three-dimensional. They have length, width and height.

time

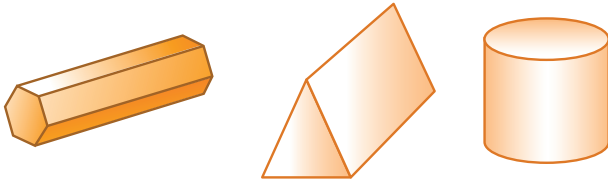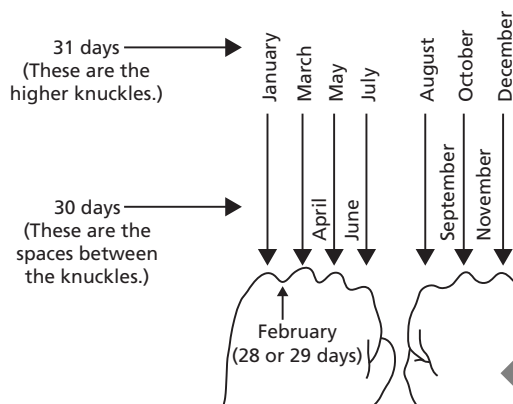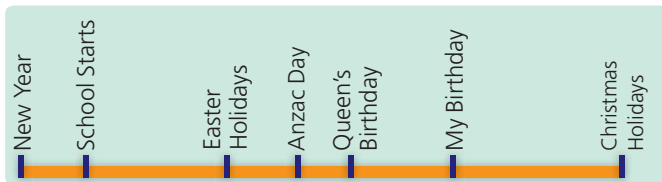● **The number of days in each month:**

30 days has September, April, June and November. All the rest have 31, except February alone, which has 28 days clear and 29 days each leap year.

● 60 seconds = 1 minute (60 s = 1 min)
  60 minutes = 1 hour (60 min = 1 h)
  24 hours = 1 day
  365 days = 1 year
  366 days = 1 leap year

timeline

Shows a sequence of events in time.

translation

See *slide*.

trapezium

A quadrilateral with one pair of parallel sides.
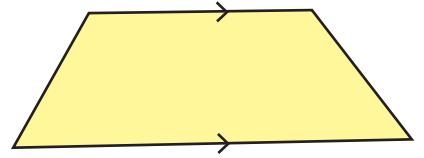
triangle

A two-dimensional shape with three straight sides and three angles.

Equilateral   Isosceles   Right-angled
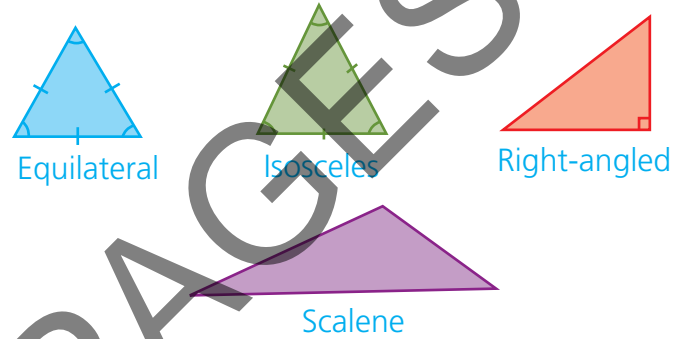
Scalene

Scalene triangles have no sides equal.
See also *polygon*.

turn (rotation)

To rotate a shape about a given point.

vertex

A point at which two or more lines meet to form a corner on a 2D shape or 3D object.
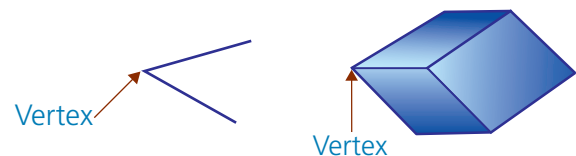
Vertex   Vertex

The plural of *vertex* is *vertices*.

vertical

● at right angles to the horizontal.
● straight up and down
● the direction in which an object falls under gravity.

volume

The amount of space occupied by a 3D object.

Volume = 10 cubic units
1 cubic centimetre = 1 mL

width or breadth (dimensions)

The distance from side to side.

2D shapes (two-dimensional)

Flat shapes are two-dimensional.
They have length and width.

circle
1 curved side

triangle
3 sides
3 corners

square
4 equal sides
4 corners

rectangle
2 equal long sides
and 2 equal short sides,
like a stretched square

oval
1 curved side, like
a squashed circle

pentagon
5 sides
5 corners

hexagon
6 sides
6 corners

octagon
8 sides
8 corners

quadrilaterals
4 sides and 4 corners.

parallelogram
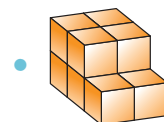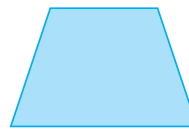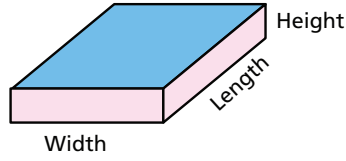two pairs of parallel lines
opposite sides equal

trapezium
one pair of
parallel lines
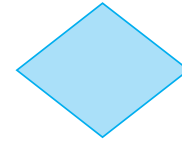
rhombus
all sides equal
(a diamond)
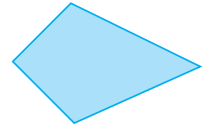
kite
two pairs of
equal sides

All of the blue shapes are quadrilaterals.

3D shapes (three-dimensional)

Solid objects are three-dimensional.
They have length, width and height.

sphere
A sphere is curved and round.
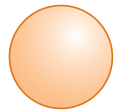
cube
A cube has 6 faces, 8 vertices
and 12 straight edges.
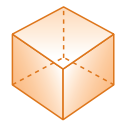
cylinder
A cylinder has 2 flat surfaces
and 1 curved surface.
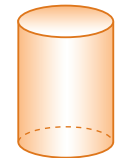
cone
A cone has 1 flat surface and
1 curved surface.
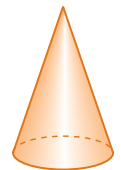
pyramid
A pyramid has triangular
faces joined around a base.
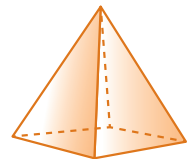
prism
A prism has rectangular faces
joining two identical bases.

CONCEPT
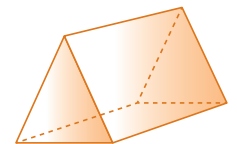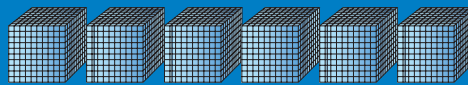
4325

| 4 | thousands | 3 | hundreds | 2 | tens | 5 | ones |

four thousand, three hundred and twenty-five

This number has:
• 43 hundreds and 25 ones
• 432 tens and 5 ones

❶ Fill out the numeral expander and write the numeral.

a

| | thousands | | hundreds | | tens | | ones |

| | | | | | tens | | ones |

b

| | thousands | | hundreds | | tens | | ones |

| | | | | | tens | | ones |

❷ How many digits are there in each numeral?

a 639 ☐   **b** 1256 ☐   **c** 3970 ☐   **d** 567 ☐

1309 has four digits.

1309

❸ Write these as numerals.

a one thousand and forty ☐   **b** seven thousand and eighteen ☐

c five thousand, one hundred and seventy-nine ☐   **d** nine thousand and seven ☐

❹ Write in words:

a 4023 _____

b 9030 _____

❺ Arrange these numbers in ascending order.

a 6426, 6624, 6246 ☐

b 8345, 8453, 8543 ☐

❻ Arrange these numbers in descending order.

a 8204, 8042, 8402 ☐

b 2083, 8302, 8203 ☐

❼ Does changing the order of the digits in a number change the size of the number? ☐

❽ **a** Write the largest number you can using the digits 5, 2, 8 and 4. ☐

b Write the second largest number you can using the digits 5, 2, 8 and 4. ☐

Ten thousands = 10 000 = 10 x 1000 = 100 x 100 = 1000 x 10. There are 4 zeros in each.

We leave a space after the 1000s column for numbers with more than 4 digits.

67 208
14 000

CONCEPT

10 ×

1 ten-thousand
10 000
10 × 1000
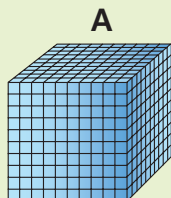
A
1 thousand
1000
10 × 100
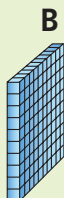
B
1 hundred
100
10 × 10

C
1 ten
10
10 × 1

D
1 one
1
1

Each column has ten times the value of the one on its right.

❶ How many times as big is the number shown in:

a **A**, compared to the one shown in **B**?

b **B**, compared to the one shown in **C**?

c **C**, compared to the one shown in **D**?

d **A**, compared to the one shown in **C**?

e **B**, compared to the one shown in **D**?

f **A**, compared to the one shown in **D**?

92 thousand		5 hundred and sixty-one		
100 000	10 000	1000	100	10	1
	9	2	5	6	1

This place-value house shows 92 561.

When we multiply by 10 we add a zero. This changes the place value of the digits.

❷ Which number is larger:

a **A**: 60 000 + 7000 + 600 + 80 + 1 or **B**: 60 000 + 900 + 90 + 9?

b **C**: 80 000 + 1000 + 200 + 40 + 9 or **D**: 80 000 + 2000 + 100 + 60 + 2?

c **E**: 20 000 + 5000 + 700 + 10 + 8 or **F**: 20 000 + 5000 + 800 + 80 + 1?

d **G**: 50 000 + 3000 + 900 + 90 + 2 or **H**: 50 000 + 9000 + 700 + 90 + 2?

❸ A 74 186 B 79 146 C 60 715 D 40 207 E 97 364 F 98 170

a Which number has a 7 that stands for 7000?

b Which numbers contain 6s that have the same value?

c Which numbers contain 9s that have the same value?

d Which numbers contain 7s that have the same value?

e How many times as big is the 7 in **B** compared to the 7 in **E**?

What other questions could you ask?

Wipe out a digit

○ A student enters any 5-digit number into a calculator.

○ A partner selects any digit to be 'wiped out', i.e. changed to zero.

○ Only one operation can be entered into the calculator to wipe out a digit.

○ Take turns and score one point for each successful wipe out.

SAMPLE PAGES

We round 15 off to 20 (to the nearest 10).
We round 15 000 off to 20 000 (to the nearest 10 000).

CONCEPT

3478 rounds off to 3000 (to the nearest 1000).   65 432 rounds off to 70 000 (to the nearest 10 000).

closer to 3000 | closer to 4000
3000   3500   4000

3500 rounds up to 4000.

closer to 60 000 | closer to 70 000
60 000   65 000   70 000

65 000 rounds up to 70 000.
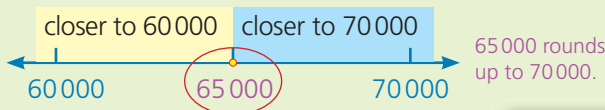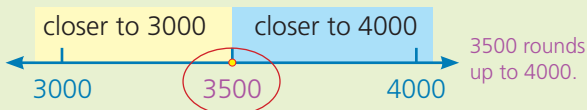
When rounding a number to a particular place, look at the next digit.
If it is 5 or more, round up.
If it is less than 5, round down.

This rounds off to 97 000.

96 834

1 Round off these numbers to the nearest hundred.

a 3674
b 4237
c 1396
d 9271

e 6549
f 6704
g 8962
h 5854

2 Round off these numbers to the nearest thousand.

a 31 569
b 82 738
c 10 846
d 57 249

e 23 496
f 52 301
g 46 972
h 69 347

3 Round off these numbers to the nearest ten-thousand.

a 46 867
b 82 999
c 25 000
d 88 235

e 92 675
f 33 951
g 65 007
h 74 000

4 a Circle numbers that round off to 53 000.

53 640   52 967   52 849
52 621   52 076   53 297
53 599   53 346   52 374

b Circle numbers that round off to 80 000.

79 621   87 231   81 119
85 000   74 649   75 000
83 713   71 998   76 014

5 Answer **true** or **false** for each statement.

a 4639 rounds off to 4600.

b 1854 rounds off to 1800.

c 6341 rounds off to 6400.

d 9782 rounds off to 9800.

e 35 000 rounds off to 40 000.

6

thousands | hundreds | tens | ones

hundreds | tens | ones

hundreds | ones

Number and algebra

1:04

Partitioning large numbers

48 000
= 40 000 + 8000 or
30 000 + 18 000
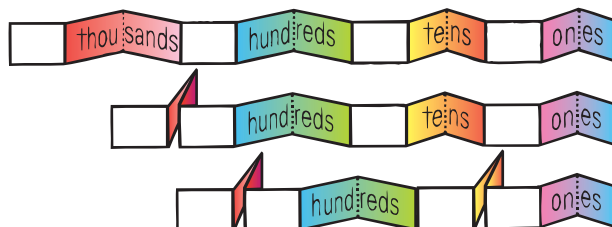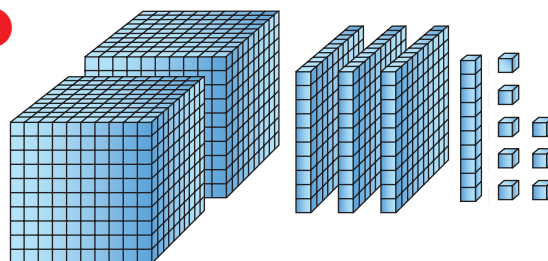
This place-value house shows 73 000.
We can partition this in many ways.
70 000 + 3000
or 60 000 + 13 000
or 730 hundreds.

Thousands					
100 000	10 000	1000	100	10	1
H	T	O	H	T	O
	7	3	0	0	0

CONCEPT

❶ Write these numbers in the place-value house then list different ways to partition them.

a 95 000

Thousands					
H	T	O	H	T	O

a 48 000

Thousands					
H	T	O	H	T	O

❷ We can write 36 000 as 20 thousands and 16 thousands. Partition these numbers in the same way.

a 42 000

b 58 000

c 37 000

❸ **a** 35 000 = 30 000 +
     = 20 000 +

b 83 000 = 80 000 +
     = 70 000 +

c 28 000 = 20 000 +
     = 10 000 +

d 63 000 = 60 000 +
     = 50 000 +

e 72 500 = 70 000 +
     = 20 000 +

f 91 300 = 90 000 +
     = 50 000 +

We can break up numbers in many ways.

❹ Rearranging the digits changes the size of a number. Use the digits 6, 2, 7, 9, 2 to:

a Write the smallest number you can.

b Write the second smallest number you can.

c Write the second largest number you can.

Rearranging digits changes the size of the number.

$\frac{5}{12}$ of this group of stars has been coloured.

CONCEPT

7 parts have not been coloured.

Numerator $\longrightarrow$ $\frac{5}{12}$ is 5 of 12 equal parts.
Denominator $\longrightarrow$

5 parts have been coloured.

Fractions are used in many ways. We can find fractions of a whole, a group or an object.
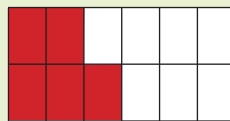
$\frac{5}{12}$

1 What part of each shape has been coloured?

a   b   c   d

e   f   g   h

2 What part of each shape above has not been coloured?

a   b   c   d   e   f   g   h

3 Colour part of each shape to match the given fraction.

a $\frac{4}{12}$ b $\frac{1}{6}$ c $\frac{1}{3}$ d $\frac{4}{6}$

e $\frac{9}{12}$ f $\frac{5}{6}$ g $\frac{6}{12}$ h $\frac{10}{12}$

4 What part of each group has been coloured?

a   b   c

d   e   f

The part coloured is $\frac{7}{12}$.
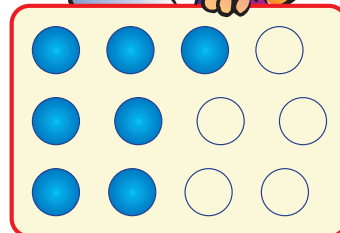
5 What part of each group above has not been coloured?

a   b   c   d   e   f

This is cut into two equal parts.

This is cut into five equal parts.

$\frac{1}{2}$ $\frac{1}{5}$

$\frac{1}{2}$ **is bigger than** $\frac{1}{5}$.

CONCEPT

We need to have equal wholes to compare fractional parts.

1 Circle the larger fraction. Discuss how the denominators affect the size of each unit fraction.
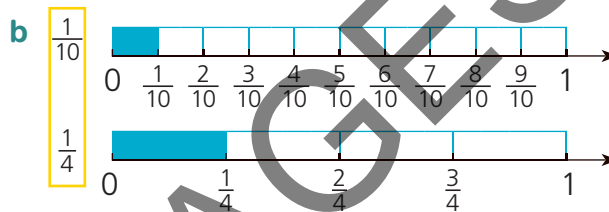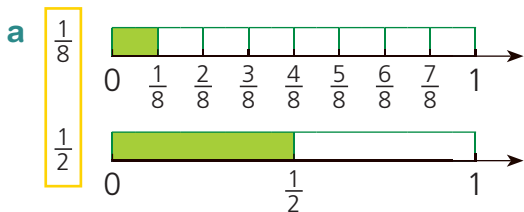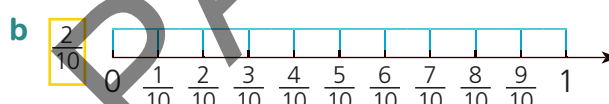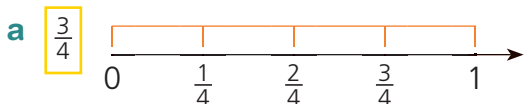
a $\frac{1}{8}$

0 $\frac{1}{8}$ $\frac{2}{8}$ $\frac{3}{8}$ $\frac{4}{8}$ $\frac{5}{8}$ $\frac{6}{8}$ $\frac{7}{8}$ 1

$\frac{1}{2}$

0 $\frac{1}{2}$ 1

b $\frac{1}{10}$

0 $\frac{1}{10}$ $\frac{2}{10}$ $\frac{3}{10}$ $\frac{4}{10}$ $\frac{5}{10}$ $\frac{6}{10}$ $\frac{7}{10}$ $\frac{8}{10}$ $\frac{9}{10}$ 1

$\frac{1}{4}$

0 $\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$ 1

2 Colour part of each shape to match the given fraction.

a $\frac{3}{4}$

0 $\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$ 1

Part coloured: ☐ Part not coloured: ☐

b $\frac{2}{10}$

0 $\frac{1}{10}$ $\frac{2}{10}$ $\frac{3}{10}$ $\frac{4}{10}$ $\frac{5}{10}$ $\frac{6}{10}$ $\frac{7}{10}$ $\frac{8}{10}$ $\frac{9}{10}$ 1

Part coloured: ☐ Part not coloured: ☐

**c** $\frac{5}{8}$

0 $\frac{1}{8}$ $\frac{2}{8}$ $\frac{3}{8}$ $\frac{4}{8}$ $\frac{5}{8}$ $\frac{6}{8}$ $\frac{7}{8}$ 1

Part coloured: ☐ Part not coloured: ☐

d $\frac{2}{5}$

0 $\frac{1}{5}$ $\frac{2}{5}$ $\frac{3}{5}$ $\frac{4}{5}$ 1
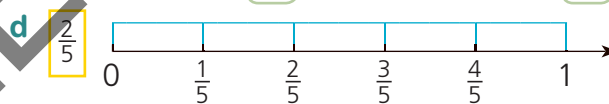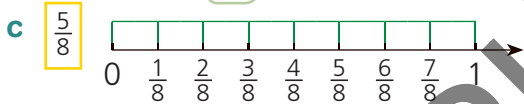
Part coloured: ☐ Part not coloured: ☐

Circle the fractions that are greater than one half.

3 Write true or false for each statement. You could draw these fractions to compare them.

a $\frac{2}{2} = 1$ ☐ **b** $\frac{4}{5} = 1$ ☐ **c** $\frac{8}{8} = 1$ ☐

d $1 = \frac{10}{10}$ ☐ **e** $1 = \frac{3}{8}$ ☐ **f** $1 = \frac{5}{5}$ ☐

$\frac{2}{2}$, $\frac{5}{5}$ and $\frac{10}{10}$ are all 1.

INVESTIGATION

● Ashton, Harry and Riley each coloured half of a strip of paper. Explain why each half was a different size.

☐

☐

☐

6 cm

4 cm

2 cm
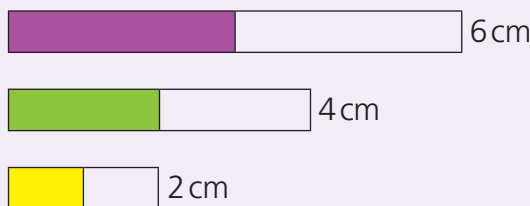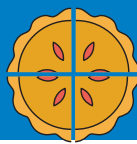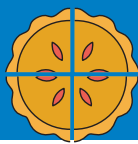
$\frac{4}{4} = 1$

$\frac{8}{4} = 2$

CONCEPT

Scott had 2 halves of a biscuit. Rachel gave him another half.
Now he has 3 halves.
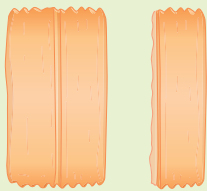
$\frac{3}{2} = \frac{2}{2} + \frac{1}{2}$

$= 1 + \frac{1}{2}$

$= 1\frac{1}{2}$

$\frac{3}{2}$ is called an improper fraction because the numerator is larger than the denominator.
$1\frac{1}{2}$ is called a mixed number.
It has a whole part and a fraction part.

He has $\frac{3}{2}$ or $1\frac{1}{2}$ biscuits.

1 Write the improper fraction for the parts coloured.

a ☐ — $\frac{5}{2}$

☐ 5 halves

b ☐ — ☐

☐ halves

c ☐ — ☐

☐ halves

d ☐ — ☐

☐ quarters

e ☐ — ☐

☐ quarters

f ☐ — ☐

☐ quarters

g ☐ — $\frac{☐}{4}$

☐ thirds

h ☐ — ☐

☐ sixths

i ☐ — ☐

☐ fifths

2 Complete the number line. Practise counting forwards and backwards.

Top row: ☐ $\frac{1}{4}$ ☐ $\frac{3}{4}$ ☐ ☐ $\frac{6}{4}$ ☐ ☐ ☐ $\frac{10}{4}$ ☐ ☐ ☐ ☐ ☐ ☐

Bottom row: ☐ ☐ ☐ ☐ 1 $1\frac{2}{4}$ ☐ ☐ ☐ ☐ 3 ☐ ☐ $3\frac{3}{4}$ ☐
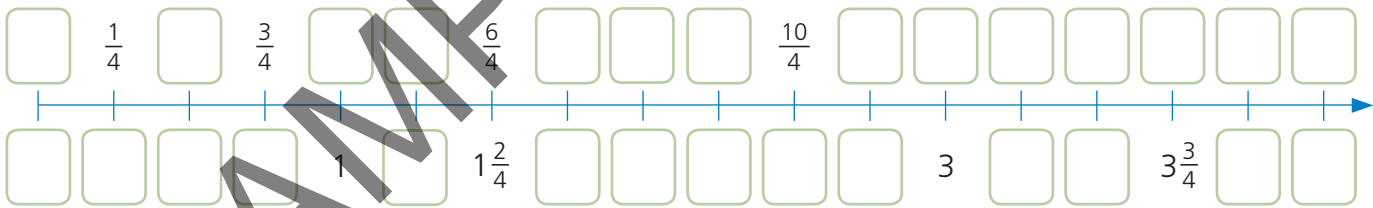
3 Write the improper fraction for:

a $1\frac{1}{2}$ ☐ **b** $2\frac{1}{5}$ ☐ **c** $3\frac{2}{4}$ ☐ **d** $1\frac{4}{5}$ ☐

e $2\frac{3}{4}$ ☐ **f** $2\frac{5}{4}$ ☐ **g** $4\frac{2}{3}$ ☐ **h** $2\frac{5}{8}$ ☐

$2\frac{2}{3}$

$= \frac{3}{3} + \frac{3}{3} + \frac{2}{3}$

$= \frac{8}{3}$

These have the same value.

$2\frac{2}{3}$ $\frac{8}{3}$

4 Write the mixed number for:

a $\frac{7}{4}$ ☐ **b** $\frac{9}{5}$ ☐ **c** $\frac{11}{4}$ ☐ **d** $\frac{11}{5}$ ☐

e $\frac{8}{5}$ ☐ **f** $\frac{13}{4}$ ☐ **g** $\frac{14}{5}$ ☐ **h** $\frac{17}{4}$ ☐

See Extra Support 19 (Fraction patterns).

1:08 Number and algebra
Fractions beyond 1

five-quarters
$\frac{5}{4}$

one and one-quarter
$1\frac{1}{4}$
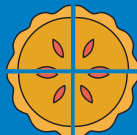
CONCEPT

Caleb's chocolate bar has 3 thirds. Josie gave him one of her thirds. Now he has 4 thirds.

+

He has $\frac{4}{3}$ or $1\frac{1}{3}$ chocolate bars.

Alf

Rachel

$$1\frac{1}{3} = 1 + \frac{1}{3}$$
$$= \frac{3}{3} + \frac{1}{3}$$
$$= \frac{4}{3}$$

1 **a** $\frac{1}{3}$, $\frac{2}{3}$, 1, $1\frac{1}{3}$, $1\frac{2}{3}$, 2, $2\frac{1}{3}$, $2\frac{2}{3}$, ☐, ☐, ☐

b one-third, two-thirds, three-thirds (or 1), four-thirds, ☐, ☐

2 Write an equivalent whole or mixed number.

a $\frac{2}{2}$ ☐   **b** $\frac{3}{2}$ ☐   **c** $\frac{4}{2}$ ☐   **d** $\frac{5}{2}$ ☐

3 Write the improper fraction and mixed number for each part.

a — or —   **b** — or —   **c** — or —

d — or —   **e** — or —   **f** — or —

g — or —

4 Write the mixed number.

a $\frac{7}{5}$ ☐   **b** $\frac{5}{2}$ ☐   **c** $\frac{13}{5}$ ☐   **d** $\frac{9}{4}$ ☐

e $\frac{13}{8}$ ☐   **f** $\frac{12}{5}$ ☐   **g** $\frac{15}{2}$ ☐   **h** $\frac{17}{5}$ ☐

$$\frac{11}{4} = 11 \div 4$$
$$= \frac{4}{4} + \frac{4}{4} + \frac{3}{4}$$
$$= 2\frac{3}{4}$$

5 Write the improper fraction.

a $1\frac{1}{5}$ ☐   **b** $5\frac{1}{2}$ ☐   **c** $3\frac{2}{5}$ ☐   **d** $6\frac{1}{3}$ ☐

e $1\frac{3}{8}$ ☐   **f** $2\frac{5}{6}$ ☐   **g** $4\frac{4}{5}$ ☐   **h** $1\frac{7}{10}$ ☐

$$8\frac{2}{3} = (8 \times 3 + 2) \text{ thirds}$$
$$= \frac{26}{3}$$

See Extra Support 19 (*Fraction patterns*).

CONCEPT

Leave a space to the right of the thousands digit.

75 248

75 248 can be written as:
- **75** thousands and **248** ones
- **752** hundreds and **48** ones
- **7524** tens and **8** ones

This numeral has 5 digits.

Seventy-five thousand, two hundred and forty-eight

This place-value house separates the thousands from the hundreds, tens and ones.

137 thousand			8 hundred and ninety-six		
100 000	10 000	1000	100	10	1
1	**3**	**7**	**8**	**9**	**6**

Using numeral expanders allows us to see how many hundreds or tens are in a number.

| 1 | 3 | 7 | 8 | hundreds | 9 | tens | 6 | ones |

| 1 | 3 | 7 | 8 | 9 | tens | 6 | ones |
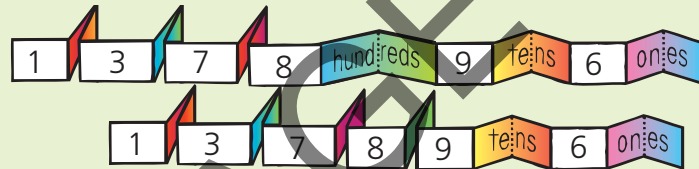
The expanded form of 137 896 is
100 000 + 30 000 + 7000 + 800 + 90 + 6.

❶ Read these numbers and then write them in figures on the place-value chart.

   a twenty-six thousand, three hundred and twenty-four

   b one hundred and sixteen thousand, eight hundred

   c five hundred and thirteen thousand and forty-seven

   d nine hundred and twenty-six thousand and eleven

Thousands					
H	T	O	H	T	O

❷ Write the numeral for:

   a 30 000 + 4000 + 500 + 20 + 8   **b** 60 000 + 7 000 + 900 + 30 + 4

   c 50 000 + 8000 + 400 + 60 + 2   **d** 90 000 + 2 000 + 700 + 40 + 8

   e 80 000 + 2000 + 300 + 50 + 9   **f** 40 000 + 8 000 + 600 + 70 + 3

   g 300 000 + 50 000 + 9 000 + 100 + 80 + 7

   h 900 000 + 20 000 + 7 000 + 200 + 30 + 5

   i 700 000 + 10 000 + 5 000 + 700 + 20 + 8

Discuss different ways of partitioning these numbers.
857304 = 8573 hundreds and 4 ones
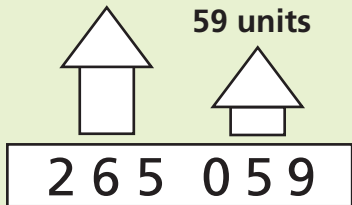
❸ When are large numbers like these used?

206 459   96 789

To compare numbers, start with the digits on the left of the space.

265 thousand
59 units

| 2 6 5   0 5 9 |

two hundred and sixty-five thousand and fifty-nine

- The value of the 2 is 200 000.
- The value of the 6 is 6 000.
- The value of the 5 is 5000.
- The value of the 0 is 0.
- The value of the 5 is 50.
- The value of the 9 is 9.

We use zero as a place holder.

340 763

329 104

CONCEPT

1 Circle the larger number in each pair.

   a 49 768   49 713   **b** 37 281   36 281   **c** 345 022   344 997   **d** 897 411   978 411

2 Circle the smallest number in each group.

   a 29 642   27 849   26 301   **b** 72 642   69 309   70 624   **c** 718 022   692 997   709 165

3 Write the numeral for:

   a twenty-eight thousand, seven hundred and forty-seven

   b fifty thousand, three hundred and seventy-eight

   c eight hundred and thirty-nine thousand, six hundred and twenty-five

   d four hundred and seventeen thousand, seven hundred and thirteen

Leave a space to the right of the thousands digit.

4 Write the numeral for:

   a 500 000 + 20 000 + 6000 + 400 + 90 + 3

   b 800 000 + 90 000 + 5000 + 600 + 50 + 1

5 Write the value of each coloured digit in these numbers.

   a 4**8**603   **b** 9**1**738   **c** **6**75 132

   d 32 4**8**0   **e** 80**9**65   **f** **4**01 360

Make the number

- For this game you need a set of playing cards marked with digits 0 to 9.
- The dealer selects a number to be made, e.g. 'Make the number closest to 30 000'.
- Five cards are then dealt to each player. The winner is the player able to arrange the five cards closest to the chosen number.
- Each winner scores one point.

My number is closer to 40 000 than yours.

FUN SPOT