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vector maths & science

International Primary

Maths

sample pages catalogue

Years 1 - 6

6 LEVELS

Maths

1

2

3

4

5

6

Vector IPM* is a pioneering series based on the modern principles of maths teaching, which introduces students to the exciting world of maths. The series aims to captivate students' interest, motivate mathematical investigation and assist students in developing and mastering the skills necessary for success.

VECTOR IPM* is a contemporary six-level series for primary students. Responding to the needs of the 21st century, the course aims to reinforce skills such as critical thinking, problem solving and logical reasoning through a balanced and progressive development of learning objectives. The syllabus is structured in a spiral form to promote a holistic view of maths and to enhance the interconnection between different domains. Each lesson is carefully designed to enable students to gain a deep understanding of core mathematical ideas.

Domains

- Numbers
- Geometry
- Measurement
- Data
- Problem Solving

*International Primary Maths

Course features

FOR STUDENTS:

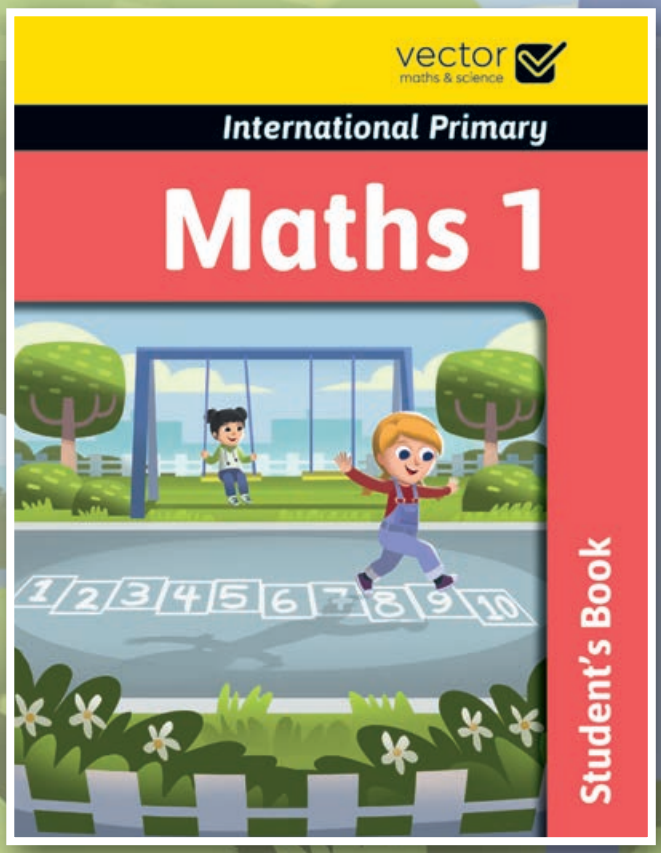
- **Age-appropriate** mathematical learning objectives
- A **gradual and spiral development** of mathematical knowledge
- Lessons based on the teaching model of **Engage, Explore, Explain, Elaborate and Evaluate (5 Es' Model)**
- Simple and comprehensible **vocabulary to support EAL (English as an Additional Language) students**
- Gradual development of mathematical terminology and literacy
- **Visuals and pictorial representations** that facilitate learning
- Stimulating activities that enhance the consolidation of knowledge and reinforce **critical thinking** and **mathematical reasoning skills**
- A special emphasis on the **development of problem solving skills**
- **Enjoyable games, puzzles, riddles and cross-curricular activities** that enhance a positive attitude towards mathematics
- **Review pages** at the end of each unit
- Workbook/Supplementary activities for individual practice
- **Resource Sheets** to support understanding of mathematical concepts and processes (provided at the back of the Workbook)
- **Glossary** with visual representations, age appropriate definitions and comprehensible examples
- Modern student-friendly layout with high-quality illustration
- Extension of mathematical concepts in real life context

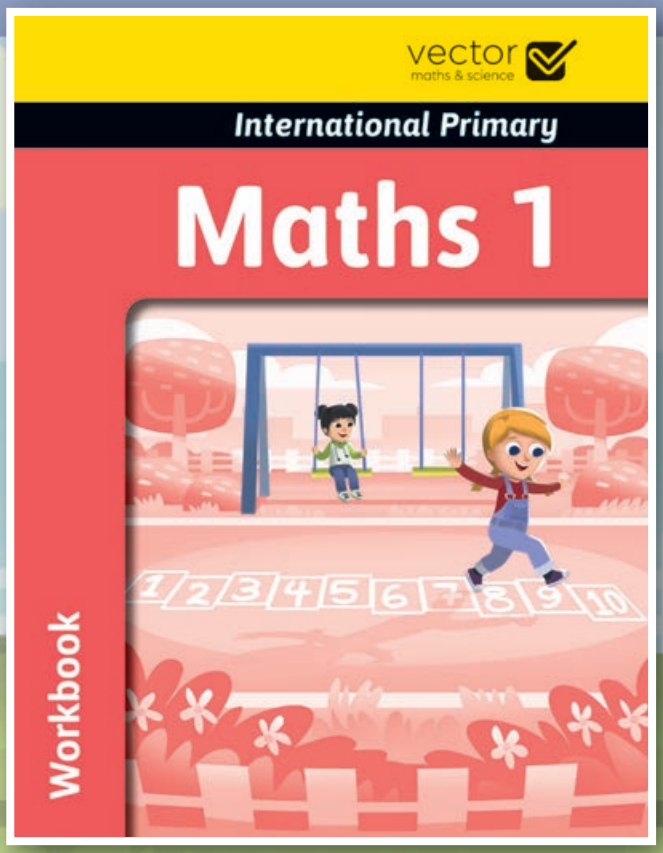
FOR TEACHERS:

- Specific learning objectives for each lesson
- **Consistency** of the mathematical content throughout the series
- **Unit maps** at the beginning of each unit that provide well-organised information about the mathematical content of each lesson as well as students' prior knowledge
- List of possible **common student preconceptions**
- **Cross-curriculum links**
- **Extensive step-by-step lesson plans** for all lessons and the review section
- **Thought-provoking questions** that involve higher-level thinking to enrich the lesson content and trigger critical thinking
- **Differentiated activities** for students of basic or advanced performance
- Brief description of games, riddles, puzzles and cross-curricular activities
- **EAL (English as an Additional Language) support**
- **Review and Assessment pages** for each unit with detailed guidelines on how to approach and carry out each activity
- **Keys** provided for all the activities
- Safety warnings and guidelines
- Reminders to facilitate the teaching procedure
- **Resources** such as Resource Sheets and Worksheets to support comprehension and extension of knowledge

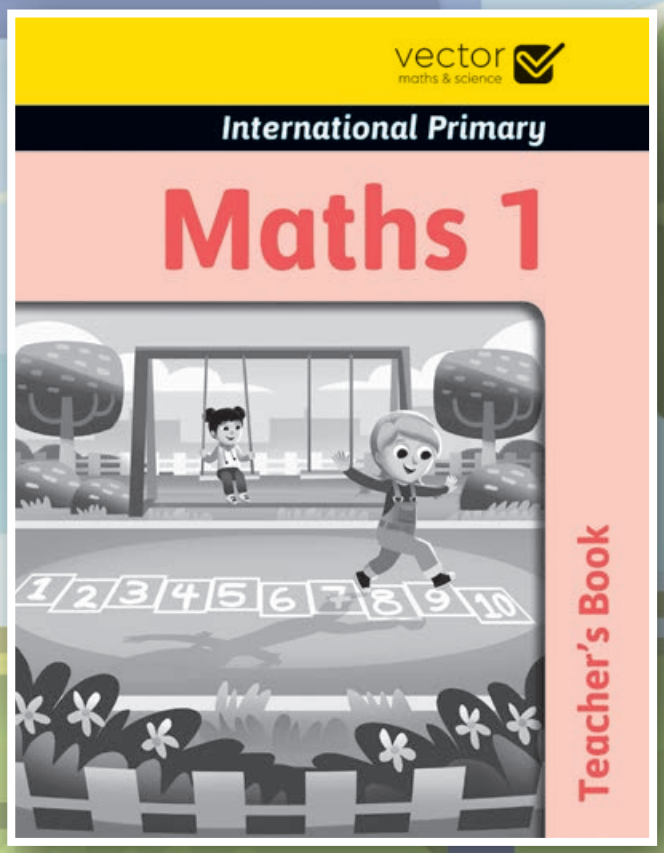
Components

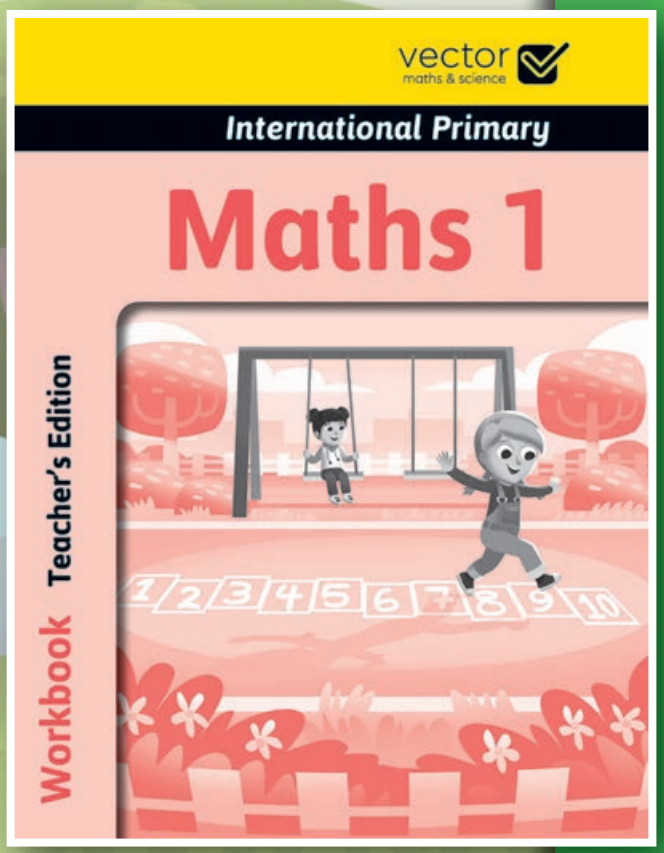
FOR STUDENTS





FOR TEACHERS





Maths 1

Learning Objectives

Numbers

- Recognise the 100 square as a tool for depicting numbers.
- Perceive the number line as a tool for ordering numbers.
- Count to 10 aloud.
- Count to 20 aloud.
- Count forwards and backwards between 0-20.
- Count forwards between 0-100.
- Write numbers up to 100.
- Recognise numerals in a real-life context.
- Read and write the numbers up to 10 in numerals and in words.
- Read and write the numbers up to 20 in numerals and in words.
- Count the number of objects between 0-10 in a set of uniform objects.
- Identify zero as the numeral that shows no existence of items.
- Count the number of objects between 10-20 in a set of uniform objects.
- Perceive that the number of objects remains the same even when rearranged.
- Count forwards and backwards in tens starting from any given number.
- Count forwards and backwards in twos starting from any given number.
- Recognise that even and odd numbers are every other number.
- Perceive teen numbers (11-19) as ten and some more.
- Write a teen number (11-19), given its tens and ones.
- Recognise the place value of each digit in two-digit numbers.
- Write a two-digit number as tens and ones and vice versa.
- Find the number that is 1 more/less than any given number up to 100 using the 100 square.
- Compare numbers using comparative vocabulary (more/less/fewer).
- Compare numbers according to place value.
- Find the number that lies between two given numbers on a number line.
- Put numbers in order from the greatest to the smallest and vice versa.
- Put numbers up to 20 in order on a number track.
- Read and write ordinal numbers as words.
- Use appropriate notation for ordinals.
- Differentiate ordinals from numerals.
- Use the (=) sign to indicate equality.
- Estimate the number of objects (up to 50) in a set.
- Estimate the number of objects in a set using groups of ten.
- Calculate halves of small numbers.
- Memorise and write all number pairs to 10.
- Derive all four number facts given a number pair.
- Use number pairs to complete addition and subtraction facts.
- Write all number pairs for each number from 1 to 10.
- Add three single-digit numbers flexibly using number pairs to 10.
- Add two single-digit numbers between 0-20 using partitioning to make number pairs to 10.
- Memorise doubles up to double 5.
- Add using the near doubles strategy.
- Identify multiples of 2 as jumps of 2 starting from zero.
- Identify multiples of 10 as jumps of 10 starting from zero.
- Perceive addition as the act of combining numbers to find the total.
- Perceive addition as the act of counting forwards.
- Perceive subtraction as the act of taking away.
- Perceive subtraction as the act of counting backwards.
- Respond to questions such as 'how many more?'.
- Add a single-digit number by counting forwards.
- Subtract by counting backwards starting from the bigger number.
- Say and write the number that is 2 more/less than any given number to 20 using a number line.
- Find the number that is 10 more/less than any given number using the 100 square and by counting forwards or backwards.
- Use the addition and equals signs (+, =) to denote addition in number sentences.
- Use the subtraction and equals signs (–, =) to denote subtraction in number sentences.
- Recognise that addition can be done in any order and the outcome will always be the same.
- Add two numbers by counting forwards starting from the greatest addend.
- Understand the use of a sign (e.g. ◯) in the place of the unknown number in a number sentence.
- Add a two-digit number and a single-digit number.
- Calculate doubles of numbers between 0-10.
- Conclude that finding the double of a number requires adding two of the same numbers.

Geometry

- Distinguish between straight, curved and zig-zag lines.
- Name and recognise common 2D shapes.
- Identify the common 2D shapes that form a picture.
- Describe common 2D shapes referring to the number of their sides and whether they are straight or curved.
- Sort 2D shapes according to their attributes.
- Name and recognise common 3D shapes.
- Identify the common 3D shapes that form a model.
- Distinguish between flat and curved faces.
- Give examples of objects in real life with curved and flat faces.
- Sort 3D shapes according to their attributes.
- Explore the concept of line symmetry using folded paper.
- Distinguish symmetrical from non-symmetrical images by folding.
- Identify line symmetry.
- Match the symmetrical parts of a drawing.
- Recognise which shapes are divided into two equal parts, by folding.
- Describe position using appropriate vocabulary: left, right, in front of, behind, on, under, next to, between.
- Describe position changing the subject of reference.
- Describe a simple route on a map.
- Follow and give simple directions (go forwards/backwards, turn left/right) to reach a destination.

Measurement

- Recognise and name coins (1 cent, 5 cents, 10 cents, 25 cents, 50 cents, 1 dollar) and their values.
- Work out a total using coins.
- Find totals to make a payment.
- Exchange coins according to their value.
- Characterise objects as tall/long or short.
- Directly compare the length/height of two objects.
- Measure the length/height of an object using uniform non-standard units of measurement.
- Compare objects by length using uniform non-standard units.
- Rank objects according to length/height in order to determine which is the longest, the shortest or the tallest.
- Characterise objects as heavy or light.
- Directly compare the weight of two objects.
- Measure the weight of an object using uniform non-standard units of measurement.
- Compare objects by weight using uniform non-standard units.
- Rank objects according to weight in order to determine which is the heaviest or the lightest.
- Characterise containers as full, half full or empty.
- Estimate and directly compare the capacity of two different containers.
- Estimate the capacity of a container using non-standard units of measurement.
- Measure the capacity of a container using uniform non-standard units of measurement.
- Compare containers by capacity according to non-standard units.
- Rank different types of containers according to capacity in order to determine which holds the most or the least.
- Use comparative vocabulary for length (longer than, shorter than, taller than).
- Use comparative vocabulary for weight (heavier than, lighter than).
- Use comparative vocabulary for capacity (holds more, holds less, full, empty, half full).
- Choose appropriate units to express time intervals.
- Refer to the duration of everyday activities (a minute or an hour).
- Compare activities according to their duration.
- Use the words 'day before', 'day after', 'weekday' and 'weekend' to specify a day.
- Read, write and put the months of the year in order.
- Conclude that a year has twelve months.
- Read the time on the hour (o'clock times) using an analogue clock.
- Place the minute and hour hands to show o'clock times on a clock face.
- Recognise and order key times of the day (morning, afternoon, night).
- Connect everyday activities with specific o'clock times and key times of the day.
- Describe activities that take place at key times of the day.
- Read and write the days of the week and put them in order.
- Complete a week planner according to daily activities.

Data

- Answer a question according to data provided in lists or tables.
- Organise data in lists and tables.
- Recognise pictograms and their basic format.
- Obtain information from pictograms to answer questions.
- Organise data in pictograms.
- Find totals for each category of data by counting the images in the pictograms.
- Recognise block graphs and their basic format.
- Obtain information from block graphs to answer questions.
- Organise data in block graphs.
- Find totals for each category of data by counting the blocks in the block graphs.
- Recognise Venn diagrams and their basic format.
- Obtain information from Venn diagrams to answer questions.
- Complete the missing data in Venn diagrams.
- Recognise Carroll diagrams and their basic format.
- Obtain information from Carroll diagrams to answer questions.
- Complete the missing data in Carroll diagrams.
- Sort objects into two groups according to their attributes.
- Sort objects into four groups according to their attributes.

Problem Solving

- Use known strategies to calculate easily and justify the reasoning behind the process.
- Solve number puzzles involving known operations.
- Search for all possible combinations.
- Model an addition or subtraction word problem using pictorial representations or everyday objects.
- Check the outcome of an addition by changing the order of addends.
- Check the outcome of a subtraction using addition.
- Identify the rule in patterns of numbers or shapes.
- Continue simple patterns of numbers or shapes.
- Describe the relationship between numbers or shapes.
- Estimate the outcome of an operation before calculating.
- Check whether the outcome of an operation is reasonable or not.

Maths 2

Learning Objectives

Numbers

- Read and write numbers up to 100 in numerals.
- Count forwards and backwards between 0-100.
- Count sets of objects between 0-100.
- Count on in ones and tens from any given number up to 100 forwards and backwards.
- Count on in twos, fives and tens from any given number up to 100 forwards and backwards.
- Count a large set of objects by making groups of two, five or ten.
- Start counting on in threes and fours starting from zero.
- Identify the place value of digits in a two-digit number.
- Partition and synthesise two-digit numbers in tens and ones.
- Find the number that is 1 more/less than any two-digit number.
- Find the number that is 10 more/less than any two-digit number.
- Round any given number up to 100 to the nearest ten.
- Find the nearest ten for a given two-digit number.
- Find a number between two tens.
- Put numbers in order on a number line marked in ones or tens.
- Recognise and use ordinal numbers up to the 20th.
- Use the (<, >) signs to express inequality.
- Put numbers to 100 in order from the greatest to the smallest and vice versa.
- Estimate sets of up to 100 objects choosing from multiples of 10, such as 10, 20, 50 or 100.
- Identify odd and even numbers up to 20.
- Recognise that numbers are alternately even-odd.
- Sort numbers according to their properties (e.g. odd/even, multiples of 2, 5 and 10 etc.).
- Name and write a half part as $\frac{1}{2}$ and a quarter part as $\frac{1}{4}$.
- Name and write two quarters as $\frac{2}{4}$ and three quarters as $\frac{3}{4}$.
- Recognise that two halves ($2 \times \frac{1}{2}$) or four quarters ($4 \times \frac{1}{4}$) make a whole.
- Recognise the equivalence between $\frac{1}{2}$ and $\frac{2}{4}$.
- Recognise which shapes are divided in two or four equal parts and which are not.
- Visualise halves and quarters as well as the equivalence between $\frac{1}{2}$ and $\frac{2}{4}$ using shapes divided in two or four equal parts.
- Identify the half or the quarter part of a shape or number of objects.
- Revise all number pairs to 10.
- Memorise and write all number pairs for 20.
- Derive all the related addition and subtraction facts after splitting a number up to 20 into pairs.
- Derive all number pairs for 100 with multiples of 10 and their related addition and subtraction facts.
- Recognise multiples of 2 up to the 10th multiple.
- Recognise multiples of 5 and 10 up to the 10th multiple.
- Complete and memorise the times table of 2 up to the 10th multiple.
- Complete and memorise the times tables of 5 and 10 up to the 10th multiple.
- Derive the division facts given an array or a multiplication.
- Memorise doubles for all numbers up to 10 and also 15, 20, 25 and 50.
- Identify the relationship between counting forwards/backwards in tens and finding 10 more/less than any given number up to 100.
- Identify the relationship between counting forwards/backwards in tens and adding/subtracting multiples of 10.
- Use the (=) sign to indicate equality, e.g. 12 + 4 = 15 + 1.
- Add at least three single-digit numbers.
- Use symbols such as ☐ and ◇ to represent an unknown number.
- Solve number sentences such as 34 + ☐ = 40 to find the unknown number, by applying a range of strategies.
- Add a single-digit number to a two-digit number.
- Subtract a single-digit number from a two-digit number.
- Add two two-digit numbers.
- Find the difference between two two-digit numbers.
- Recognise that addition can be done in any order, whereas subtraction cannot.
- Realise that both 'difference' and 'take away' refer to subtraction.
- Record multiplication using the (×) sign.
- Recognise multiplication as a process of repeated addition.
- Depict multiplication as an array of objects.
- Write two multiplications for a given array to show that multiplication can be done in any order.
- Record division using the (÷) sign.
- Recognise division as a process of grouping.
- Recognise division as a process of sharing.
- Solve word problems using repeated addition.
- Calculate doubles of multiples of 5 up to the 10th multiple, and their corresponding halves.
- Find doubles of two-digit numbers.
- Complete the times tables of 3 and 4 and derive multiplication and division facts.
- Understand that in division there can be some left over.

Geometry

- Recall common 2D shapes and their attributes.
- Recognise common 2D shapes in different orientations or sizes.
- Name and identify regular and irregular 2D shapes.
- Recognise that regular shapes have all sides the same length.
- Use mathematical terminology to describe 2D shapes.
- Identify common 2D shapes given the descriptions.
- Draw 2D shapes according to a description provided.
- Sort 2D shapes according to their attributes.
- Recall common 3D shapes and their attributes.
- Recognise common 3D shapes in different orientations or sizes and their 2D drawings.
- Use mathematical terminology to describe 3D shapes.
- Identify common 3D shapes given the descriptions.
- Sort 3D shapes according to their attributes.
- Identify and draw the line of symmetry in images and 2D shapes.
- Recognise reflective symmetry in shapes and patterns.
- Give examples of 2D shapes in real life.
- Give examples of 3D shapes in real life.
- Give examples of images that are symmetrical in real life.
- Follow directions or give instructions with reference to position, direction and movement.
- Give instructions using appropriate vocabulary to describe movement and direction.
- Differentiate between clockwise and anti-clockwise direction.
- Recognise a quarter turn, half turn and whole turn (both clockwise and anti-clockwise).
- Identify a quarter turn as right angle.

Measurement

- Identify all coins and their value.
- Identify all notes and their value.
- Use appropriate notation for coins and notes.
- Find a total amount of money using coins, notes or both.
- Provide different combinations of coins and/or notes to pay a specific amount of money.
- Calculate and give change.
- Estimate, measure and record the length of an object using uniform non-standard units.
- Compare objects by length using uniform non-standard units.
- Estimate, measure and record the weight of an object using uniform non-standard units.
- Compare objects by weight using uniform non-standard units.
- Estimate, measure and record the capacity of a container using uniform non-standard units.
- Compare containers by capacity using uniform non-standard units.
- Estimate the length of an object using uniform standard units (metre and centimetre).
- Choose appropriate standard units to measure length.
- Measure and record the length of an object using appropriate tools and notation.
- Estimate the weight of an object using uniform standard units (kilogram and gram).
- Choose appropriate standard units to measure weight.
- Measure and record the weight of an object using appropriate tools and notation.
- Estimate the capacity of a container using uniform standard units (litre).
- Choose appropriate standard units to measure capacity.
- Measure and record the capacity of a container using appropriate tools and notation.
- Compare objects by length using uniform standard units (metre and centimetre).
- Compare objects by weight using uniform standard units (kilogram and gram).
- Compare containers by capacity using uniform standard units (litre).
- Recognise and use common units of time, such as seconds, minutes, hours, days, weeks, months and years.
- Recognise that 1 minute has 60 seconds.
- Recognise that 1 hour has 60 minutes.
- Read and write the time from analogue and digital clocks (at o' clock and the half hour).
- Estimate and measure the duration of everyday activities in seconds or minutes.
- Name the days of the week and the months of the year.
- Put the days of the week and the months of the year in order starting from any given day or month.

Data

- Record and organise data in lists and tables.
- Answer a question using recorded data from a list or a table.
- Complete a block graph according to the data provided in a table or list.
- Answer a question using recorded data from a block graph.
- Complete a pictogram according to the data provided in a table or list.
- Answer a question using recorded data from a pictogram.
- Sort objects in Venn diagrams with one or two criteria.
- Sort objects in Carroll diagrams with one or two criteria.
- Sort numbers (e.g. odd/even, multiples of 2, 5 and 10 etc.) in Venn and Carroll diagrams with one criterion using the rule 'property or non-property' and justify the reasoning behind the choice.

Problem Solving

- Choose from a variety of mental strategies the most appropriate to perform a calculation and explain how the answer was reached.
- Explain and justify the reasoning behind the process of a strategy or a method.
- Work out problems with numbers or puzzles.
- Understand an up to two-step word problem, choose the appropriate operation and represent the answer using pictorial representations, everyday objects or a number line.
- Create a story using numbers provided.
- Check the result of an addition by using alternative methods, e.g. changing the order of the numbers, choosing a different strategy etc.
- Check the result of a subtraction by adding the result of the subtraction to the subtracted number.
- Observe a pattern and continue a two, three, four or five step number pattern.
- Describe the relationship between numbers or shapes.
- Estimate the outcome of an operation before calculating.
- Judge if a result or an answer to a problem is logical depending on the context.

Maths 3

Learning Objectives

Numbers 1 2 3 4

- Count forwards from 100 to at least 200.
- Read and write numbers up to 1000 in numerals or number words.
- Count forwards and backwards in ones, tens and hundreds starting from any two- or three-digit number.
- Count forwards and backwards in twos, threes, fours and fives up to 100.
- Represent numbers up to 1000 with pictorial representations and state what each digit represents (units, tens, hundreds).
- Use an abacus as a tool for displaying place value.
- Identify the number that is 1, 10, 100 more/less than any given number up to 1000.
- Mentally multiply any two-digit number by 10.
- Round any two- or three-digit number to the nearest ten based on the units digit of the number.
- Round any three-digit number to the nearest hundred based on the tens digit of the number.
- Place any three-digit number on a number line marked in hundreds.
- Place any three-digit number on a number line marked in tens.
- Compare numbers up to 999 based on digit to digit (place value) comparison.
- Find a number between two three-digit numbers.
- Order numbers up to 999 from the greatest to the smallest and vice versa.
- Estimate a large number of objects giving a range (e.g. 50 to 70) by grouping in tens.
- Calculate the halves of even numbers up to 40.
- Calculate the halves of odd numbers up to 40, using mixed numbers in the answers.
- Recognise and use fraction notation to represent parts of one whole.
- Verify the equivalence of the fractions $\frac{1}{2}$, $\frac{2}{4}$, $\frac{4}{8}$ and $\frac{5}{10}$.
- Recognise and show mixed numbers in shapes.
- Place fractions or mixed numbers on a number line to put them in order.
- Identify that $\frac{1}{2}$ is situated halfway between 0 and 1 or more precisely halfway between $\frac{1}{4}$ and $\frac{3}{4}$ and $1\frac{1}{2}$ is situated halfway between 1 and 2.
- Relate fractions to division.
- Draw a half, third, quarter or tenth of a shape (divided into two, three, four or ten equal parts) and write the corresponding fraction.
- Calculate quarters, thirds and tenths of numbers (whole number outcomes only).
- Memorise all number pairs to 20 and write the corresponding facts.
- Complete number pairs for 1000 and the corresponding addition and subtraction facts, using multiples of 100.
- Complete number pairs for 100 and the corresponding addition and subtraction facts, using multiples of 5.
- Fill in the multiplication table of 2 and complete the corresponding facts up to 20.
- Fill in the multiplication table of 3 and complete the corresponding facts up to 30.
- Fill in the multiplication table of 4 and complete the corresponding facts up to 40.
- Fill in the multiplication table of 5 and complete the corresponding facts up to 50.
- Fill in the multiplication table of 6 and complete the corresponding facts up to 60.
- Fill in the multiplication table of 9 and complete the corresponding facts up to 90.
- Fill in the multiplication table of 10 and complete the corresponding facts up to 100.
- Recognise that all multiples of 2 finish in 0, 2, 4, 6 or 8.
- Recognise that all multiples of 5 finish in 0 or 5.
- Recognise that all multiples of 10 finish in 0.
- Mentally calculate doubles of numbers up to 20 and the corresponding halves.
- Find the doubles of multiples of 5 up to 100 and write the corresponding halves.
- Find the doubles of multiples of 50 up to 500 and write the corresponding halves.
- Add a multiple of 10 to any two- or three-digit number (e.g. 126 + 30).
- Subtract a multiple of 10 from any larger two- or three-digit number (e.g. 126 – 30).
- Add a multiple of 100 to any two- or three-digit number (e.g. 210 + 400).
- Subtract a multiple of 100 from any larger three-digit number to find the difference (e.g. 375 – 200 = 175).
- Identify and write equivalent number sentences using the = sign.
- Calculate the sum of more than two single-digit numbers.
- Add two two-digit numbers.
- Subtract a two-digit number from another two-digit number to find the difference.
- Use notes to add a two-digit number to a three-digit number.
- Change the order of numbers in an addition to calculate a sum easily (e.g. 4 + 7 + 6 = 4 + 6 + 7 = 17).
- Add a single-digit number to a two-digit number.
- Add a single-digit number to a three-digit number.
- Subtract a single-digit number from a two-digit number to find the difference.
- Subtract a single-digit number from a three-digit number to find the difference.
- Subtract a two-digit number from a three-digit number to find the difference.
- Make jumps of multiples of 10 or 100 forwards and backwards given a three-digit number.
- Perceive that doubling a number requires multiplying by 2 and conversely halving a number requires dividing by 2.
- Perceive that halving and doubling are inverse operations.
- Show halving and doubling with pictorial representations.
- Recognise the underlying rule when multiplying a two-digit number by 10.
- Multiply single-digit numbers by 2 or 4.
- Divide two-digit numbers by 2 or 4.
- Multiply single-digit numbers by 3, 6 or 9.
- Divide two-digit numbers by 3, 6 or 9.
- Multiply single-digit numbers by 5 or 10.
- Divide two-digit numbers by 5 or 10.
- Multiply teen numbers by 2, 3, 4, 5, 6 or 9 using partitioning.
- Divide two-digit numbers by 2, 3, 4, 5, 6 or 9 beyond the 10th multiple.
- Realise that some divisions have a remainder.
- Relate remainder to left over.
- Recognise and apply the commutative property of multiplication.
- Depict a multiplication as an array of objects.
- Use pictorial representations to show the relationship between multiplying and dividing and write the corresponding number sentences.

Geometry

- Identify and describe 2D shapes, both regular and irregular (triangles, quadrilaterals, pentagons, hexagons, octagons), as well as circles and semi-circles.
- Draw regular and irregular 2D shapes.
- Sort 2D shapes according to their attributes (number of sides, vertices, right angles, lines of symmetry).
- Identify pyramids and prisms.
- Recognise the attributes of pyramids and prisms.
- Recognise known 3D shapes and their attributes.
- Describe 3D shapes.
- Create 3D shapes given their faces.
- Explore different nets of the same cube.
- Sort 3D shapes according to their attributes (number and shape of faces, vertices and edges).
- Draw and complete symmetrical shapes and patterns and indicate their line(s) of symmetry.
- Draw the reflection of a shape, a picture or a pattern on a grid using a mirror.
- Match 2D and 3D shapes with their drawings.
- Give examples of line symmetry in the environment.
- Find examples of 2D shapes (regular and irregular) in a given picture.
- Find examples of right angles in the environment.
- Find right angles in shapes.
- Use mathematical terms to describe position and movement of an object both clockwise and anti-clockwise.
- Find the position of a square on a squared map.
- Describe the position of a square using labelled rows and columns.
- Use a set square as a tool to draw a right angle.
- Compare different types of angles with a right angle.
- Perceive that two right angles create a straight line.

Measurement

- Express an amount of money from groups of coins and notes using appropriate notation.
- Use number pairs for 100 to calculate change.
- Estimate length using appropriate units (m, cm, or km).
- Estimate the mass of objects using appropriate units (kg or g).
- Differentiate between capacity and volume.
- Estimate capacity and volume using appropriate units (*l* or *ml*).
- Use appropriate tools and notation to measure and record mass measurements.
- Use appropriate tools and notation to measure and record length measurements.
- Use appropriate tools and notation to measure and record capacity and volume measurements.
- Recognise that the metre is the basic unit of length measurement and equals 100 centimetres.
- Understand the need for larger units of length measurement and name the unit that includes 1000 metres as a kilometre.
- Recognise that the kilogram is the basic unit of mass measurement and equals 1000 grams.
- Recognise that the litre is the basic unit of capacity measurement and equals 1000 millilitres.
- Read a measurement by rounding to the nearest division or half division given a complete or half-complete scale.
- Draw a line and measure its length to the nearest centimetre, using a ruler.
- Solve word problems including measurement.
- Choose appropriate units to express time intervals.
- Understand the relationships between seconds, minutes, hours, days, weeks, months and years.
- Recognise that an hour has 60 minutes and a minute has 60 seconds.
- Read the time on an analogue clock to the nearest 5 minutes using the words 'past' and 'to'.
- Read the time on a digital clock to the nearest minute.
- Calculate simple time intervals expressed in appropriate units (hours and minutes) using an analogue or a digital clock.
- Use a calendar and calculate time intervals in days or weeks.

Data

- Pose a question, collect and organise data to answer the question reasonably.
- Extract information from a frequency table to answer questions.
- Extract information from a pictogram where a picture represents one or two units to answer questions.
- Extract information from a bar chart where the scale is marked in ones or twos to answer questions.
- Complete a tally chart and a frequency table according to the data provided in a list.
- Complete a pictogram where each picture represents one or two units, according to the data provided.
- Complete a bar chart with a scale marked in ones or twos according to the data provided.
- Sort objects and data in a Venn diagram using two criteria.
- Sort objects and data in a Carroll diagram using two criteria.

Problem Solving

- Choose from a variety of known strategies to add, subtract, multiply or divide.
- Comprehend systems of measurement and use appropriate units of measurement.
- Solve one- or two-step problems involving addition and subtraction.
- Solve one-step problems choosing from known operations.
- Solve problems in the context of money.
- Check the result of an addition by changing the order of numbers, applying a different strategy, or using subtraction.
- Check the result of a subtraction by adding the result of the subtraction to the subtracted number.
- Check multiplication by changing the order.
- Check division by applying the inverse operation.
- Find similarities and differences among 2D shapes.
- Find similarities and differences among 3D shapes.
- Use approximation and estimation in calculations.
- Estimate an answer to a problem before calculating using a variety of strategies.
- Determine whether an answer is reasonable or not.
- Narrate a number story corresponding to a calculation in various contexts (e.g. money, measurement).
- Justify the strategy chosen to work out a calculation.
- Work on number puzzles applying different strategies.
- Use data in lists and tables to solve problems.
- Find the rule and complete the missing elements in patterns.
- Find out how numbers relate to each other (e.g. 250 is 100 more than 150.).
- Find out how different shapes relate to each other (e.g. same number of lines of symmetry).
- Verify or reject a statement by the use of examples or counter-examples.
- Justify the strategy or the method chosen to solve a problem.

Maths 4

Learning Objectives

Numbers 1 2 3 4

- Read and write numbers up to 10 000 in numerals or number words.
- Count forwards and backwards in ones, tens, hundreds and thousands starting from any four-digit number.
- Recognise the place value of each digit in three- and four-digit numbers.
- Partition any number up to 10 000 into thousands, hundreds, tens and units.
- Recognise the place value for tenths and hundredths.
- Express amounts of money in decimal form.
- Convert amounts of money from dollars to cents.
- Convert measurements, e.g. lengths, from one form to another.
- Round an amount of money to the nearest dollar.
- Order measurements (e.g. lengths, amounts of money, etc.), expressed in decimal form, from the greatest to the smallest and vice versa.
- Comprehend decimal notation in measurement context (e.g. money, length, mass, capacity).
- Add and subtract multiples of 10, 100, 1000 to/from any number up to 10 000.
- Perform multiplications and divisions of any whole number up to 1000 by 10 (whole number results only).
- Perform multiplications of whole numbers by 100 and write the corresponding division facts (whole number results only).
- Identify multiples of 5, 10, 50 and 100 up to 1000.
- Round any whole number up to 10 000 to the nearest ten or hundred.
- Find the nearest thousand to any four-digit number by placing it on a number line.
- Precisely place any number up to 1000 on a number line with unnumbered divisions or a number line with divisions that are multiples of 10 or 100.
- Estimate and show the position of a three- or four-digit number on blank 0-1000 or 0-10 000 number lines.
- Compare numbers up to 10 000 using the < and > signs and arrange them in ascending or descending order.
- Find a number between two three- or four-digit numbers.
- Explore examples of negative numbers in different contexts, e.g. temperature, lift, etc.
- Identify and continue number sequences by counting on or back in steps of the same size.
- Extend number sequences below zero to include negative numbers.
- Identify odd and even numbers.
- State general rules that apply to the sums and differences of odd and even numbers.
- Recognise and use fraction notation to represent parts of one whole.
- Compare fractions with the same denominator (halves, thirds, quarters, fifths, eighths, tenths) and put them in order from the greatest to the smallest and vice versa.
- Identify equivalent fractions representing one half ($\frac{1}{2}$, $\frac{4}{8}$ and $\frac{5}{10}$), one quarter ($\frac{1}{4}$ and $\frac{2}{8}$) and one fifth ($\frac{1}{5}$ and $\frac{2}{10}$).
- Compare and order fractions using knowledge of equivalent fractions where necessary.
- Recognise the equivalent relationship between one-place decimals and decimal fractions with a denominator of ten.
- Recognise the equivalence between 0.5, $\frac{1}{2}$ and $\frac{5}{10}$.
- Identify the equivalent vulgar fraction form of halves, quarters, tenths and hundredths given the corresponding decimal fraction and vice versa.
- Identify mixed numbers and place them on a number line.
- Begin to arrange mixed numbers in order of size.
- Relate calculating fractions of a quantity to division.
- Show fractions (halves, thirds, quarters, fifths, eighths and tenths) of shapes.
- Calculate fractions (halves, thirds, quarters, fifths, eighths and tenths) of numbers.
- Find pairs of two-digit numbers that have a sum of 100, e.g. 56 + 44 = 100.
- Find pairs of multiples of 50 that have a sum of 1000, e.g. 650 + 350 = 1000.
- Find pairs of fractions that have a sum of 1, e.g. $\frac{3}{5} + \frac{2}{5} = 1$.
- Recall the multiplication tables for numbers 2, 3, 4, 5, 6, 9 and 10 and write the corresponding division facts.
- Fill in the multiplication tables for numbers 7 and 8 and write the corresponding division facts.
- Identify multiples of 2, 3, 4, 5 and 10, up to the 10th multiple.
- Calculate the sum of three or four single-digit numbers, using number pairs for 10 or 20.
- Calculate the sum of three multiples of 10 less than 100.
- Add a near multiple of 10 or 100 to a three-digit number, e.g. 564 + 298.
- Subtract a near multiple of 10 or 100 from a three-digit number, e.g. 564 – 298.
- Calculate the sum of two two-digit numbers, applying an appropriate strategy.
- Subtract two two-digit numbers, applying an appropriate strategy.
- Calculate small differences between near multiples of 100 up to 1000, e.g. 505 – 498.
- Subtract a single-digit from a three-digit number crossing the hundreds boundary, e.g. 803 – 7.
- Multiply two single-digit numbers.
- Apply the commutative property of multiplication to easily calculate a product.
- Understand the role of brackets to indicate the order of operations in a calculation.
- Recognise the underlying rule when multiplying or dividing a three-digit number by 10.
- Find the doubles of whole numbers up to 50, using mental strategies and write the corresponding halves.
- Find the doubles of multiples of 10 up to 500 and doubles of multiples of 100 up to 5000, using mental strategies and write the corresponding halves.
- Add two three-digit numbers.
- Add a two-digit to a three-digit number.
- Calculate the difference between a two- and a three-digit number.
- Calculate the difference between two three-digit numbers.
- Calculate doubles of two-digit numbers.
- Calculate halves of even two-digit numbers.
- Multiply a two-digit multiple of 10 by a single-digit number.
- Perform multiplications of two-digit and single-digit numbers.
- Divide a two-digit number by a single-digit number (answers up to 20).
- Determine whether to round up or down the result of a division to give a reasonable answer to a problem.
- Perceive that multiplication and division are inverse operations.
- Perceive ratio as 'part to part' comparison.
- Perceive proportion as 'part to whole' comparison.
- Comprehend and apply simple ideas of ratio and proportion in context.

Geometry

- Recognise and describe the attributes of 2D shapes, including a range of quadrilaterals as well as some new 2D shapes, e.g. heptagon.
- Recognise and describe the attributes of 3D shapes, e.g. tetrahedron.
- Create polygons on a geoboard and record drawings of these shapes on a dot grid.
- Sort polygons, including quadrilaterals, into regular or not, symmetrical or not as well as according to different features such as the number of right angles.
- Recognise and draw the line(s) of symmetry in 2D shapes and patterns.
- Identify 3D shapes given a net or a 2D drawing.
- Make nets of common 3D shapes.
- Identify or give examples of shapes and symmetry found in the environment and in art.
- Recognise and describe the position of a square on a grid of squares using numbers and/or letters to indicate rows and columns.
- Recognise the unit for measuring angles as the degree and use the appropriate notation (°).
- Recognise that a whole turn is 360° or four right angles.
- Compare and order angles smaller than 180°.
- Suggest a path to follow on a grid of squares giving directions.
- Follow a set of directions to draw a path on a grid of squares.

Measurement

- Estimate, measure and record length, mass, capacity and volume measurements using metric units and appropriate notation (km, m, cm, mm, kg, g, *l*, *ml*).
- Recognise the relationships between the different units of length, mass and capacity or volume and begin to make conversions between the units.
- Interpret 'kilo', 'centi' and 'milli' in the context of measurement.
- Record measurements in decimal form.
- Read and record measurements precisely, interpreting the intervals between divisions on scales that are partially numbered.
- Use an analogue or a 12-hour digital clock to read and tell the time to the nearest minute.
- Refer to everyday activities using a.m. and p.m. notation and a 12-hour digital clock.
- Use and extract information from timetables and calendars.
- Calculate time intervals choosing appropriate units.
- Draw a rectangle and measure the length of its sides to find its perimeter.
- Calculate the perimeter of a rectangle.
- Perceive that we use square units, e.g. cm^2, to measure area.
- Measure the area of a rectilinear shape by counting squares on a grid.

Data

- Organise, present and explicate data in pictograms where each picture represents more than one unit, e.g. 2, 5, 10 or 20 units to answer questions.
- Organise, present and explicate data in bar charts where an axis is marked in different intervals, e.g. twos, fives, tens or twenties to answer questions.
- Organise, present and explicate data in tables, tally charts and frequency tables to answer questions.
- Collect the data needed to answer questions.
- Consider the consequences of changing the intervals on scales used in a representation.
- Sort data and objects according to two or three criteria using Venn or Carroll diagrams.
- Identify and apply efficient strategies (mental or written) to perform additions or subtractions.
- Comprehend systems of measurement in length, mass, capacity, volume and time and apply in context.

Problem Solving

- Solve word problems in the context of measurement.
- Solve one- or multi-step word problems choosing from all four operations.
- Check the result of an addition by changing the order of numbers, applying a different strategy, or using subtraction.
- Check the result of a subtraction by adding the result of the subtraction to the subtracted number.
- Check the result of a multiplication by using an alternative strategy to perform the same multiplication.
- Check the result of a division by performing multiplication.
- Find out how 2D shapes relate to each other, e.g. a rectangle is a parallelogram.
- Find similarities and differences among 3D shapes.
- Use approximation and estimation before calculating, then check results.
- Narrate a number story corresponding to a calculation in various contexts (e.g. money, measurement).
- Justify the strategy chosen to work out a calculation.
- Justify the strategy or the method chosen to solve a problem.
- Investigate and work on number problems and puzzles that involve logical reasoning.
- Solve problems methodically by organising information in lists and tables.
- Identify and extend number sequences.
- Identify the relationship between numbers in a sequence and describe the rule for generating the next number in the sequence.
- Make true statements to describe how shapes relate to each other, e.g. these polygons are all quadrilaterals because...
- Find out how numbers relate to each other in a pattern.
- Decide whether a statement is always true, sometimes true or never true providing examples or counterexamples, e.g. the difference between an odd and an even number is always an odd number.
- Make conjectures and test them to verify or reject.
- Explain the methods used and provide adequate justification to support reasoning (orally and in written form).

Maths 5

Learning Objectives

Numbers

- Read and write numbers up to 1 000 000 in numerals or number words.
- Count forwards and backwards in steps of a whole number, often extending into negative numbers.
- Recognise the place value of each digit in five- and six-digit numbers.
- Partition any number up to 1 000 000 into hundred thousands, ten thousands, thousands, hundreds, tens and units.
- Read and write decimals with one or two decimal places.
- Identify the tenths and hundredths digits in decimals with one or two decimal places and use decimal notation.
- Find the nearest whole number for any decimal with one or two decimal places.
- Compare one- or two-place decimals and arrange them in ascending or descending order.
- Place decimals on a number line marked in whole units, tenths or hundredths.
- Perform multiplications and divisions of any whole number up to 10 000 by 10 or 100 and describe the process.
- Identify multiples of 5, 10, 25, 50 and 100 up to 1000.
- Identify odd and even numbers up to 1000.
- State and use divisibility rules to answer whether or not a number is a multiple of 2, 5, 10 and 100.
- Round any whole number up to 10 000 to the nearest ten, hundred or thousand.
- Compare numbers up to 1 000 000 using the < and > signs and arrange them in ascending or descending order.
- Begin to compare and order positive and negative numbers by placing them on a number line or a temperature scale.
- Calculate the new temperature after an increase or decrease.
- Identify and continue number sequences involving both positive and negative numbers.
- State general rules that apply to sums, differences and multiples of odd and even numbers.
- Understand how decimals and fractions can be equivalent for halves, tenths and hundredths and use this knowledge to put fractions in order, e.g. $\frac{1}{2}$ is less than 0.8 and greater than 20%.
- Compare and order fractions using knowledge of equivalent fractions where necessary.
- Identify equivalent fractions for one half ($\frac{1}{2}$, $\frac{2}{4}$ and $\frac{4}{8}$), one third ($\frac{1}{3}$ and $\frac{2}{6}$) and one fifth ($\frac{1}{5}$ and $\frac{2}{10}$).
- Convert an improper fraction into a mixed number by dividing the numerator by the denominator.
- Arrange mixed numbers in order of size and place them on a number line between two consecutive whole numbers.
- Relate calculating fractions of a quantity to division.
- Calculate simple fractions of a quantity.
- Perceive percentage as the number of equal parts in a hundred.
- Calculate simple percentages of a quantity.
- Write halves, tenths and hundreds in percentage form.
- Memorise pairs of one-place decimals that add up to 1, e.g. 0.7 + 0.3.
- Find pairs of decimals that add up to 1 or 10.
- Recall the times tables of all numbers up to 10 and write the corresponding division facts.
- Identify multiples of 6, 7, 8 and 9 up to the 10th multiple.
- Memorise squares of all numbers up to 10
- Write the factors of a two-digit number.
- Perform additions and subtractions involving near multiples of 10 or 100, e.g. 7246 + 499.
- Calculate small differences between near multiples of 1000 up to 10 000.
- Calculate small differences between decimals, e.g. 5.3 – 4.8.
- Use brackets to show the order of operations.
- Begin to perform calculations in number sentences involving brackets.
- Begin to explore the laws of multiplication and apply to simple number sentences.
- Find the doubles of three-digit multiples of 10, e.g. 780 and write the corresponding halves.
- Find the doubles of four-digit multiples of 100, e.g. double 4800 and write the corresponding halves.
- Double two-digit numbers and find the corresponding halves.
- Double one- and two-place decimals by doubling the corresponding whole numbers.
- Halve one- and two-place decimals by halving the corresponding whole numbers.
- Add or subtract by counting forwards or backwards in ones, tens, hundreds and thousands.
- Add two two-digit or three-digit numbers, making short notes to support working where necessary.
- Subtract two two-digit or three-digit numbers, making short notes to support working where necessary.
- Add two one-place decimals, making short notes to support working where necessary.
- Subtract two one-place decimals, making short notes to support working where necessary.
- Use a written method to add at least three two- or three-digit numbers.
- Find the sum of or the difference between two three- and/or four-digit numbers.
- Add or subtract decimals with the same number of decimal places.
- Add or subtract amounts of money expressed in the form of decimals with the same number of decimal places.
- Multiply a two-digit multiple of 10 by a single-digit number.
- Multiply a three-digit multiple of 100 by a single-digit number.
- Perform multiplications by 19 or 21 by multiplying by 20 and adjusting the answer.
- Multiply by 100 and then divide by 4 to multiply by 25.
- Multiply using factors (e.g. to multiply by 8, first multiply by 4 and then double).
- Perform multiplications of three-digit and single-digit numbers.
- Perform multiplications of two two-digit numbers.
- Perform multiplications of one-place decimals by single-digit numbers.
- Divide a two- or three-digit number by a single-digit number with or without a remainder (answers up to 30).
- Become familiar with writing remainders as a fraction of the divisor when performing divisions between a two- and a single-digit number.
- Perform a division by applying either grouping (based on known multiplication facts) or sharing (halve or quarter).
- Determine whether to round the result of a division up or down to give a reasonable answer to a problem.
- Estimate and express proportions of small quantities as fractions.
- Perceive fractions of quantities as parts of a whole.
- Solve ratio word problems in various contexts, e.g. mixing paint, recipes, etc.

Geometry

- Recognise and describe the attributes of different types of triangles (equilateral, isosceles, scalene) referring to their sides and angles.
- Sort triangles into equilateral, isosceles or scalene.
- Identify the attribute of reflective symmetry in regular polygons.
- Identify the attribute of rotational symmetry in regular polygons.

- Explore the concept of symmetry by making patterns with two lines of symmetry on a geoboard or drawing them on squared paper.
- Identify 3D shapes given a net or a 2D drawing.
- Identify 2D shapes with parallel or perpendicular sides.
- Identify or give examples of parallel and perpendicular lines found in drawings and in the environment.
- Recognise that coordinates are pairs of numbers that show the position of a point.
- Describe the position of a point in the first quadrant using coordinates.
- Practise plotting coordinates in the first quadrant to show the position of a point.
- Investigate whether or not a set of three coordinates makes a triangle.
- Measure the size of an angle in degrees, rounding to multiples of 5°, using a protractor.
- Estimate the size of angles by comparing them to the right angle.
- Sort angles into right, acute or obtuse angles.
- Calculate the size of one unknown angle in a pair of angles with a sum of 180°.
- Draw a polygon after it is reflected in a mirror line that is parallel to one of the sides and that is either an oblique line or not.
- Perceive translation as a movement along a straight line.
- Follow a set of instructions to translate a shape
- Write a set of instructions to describe the translation of a shape.

Measurement

- Estimate, measure and record length, mass, capacity and volume measurements to a particular level of precision using metric units and appropriate notation (km, m, cm, mm, kg, g, *l*, *ml*).
- Recognise the relationships between the different units of length, mass and capacity or volume to convert measurements (including decimals with one decimal place) from greater to smaller units.
- Arrange measurements expressed in different metric units in ascending or descending order, e.g. 250 cm, 2.7 m, 2804 mm.
- Find the nearest whole unit to round measurements expressed in decimal form.
- Read and interpret any marking on scales with unnumbered divisions.
- Make comparisons between readings made using different scales.
- Draw and measure a line precisely to the nearest centimetre or millimetre.
- Know the units of time (seconds, minutes, hours, days, months and years) and use them to make conversions between the units.
- Read and tell time using analogue (12-hour) and digital clocks (12-hour and 24-hour) and compare between these time formats.
- Change 12-hour clock times to 24-hour clock times and vice versa.
- Extract information from timetables using the 24-hour clock.
- Find the time interval, between two dates, in days and/or weeks using a calendar.
- Find the time interval between two dates, in months and/or years.
- Use analogue or digital clocks to calculate the time interval between two times in seconds, minutes and/or hours.
- Measure the perimeter of regular and irregular polygons.
- Calculate the perimeter of a regular polygon using the length of one side.
- Perceive that we use square units, e.g. cm^2, to measure area.
- Calculate the area of a rectangle using a formula.

Data

- Collect, record and organise data referring to a specific topic to answer questions.
- Come up with conclusions based on data they have collected on their own or using data collected by other people.
- Pose more questions to be asked chart with a vertical axis marked in twos, fives, tens, twenties or hundreds.
- Draw a bar line chart with a vertical axis marked in twos, fives, tens, twenties or hundreds to display data.
- Realise the consequences of changing the scale on the vertical axis of bar line charts.
- Draw a line graph to show changes of a phenomenon over time.
- Justify the existence or non-existence of intermediate points in a line graph by examining a range of examples.
- Identify the mode as the number that occurs most often in a set of data.
- Find the mode of a set of data and interpret it considering the context.
- Describe how often an event occurs using vocabulary associated with probability.

Problem Solving

- Comprehend systems of measurement for length, mass, capacity, volume, time and temperature and apply in context.
- Perform calculations in the context of measurement.
- Solve word problems in the context of measurement.
- Solve one- or multi-step word problems choosing from all four operations.
- Use a diagram or a number line to display the problem and its solution.
- Solve multi-step word problems by posing sub-questions to be answered.
- Check the result of an addition by changing the order of numbers or applying the inverse operation.
- Check the result of a subtraction by applying the inverse operation.
- Check the result of a division by performing multiplication.
- Find out how 2D and 3D shapes relate to each other, e.g. a face of a triangular pyramid is a triangle.
- Use approximation and estimation before calculating e.g. use rounding, then check results.
- Determine whether the outcome of a problem is reasonable.
- Justify the strategy chosen to work out a calculation.
- Investigate and work on number problems and puzzles that involve logical reasoning.
- Derive new data from the existing data to draw new conclusions and solve problems.
- Solve problems methodically by organising information in lists and tables.
- Identify and extend number sequences involving negative numbers.
- Identify the relationship between numbers in a sequence and describe the rule for generating the next number in the sequence
- Make true statements to describe how shapes relate to each other, e.g. squares and rectangles are parallelograms.
- Decide whether a statement is always true, sometimes true or never true providing examples or counterexamples, e.g. double a number plus 1 is always an odd number.
- Make conjectures, and test them to verify or reject.
- Explain the methods used and provide adequate justification to support reasoning (orally and in written form).

Maths 6

Learning Objectives

Numbers

- Count forwards and backwards in steps of a fraction, decimal or whole number, often extending into negative numbers.
- Recognise the place value of each digit in whole numbers up to 1 000 000.
- Recognise the place value of each digit in decimals with one or two decimal places.
- Express measurements using decimals with one, two or three decimal places.
- Find the nearest tenth or whole number for any decimal with two decimal places.
- Compare one- or two-place decimals to numbers with the same or a different number of decimal places and arrange them in ascending or descending order.
- Perform multiplications and divisions of any whole number up to 10 000 by 10, 100 or 1000 and describe the process.
- Perform multiplications and divisions of decimals by 10 or 100 (resulting in one- or two-place decimals) and describe the process.
- Identify multiples of 5, 10, 25, 50 and 100 up to 1000.
- Identify odd and even numbers up to 1000.
- State and use divisibility rules to answer whether or not a number is a multiple of 2, 4, 5, 10, 25 and 100.
- Round any whole number to the nearest ten, hundred or thousand.
- Estimate and show the position of a four-digit number on a blank 0 - 10 000 number line.
- Use the <, > and = signs to denote inequality or equality.
- Compare and order positive numbers up to 1 000 000 and negative integers within a reasonable range.
- Calculate the difference between a positive and a negative integer or two negative integers in different contexts, e.g. temperature, or by visualising numbers on a number line.
- Identify and continue number sequences involving positive and negative numbers, fractions and decimals.
- State general rules that apply to sums, differences and multiples of odd and even numbers.
- Identify prime numbers up to 20 and explore prime numbers up to 100.
- Explore the history and the development of our number system through research on specific topics.
- Compare and order fractions using knowledge of equivalent fractions where necessary.
- Understand the equivalent relationship between the decimal and the fraction form of a number.
- Become familiar with changing vulgar fractions to decimal fractions by dividing the numerator by the denominator.
- Simplify fractions representing one half, one quarter, three quarters, a number of fifths or tenths.
- Identify equivalent fractions representing a number of halves, tenths or hundredths.
- Arrange mixed numbers in order of size and place them on a number line between two consecutive whole numbers.
- Convert an improper fraction into a mixed number by dividing the numerator by the denominator.
- Relate calculating fractions of a quantity to division.
- Calculate fractions of a quantity, e.g. tenths and hundredths.
- Convert $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{10}, \frac{1}{100}$ into percentages.
- Perceive percentage as the number of equal parts in a hundred.
- Calculate simple percentages of whole numbers.
- Show simple percentages in shapes.
- Estimate and approximate large numbers reasonably.
- Memorise fact families for any whole number up to 20.
- Memorise pairs of one-place decimals that add up to 1, e.g. 0.7 + 0.3.
- Find pairs of one-place decimals that add up to 10, e.g. 3.2 + 6.8, and pairs of two-place decimals that add up to 1, e.g. 0.53 + 0.47.
- Use multiplication facts and knowledge of place value to mentally perform multiplications and divisions with decimals.
- Explore finding common multiples of two or more numbers, e.g. 3 and 5.
- Explore finding factors of two-digit numbers.
- Perform additions and subtractions involving near multiples of 1, e.g. 7.8 + 2.3; 4.6 – 1.9.
- Perform additions and subtractions involving near multiples of 10, 100 or 1000, e.g. 2945 + 5997; 6764 – 499.
- Perform additions and subtractions involving a near dollar amount, e.g. $5.85 + $2.99.
- Comprehend and apply the commutative, associative and distributive laws of multiplication with or without using conventional mathematical terms.
- Double two-digit numbers, including whole numbers or decimals with up to two decimal places, e.g. 56, 5.6, 0.56 using mental strategies and write the corresponding halves.
- Add or subtract two-digit whole numbers using knowledge of place value and number pairs.
- Add or subtract three-digit multiples of 10 using knowledge of place value and number pairs, e.g. 140 + 360.
- Add or subtract pairs of decimals using knowledge of place value or pairs of decimals that add up to 1, e.g. 0.27 + 0.73.
- Find the sum of two- and three-digit whole numbers with the same or a different number of digits.
- Add or subtract decimals with the same or a different number of decimal places.
- Add or subtract amounts of money expressed in the form of decimals with the same or a different number of decimal places.
- Multiply two multiples of 10 or a multiple of 10 by a multiple of 100, e.g. 60 × 50, 300 × 80.
- Perform multiplications involving near multiples of 10 using multiples of 10 and adjusting the answer, e.g. 39 × 6.
- Calculate the product of two numbers by halving one number and doubling the other, e.g. 25 × 12 = 50 × 6.
- Derive new multiplication facts from already known ones, e.g. the 16× table from 10× and 6× tables.
- Perform multiplications of numbers with up to four digits (whole numbers or decimals in the context of money) and single-digit numbers.
- Perform multiplications of two- or three-digit numbers (whole numbers or decimals in the context of money) and single-digit numbers.
- Divide a two-digit number by a single-digit number with or without a remainder.
- Divide a three-digit number by a single-digit number with or without a remainder.
- Divide a three-digit number by a two-digit number without a remainder including divisions in the context of money.
- Express the answer to a division where the divisor is 2, 4, 5, 10 or 100 as a mixed number or decimal.
- Use ratio and proportion to investigate the relationship between different quantities.

Geometry

- Recognise and describe different types of polygons and check whether a shape is a polygon or not.
- Recognise and sort quadrilaterals by their attributes (parallel sides or not, number of equal sides/angles).
- Recognise and describe the attributes of the parallelogram, rhombus, trapezium and other quadrilaterals.
- Explore 3D shapes referring to their attributes, e.g. faces, edges, vertices
- Identify regular polyhedra and describe their attributes.
- Identify and make 2D drawings or nets of 3D shapes.

- Describe the position of a point in any of the four quadrants using coordinates.
- Practise plotting coordinates in any of the four quadrants to show the position of a point on a grid.
- Identify whether an angle is acute or obtuse and measure angles within 1°, using a protractor.
- Draw acute and obtuse angles within 1°, using a protractor.
- Deduce that the sum of the angles in a triangle is 180° using a variety of methods, e.g. measure angles with a protractor or use paper folding.
- Calculate the size of one unknown angle in a triangle.
- Calculate the size of one unknown angle in a set of angles about a point.
- Determine the position of a polygon after one reflection in a mirror line, when the line is not parallel or perpendicular to any side of the shape and draw the reflected shape on a grid.
- Determine the position of a polygon after one translation and draw the translated shape on a grid.
- Determine the position of a polygon after rotating the shape 90°, about one of its vertices in a clockwise or anti-clockwise direction and draw the rotated shape on a grid.

Measurement

- Record measurements using standard metric or imperial units.
- Convert measurements (including decimals with up to three decimal places) from one unit to another.
- Read and interpret any marking on scales with different divisions, on a variety of instruments used for measurement, e.g. rulers, scales, jugs.
- Draw and measure a line precisely to the nearest centimetre or millimetre.
- Recognise and use imperial units, contemporarily used and approximately convert these to the corresponding metric units, e.g. miles to metres or kilometres.
- Know the units of time, including decades and centuries and the relationships between them.
- Convert between the different time units.
- Read and tell time on an analogue clock (12-hour) and a digital clock (12-hour and 24-hour).
- Compare 24-hour digital times and analogue times, e.g. 17:50 and twenty to six in the afternoon.
- Use and extract information from timetables using the 24-hour clock.
- Find the time interval, between two dates, in days, weeks and/or months using a calendar.
- Find the time interval between two dates, in days, months or years using knowledge of leap years.
- Find the time interval between two times on 24-hour digital clocks and analogue clocks in hours and minutes.
- Realise that there are time differences between places around the world and that the regions in the same time zone have a common time.
- Apply the knowledge of time zones to find time intervals and solve time problems.
- Measure and calculate the perimeter of rectilinear shapes.
- Calculate the perimeter of composite shapes that can be divided into rectangles.
- Calculate the area of rectilinear shapes using a formula.
- Solve problems in the contexts of area and perimeter, e.g. calculate the length of a rectangle, given its width and area.
- Count the squares and half squares that form an irregular shape, including a parallelogram, to approximate area.

Data

- Extract and interpret information found in graphs, e.g. line graphs and tables, including a ready reckoner, to answer a set of questions and solve a problem.
- Extract and interpret information found in pie charts to answer a set of questions and solve a problem.
- Realise that a ready reckoner is a table used to convert between units, e.g. cups to millilitres.
- Use a ready reckoner to convert between currencies.
- Draw line graphs and bar charts or convert from one form to the other to present data in a convenient way.
- Compare a bar chart to a pie chart and convert between them by drawing a bar chart to present data from a pie chart.
- Come up with conclusions based on data represented on line graphs, bar charts and pie charts.
- Identify the mode and range of a set of data drawing upon the results of a scientific experiment or a survey.
- Begin to calculate the median and the mean of a set of data and interpret.
- Investigate the ways statistics are applied in everyday life.
- Discuss the likelihood of an event using probability vocabulary.
- Investigate the probability in a range of events, including events that have an even chance of occurring.

Problem Solving

- Identify and apply efficient strategies (mental or written) to perform all four operations.
- Comprehend systems of measurement for length, mass, capacity, volume, time and temperature and apply in context.
- Perform calculations in the context of measurement.
- Solve word problems in the context of measurement.
- Solve one- or multi-step word problems choosing from all four operations.
- Use a diagram or a number line to display the problem and its solution.
- Use brackets to show the order of operations necessary to solve a problem.
- Apply knowledge of ratio and direct proportion to solve simple word problems.
- Apply knowledge of percentages to solve simple word problems.
- Check the result of an addition by changing the order of numbers when adding several numbers (whole numbers or decimals).
- Check the result of a subtraction by applying the inverse operation.
- Identify 2D and 3D shapes and find out how these shapes relate to each other.
- Explore cross sections of known 3D shapes after parallel cuts through one of the faces, e.g. a cylinder has a circular cross-section.
- Use approximation and estimation before calculating, e.g. use rounding, then check results.
- Justify the strategy chosen to work out a calculation and share working in class.
- Apply logical reasoning to investigate and work on number problems and mathematical puzzles.
- Derive new data from the existing data to draw new conclusions and realise the interaction between different pieces of information.
- Solve problems methodically by organising information in lists and tables.
- Find out how numbers relate to each other and come up with generalisations.
- Use words, then symbols or letters to denote generalisations, e.g. every odd number is twice a number plus 1 (2n + 1).
- Make conjectures, test them and make refinements, provide adequate justification to support methods and strategies, reasoning and conclusions.

high-quality illustrations to introduce the topic, capture students' interest and motivate mathematical investigation

an introductory question to engage students in the lesson and trigger whole-class discussion

2.6 Let's put them together!

How many apples are there altogether?

Look!

keywords highlighted in each lesson

When we **put together**, we **add**.

6	+	3	=	9

the main mathematical concepts presented using pictorial representations and age-appropriate vocabulary

6 and 3 is 9.

32

activities that reinforce mathematical skills and acquired knowledge through practice

domain(s) taught in each lesson highlighted

2.6

Activities

1. Circle the correct number.

a.  

4 + 2 = **7 / 5 / 6**

b.  

4 + 1 = **6 / 5 / 8**

c.  

7 + 3 = **9 / 8 / 10**

enjoyable cooperative/individual games, puzzles or cross-curricular activities that promote creative thinking and involve the application of knowledge and skills in different contexts

2. Count and write the numbers.

a.  

☐ + ☐ = ☐

b.  

☐ + ☐ = ☐

c. 

☐ + ☐ = ☐

3. How many balls of play dough are there altogether?

a keyword list with the significant words of the lesson

Keywords

altogether
put together
add

The materials needed for the activities of each unit, accompanied by pictures, are presented at the back of the book.

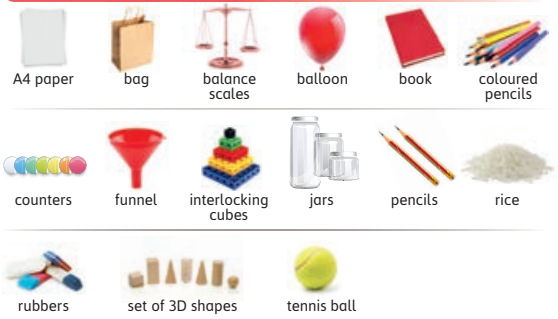
Materials

Maths 1

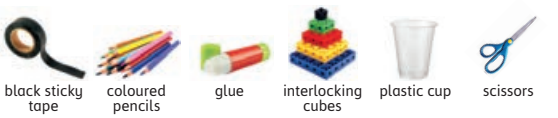
Unit 1

Unit 2

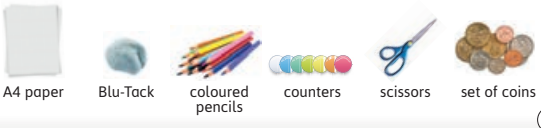
Unit 3



Unit 4



Unit 5



160 161

The key mathematical terms presented with comprehensible, age-appropriate definitions or pictures and examples ensure a gradual development of mathematical terminology.

Glossary

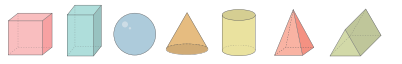
Maths 1

100 square

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

2D shape

3D shape



add — to put numbers or groups of objects together

addition — a number sentence that shows adding
e.g. 6 + 3 = 9

after

The brown canoe is ***after*** *the green canoe.*

afternoon — the part of the day between 12 o'clock and about 6 o'clock

altogether — how much of something there is after adding

backwards — in the direction that is behind us

balance scales — a device for measuring how heavy something is

balanced — when the things placed on the two sides of a pair of scales weigh the same

before

The yellow canoe is ***before*** *the green canoe.*

behind

The school is ***behind*** *the tree.*

between

The bag is ***between*** *the table and the chair.*

bigger (for numbers) — more than
e.g. 13 is ***bigger*** *than 11.*

biggest (for numbers) — the most
e.g. 2, 11, 13, 19
19 is the ***biggest*** *number.*

block graph — an organised way to show information using blocks

capacity — how much a container can hold

Carroll diagram — a way to sort objects into groups by asking 'Yes' or 'No' questions

cent

cent coins

check — to make sure that an answer to a number sentence is correct

circle

164 165

Practice activities are provided for each lesson of the Student's Book, with a gradually increasing level of difficulty, to reinforce students' understanding of concepts and processes and to help them expand their knowledge. Keys for all the activities of the Workbook are provided in the Workbook Teacher's Edition.

2.6 Let's put them together!

1. How many are there altogether? Write the numbers.

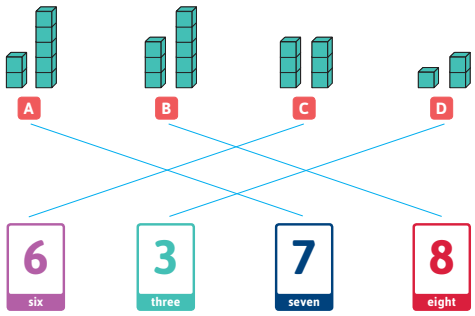
a. + = 9

b. + = 10

c. + = 4

d. + = 7

2. How many cubes are there altogether? Draw lines to match.



3. Count the squares and write the numbers.

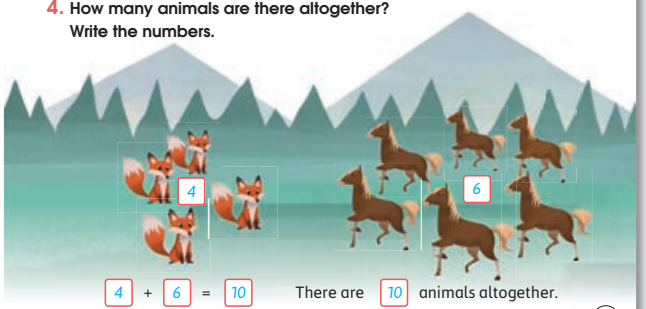
a. 1 + 4 = 5

b. 4 + 2 = 6

c. 2 + 5 = 7

d. 5 + 3 = 8

4. How many animals are there altogether? Write the numbers.



4 + 6 = 10 There are 10 animals altogether.

The first two pages of each unit contain a brief introduction to the unit, an overview of each lesson and supplementary information, which together reveal the structure of the mathematical content in this unit and enable teachers to monitor the progression of knowledge throughout the units.

2 Unit map

IN UNIT 2, Ss will deal with the domains of Geometry and Numbers. Ss will recognise three different types of lines. Ss will also recognise common 2D shapes and describe their basic attributes. Then Ss will explore symmetry in pictures through folding and identify odd and even numbers. Finally, Ss will add and subtract through putting sets of objects together or taking them away. The unit is divided into seven lessons:

2.1 Lines
In this lesson, Ss will recognise three types of lines: straight, curved and zig-zag.

2.2 Name the 2D shapes
In this lesson, Ss will recognise a circle, a triangle, a rectangle and a square. Ss will recognise their basic attributes; the total number of sides and corners they have.

2.3 More 2D shapes
In this lesson, Ss will recognise a pentagon and a hexagon. Ss will recognise their basic attributes; the total number of sides and corners they have.

2.4 Symmetrical or not
In this lesson, Ss will identify line symmetry through folding paper.

2.5 Even or odd
In this lesson, Ss will recognise and differentiate even and odd numbers according to how objects are paired.

2.6 Let's put them together!
In this lesson, Ss will add by putting together sets of objects.

2.7 Now, let's take away!
In this lesson, Ss will subtract by removing or crossing out objects from sets.

Domain	Prior Knowledge	Learning Objectives	Keywords
Geometry	Ss know some names of common 2D shapes. Ss know some attributes of common 2D shapes.	> Distinguish between straight, curved and zig-zag lines. > Name and recognise common 2D shapes. > Identify the common 2D shapes that form a picture. > Describe common 2D shapes referring to the number of their sides and whether they are straight or curved. > Explore the concept of line symmetry using folded paper. > Distinguish symmetrical from non-symmetrical images by folding. > Identify line symmetry. > Match the symmetrical parts of a drawing.	> straight line > curved line > zig-zag line > 2D shape > square > triangle > circle > rectangle > straight side > corner > curved side > pentagon > hexagon > symmetrical > fold > line of symmetry
Numbers	Ss name, write, recite, compare and put numbers up to 10 in order. Ss count sets of up to 10 objects. Ss find the difference between two single-digit numbers.	> Perceive addition as the act of combining numbers to find the total. > Perceive subtraction as the act of taking away. > Use the addition and equals signs (+, =) to denote addition in number sentences. > Use the subtraction and equals signs (-, =) to denote subtraction in number sentences. > Name the numbers that can be paired as even and the others as odd. > Identify and name even and odd numbers up to 10 (except zero).	> pair > even > odd > altogether > put together > add > take away > subtract

age-appropriate learning objectives covered in each lesson

a list of the keywords of the lesson to ease lesson planning

materials and resources that students and teachers need throughout the lesson as well as for the activities in the More practice section

a list of students' possible difficulties and/or preconceptions to assist the teacher in intervening appropriately

the interconnections between the current lesson and previous lessons or other school subjects are indicated

an introductory question to capture students' interest and motivate them to explore the picture through whole-class discussion

2.6 Let's put them together!

Learning Objectives

- Perceive addition as the act of combining numbers to find the total.
- Use the addition and equals signs (+, =) to denote addition in number sentences.

Keywords

For the presentation of the keywords, see the guidelines in the TB map.

> altogether > put together > add

Materials and Resources

- Number cards
- interlocking cubes (2 different colours), play dough, pencils

Common Student Preconceptions

- Some Ss are familiar with various real-life situations where they have to put things together (e.g. while playing or collecting items).
- Some Ss may use the word add incorrectly, without any mathematical meaning. For example, I add some sugar in my tea.
- Some Ss may not use the symbols (+, =) correctly.
- Some Ss may not identify that the number that shows the total is equal to the number of the last object to be counted.
- Some Ss may have difficulties with additions involving zero.

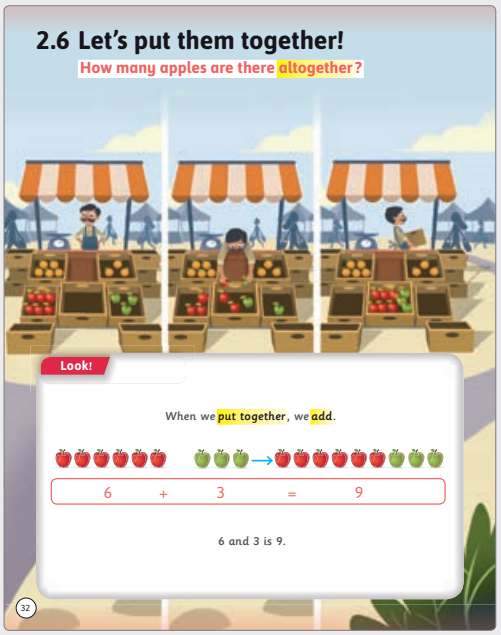
Cross Curriculum Links (CCL)

- This lesson can be linked with lesson 1.5 from Unit 1, as Ss already know how to count up to ten objects.

LESSON PLAN

How many apples are there altogether?

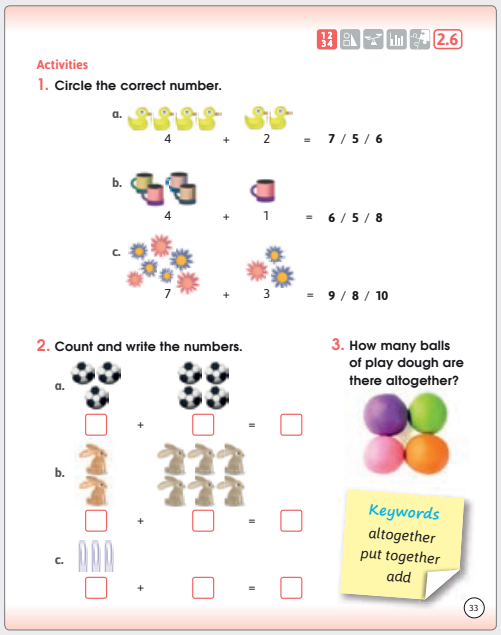
- Draw Ss' attention to the picture and ask them to say what they can see (a man in a market, red and green apples, oranges).
- Ask Ss the introductory question ***How many apples are there altogether?***
- Allow Ss some time to think about their answers.
- Encourage Ss to express their opinions and initiate a short discussion in class.
- Don't correct Ss' answers at this stage of the lesson.



Look!

- Draw Ss' attention to the Look! section.
- Have Ss count the red apples and then the green apples to conclude that there are 6 red apples and 3 green apples.
- Make sure that Ss do not miscount (e.g. Some Ss may count some objects more than once or not count some objects at all.).
- Explain to Ss that they have to find how many red and green apples there are altogether.
- Explain to Ss that we count all the apples together to find how many there are altogether.
- Have Ss count aloud with you.
- Make sure that Ss realise that they should start counting the apples one by one and that the last number they say shows how many apples there are altogether.
- Point out to Ss that there are 9 apples altogether.
- Explain to Ss that when we put together, we add.
- Write '6 + 3 = 9' on the board.
- Explain to Ss that we read (+) as 'and' and (=) as 'is', so we say that 6 and 3 is 9.
- Draw Ss' attention to the picture in the previous section and ask them ***How many oranges***

extensive step-by-step guidelines that follow the structure of the Look! section



are there altogether? (There are 8 oranges altogether.).

- Encourage Ss to use interlocking cubes (2 different colours) and ask them questions such as ***There are 3 cherries in a basket and 2 cherries in another basket. How many cherries are there altogether?*** (There are 5 cherries altogether.).
- Allow Ss some time to think about their answers.
- Make sure that Ss answer correctly at this stage of the lesson.

Activities

1. a. 6 b. 5 c. 10
2. a. 3 + 4 = 7 b. 2 + 6 = 8 c. 3 + 0 = 3
3. • Divide Ss into pairs.
   - Provide Ss with play dough.
   - Instruct Ss to use their number cards 0-5.
   - Have Ss make a pile using the number cards.
   - Have Ss pick a number card out of the pile, read the number aloud and use play dough to make the correct number of balls as on the number card. Then have each pair put all the balls of play dough together and count aloud to find how many balls there are altogether.
   - Have Ss repeat the activity until Ss have used all their cards.
   - Give Ss some time to do the activity.

More practice

For lower-performing Ss:

- Divide Ss into pairs.
- Provide Ss with pencils.
- Have each pair act out a story problem such as ***Kate has six pencils. Lin gives her four pencils. How many pencils does Kate have now?*** (Kate has 10 pencils now.).
- Encourage Ss to use their fingers to help them add.
- Give Ss some time to do the activity.
- Have Ss repeat the activity with different numbers.

For higher-performing Ss:

- Provide Ss with interlocking cubes.
- Ask Ss questions involving additions of three numbers such as ***Kate has 4 cubes, Lin has 2 cubes and Karim has 3 cubes. How many cubes do they have altogether?*** (They have 9 cubes altogether.).
- Encourage Ss to use interlocking cubes to answer.
- Give Ss some time to do the activity.
- Have Ss repeat the activity with different numbers.
- Make sure that the totals do not exceed ten.

Don't forget to prepare the materials and resources for the next lesson.

…s have to walk among the desks.

Safety rules

> Ss should move slowly and calmly.

- Give Ss some time to do the activity.

differentiated activities for lower or higher performing students, designed to enhance cooperative learning

keys for all the activities of the Student's Book

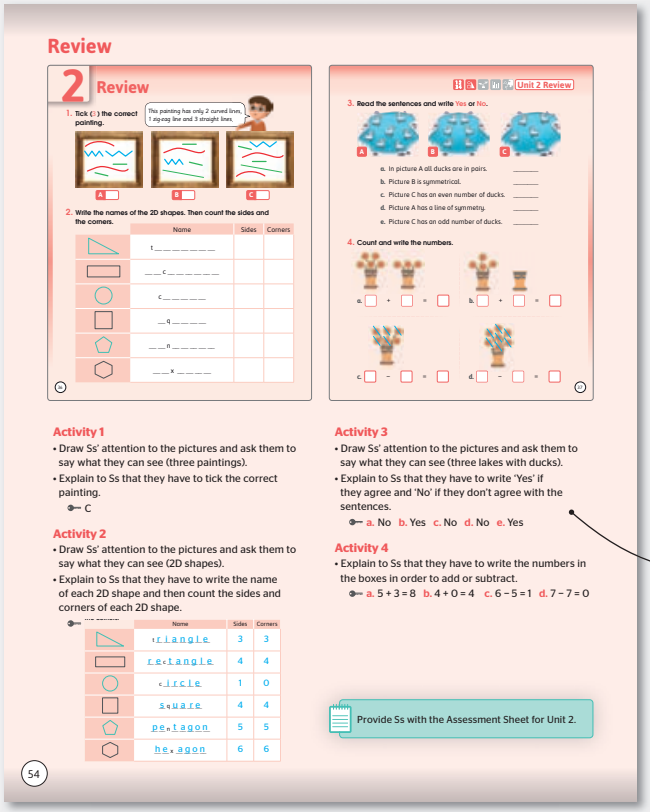
reminders to facilitate the teaching procedure

brief instructions for the games, puzzles and/or cross curricular activities (the use of materials is often required)

thought-provoking questions that enable students to better explore the mathematical concepts of the lesson and which often require justification

notes focusing on safety issues for the students

Review activities, designed to assist students in consolidating their learning and reflecting on their knowledge, are provided at the end of each unit.



Review

2 Review

1. Tick (✓) the correct painting.

This painting has only 2 curved lines, 1 zig-zag line and 3 straight lines.

A ☐ B ☐ C ☐

2. Write the names of the 2D shapes. Then count the sides and the corners.

Name	Sides	Corners
t_____		
___c_____		
c_____		
___q_____		
___n_____		
___x_____		

Unit 2 Review

3. Read the sentences and write Yes or No.

a. In picture A all ducks are in pairs. _____
b. Picture B is symmetrical. _____
c. Picture C has an even number of ducks. _____
d. Picture A has a line of symmetry. _____
e. Picture C has an odd number of ducks. _____

4. Count and write the numbers.

a. ☐ + ☐ = ☐ b. ☐ + ☐ = ☐
c. ☐ − ☐ = ☐ d. ☐ − ☐ = ☐

54

Activity 1
- Draw Ss' attention to the pictures and ask them to say what they can see (three paintings).
- Explain to Ss that they have to tick the correct painting.

⊶ C

Activity 2
- Draw Ss' attention to the pictures and ask them to say what they can see (2D shapes).
- Explain to Ss that they have to write the name of each 2D shape and then count the sides and corners of each 2D shape.

Name	Sides	Corners
triangle	3	3
rectangle	4	4
circle	1	0
square	4	4
pentagon	5	5
hexagon	6	6

Activity 3
- Draw Ss' attention to the pictures and ask them to say what they can see (three lakes with ducks).
- Explain to Ss that they have to write 'Yes' if they agree and 'No' if they don't agree with the sentences.

⊶ a. No b. Yes c. No d. No e. Yes

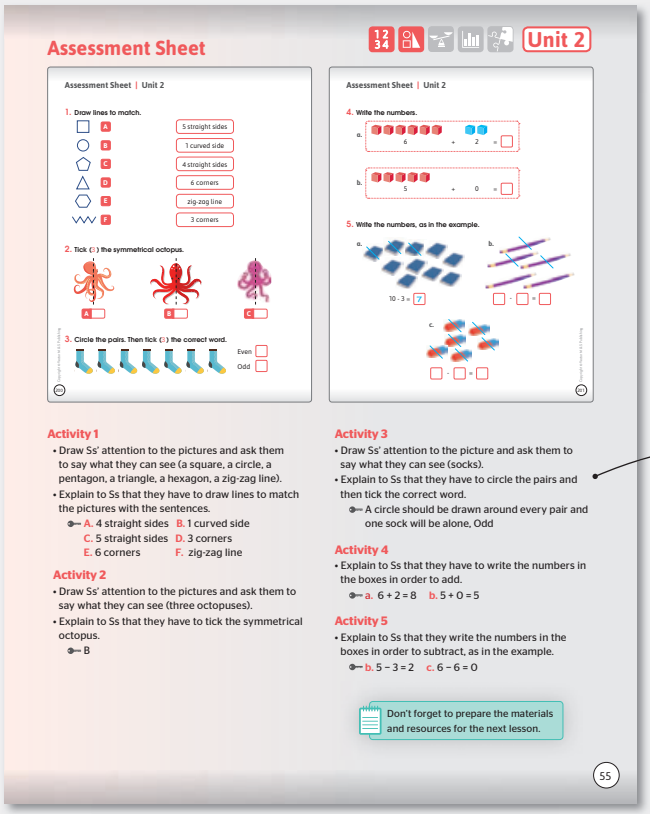
Activity 4
- Explain to Ss that they have to write the numbers in the boxes in order to add or subtract.

⊶ a. 5 + 3 = 8 b. 4 + 0 = 4 c. 6 − 5 = 1 d. 7 − 7 = 0

Provide Ss with the Assessment Sheet for Unit 2.

detailed instructions on how to approach and carry out each activity of the Review pages as well as keys for all the activities provided at the end of each unit

Assessment pages are provided to help teachers assess students' newly acquired knowledge and help students evaluate themselves and improve upon their own performance.



Assessment Sheet

Unit 2

Assessment Sheet | Unit 2

1. Draw lines to match.

A	5 straight sides
B	1 curved side
C	4 straight sides
D	6 corners
E	zig-zag line
F	3 corners

2. Tick (✓) the symmetrical octopus.

A ☐ B ☐ C ☐

3. Circle the pairs. Then tick (✓) the correct word.

Even ☐
Odd ☐

Assessment Sheet | Unit 2

4. Write the numbers.

a. 4 + 2 = ☐
b. 5 + 0 = ☐

5. Write the numbers, as in the example.

a. 10 − 3 = 7
b. ☐ − ☐ = ☐
c. ☐ − ☐ = ☐

55

Activity 1
- Draw Ss' attention to the pictures and ask them to say what they can see (a square, a circle, a pentagon, a triangle, a hexagon, a zig-zag line).
- Explain to Ss that they have to draw lines to match the pictures with the sentences.

⊶ A. 4 straight sides B. 1 curved side
C. 5 straight sides D. 3 corners
E. 6 corners F. zig-zag line

Activity 2
- Draw Ss' attention to the pictures and ask them to say what they can see (three octopuses).
- Explain to Ss that they have to tick the symmetrical octopus.

⊶ B

Activity 3
- Draw Ss' attention to the picture and ask them to say what they can see (socks).
- Explain to Ss that they have to circle the pairs and then tick the correct word.

⊶ A circle should be drawn around every pair and one sock will be alone, Odd

Activity 4
- Explain to Ss that they have to write the numbers in the boxes in order to add.

⊶ a. 6 + 2 = 8 b. 5 + 0 = 5

Activity 5
- Explain to Ss that they write the numbers in the boxes in order to subtract, as in the example.

⊶ b. 5 − 3 = 2 c. 6 − 6 = 0

Don't forget to prepare the materials and resources for the next lesson.

detailed instructions on how to approach and carry out all the Assessment activities as well as corresponding keys provided at the end of each unit

Resource Sheets are provided to support learning comprehension and serve as visual supports for students.

Resource Sheet | Objects to sort

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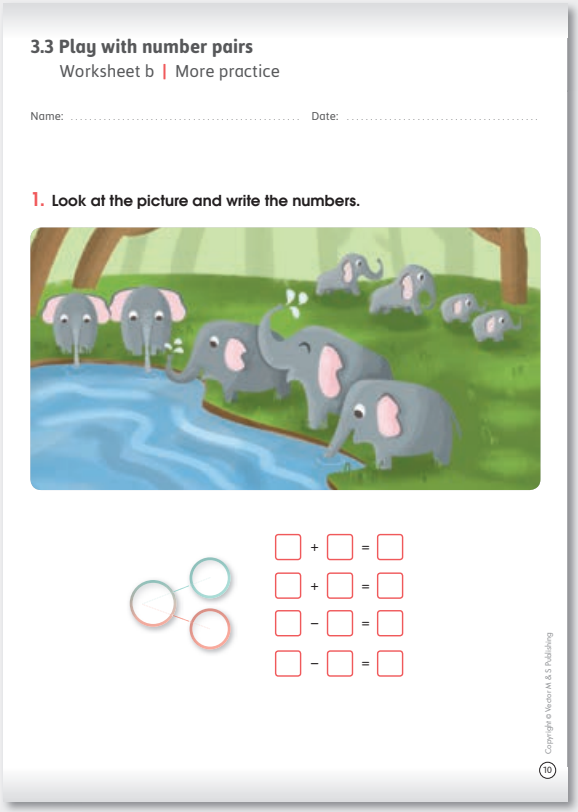
Worksheets, for the differentiated activities of the More practice section, are provided to support understanding of the mathematical concepts and processes and serve as a tool for reinforcement or expansion of knowledge.



3.3 Play with number pairs

Worksheet b | More practice

Name: ..... Date: .....

1. Look at the picture and write the numbers.

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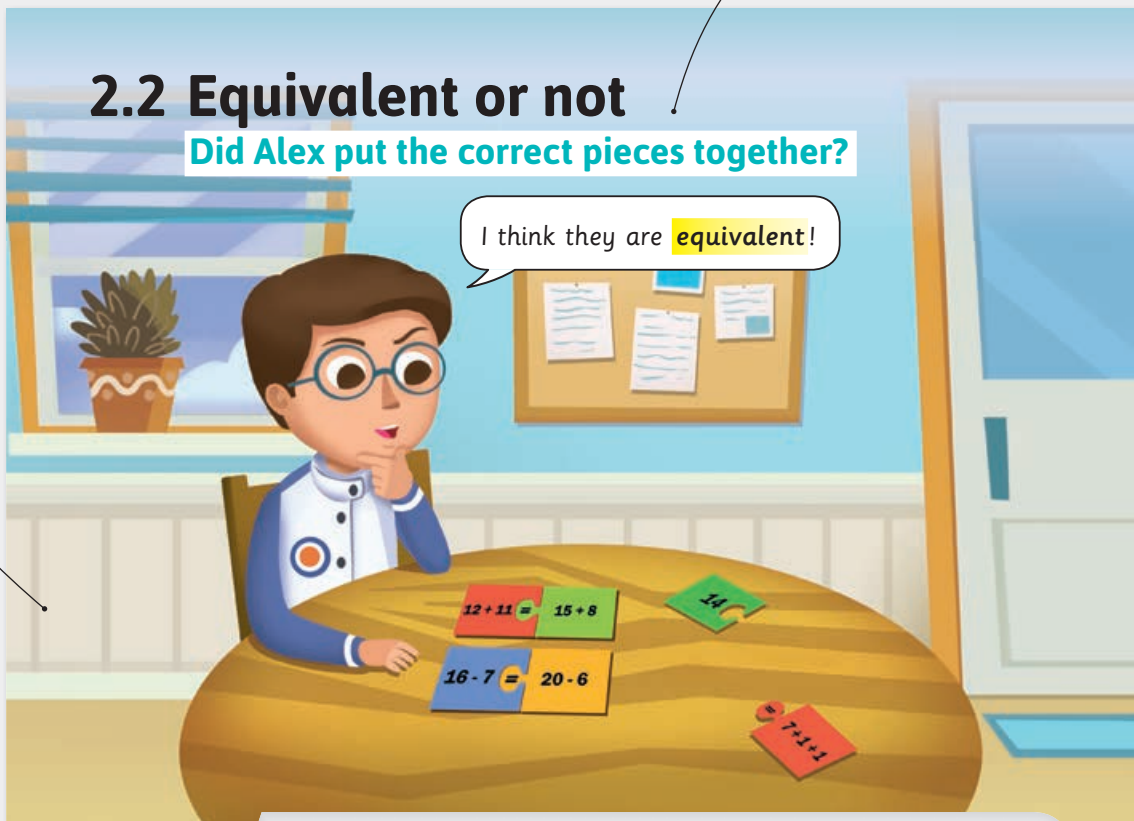
high-quality illustrations introduce the topic, capture students' interest and motivate mathematical investigation

an introductory question to engage students in the lesson and trigger whole-class discussion

2.2 Equivalent or not

Did Alex put the correct pieces together?

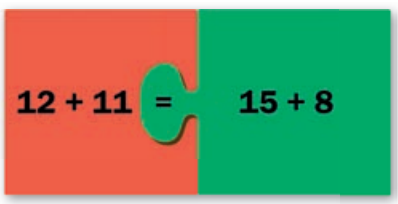


keywords highlighted in each lesson

Look!

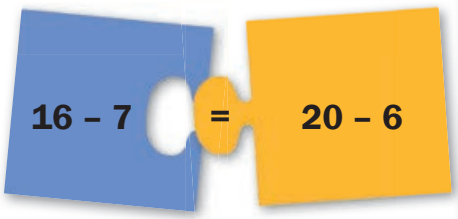
We call **calculations** with the same value equivalent.

the main mathematical concepts presented using pictorial representations and age-appropriate vocabulary



4

12 + 11 is equivalent to 15 + 8.



7

16 – 7 is not equivalent to 20 – 6.

22

activities that reinforce mathematical skills and acquired knowledge through practice

domain(s) taught in each lesson highlighted

2.2

Activities

1. Draw lines to match the boxes with the same value.

16 + 5	38 – 30	24 – 7	22
13 + 4	12 + 9	2 + 2 + 4	32 – 10

2. Tick (4) the correct number sentences.

- 17 – 4 = 26 – 8 ☐
- 4 + 8 + 3 = 18 – 3 ☐
- 15 + 4 = 23 – 4 ☐
- 25 + 4 = 17 + 12 ☐
- 16 – 4 = 27 – 12 ☐
- 30 – 15 = 7 + 7 ☐

3. Complete the number sentences with the numbers in the box.

4 5 6 12 13 15

a. 7 + ☐ = 15 – 2 b. 24 – ☐ = 19 – 7 c. 35 = 40 – ☐

d. ☐ – 5 = 7 + 2 + 1 e. 13 + 21 = 38 – ☐ f. 8 + 4 + ☐ = 22 + 3

4. Let's make a train!

Keywords
equivalent
calculation

23

enjoyable cooperative/individual games, puzzles or cross-curricular activities that promote creative thinking and involve the application of knowledge and skills in different contexts

a keyword list with the significant words of the lesson

The first two or four pages of each unit contain a brief introduction to the unit, an overview of each lesson and supplementary information, which together reveal the structure of the mathematical content in this unit and enable teachers to monitor the progression of knowledge throughout the units.

2 Unit map

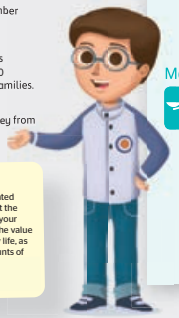
IN UNIT 2, Ss will deal with the domains of Numbers, Measurement, Geometry and Problem Solving. Ss will solve a variety of puzzles using already known operations and identify equivalent number sentences. Ss will also derive number pairs for 100 and 1000 using multiples of 5 and 100 correspondingly and write the related fact families. Then Ss will calculate totals of money from groups of coins and notes, choose between the standard units the most appropriate to measure different lengths, masses, capacities or volumes, as well as identify the relationships between them. Finally, Ss will broaden their knowledge of 3D shapes, recognise different types of prisms and pyramids and explore different nets of common 3D shapes.
The unit is divided into nine lessons:

2.1 Puzzles
In this lesson, Ss will solve a variety of puzzles using already known operations.

2.2 Equivalent or not
In this lesson, Ss will identify equivalent number sentences.

2.3 Fact families for 100 and 1000
In this lesson, Ss will derive the number pairs for 100 and 1000 using multiples of 5 and 100 correspondingly and write the related fact families.

2.4 Money totals
In this lesson, Ss will calculate totals of money from groups of coins and notes.



A useful teaching note!

Be aware that US coins and notes are presented as an example of currency. You may readjust the lesson plans based on the local currency of your country. It is important that Ss recognise and learn the value of the coins and the notes they use in their everyday life, as well as familiarise themselves with calculating amounts of money.

Domain	Prior Knowledge	Learning Objectives	Keywords
Numbers	Ss know the number pairs for numbers up to 20. Ss identify equivalent number sentences and use the equals sign to denote equivalence. Ss add three single-digit numbers. Ss add numbers in any order.	> Memorise all number pairs to 20 and write the corresponding facts. > Complete number pairs for 1000 and the corresponding addition and subtraction facts, using multiples of 100. > Complete number pairs for 100 and the corresponding addition and subtraction facts, using multiples of 5. > Identify and write equivalent number sentences using the '=' sign. > Calculate the sum of more than two single-digit numbers. > Change the order of numbers in an addition to calculate a sum easily (e.g. 4 + 7 + 6 = 4 + 6 + 7 = 17).	> equivalent > calculation
Measurement	Ss find a total amount of money using coins or notes. Ss use standard units of measurement to estimate, measure and record the length, height, weight and capacity of an object. Ss use tools of measurement.	> Express an amount of money from groups of coins and notes using appropriate notation. > Estimate length using appropriate units (m, cm, or km). > Estimate the mass of objects using appropriate units (kg or g). > Differentiate between capacity and volume. > Estimate capacity and volume using appropriate units (*l* or *ml*). > Use appropriate tools and notation to measure and record length measurements. > Use appropriate tools and notation to measure and record capacity and volume measurements. > Use appropriate tools and notation to measure and record mass measurements. > Recognise that the metre is the basic unit of length measurement and equals 100 centimetres. > Understand the need for larger units of length measurement and name the unit that includes 1000 metres as a kilometre. > Recognise that the kilogram is the basic unit of mass measurement and equals 1000 grams. > Recognise that the litre is the basic unit of capacity and volume measurement and equals 1000 millilitres. > Read a measurement by rounding to the nearest division or half division given a complete or half-complete scale.	> distance > kilometre (km) > mass > millilitre (*ml*) > volume

2 Unit map

2.5 Units of length
In this lesson, Ss will choose between the standard units of length measurement (cm, m, km) the most appropriate to measure different lengths or distances and identify the relationships between them.

2.6 Units of mass
In this lesson, Ss will choose between the standard units of mass measurement (g, kg) the most appropriate to measure different masses and identify the relationships between them.

2.7 Units of capacity and volume
In this lesson, Ss will differentiate between volume and capacity, choose between the standard units (*ml*, *l*) the most appropriate to measure different volumes or capacities and identify the relationships between them.

2.8 Some new 3D shapes
In this lesson, Ss will identify the triangular, pentagonal and hexagonal prisms as well as the square pyramid and the triangular pyramid. Ss will describe 3D shapes based on their basic attributes; the number and shape of faces and edges they have.

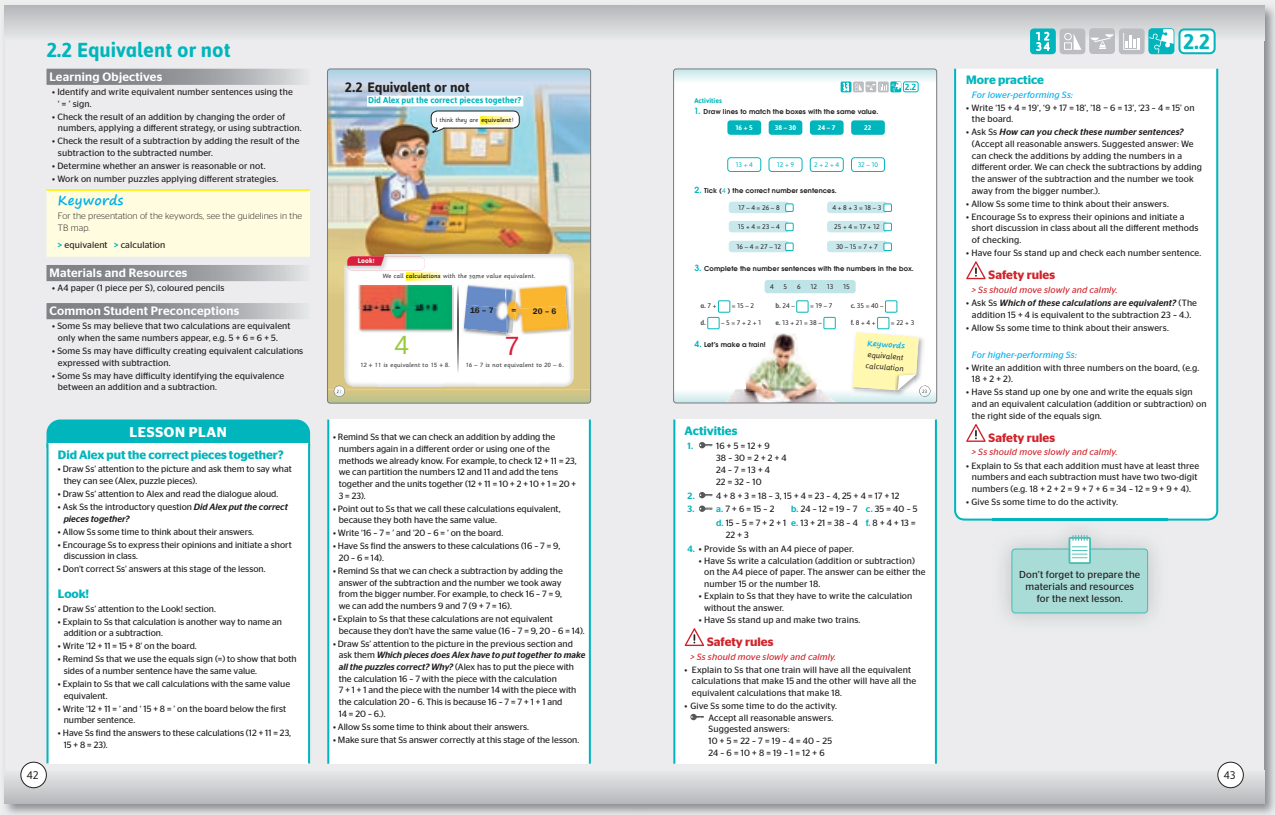
2.9 Make 3D shapes from nets
In this lesson, Ss will explore different nets of common 3D shapes.

A useful teaching note!

Be aware that mass and weight are proportional when we don't take into consideration the effect of acceleration due to gravity. That explains why the term weight is widely used instead of the term mass. At a former age, Ss were not supposed to know the substantial difference between the terms mass and weight. Subsequently, we used the term weight in the corresponding lessons. Ss at this age will gradually begin to differentiate between the terms mass and weight. It is important for you to know that mass is the amount of matter in an object while weight is the force of gravity by which an object is being attracted towards the Earth.

Domain	Prior Knowledge	Learning Objectives	Keywords
Geometry	Ss are familiar with the common 3D shapes. Ss describe 3D shapes using mathematical terminology. Ss sort 3D shapes.	> Identify pyramids and prisms. > Recognise the attributes of pyramids and prisms. > Recognise known 3D shapes and their attributes. > Describe 3D shapes. > Create 3D shapes given their faces. > Explore different nets of the same cube. > Sort 3D shapes according to their attributes (number and shape of faces, vertices and edges). > Match 2D and 3D shapes with their drawings.	> rectangular > prism > triangular > pentagonal > hexagonal > circular > net
Problem Solving	Ss solve one- and two-step word problems. Ss check the outcome of a calculation. Ss solve simple puzzles. Ss relate numbers or shapes.	> Choose from a variety of known strategies to add, subtract, multiply or divide. > Comprehend systems of measurement and use appropriate units of measurement. > Solve one- or two-step problems involving addition and subtraction. > Solve problems in the context of money. > Check the result of an addition by changing the order of numbers, applying a different strategy, or using subtraction. > Check the result of a subtraction by adding the result of the subtraction to the subtracted number. > Find similarities and differences among 3D shapes. > Estimate an answer to a problem before calculating using a variety of strategies. > Determine whether an answer is reasonable or not. > Justify the strategy chosen to work out a calculation. > Work on number puzzles applying different strategies. > Find out how numbers relate to each other (e.g. 250 is 100 more than 150.).	Known keywords will be repeated.

Step-by-step guidelines for each lesson plan and the required preparation are provided in two pages for each lesson.



2.2 Equivalent or not

Learning Objectives
- Identify and write equivalent number sentences using the ' = ' sign.
- Check the result of an addition by changing the order of numbers, applying a different strategy, or using subtraction.
- Check the result of a subtraction by adding the result of the subtraction to the subtracted number.
- Determine whether an answer is reasonable or not.
- Work on number puzzles applying different strategies.

Keywords
For the presentation of the keywords, see the guidelines in the TB map.
> equivalent > calculation

Materials and Resources
- A4 paper (1 piece per S), coloured pencils

Common Student Preconceptions
- Some Ss may believe that two calculations are equivalent only when the same numbers appear, e.g. 5 + 6 = 6 + 5.
- Some Ss may have difficulty creating equivalent calculations expressed with subtraction.
- Some Ss may have difficulty identifying the equivalence between an addition and a subtraction.

LESSON PLAN

Did Alex put the correct pieces together?
- Draw Ss' attention to the picture and ask them to say what they can see (Alex, puzzle pieces).
- Draw Ss' attention to Alex and read the dialogue aloud.
- Ask Ss the introductory question ***Did Alex put the correct pieces together?***
- Allow Ss some time to think about their answers.
- Encourage Ss to express their opinions and initiate a short discussion in class.
- Don't correct Ss' answers at this stage of the lesson.

Look!
- Draw Ss' attention to the Look! section.
- Explain to Ss that calculation is another way to name an addition or a subtraction.
- Write '12 + 11 = 15 + 8' on the board.
- Remind Ss that we use the equals sign (=) to show that both sides of a number sentence have the same value.
- Explain to Ss that we call calculations with the same value equivalent.
- Write '12 + 11 = ' and '15 + 8 = ' on the board below the first number sentence.
- Have Ss find the answers to these calculations (12 + 11 = 23, 15 + 8 = 23).

2.2 Equivalent or not
Did Alex put the correct pieces together?

- Remind Ss that we can check an addition by adding the numbers again in a different order or using one of the methods we already know. For example, to check 12 + 11 = 23, we can partition the numbers 12 and 11 and add the tens together and the units together (12 + 11 = 10 + 2 + 10 + 1 = 20 + 3 = 23).
- Point out to Ss that we call these calculations equivalent, because they both have the same value.
- Write '16 – 7 = ' and '20 – 6 = ' on the board.
- Have Ss find the answers to these calculations (16 – 7 = 9, 20 – 6 = 14).
- Remind Ss that we can check a subtraction by adding the answer of the subtraction and the number we took away from the bigger number. For example, to check 16 – 7 = 9, we can add the numbers 9 and 7 (9 + 7 = 16).
- Explain to Ss that these calculations are not equivalent because they don't have the same value (16 – 7 = 9, 20 – 6 = 14).
- Draw Ss' attention to the picture in the previous section and ask them ***Which pieces does Alex have to put together to make all the puzzles correct? Why?*** (Alex has to put the piece with the calculation 16 – 7 with the piece with the calculation 7 + 1 + 1 and the piece with the number 14 with the piece with the calculation 20 – 6. This is because 16 – 7 = 7 + 1 + 1 and 14 = 20 – 6.).
- Allow Ss some time to think about their answers.
- Make sure that Ss answer correctly at this stage of the lesson.

Activities
1. 16 + 5 = 12 + 9
   38 – 30 = 2 + 2 + 4
   24 – 7 = 13 + 4
   22 = 32 – 10
2. 4 + 8 + 3 = 18 – 3, 15 + 4 = 23 – 4, 25 + 4 = 17 + 12
3. a. 7 + 6 = 15 – 2 b. 24 – 12 = 19 – 7 c. 35 = 40 – 5
   d. 15 – 5 = 7 + 2 + 1 e. 13 + 21 = 38 – 4 f. 8 + 4 + 13 = 22 + 3
4. • Provide Ss with an A4 piece of paper.
   • Have Ss write a calculation (addition or subtraction) on the A4 piece of paper. The answer can be either the number 15 or the number 18.
   • Explain to Ss that they have to write the calculation without the answer.
   • Have Ss stand up and make two trains.

Safety rules
> Ss should move slowly and calmly.
- Explain to Ss that one train will have all the equivalent calculations that make 15 and the other will have all the equivalent calculations that make 18.
- Give Ss some time to do the activity.

Accept all reasonable answers.
Suggested answers:
10 + 5 = 22 – 7 = 19 – 4 = 40 – 25
24 – 6 = 10 + 8 = 19 – 1 = 12 + 6

More practice

For lower-performing Ss:
- Write '15 + 4 = 19', '9 + 17 = 18', '18 – 6 = 13', '23 – 4 = 15' on the board.
- Ask Ss ***How can you check these number sentences?*** (Accept all reasonable answers. Suggested answer: We can check the additions by adding the numbers in a different order. We can check the subtractions by adding the answer of the subtraction and the number we took away from the bigger number.).
- Allow Ss some time to think about their answers.
- Encourage Ss to express their opinions and initiate a short discussion in class about all the different methods of checking.
- Have four Ss stand up and check each number sentence.

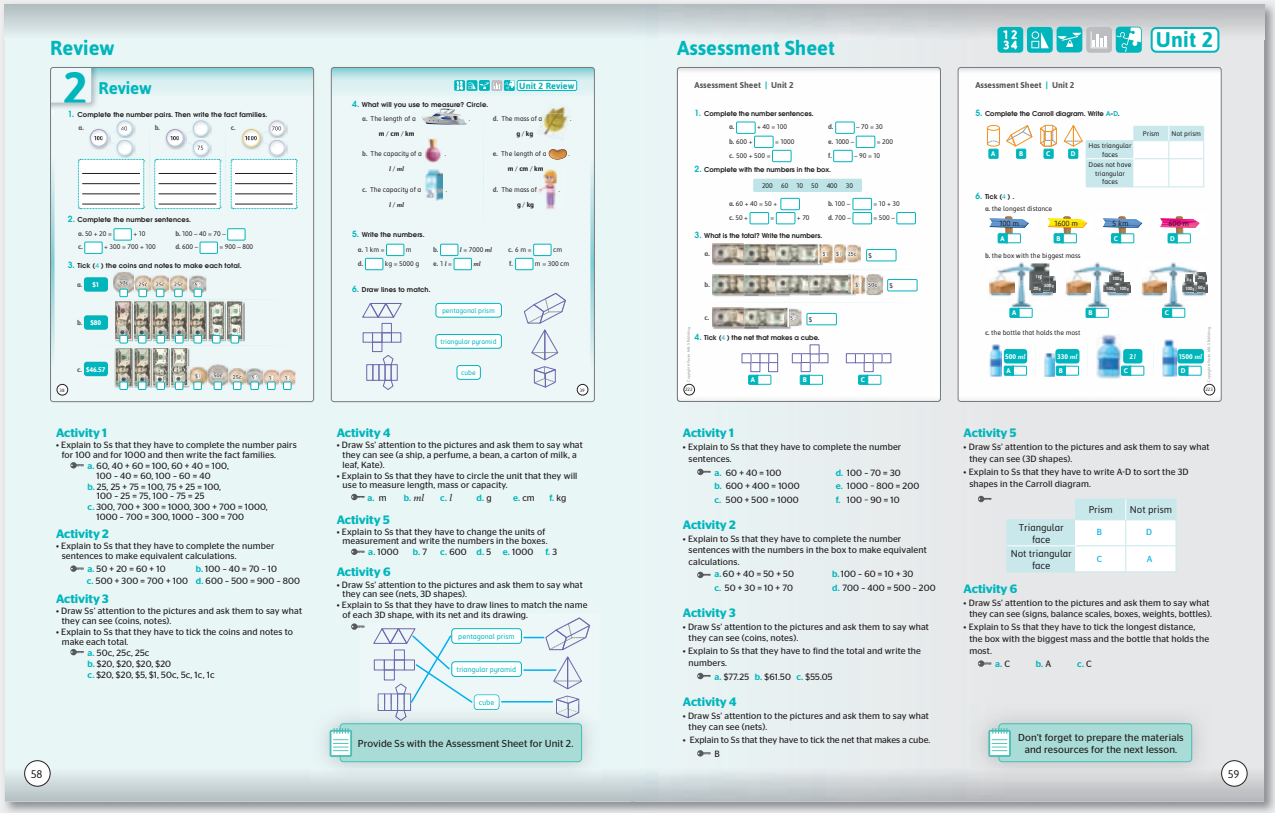
Safety rules
> Ss should move slowly and calmly.
- Ask Ss ***Which of these calculations are equivalent?*** (The addition 15 + 4 is equivalent to the subtraction 23 – 4.).
- Allow Ss some time to think about their answers.

For higher-performing Ss:
- Write an addition with three numbers on the board, (e.g. 18 + 2 +2).
- Have Ss stand up one by one and write the equals sign and an equivalent calculation (addition or subtraction) on the right side of the equals sign.

Safety rules
> Ss should move slowly and calmly.
- Explain to Ss that each addition must have at least three numbers and each subtraction must have two two-digit numbers (e.g. 18 + 2 + 2 = 9 + 7 + 6 = 34 – 12 = 9 + 9 + 4).
- Give Ss some time to do the activity.

Don't forget to prepare the materials and resources for the next lesson.

Detailed instructions on how to approach and carry out all the Review and Assessment activities as well as the corresponding keys are provided at the end of each unit.



Review

Activity 1
- Explain to Ss that they have to complete the number pairs for 100 and for 1000 and then write the fact families.

a. 60, 40 + 60 = 100, 60 + 40 = 100, 100 – 40 = 60, 100 – 60 = 40
b. 25, 25 + 75 = 100, 75 + 25 = 100, 100 – 25 = 75, 100 – 75 = 25
c. 300, 700 + 300 = 1000, 300 + 700 = 1000, 1000 – 700 = 300, 1000 – 300 = 700

Activity 2
- Explain to Ss that they have to complete the number sentences to make equivalent calculations.

a. 50 + 20 = 60 + 10 b. 100 – 40 = 70 – 10
c. 500 + 300 = 700 + 100 d. 600 – 500 = 900 – 800

Activity 3
- Draw Ss' attention to the pictures and ask them to say what they can see (coins, notes).
- Explain to Ss that they have to tick the coins and notes to make each total.

a. 50c, 25c, 25c
b. $20, $20, $20, $20
c. $20, $20, $5, $1, 50c, 5c, 1c, 1c

Activity 4
- Draw Ss' attention to the pictures and ask them to say what they can see (a ship, a perfume, a bean, a carton of milk, a leaf, Kate).
- Explain to Ss that they have to circle the unit that they will use to measure length, mass or capacity.

a. m b. *ml* c. *l* d. g e. cm f. kg

Activity 5
- Explain to Ss that they have to change the units of measurement and write the numbers in the boxes.

a. 1000 b. 7 c. 600 d. 5 e. 1000 f. 3

Activity 6
- Draw Ss' attention to the pictures and ask them to say what they can see (nets, 3D shapes).
- Explain to Ss that they have to draw lines to match the name of each 3D shape, with its net and its drawing.

Provide Ss with the Assessment Sheet for Unit 2.

Assessment Sheet

Activity 1
- Explain to Ss that they have to complete the number sentences.

a. 60 + 40 = 100 d. 100 – 70 = 30
b. 600 + 400 = 1000 e. 1000 – 800 = 200
c. 500 + 500 = 1000 f. 100 – 90 = 10

Activity 2
- Explain to Ss that they have to complete the number sentences with the numbers in the box to make equivalent calculations.

a. 60 + 40 = 50 + 50 b. 100 – 60 = 10 + 30
c. 50 + 30 = 10 + 70 d. 700 – 400 = 500 – 200

Activity 3
- Draw Ss' attention to the pictures and ask them to say what they can see (coins, notes).
- Explain to Ss that they have to find the total and write the numbers.

a. $77.25 b. $61.50 c. $55.05

Activity 4
- Draw Ss' attention to the pictures and ask them to say what they can see (nets).
- Explain to Ss that they have to tick the net that makes a cube.

B

Activity 5
- Draw Ss' attention to the pictures and ask them to say what they can see (3D shapes).
- Explain to Ss that they have to write A-D to sort the 3D shapes in the Carroll diagram.

	Prism	Not prism
Triangular face	B	D
Not triangular face	C	A

Activity 6
- Draw Ss' attention to the pictures and ask them to say what they can see (signs, balance scales, boxes, weights, bottles).
- Explain to Ss that they have to tick the longest distance, the box with the biggest mass and the bottle that holds the most.

a. C b. A c. C

Don't forget to prepare the materials and resources for the next lesson.

an introductory question to engage students in the lesson and trigger whole-class discussion

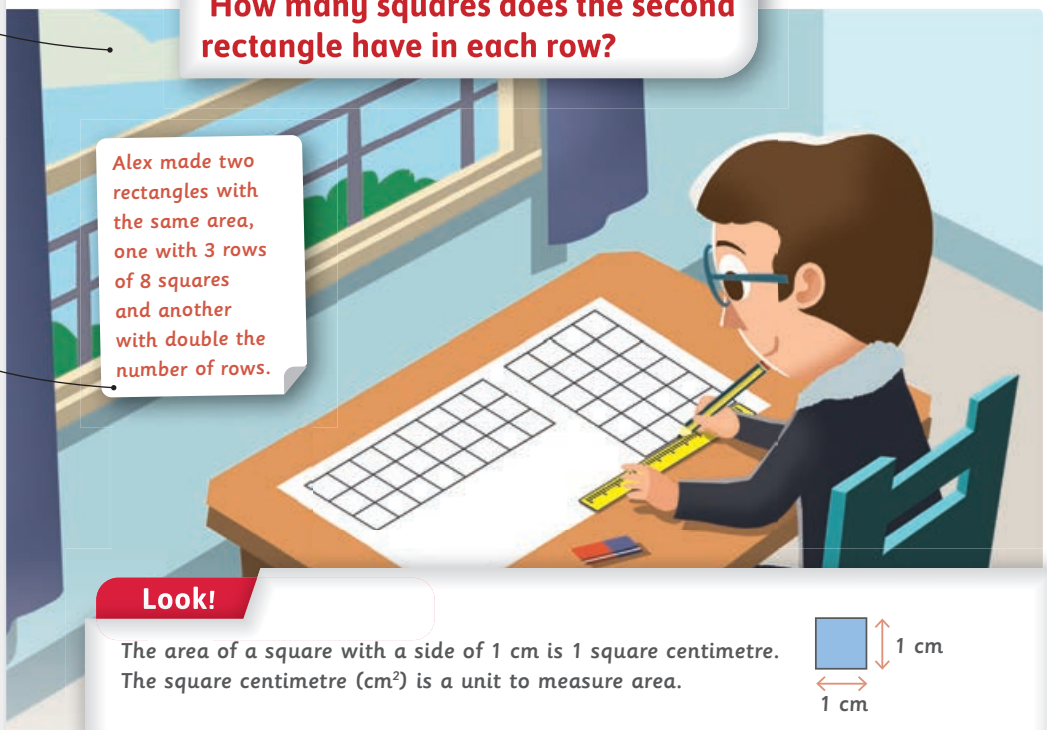
high-quality illustrations to introduce the topic, capture students' interest and motivate mathematical investigation

in some lessons, a small text is included in order to support the information portrayed in the pictures

the main mathematical concepts presented using pictorial representations and age-appropriate vocabulary

3.8 Calculate area

How many squares does the second rectangle have in each row?

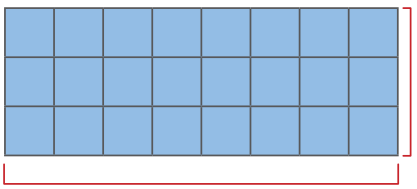


Look!

The area of a square with a side of 1 cm is 1 square centimetre.
The square centimetre (cm^2) is a unit to measure area.

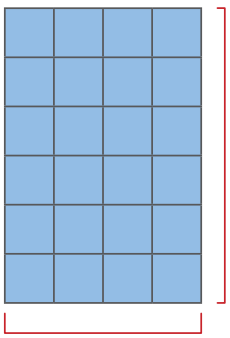
We can multiply the number of columns by the number of rows to find the area of a rectangle.

3 rows of 8 squares



$8 \times 3 = 4 \times 6 = 24\ cm^2$

6 rows of 4 squares



Both rectangles have an area of 24 cm^2.

22

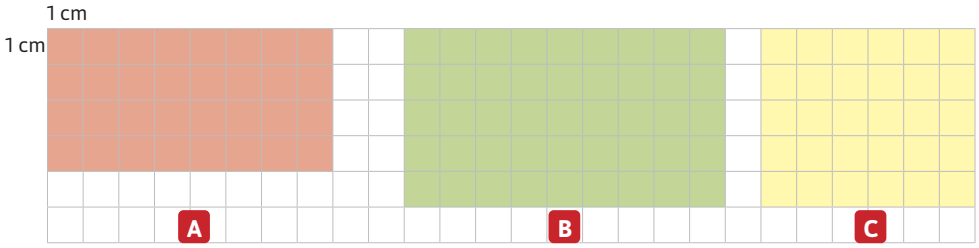
activities that reinforce mathematical skills and acquired knowledge through practice

domain(s) taught in each lesson highlighted

3.8

Activities

1. Calculate the areas. Then complete the sentences.



area of A: ☐ area of B: ☐ area of C: ☐

a. Rectangle ____ has the smallest area.

b. Rectangle ____ can have the same area as a rectangle with 8 rows of squares.

c. Rectangle ____ can have the same area as a rectangle with 10 rows of squares.

2. Answer the questions.

a. What is the area of 5 squares? _____

b. What is the area of a rectangle with 7 rows of 6 squares? _____

c. How many rows of 3 squares does a rectangle with an area of 15 cm² have? _____

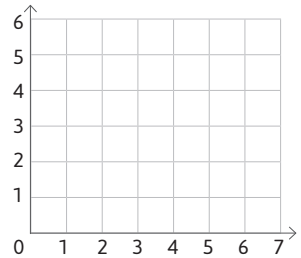
d. How many columns of 6 squares does a rectangle with an area of 42 cm² have? _____

3. What rectangles have an area of 40 cm²? Complete the table with the number of rows and columns.

Rows	Columns

4. Find the area on a grid of coordinates!

(1,2) (1,6) (5,6) (5,2)



23

inquiry-based exploration activities and brainteasers that enhance critical thinking and boost appreciation of maths

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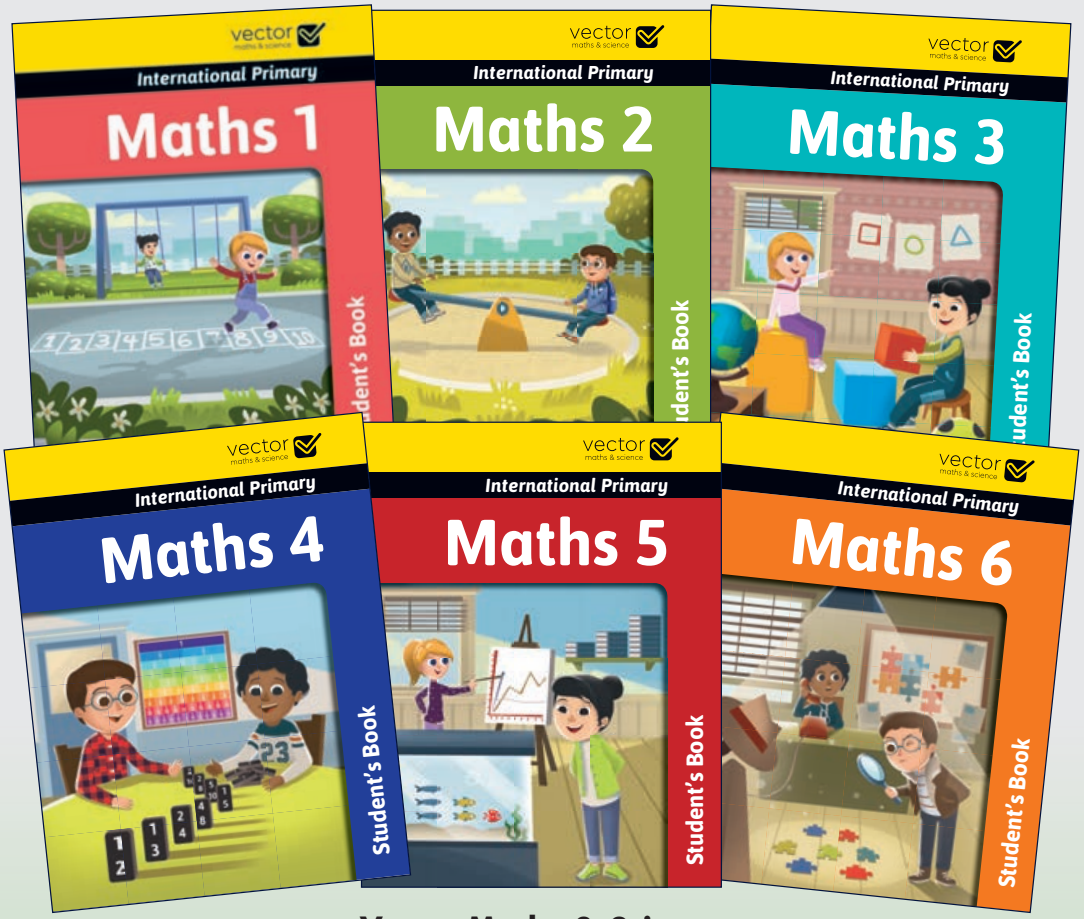
Maths



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