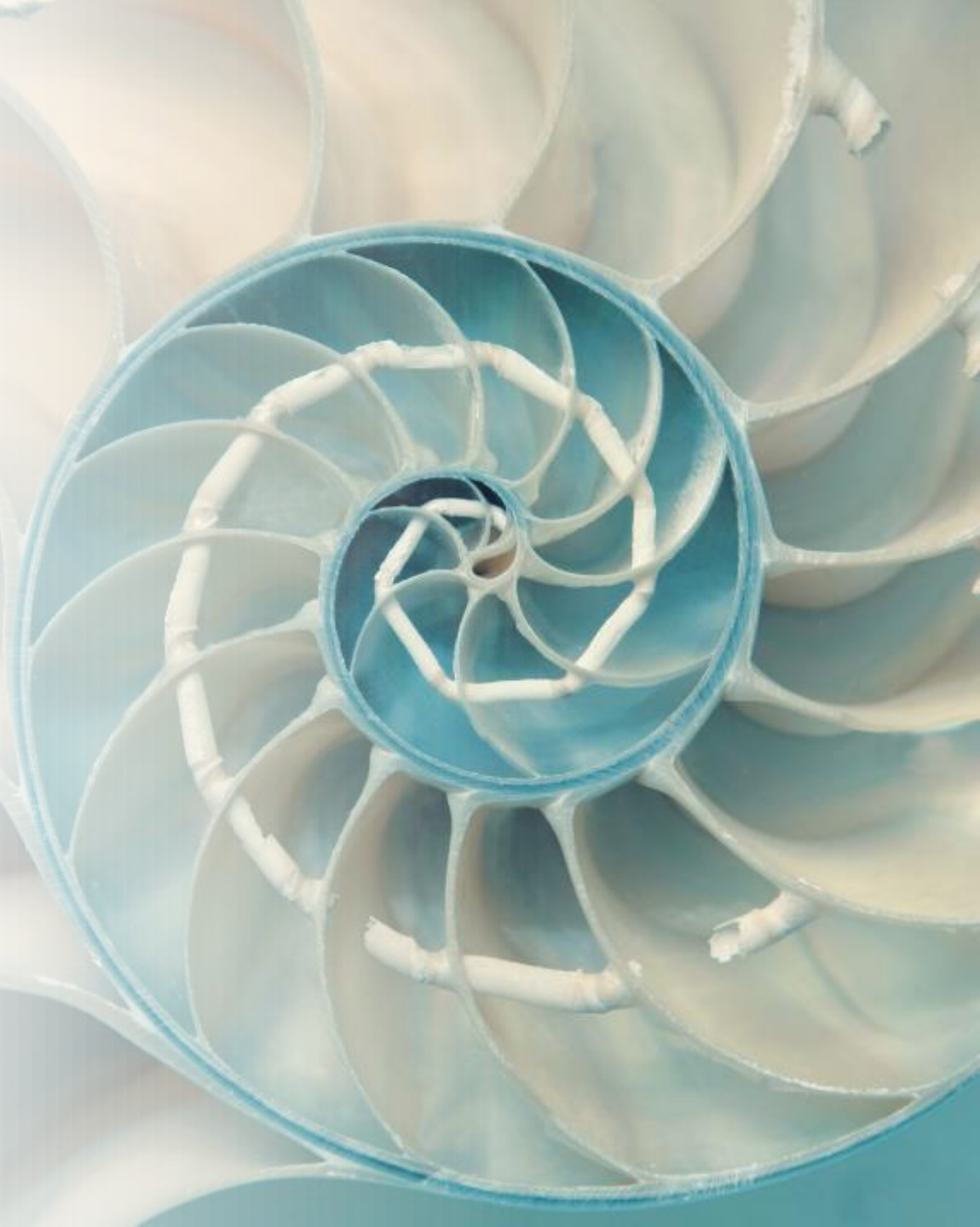
Everyday to extraordinary

A guide to **maths** at Silsden



Maths – from the everyday to the extraordinary

At Silsden PS…

- Every child says confidently and proudly ‘I am a mathematician and I can do maths!’
- Our children and teachers love maths and notice it all around us
- Maths is purposeful and relevant to our children
- We embrace the fact that maths is a playful subject, where we explore and learn from our mistakes
- Our maths learning builds our children’s confidence, resilience and independence
- Our maths is not just about the numbers! Its about understanding the process and concepts behinds the numbers.
- Our maths is accessible to all
- We challenge all of our pupils in order to deepen their understanding
- Our maths learning is based on simple building blocks that grow as we grow
- Our learning in maths has a clear sequence – concrete, pictorial, abstract (simple fluency), varied fluency and problem solving – we reason all the time!
- Maths is a time for talking – we talk about what we are doing, how we are doing and any connections we can make
- We teach maths using a wide variety of methods e.g. big maths, outdoor learning, technology
- Our children are confident to choose the resources they need to help them work like a mathematician

Maths in KS1 and KS2

Maths has 8 building blocks

Number & place value	Addition & subtraction	Multiplication & division	Algebra
Measurement	Geometry	Statistics	Fractions, decimals & percentages

For **number and place value** we want our children to…

- **Accurately recognise and count numbers 0 – 10 in a variety of forms** *e.g. numeral, objects, words, pictures*
- **Explain and show me what numbers 0 – 10 mean** *e.g. what 7 objects looks like, how 7 could be made, what 7 is bigger/smaller than, how 7 can be represented*
- **Confidently and accurately count around and explain the value of each digit in 2+ digit numbers** *e.g. show me how 72 can be made in a variety of ways; partition 72; tell me where 72 is on the ordinal scale; say what 72 is bigger/smaller than; tell me what 72 is closest to; represent 72 in a variety of ways*
- **Use the vocabulary of number and place value** e.g. more than, less than, fewer, one, ten, hundred, thousand, million, estimate, most, least, negative number, equals, and the symbols = < >
- **Recognise and read Roman numerals** (Y4 - 6)

Year 1 Number & place value

- count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number
- count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens
- given a number, identify one more and one less
- identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least
- read and write numbers from 1 to 20 in numerals and words

Year 2 Number & place value

- count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
- recognise the place value of each digit in a two-digit number (tens, ones)
- identify, represent and estimate numbers using different representations, including the number line
- compare and order numbers from 0 up to 100; use <, > and = signs
- read and write numbers to at least 100 in numerals and in words
- use place value and number facts to solve problems

Year 3 Number & place value

- count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
- recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- compare and order numbers up to 1000
- identify, represent and estimate numbers using different representations
- read and write numbers up to 1000 in numerals and in words
- solve number problems and practical problems involving these ideas

Year 4 Number & place value

- count in multiples of 6, 7, 9, 25 and 1000
- find 1000 more or less than a given number
- count backwards through zero to include negative numbers
- recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
- order and compare numbers beyond 1000
- identify, represent and estimate numbers using different representations
- round any number to the nearest 10, 100 or 1000
- solve number and practical problems that involve all of the above and with increasingly large positive numbers
- read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value

Year 5 Number & place value

- read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
- round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100000
- solve number problems and practical problems that involve all of the above
- read Roman numerals to 1000 (M) and recognise years written in Roman numerals

Year 6 Number & place value

- read, write, order and compare numbers up to 10 000 000 and determine the value of each digit
- round any whole number to a required degree of accuracy
- use negative numbers in context, and calculate intervals across zero
- solve number and practical problems that involve all of the above

For **addition and subtraction** we want our children to…

- **Be fluent in number bonds to and within 10, 20, 50, 100, 1000**
- **Talk about what the symbols +, - and = mean**
- **Use the vocabulary of addition and subtraction** e.g. add, plus, total, altogether, more, sum; subtract, take away, minus, less, fewer, difference
- **Represent addition and subtraction in concrete, pictorial, and abstract forms**
- **Estimate, calculate and check (using inverse)**
- **Confidently and accurately use and apply formal written methods** e.g. 127+746=?; 127+?=873; ?-127=746; 8?3-1?7=746

Year 1 addition & subtraction

- read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20
- add and subtract one-digit and two-digit numbers to 20, including zero
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems

Year 2 addition & subtraction

- solve problems with addition and subtraction:
  - ✓ using concrete objects and pictorial representations, including those involving numbers, quantities and measures
  - ✓ applying their increasing knowledge of mental and written methods
- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
  - ✓ a two-digit number and ones
  - ✓ a two-digit number and tens
  - ✓ two two-digit numbers
  - ✓ adding three one-digit numbers
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems

Year 3 addition & subtraction

- add and subtract numbers mentally, including:
- a three-digit number and ones
- a three-digit number and tens
- a three-digit number and hundreds
- add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

Year 4 addition & subtraction

- add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- estimate and use inverse operations to check answers to a calculation
- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why

Year 5 addition & subtraction

- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
- add and subtract numbers mentally with increasingly large numbers
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Year 6 addition & subtraction

- perform mental calculations, including with mixed operations and large numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

For **multiplication and division** we want our children to…

- **Be fluent in multiplication and division facts to 12**
- **Talk about what the symbols x, ÷ and = mean**
- **Use the vocabulary of multiplication and division** e.g. times, multiply, product, lots of, groups of, divide, share, group, equally, remainder
- **Represent multiplication and division in concrete, pictorial, and abstract forms**
- **Estimate, calculate and check (using inverse)**
- **Confidently and accurately use and apply formal written methods** e.g. add example as an image

Year 1 Multiplication & division

- solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher

Year 2 Multiplication & division

- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs
- show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
- solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts

Year 3 Multiplication & division

- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects

Year 4 Multiplication & division

- recall multiplication and division facts for multiplication tables up to 12 × 12
- use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- recognise and use factor pairs and commutativity in mental calculations
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects

Year 5 Multiplication & division

- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
- establish whether a number up to 100 is prime and recall prime numbers up to 19
- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- multiply and divide numbers mentally drawing upon known facts
- divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes
- solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates

Year 6 Multiplication & division

- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- perform mental calculations, including with mixed operations and large numbers
- identify common factors, common multiples and prime numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

For **algebra** we want our children to…

- **Describe and continue number sequences**
- **Find all the pairs of values that satisfy an equation** – e.g. ♥ +  = 10; A + B = 10
- **Use formulae to calculate** e.g. Standard formula - half x base x height (area of a triangle); (2 x length) + (2 x width) = perimeter of a rectangle; length x width = area; non-standard formula – 2A + B = C

Year 6 Algebra

- use simple formulae
- generate and describe linear number sequences
- express missing number problems algebraically
- find pairs of numbers that satisfy an equation with two unknowns
- enumerate possibilities of combinations of two variables

For measurement we want our children to…

- **Use the comparative language of measurement** e.g. heavier than, lighter than, longer, shorter, earlier, later
- **Use equipment to measure (standard & non-standard) –** mass, weight, time, length, height, volume, angles, temperature, capacity, perimeter, area
- **Use units of measurement (standard & non-standard) -** use the correct unit of measurement; understand how big units of measurement are; compare units of measurement; convert units of measurement; know equivalence between metric & imperial (inches, lbs, pints, miles, ounces)
- **Estimate**
- **Calculate measurements** - find the total and find the difference; use formula to calculate area, perimeter, area of triangles, diameter, radius
- **Read and interpret scales** e.g. weighing scales, thermometer, Newton metre, metre sticks, rulers, protractors measuring cylinders, jugs etc.
- **Use money** – recognise different coins & notes; find total amounts; work out change; working out value for money
- **Tell the time –** analogue and digital, 24 hour and 12 hour, weeks, months, years, duration of events, read timetables, interpret timelines, sequencing (e.g. events into chronological order, planning the order of how to do things)

Year 1 measurement

- compare, describe and solve practical problems for:
  - lengths and heights [for example, long/short, longer/shorter, tall/short, double/half]
  - mass/weight [for example, heavy/light, heavier than, lighter than]
  - capacity and volume [for example, full/empty, more than, less than, half, half full, quarter]
  - time [for example, quicker, slower, earlier, later]
- measure and begin to record the following:
  - lengths and heights
  - mass/weight
  - capacity and volume
  - time (hours, minutes, seconds)
- recognise and know the value of different denominations of coins and notes
- sequence events in chronological order using language [for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening]
- recognise and use language relating to dates, including days of the week, weeks, months and years
- tell the time to the hour and half past the hour and draw the hands on a clock face to show these times

Year 2 measurement

- choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels
- compare and order lengths, mass, volume/capacity and record the results using >, < and =
- recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value
- find different combinations of coins that equal the same amounts of money
- solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change
- compare and sequence intervals of time
- tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times
- know the number of minutes in an hour and the number of hours in a day

Year 3 measurement

- measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)
- measure the perimeter of simple 2-D shapes
- add and subtract amounts of money to give change, using both £ and p in practical contexts
- tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks
- estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight
- know the number of seconds in a minute and the number of days in each month, year and leap year
- compare durations of events [for example to calculate the time taken by particular events or tasks]

Year 4 measurement

- Convert between different units of measure [for example, kilometre to metre; hour to minute]
- measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres
- find the area of rectilinear shapes by counting squares
- estimate, compare and calculate different measures, including money in pounds and pence
- read, write and convert time between analogue and digital 12- and 24-hour clocks
- solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days

Year 5 measurement

- convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
- understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints
- measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
- calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes
- estimate volume [for example, using 1 cm3 blocks to build cuboids (including cubes)] and capacity [for example, using water]
- solve problems involving converting between units of time
- use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling

Year 6 measurement

- solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate
- use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places
- convert between miles and kilometres
- recognise that shapes with the same areas can have different perimeters and vice versa
- recognise when it is possible to use formulae for area and volume of shapes
- calculate the area of parallelograms and triangles
- calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units [for example, mm^3 and km^3]

For **geometry** we want our children to…

- **Recognise & name 2D & 3D shapes** – in usual & unusual orientations
- **Describe 2D shapes –** number of sides & lines of symmetry; perpendicular & parallel lines; regular & irregular
- **Describe 3D shapes** – number of edges, vertices & faces (identify the 2D shapes)
- **Draw & make 2D & 3D shapes**
- **Compare, sort & classify 2D & 3D shapes**
- **Describe position, direction & movement -** Use positional and directional language e.g. left, right, up, down, forwards, backwards, ¼ turn, 1/2 turn, ¾ turn, full turn, clockwise, anti-clockwise, 90 degree turn, 180 degree turn etc.
- **Describe where something is using grids & coordinates** – using 1 quadrant & 4 quadrants
- **Complete, reflect & translate shapes using coordinates**
- **Name, draw, estimate, measure, compare & order angles** (KS2)
- **Understand symmetry** – find lines of symmetry; complete simple symmetrical drawings
- **Describe & name parts of circles** – circumference, radius, diameter

Year 1 Geometry

- recognise and name common 2-D and 3-D shapes, including:
  - 2-D shapes [for example, rectangles (including squares), circles and triangles]
  - 3-D shapes [for example, cuboids (including cubes), pyramids and spheres]
- describe position, direction and movement, including whole, half, quarter and three-quarter turns.

Year 2 Geometry

- identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line
- identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces
- identify 2-D shapes on the surface of 3-D shapes [for example, a circle on a cylinder and a triangle on a pyramid]
- compare and sort common 2-D and 3-D shapes and everyday objects.

- order and arrange combinations of mathematical objects in patterns and sequences
- use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)

Year 3 Geometry

- draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them
- recognise angles as a property of shape or a description of a turn
- identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle
- identify horizontal and vertical lines and pairs of perpendicular and parallel lines

Year 4 Geometry

- compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes
- identify acute and obtuse angles and compare and order angles up to two right angles by size
- identify lines of symmetry in 2-D shapes presented in different orientations
- complete a simple symmetric figure with respect to a specific line of symmetry.

- describe positions on a 2-D grid as coordinates in the first quadrant
- describe movements between positions as translations of a given unit to the left/right and up/down
- plot specified points and draw sides to complete a given polygon

Year 5 Geometry

- compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes
- identify acute and obtuse angles and compare and order angles up to two right angles by size
- identify lines of symmetry in 2-D shapes presented in different orientations
- complete a simple symmetric figure with respect to a specific line of symmetry.

- describe positions on a 2-D grid as coordinates in the first quadrant
- describe movements between positions as translations of a given unit to the left/right and up/down
- plot specified points and draw sides to complete a given polygon

Year 6 Geometry

- identify 3-D shapes, including cubes and other cuboids, from 2-D representations
- know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles
- draw given angles, and measure them in degrees (^{o})
- identify:
  - angles at a point and one whole turn (total 360^{o})
  - angles at a point on a straight line and ½ turn (total 180^{o})
  - other multiples of 90^{o}
- use the properties of rectangles to deduce related facts and find missing lengths and angles
- distinguish between regular and irregular polygons based on reasoning about equal sides and angles.

- identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed

For **statistics** we want our children to…

- **Interpret, construct & present information in charts, tables & graphs** – e.g. block diagrams, pictograms, tally charts, bar charts, line graphs, pie charts, timetables
- **Ask & answer questions about charts, tables & graphs** – including one step & two step problems; solving comparison, sum & difference problems
- **Calculate the mean (average)**

Year 2 Statistics

- interpret and construct simple pictograms, tally charts, block diagrams and simple tables
- ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity
- ask and answer questions about totaling and comparing categorical data

Year 3 Statistics

- interpret and present data using bar charts, pictograms and tables
- solve one-step and two-step questions [for example, ‘How many more?’ and ‘How many fewer?’] using information presented in scaled bar charts and pictograms and tables

Year 4 Statistics

- interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs.
- solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs

Year 5 Statistics

- solve comparison, sum and difference problems using information presented in a line graph
- complete, read and interpret information in tables, including timetables

Year 6 Statistics

- interpret and construct pie charts and line graphs and use these to solve problems
- calculate and interpret the mean as an average

For **fractions** we want our children to…

- **Find, name & write fractions of shapes, objects, quantities & measures –** including unit (e.g. ¼, ⅛, ⅙,) and non-unit fractions (⅔, ¾, ⅝, $^{2}/_{6}$); improper fractions (e.g. $^{3}/_{2}$, $^{5}/_{4}$, $^{12}/_{10}$); mixed numbers (e.g. 1¼ , 2⅔)
- **Find equivalent fractions**
- **Count up and down in fractions**
- **Calculate fractions of amounts**
- **Add & subtract fractions –** same & different denominators
- **Multiply fractions** – x whole (2 x $^{3}/_{5}$); x fraction ($^{1}/_{4}$ x $^{3}/_{8}$)
- **Divide fractions** – divide by whole number ($^{3}/_{4}$ divide by 3)

Year 1 Fractions

- recognise, find and name a half as one of two equal parts of an object, shape or quantity
- recognise, find and name a quarter as one of four equal parts of an object, shape or quantity

Year 2 Fractions

- recognise, find, name and write fractions 1/3, 1/4, 2/4 and 3/4 of a length, shape, set of objects or quantity
- write simple fractions for example, ½ of 6 = 3 and recognise the equivalence of 2/4 and 1/2

Year 3 Fractions

- count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
- recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
- recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators
- recognise and show, using diagrams, equivalent fractions with small denominators
- add and subtract fractions with the same denominator within one whole [for example, 75 + 71 = 76]
- compare and order unit fractions, and fractions with the same denominators
- solve problems that involve all of the above

Year 4 Fractions

- recognise and show, using diagrams, families of common equivalent fractions
- count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.
- solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number
- add and subtract fractions with the same denominator

Year 5 Fractions

- compare and order fractions whose denominators are all multiples of the same number
- identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
- recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number
- add and subtract fractions with the same denominator and denominators that are multiples of the same number
- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams

Year 6 Fractions

- use common factors to simplify fractions; use common multiples to express fractions in the same denomination
- compare and order fractions, including fractions > 1
- add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
- multiply simple pairs of proper fractions, writing the answer in its simplest form
- divide proper fractions by whole numbers

For **decimals** we want our children to…

- **Read and write decimal equivalents** – for any number of tenths, hundredths and thousandths
- **Round decimals** - to whole numbers or a specified amount of decimal places.
- **Recognise and write decimal equivalents to fractions and percentages.**
- **Compare and order decimal numbers.**
- **Solve problems using decimal measures (including money)**
- **Multiply and divide decimal numbers by 10, 100 and 1000 (including whole numbers where the answer is a decimal)**
- **Calculate decimal fraction equivalents (using division) for simple fractions**
- **Multiply 1 digit numbers with up to 2 decimal places by whole numbers.**
- **Use division methods where the answers have up to two decimal places.**
- **Represent decimals in a variety of ways** – e.g. place value grids, number lines, etc

Year 4 Decimals

- recognise and write decimal equivalents of any number of tenths or hundredths
- recognise and write decimal equivalents to ¼, ½, ¾
- find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths
- round decimals with one decimal place to the nearest whole number
- compare numbers with the same number of decimal places up to two decimal places
- solve simple measure and money problems involving fractions and decimals to two decimal places

Year 5 Decimals

- read and write decimal numbers as fractions [for example, 0.71 = 71/100]
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- round decimals with two decimal places to the nearest whole number and to one decimal place
- read, write, order and compare numbers with up to three decimal places
- solve problems involving number up to three decimal places

Year 6 Decimals

- associate a fraction with division and calculate decimal fraction equivalents for a simple fraction
- identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places
- multiply one-digit numbers with up to two decimal places by whole numbers
- use written division methods in cases where the answer has up to two decimal places
- solve problems which require answers to be rounded to specified degrees of accuracy
- recall and use equivalences between simple fractions, decimals and percentages, including in different contexts

For **percentages, ratio and proportion** we want our children to…

- **Recognise the ‘per cent’ symbol (%)**
- **Know and write percentages as their equivalent fractions and decimals**
- **Calculate percentages of amounts** - eg 15% of 200, 20% of 360^{o}
- **Solve problems involving similar shapes -** where the scale factor is known or can be calculated
- **Solve problems involving unequal sharing and grouping**

Year 5 Percentages, ratio & proportion

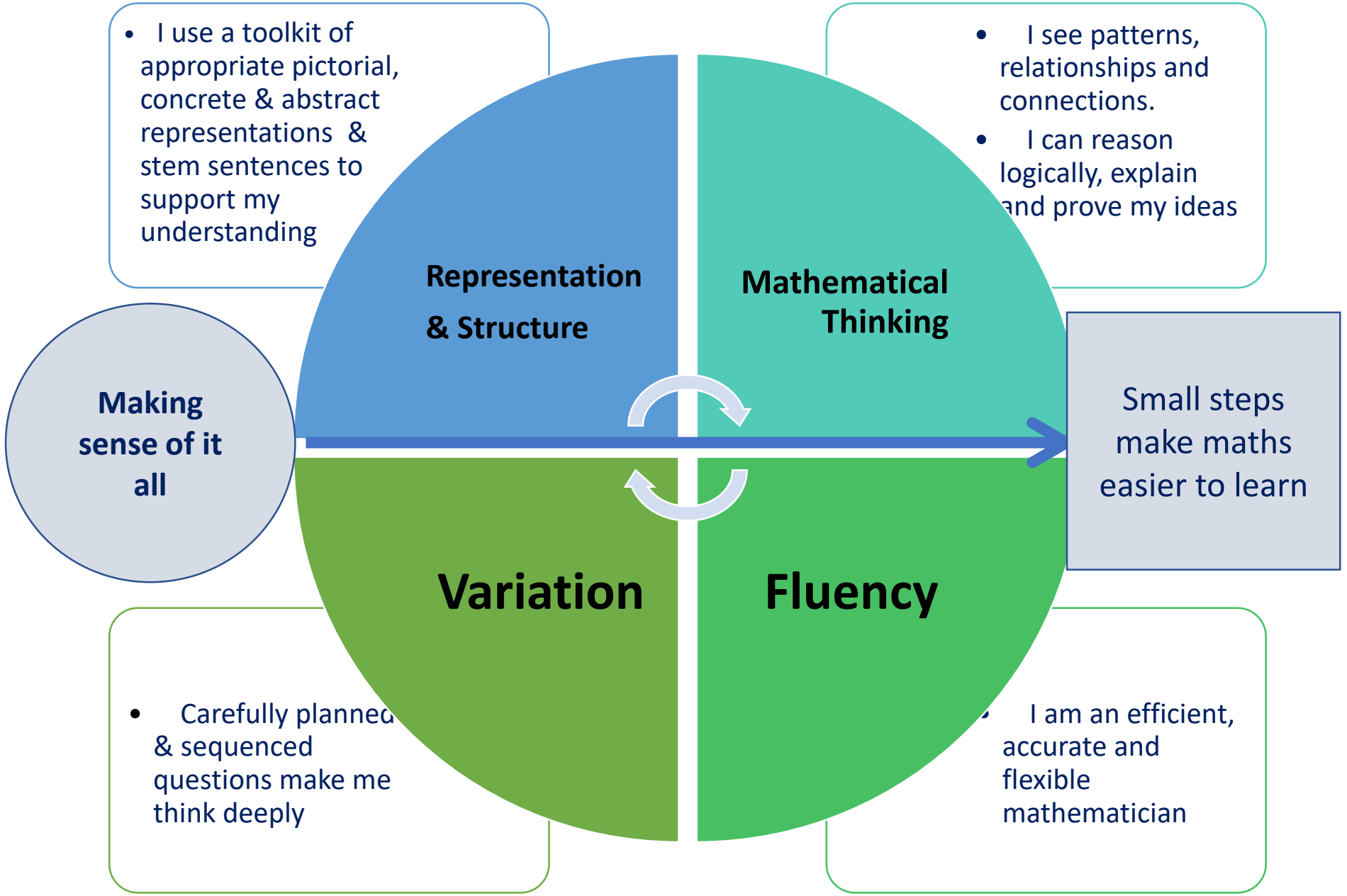
- recognise the per cent symbol (%) and understand that per cent relates to ‘number of parts per hundred’, and write percentages as a fraction with denominator 100, and as a decimal
- solve problems which require knowing percentage and decimal equivalents of 1/2, 1/4, 1/5, 2/5, 4/5 and those fractions with a denominator of a multiple of 10 or 25

Year 6 Percentages, ratio & proportion

- recall and use equivalences between simple fractions, decimals and percentages, including in different contexts

How we develop our mathematicians at Silsden

A Silsden mathematician



Mathematical thinking involves…

Looking for patterns

Looking for relationships

Connecting ideas

Reasoning logically

Explaining

Conjecturing

Proving

- Mathematical thinking is central to deep and sustainable learning
- The ideas we teach need to be thought about, reasoned with and discussed by all pupils

How we develop mathematical thinking

- By expecting all of our children to explain, reason, convince, draw diagrams etc. as a natural part of all maths activity
- Asking ‘what’s the same and what’s different?’
- Asking ‘why?’
- Asking ‘how do you know?’

Fluency involves…

Quick & efficient recall of facts & procedures

Flexibility to move between different contexts & representations

Recognising relationships & making connections

Making appropriate choices from a toolkit of methods, strategies & approaches

- Fluency is more than memorising a single procedure or collection of facts
- It is a mixture of efficiency, accuracy and flexibility

How we develop fluency

- We have a daily session to develop our number facts – Refresh your maths memory
- Aim high
- We have regular fluency lessons
- We have weekly arithmetic lessons
- We have a variety of techniques for teaching fluency
- We teach varied fluency

Variation involves…

Carefully constructed questions that highlight the structures you are teaching

(procedural variation)

Giving children examples and non-examples

(conceptual variation)

- Variation is not the same as variety
- We need to pay attention to what aspects are being varied (and what is not being varied) and for what purpose

How we develop variation

- We carefully design questions to highlight pattern and structure
- We give children examples and non-examples

Representation & structure involves…

Representation pulls out the concept being taught

In the end, children need to be able to do the maths *without* the representation

(they are the stabilizers of maths)

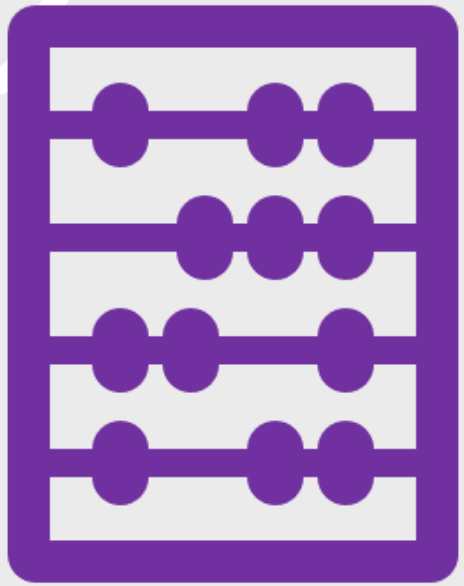
We use stem sentences to describe the representation

There are key representations that children will meet lots of times

- Representations can be concrete (using equipment e.g. place value counters, beads, Dienes, 10 frames, Numicon, fraction walls) or pictorial

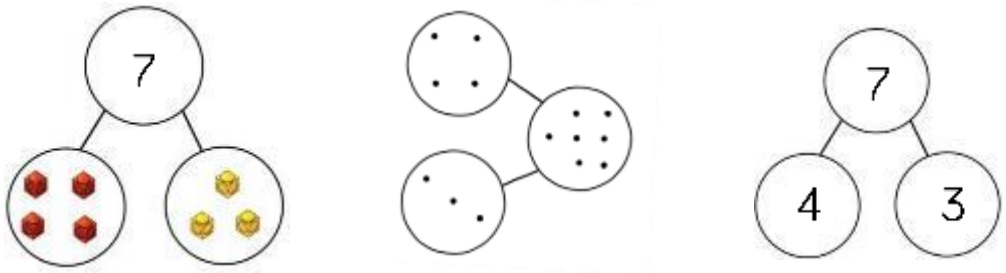
How we develop representation

- We have a clear progression document that shows which representations each year group will meet (White Rose representation guide)
- We have concrete equipment for children to use e.g. 10s frames, cubes, Dienes, bead strings, straw bundles, counters, Numicon, fraction wall
- We use a variety of pictorial representations e.g. bar model, part/whole model, 10s frames, Numicon, number lines, number squares/grids
- Children have access to core representation equipment all the time – we actively encourage them to use it!



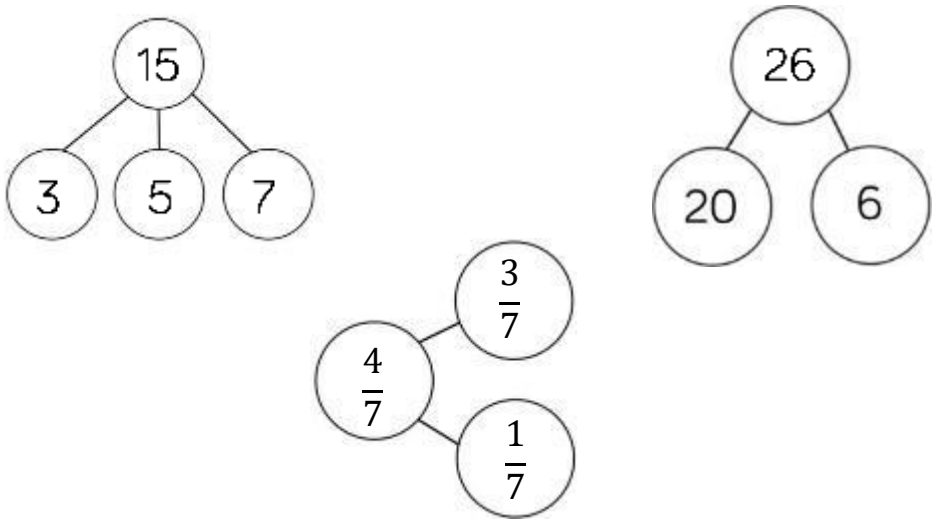
Standard representations that we use throughout school for addition & subtraction

Part-Whole Model



$7 = 4 + 3$ $\quad$ $7 - 3 = 4$

$7 = 3 + 4$ $\quad$ $7 - 4 = 3$



Benefits

This part-whole model supports children in their understanding of aggregation and partitioning. Due to its shape, it can be referred to as a cherry part-whole model.

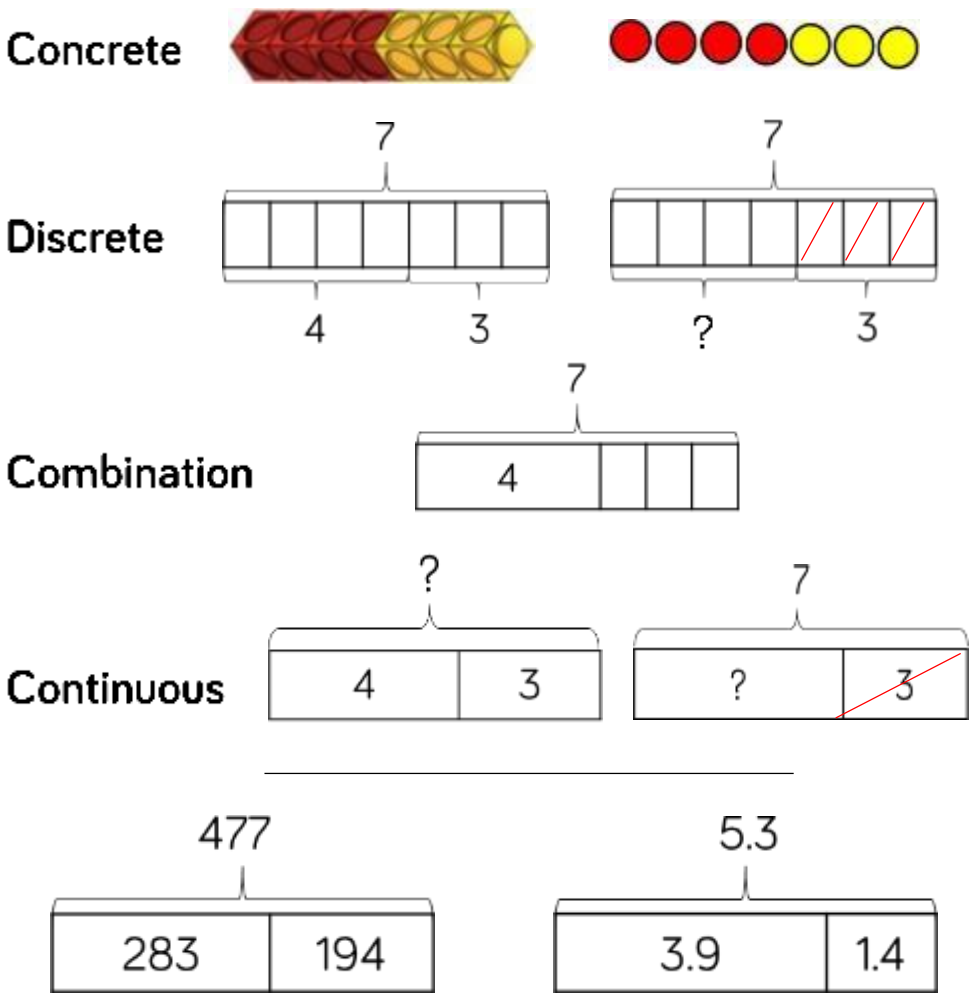
When the parts are complete and the whole is empty, children use aggregation to add the parts together to find the total.

When the whole is complete and at least one of the parts is empty, children use partitioning (a form of subtraction) to find the missing part.

Part-whole models can be used to partition a number into two or more parts, or to help children to partition a number into tens and ones or other place value columns.

In KS2, children can apply their understanding of the part-whole model to add and subtract fractions, decimals and percentages.

Bar Model (single)



Benefits

The single bar model is another type of a part-whole model that can support children in representing calculations to help them unpick the structure.

Cubes and counters can be used in a line as a concrete representation of the bar model.

Discrete bar models are a good starting point with smaller numbers. Each box represents one whole.

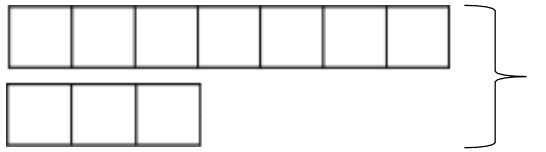
The combination bar model can support children to calculate by counting on from the larger number. It is a good stepping stone towards the continuous bar model.

Continuous bar models are useful for a range of values. Each rectangle represents a number. The question mark indicates the value to be found.

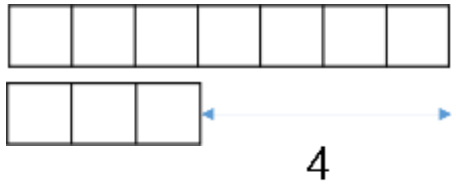
In KS2, children can use bar models to represent larger numbers, decimals and fractions.

Bar Model (multiple)

Discrete

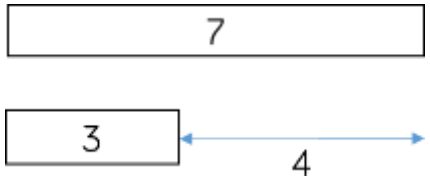


$7 + 3 = 10$

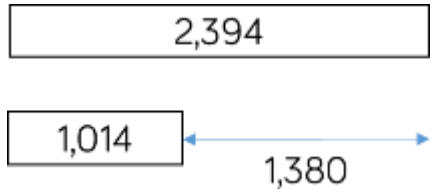


$7 - 3 = 4$

Continuous



$7 - 3 = 4$



$2{,}394 - 1{,}014 = 1{,}380$

Benefits

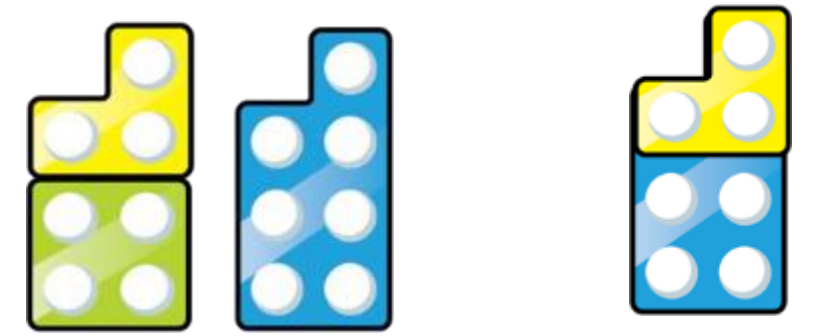
The multiple bar model is a good way to compare quantities whilst still unpicking the structure.

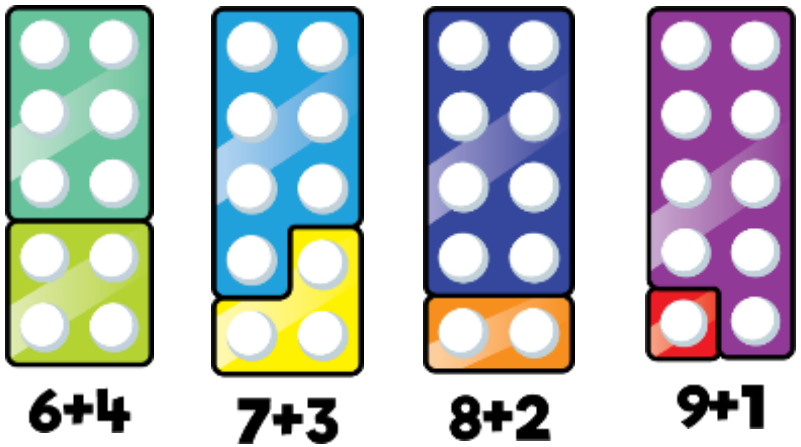
Two or more bars can be drawn, with a bracket labelling the whole positioned on the right hand side of the bars. Smaller numbers can be represented with a discrete bar model whilst continuous bar models are more effective for larger numbers.

Multiple bar models can also be used to represent the difference in subtraction. An arrow can be used to model the difference.

When working with smaller numbers, children can use cubes and a discrete model to find the difference. This supports children to see how counting on can help when finding the difference.

Number Shapes





Benefits

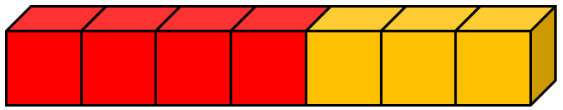
Number shapes can be useful to support children to subitise numbers as well as explore aggregation, partitioning and number bonds.

When adding numbers, children can see how the parts come together making a whole. As children use number shapes more often, they can start to subitise the total due to their familiarity with the shape of each number.

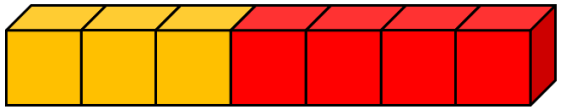
When subtracting numbers, children can start with the whole and then place one of the parts on top of the whole to see what part is missing. Again, children will start to be able to subitise the part that is missing due to their familiarity with the shapes.

Children can also work systematically to find number bonds. As they increase one number by 1, they can see that the other number decreases by 1 to find all the possible number bonds for a number.

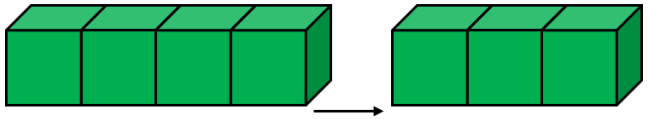
Cubes



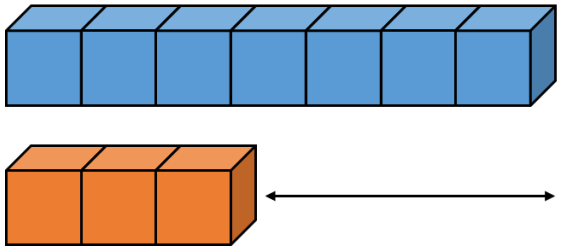
$7 = 4 + 3$



$7 = 3 + 4$



$7 - 3 = 4$



$7 - 3 = 4$

Benefits

Cubes can be useful to support children with the addition and subtraction of one-digit numbers.

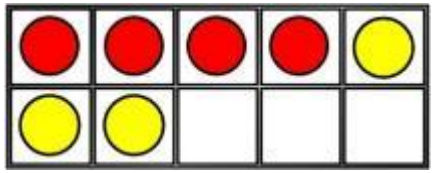
When adding numbers, children can see how the parts come together to make a whole. Children could use two different colours of cubes to represent the numbers before putting them together to create the whole.

When subtracting numbers, children can start with the whole and then remove the number of cubes that they are subtracting in order to find the answer. This model of subtraction is reduction, or take away.

Cubes can also be useful to look at subtraction as difference. Here, both numbers are made and then lined up to find the difference between the numbers.

Cubes are useful when working with smaller numbers but are less efficient with larger numbers as they are difficult to subitise and children may miscount them.

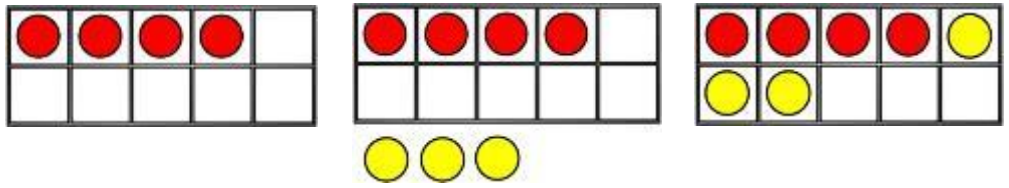
Ten Frames (within 10)



$4 + 3 = 7$
$3 + 4 = 7$
$7 - 3 = 4$
$7 - 4 = 3$

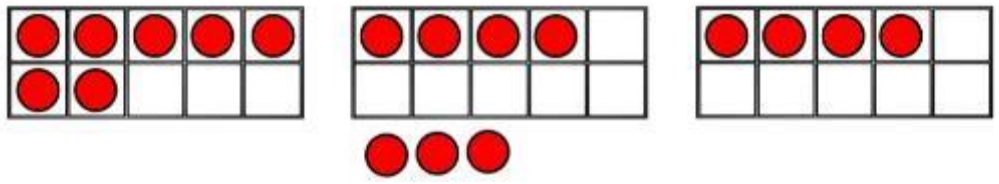
4 is a part.
3 is a part.
7 is the whole.

First Then Now



$4 + 3 = 7$

First Then Now



$7 - 3 = 4$

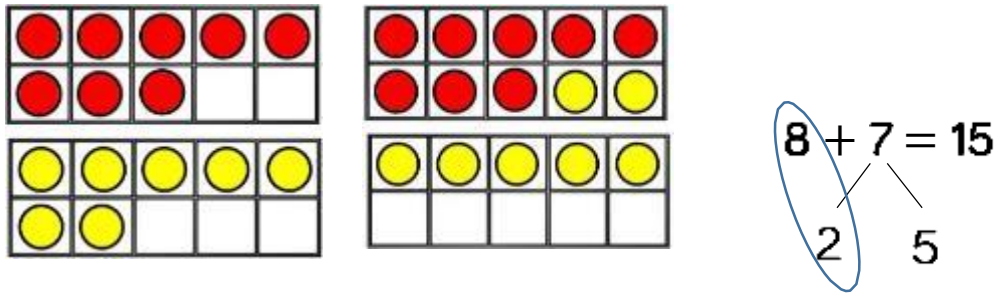
Benefits

When adding and subtracting within 10, the ten frame can support children to understand the different structures of addition and subtraction.

Using the language of parts and wholes represented by objects on the ten frame introduces children to aggregation and partitioning.
Aggregation is a form of addition where parts are combined together to make a whole. Partitioning is a form of subtraction where the whole is split into parts. Using these structures, the ten frame can enable children to find all the number bonds for a number.

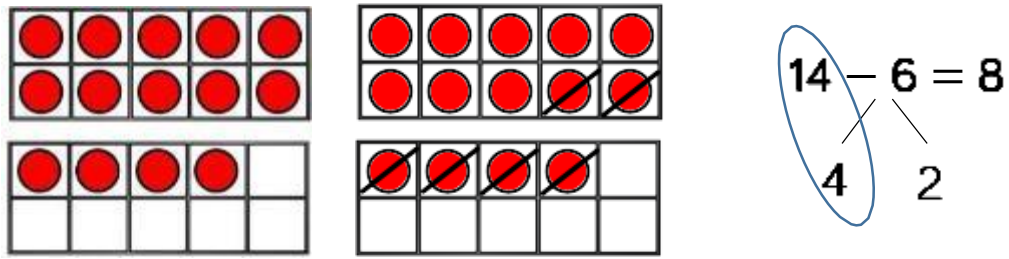
Children can also use ten frames to look at augmentation (increasing a number) and take-away (decreasing a number). This can be introduced through a first, then, now structure which shows the change in the number in the 'then' stage. This can be put into a story structure to help children understand the change e.g. First, there were 7 cars. Then, 3 cars left. Now, there are 4 cars.

Ten Frames (within 20)



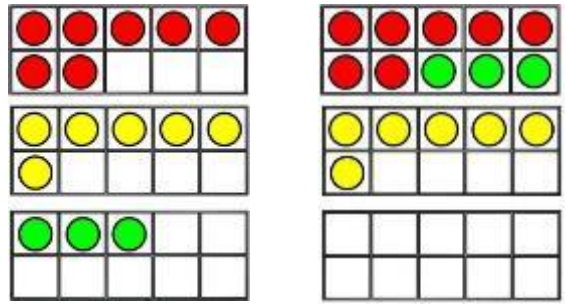
$$8 + 7 = 15$$

$$2 \quad 5$$



$$14 - 6 = 8$$

$$4 \quad 2$$



$$7 + 6 + 3 = 16$$

$$10$$

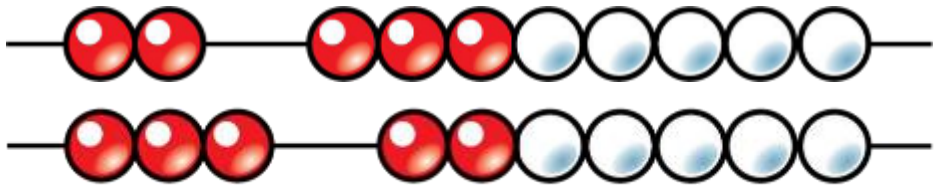
Benefits

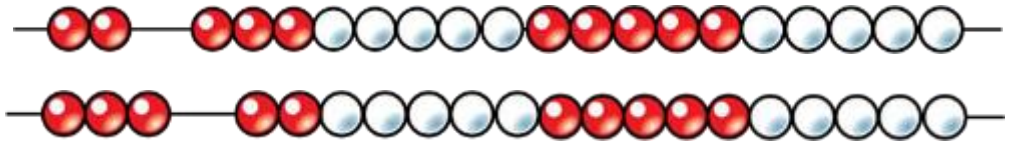
When adding two single digits, children can make each number on separate ten frames before moving part of one number to make 10 on one of the ten frames. This supports children to see how they have partitioned one of the numbers to make 10, and makes links to effective mental methods of addition.

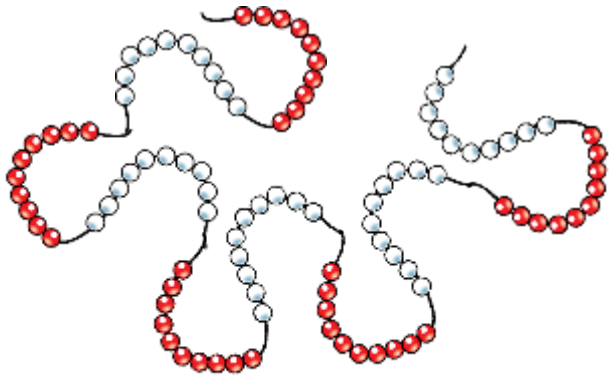
When subtracting a one-digit number from a two-digit number, firstly make the larger number on 2 ten frames. Remove the smaller number, thinking carefully about how you have partitioned the number to make 10, this supports mental methods of subtraction.

When adding three single-digit numbers, children can make each number on 3 separate 10 frames before considering which order to add the numbers in. They may be able to find a number bond to 10 which makes the calculation easier. Once again, the ten frames support the link to effective mental methods of addition as well as the importance of commutativity.

Bead Strings







Benefits

Different sizes of bead strings can support children at different stages of addition and subtraction.

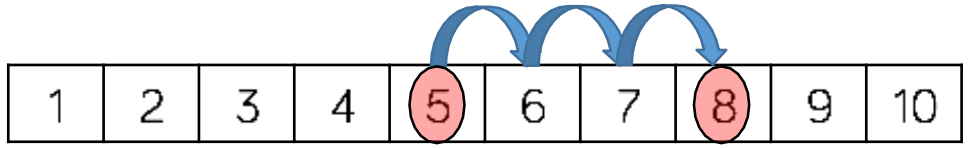
Bead strings to 10 are very effective at helping children to investigate number bonds up to 10.
They can help children to systematically find all the number bonds to 10 by moving one bead at a time to see the different numbers they have partitioned the 10 beads into e.g. $2 + 8 = 10$, move one bead, $3 + 7 = 10$.

Bead strings to 20 work in a similar way but they also group the beads in fives. Children can apply their knowledge of number bonds to 10 and see the links to number bonds to 20.

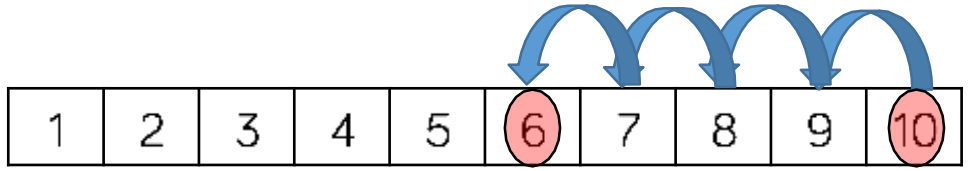
Bead strings to 100 are grouped in tens and can support children in number bonds to 100 as well as helping when adding by making ten. Bead strings can show a link to adding to the next 10 on number lines which supports a mental method of addition.

Number Tracks

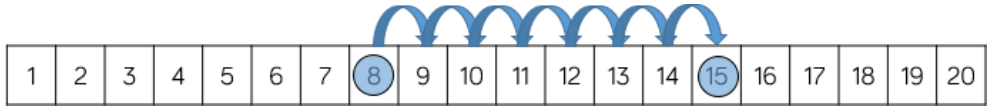
$5 + 3 = 8$



$10 - 4 = 6$



$8 + 7 = 15$



Benefits

Number tracks are useful to support children in their understanding of augmentation and reduction.

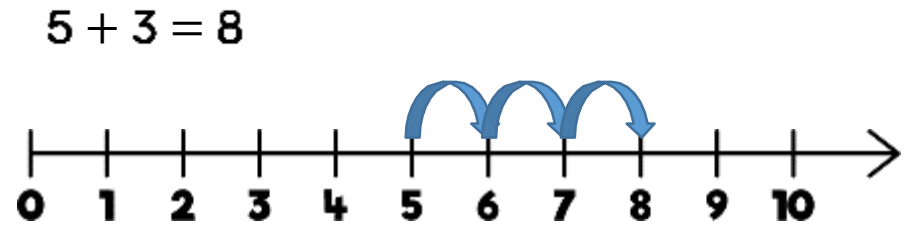
When adding, children count on to find the total of the numbers. On a number track, children can place a counter on the starting number and then count on to find the total.

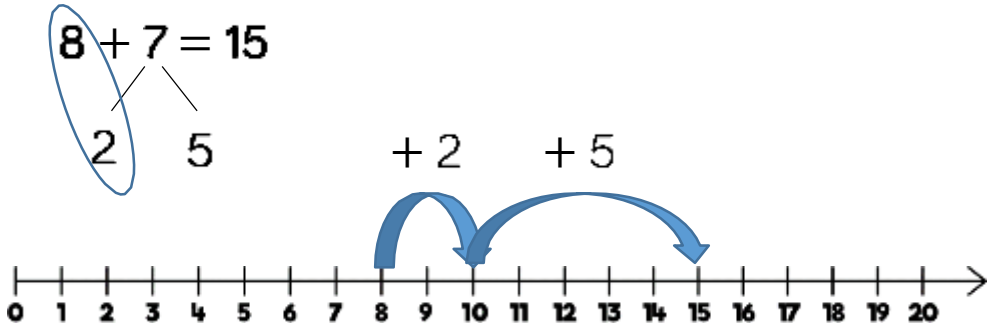
When subtracting, children count back to find their answer. They start at the minuend and then take away the subtrahend to find the difference between the numbers.

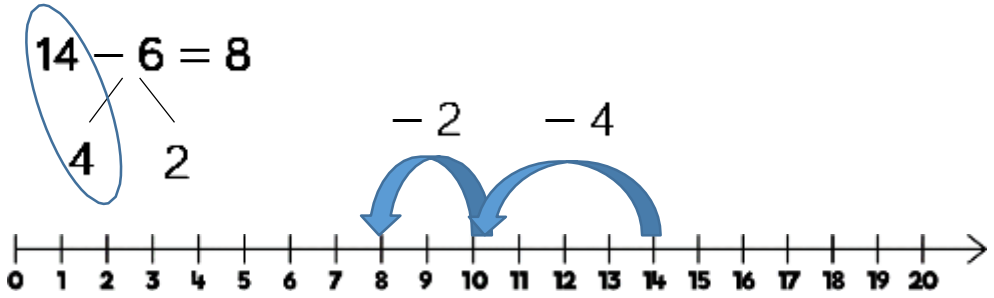
Number tracks can work well alongside ten frames and bead strings which can also model counting on or counting back.

Playing board games can help children to become familiar with the idea of counting on using a number track before they move on to number lines.

Number Lines (labelled)







Benefits

Labelled number lines support children in their understanding of addition and subtraction as augmentation and reduction.

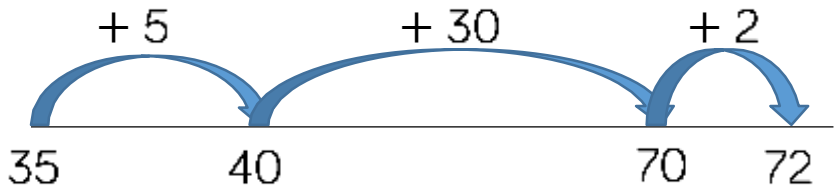
Children can start by counting on or back in ones, up or down the number line. This skill links directly to the use of the number track.

Progressing further, children can add numbers by jumping to the nearest 10 and then jumping to the total. This links to the making 10 method which can also be supported by ten frames. The smaller number is partitioned to support children to make a number bond to 10 and to then add on the remaining part.

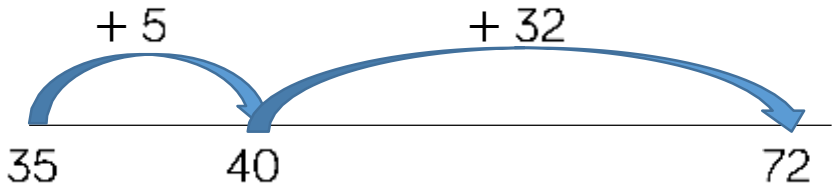
Children can subtract numbers by firstly jumping to the nearest 10. Again, this can be supported by ten frames so children can see how they partition the smaller number into the two separate jumps.

Number Lines (blank)

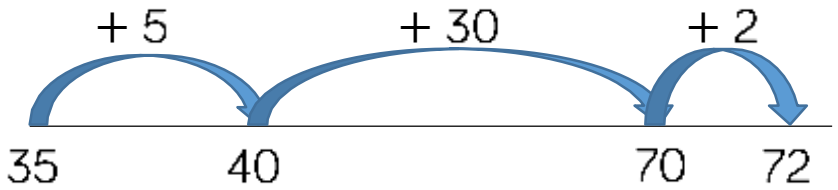
35 + 37 = 72



35 + 37 = 72



72 − 35 = 37



Benefits

Blank number lines provide children with a structure to add and subtract numbers in smaller parts.

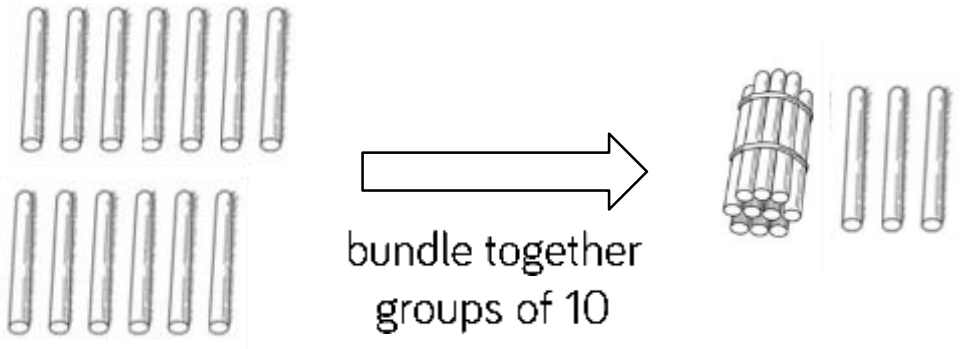
Developing from labelled number lines, children can add by jumping to the nearest 10 and then adding the rest of the number either as a whole or by adding the tens and ones separately.

Children may also count back on a number line to subtract, again by jumping to the nearest 10 and then subtracting the rest of the number.

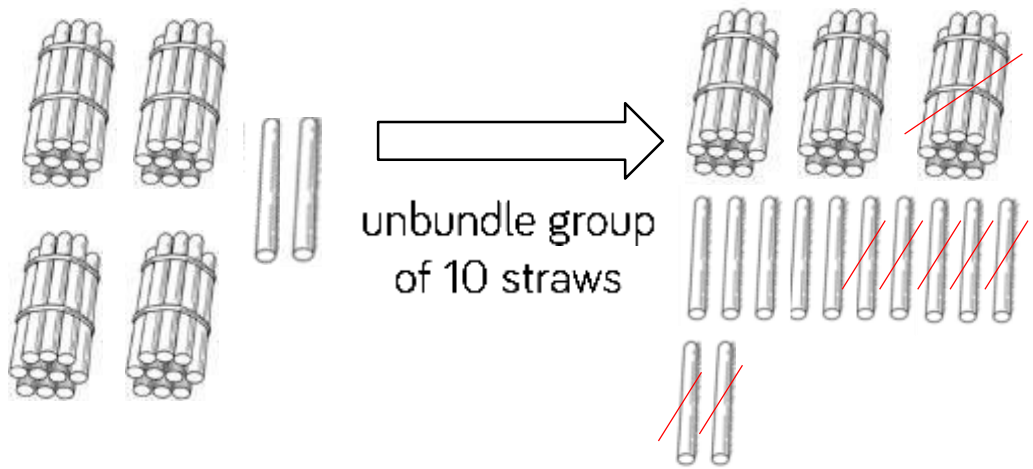
Blank number lines can also be used effectively to help children subtract by finding the difference between numbers. This can be done by starting with the smaller number and then counting on to the larger number. They then add up the parts they have counted on to find the difference between the numbers.

Straws

$7 + 6 = 13$



$42 - 17 = 25$



Benefits

Straws are an effective way to support children in their understanding of exchange when adding and subtracting 2-digit numbers.

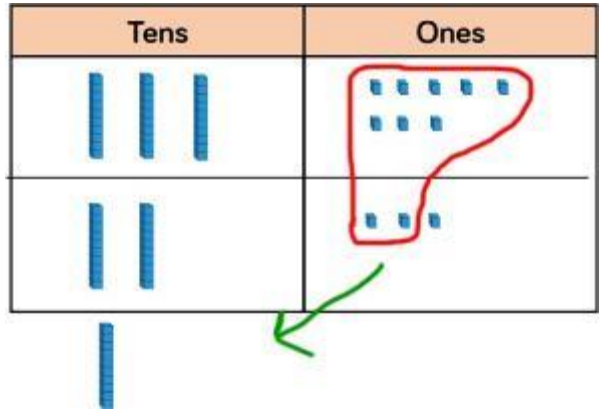
Children can be introduced to the idea of bundling groups of ten when adding smaller numbers and when representing 2-digit numbers. Use elastic bands or other ties to make bundles of ten straws.

When adding numbers, children bundle a group of 10 straws to represent the exchange from 10 ones to 1 ten. They then add the individual straws (ones) and bundles of straws (tens) to find the total.

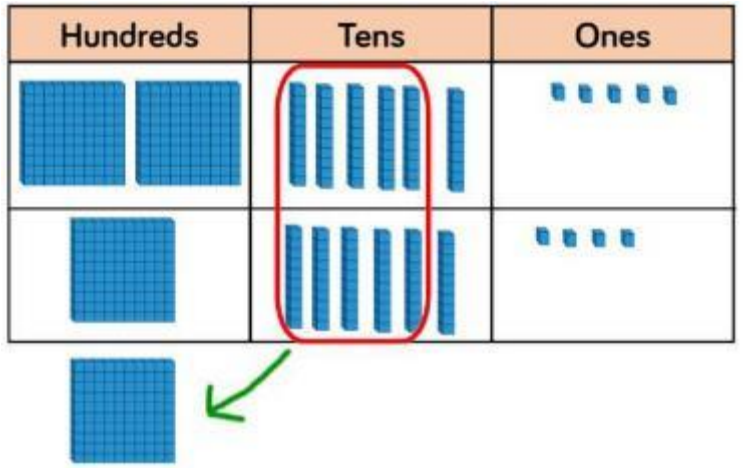
When subtracting numbers, children unbundle a group of 10 straws to represent the exchange from 1 ten to 10 ones.

Straws provide a good stepping stone to adding and subtracting with Base 10/Dienes.

Base 10/Dienes (addition)



$$\begin{array}{r} 38 \\ +\ 23 \\ \hline 61 \\ \hline 1 \end{array}$$



$$\begin{array}{r} 265 \\ +\ 164 \\ \hline 429 \\ \hline 1 \end{array}$$

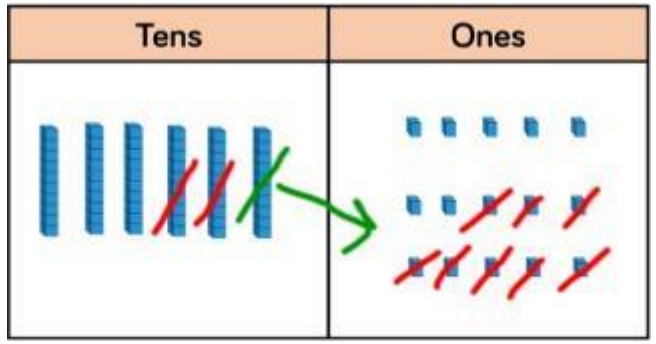
Benefits

Using Base 10 or Dienes is an effective way to support children's understanding of column addition. It is important that children write out their calculations alongside using or drawing Base 10 so they can see the clear links between the written method and the model.

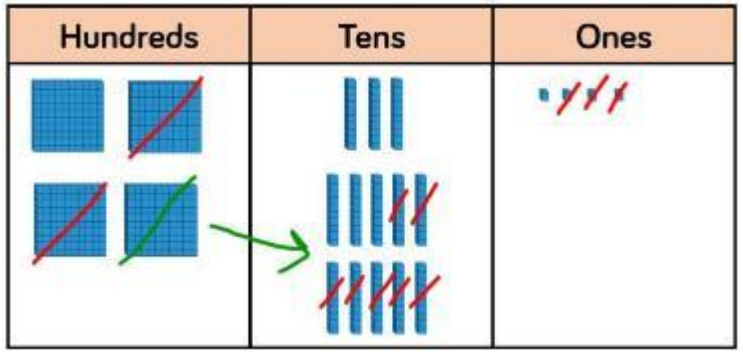
Children should first add without an exchange before moving on to addition with exchange.. The representation becomes less efficient with larger numbers due to the size of Base 10. In this case, place value counters may be the better model to use.

When adding, always start with the smallest place value column. Here are some questions to support children.
How many ones are there altogether?
Can we make an exchange? (Yes or No)
How many do we exchange? (10 ones for 1 ten, show exchanged 10 in tens column by writing 1 in column)
How many ones do we have left? (Write in ones column)
Repeat for each column.

Base 10/Dienes (subtraction)



$$\begin{array}{r} {}^{5}\cancel{6}^{1}5 \\ -\ 2\ 8 \\ \hline 3\ 7 \end{array}$$



$$\begin{array}{r} {}^{3}\cancel{4}^{1}35 \\ -\ 2\ 7\ 3 \\ \hline 2\ 6\ 2 \end{array}$$

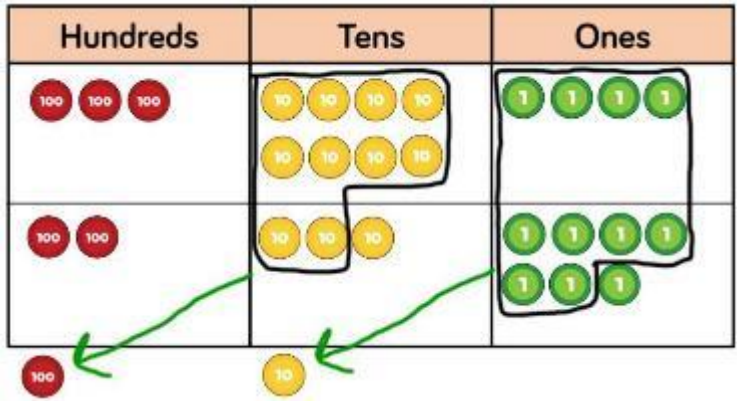
Benefits

Using Base 10 or Dienes is an effective way to support children's understanding of column subtraction. It is important that children write out their calculations alongside using or drawing Base 10 so they can see the clear links between the written method and the model.

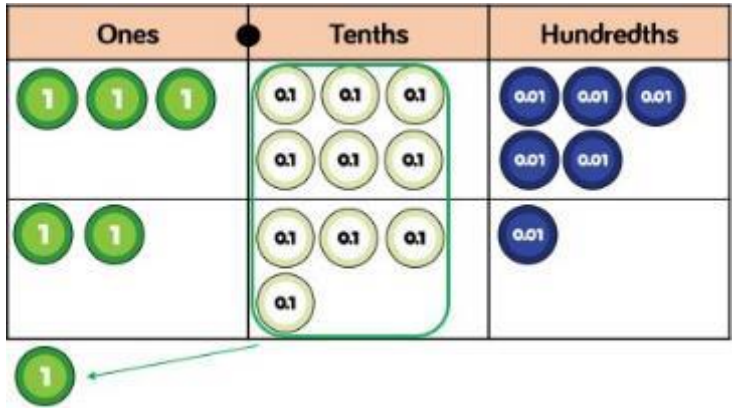
Children should first subtract without an exchange before moving on to subtraction with exchange. When building the model, children should just make the minuend using Base 10, they then subtract the subtrahend. Highlight this difference to addition to avoid errors by making both numbers. Children start with the smallest place value column. When there are not enough ones/tens/hundreds to subtract in a column, children need to move to the column to the left and exchange e.g. exchange 1 ten for 10 ones. They can then subtract efficiently.

This model is efficient with up to 4-digit numbers. Place value counters are more efficient with larger numbers and decimals.

Place Value Counters (addition)



$$\begin{array}{r} 384 \\ +\ 237 \\ \hline 621 \\ \hline 1\ 1 \end{array}$$



$$\begin{array}{r} 3.65 \\ +\ 2.41 \\ \hline 6.06 \\ \hline 1 \end{array}$$

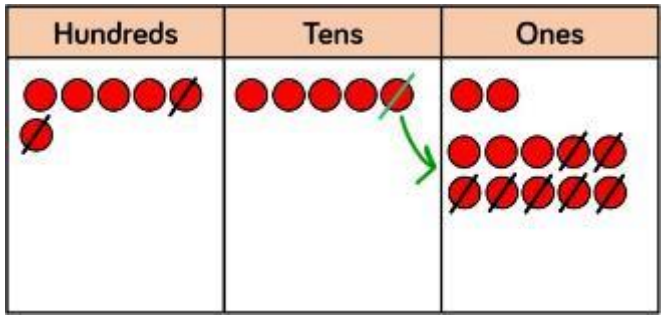
Benefits

Using place value counters is an effective way to support children's understanding of column addition. It is important that children write out their calculations alongside using or drawing counters so they can see the clear links between the written method and the model.

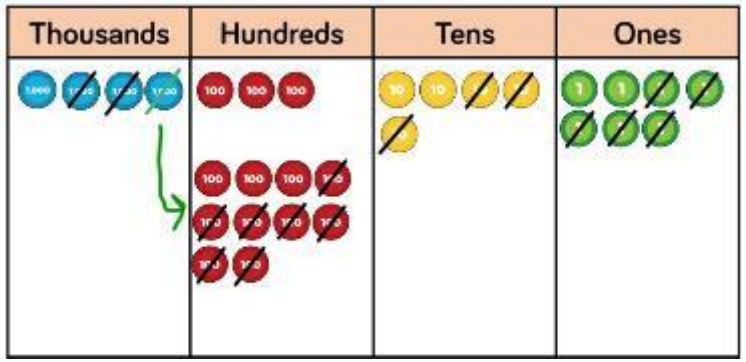
Children should first add without an exchange before moving on to addition with exchange. Different place value counters can be used to represent larger numbers or decimals. If you don't have place value counters, use normal counters on a place value grid to enable children to experience the exchange between columns.

When adding money, children can also use coins to support their understanding. It is important that children consider how the coins link to the written calculation especially when adding decimal amounts.

Place Value Counters (Subtraction)



$$\begin{array}{r} {}^{4}\cancel{6}{}^{1}\cancel{5}2 \\ -\ 207 \\ \hline 445 \end{array}$$



$$\begin{array}{r} {}^{3}\cancel{4}{}^{1}357 \\ -\ 2735 \\ \hline 1622 \end{array}$$

Benefits

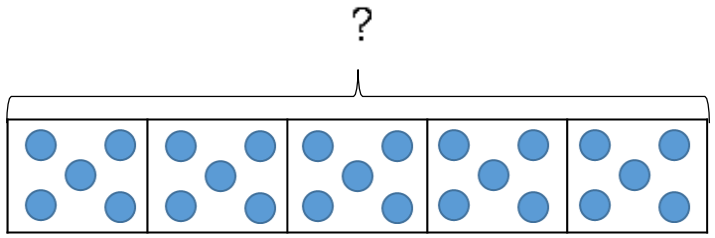
Using place value counters is an effective way to support children's understanding of column subtraction. It is important that children write out their calculations alongside using or drawing counters so they can see the clear links between the written method and the model.

Children should first subtract without an exchange before moving on to subtraction with exchange. If you don't have place value counters, use normal counters on a place value grid to enable children to experience the exchange between columns.

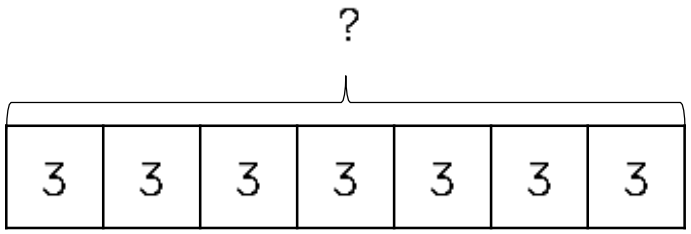
When building the model, children should just make the minuend using counters, they then subtract the subtrahend. Children start with the smallest place value column. When there are not enough ones/tens/hundreds to subtract in a column, children need to move to the column to the left and exchange e.g. exchange 1 ten for 10 ones. They can then subtract efficiently.

Standard representations that we use throughout school for multiplication & division

Bar Model

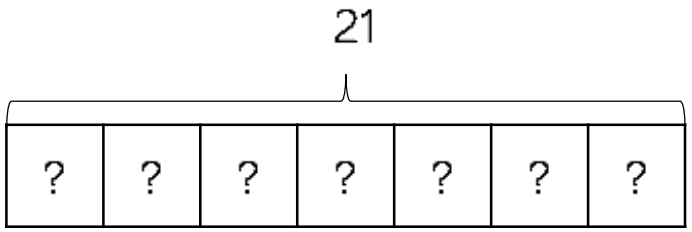


$5 \times 5 = 25$

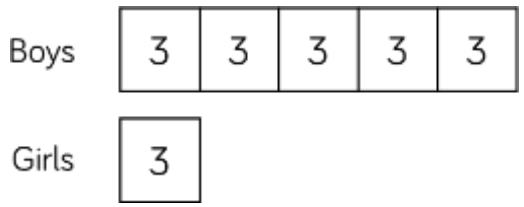


$3 \times 7 = 21$

$7 \times 3 = 21$



$21 \div 7 = 3$



Benefits

Children can use the single bar model to represent multiplication as repeated addition. They could use counters, cubes or dots within the bar model to support calculation before moving on to placing digits into the bar model to represent the multiplication.

Division can be represented by showing the total of the bar model and then dividing the bar model into equal groups.

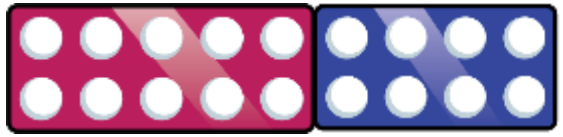
It is important when solving word problems that the bar model represents the problem.

Sometimes, children may look at scaling problems. In this case, more than one bar model is useful to represent this type of problem, e.g. There are 3 girls in a group. There are 5 times more boys than girls. How many boys are there?
The multiple bar model provides an opportunity to compare the groups.

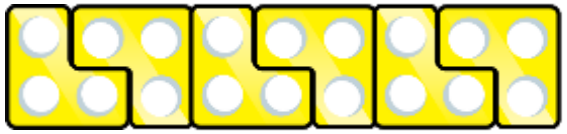
Number Shapes

$5 \times 4 = 20$
$4 \times 5 = 20$

$5 \times 4 = 20$
$4 \times 5 = 20$



$18 \div 3 = 6$



Benefits

Number shapes support children's understanding of multiplication as repeated addition.

Children can build multiplications in a row using the number shapes. When using odd numbers, encourage children to interlock the shapes so there are no gaps in the row. They can then use the tens number shapes along with other necessary shapes over the top of the row to check the total. Using the number shapes in multiplication can support children in discovering patterns of multiplication e.g. odd × odd = even, odd × even = odd, even × even = even.

When dividing, number shapes support children's understanding of division as grouping. Children make the number they are dividing and then place the number shape they are dividing by over the top of the number to find how many groups of the number there are altogether e.g. There are 6 groups of 3 in 18.

Bead Strings

$5 \times 3 = 15$
$3 \times 5 = 15$

$15 \div 3 = 5$

$5 \times 3 = 15$
$3 \times 5 = 15$

$15 \div 5 = 3$

$4 \times 5 = 20$
$5 \times 4 = 20$

$20 \div 4 = 5$

Benefits

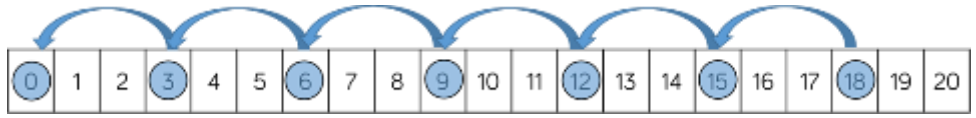
Bead strings to 100 can support children in their understanding of multiplication as repeated addition. Children can build the multiplication using the beads. The colour of beads supports children in seeing how many groups of 10 they have, to calculate the total more efficiently.
Encourage children to count in multiples as they build the number e.g. 4, 8, 12, 16, 20.

Children can also use the bead string to count forwards and backwards in multiples, moving the beads as they count.

When dividing, children build the number they are dividing and then group the beads into the number they are dividing by e.g. 20 divided by 4 – Make 20 and then group the beads into groups of four. Count how many groups you have made to find the answer.

Number Tracks

$6 \times 3 = 18$
$3 \times 6 = 18$



$18 \div 3 = 6$

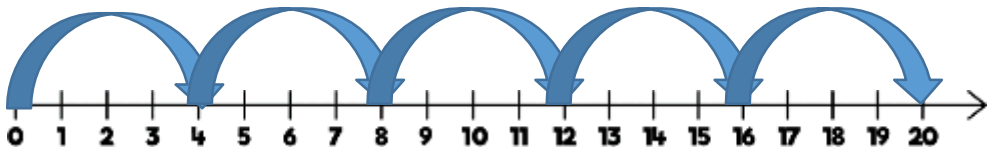
Benefits

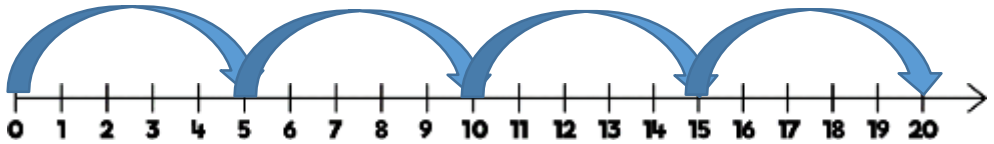
Number tracks are useful to support children to count in multiples, forwards and backwards. Moving counters or cubes along the number track can support children to keep track of their counting. Translucent counters help children to see the number they have landed on whilst counting.

When multiplying, children place their counter on 0 to start and then count on to find the product of the numbers.
When dividing, children place their counter on the number they are dividing and the count back in jumps of the number they are dividing by until they reach 0. Children record how many jumps they have made to find the answer to the division.

Number tracks can be useful with smaller multiples but when reaching larger numbers they can become less efficient.

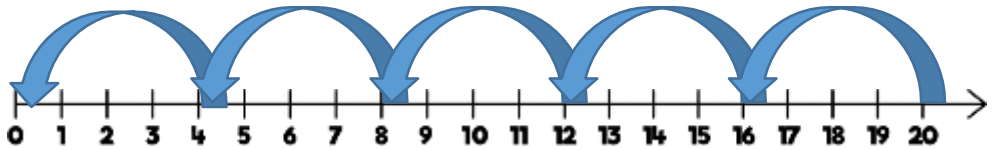
Number Lines (labelled)





$4 \times 5 = 20$

$5 \times 4 = 20$



$20 \div 4 = 5$

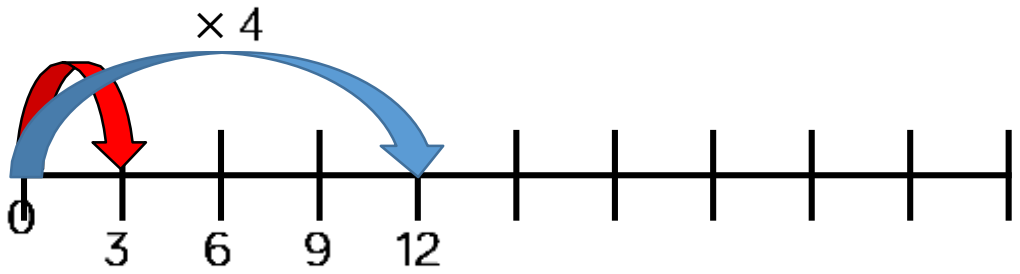
Benefits

Labelled number lines are useful to support children to count in multiples, forwards and backwards as well as calculating single-digit multiplications.

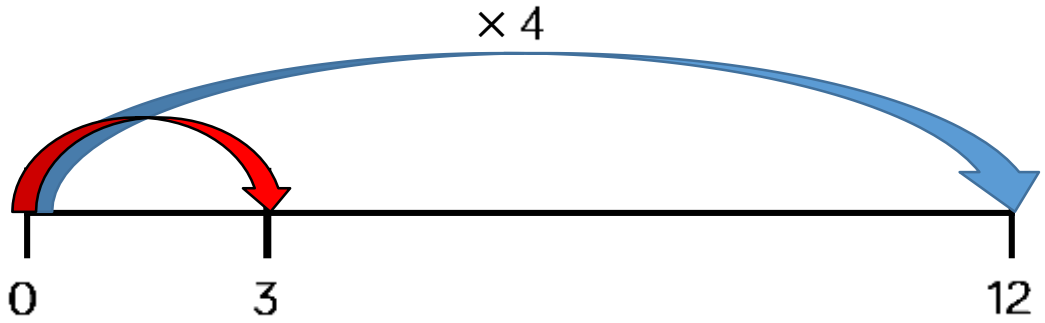
When multiplying, children start at 0 and then count on to find the product of the numbers.
When dividing, start at the number they are dividing and the count back in jumps of the number they are dividing by until they reach 0.
Children record how many jumps they have made to find the answer to the division.

Labelled number lines can be useful with smaller multiples, however they become inefficient as numbers become larger due to the required size of the number line.

Number Lines (blank)



A red car travels 3 miles.
A blue car 4 times further.
How far does the blue car travel?



A blue car travels 12 miles.
A red car 4 times less.
How far does the red car travel?

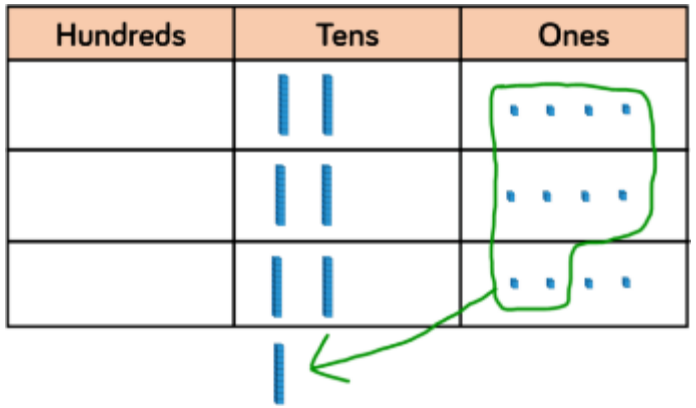
Benefits

Children can use blank number lines to represent scaling as multiplication or division.

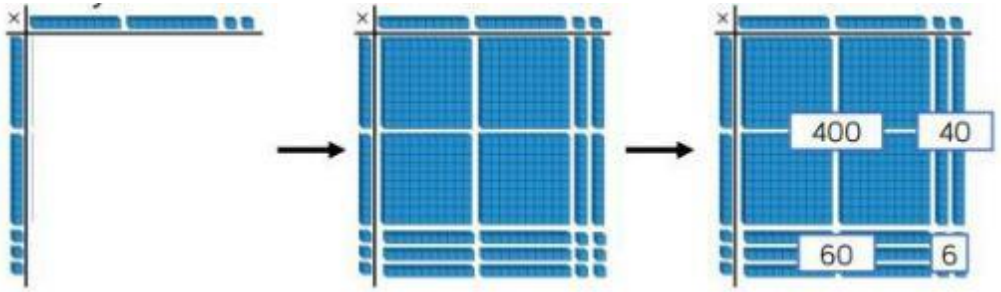
Blank number lines with intervals can support children to represent scaling accurately. Children can label intervals with multiples to calculate scaling problems.

Blank number lines without intervals can also be used for children to represent scaling.

Base 10/Dienes (multiplication)



$$\begin{array}{r} 24 \\ \times\ 3 \\ \hline 72 \\ \hline 1 \end{array}$$



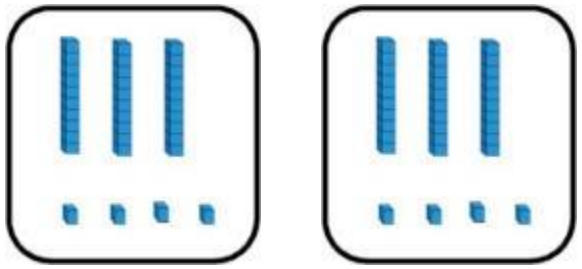
Benefits

Using Base 10 or Dienes is an effective way to support children's understanding of column multiplication. It is important that children write out their calculation alongside the equipment so they can see how the concrete and written representations match.

As numbers become larger in multiplication or the amounts of groups becomes higher, Base 10 / Dienes becomes less efficient due to the amount of equipment and number of exchanges needed.

Base 10 also supports the area model of multiplication well. Children use the equipment to build the number in a rectangular shape which they then find the area of by calculating the total value of the pieces This area model can be linked to the grid method or the formal column method of multiplying 2-digits by 2-digits.

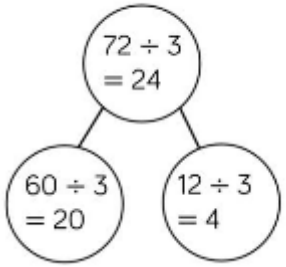
Base 10/Dienes (division)



$68 \div 2 = 34$

Tens	Ones

$72 \div 3 = 24$



Benefits

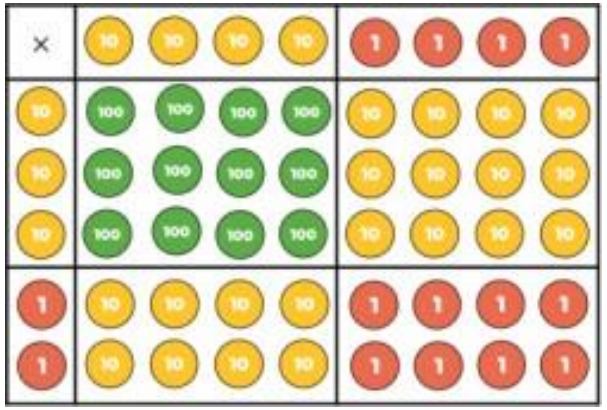
Using Base 10 or Dienes is an effective way to support children's understanding of division.

When numbers become larger, it can be an effective way to move children from representing numbers as ones towards representing them as tens and ones in order to divide. Children can then share the Base 10/ Dienes between different groups e.g. by drawing circles or by rows on a place value grid.

When they are sharing, children start with the larger place value and work from left to right. If there are any left in a column, they exchange e.g. one ten for ten ones. When recording, encourage children to use the part-whole model so they can consider how the number has been partitioned in order to divide. This will support them with mental methods.

Place Value Counters (multiplication)

$$\begin{array}{r} 34 \\ \times\ 5 \\ \hline 120 \\ \hline 1\ 2 \end{array}$$



$$\begin{array}{r} 44 \\ \times\ 32 \\ \hline 8 \\ 80 \\ 120 \\ +\ 1200 \\ \hline 1408 \\ \hline 1 \end{array}$$

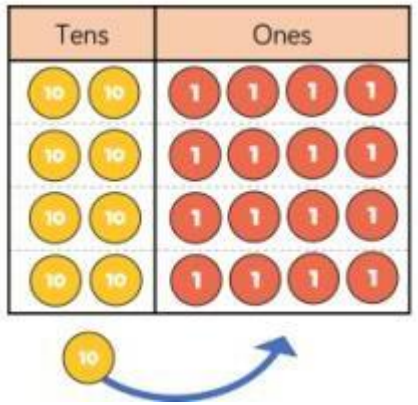
Benefits

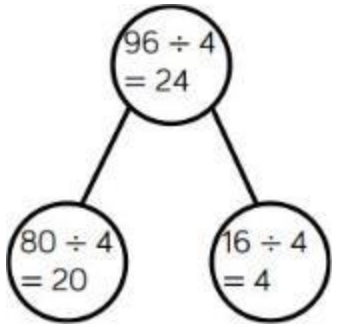
Using place value counters is an effective way to support children's understanding of column multiplication. It is important that children write out their calculation alongside the equipment so they can see how the concrete and written match.

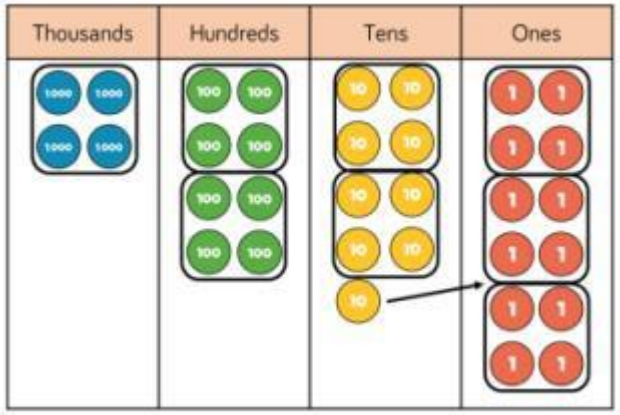
As numbers become larger in multiplication or the amounts of groups becomes higher, Base 10 / Dienes becomes less efficient due to the amount of equipment and number of exchanges needed The counters should be used to support the understanding of the written method rather than support the arithmetic.

Place value counters also support the area model of multiplication well. Children can see how to multiply 2-digit numbers by 2-digit numbers.

Place Value Counters (division)







$$
\begin{array}{r}
1223 \\
4\overline{)\,4892} \\
\end{array}
$$

Benefits

Using place value counters is an effective way to support children's understanding of division.

When working with smaller numbers, children can use place value counters to share between groups. They start by sharing the larger place value column and work from left to right. If there are any counters left over once they have been shared, they exchange the counter e.g. exchange one ten for ten ones. This method can be linked to the part-whole model to support children to show their thinking.

Place value counters also support children's understanding of short division by grouping the counters rather than sharing them. Children work from left to right through the place value columns and group the counters in the number they are dividing by. If there are any counters left over after they have been grouped, they exchange the counter e.g. exchange one hundred for ten tens.

Making sense of it all

We are really clear about what we want the children to learn

We work in small steps

We develop mathematical vocabulary in every lesson

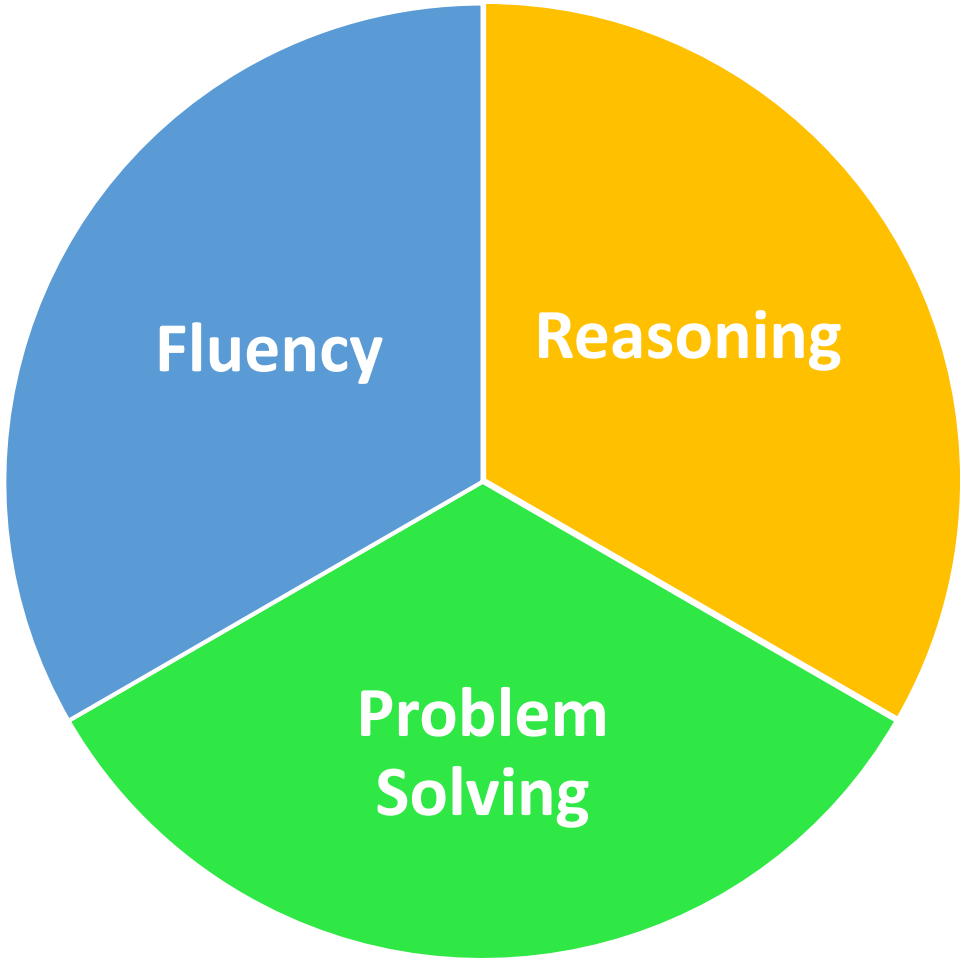
We discuss maths in every lesson

We carefully sequence the images, techniques & concepts that we will use

We keep working on a concept until we've got it!

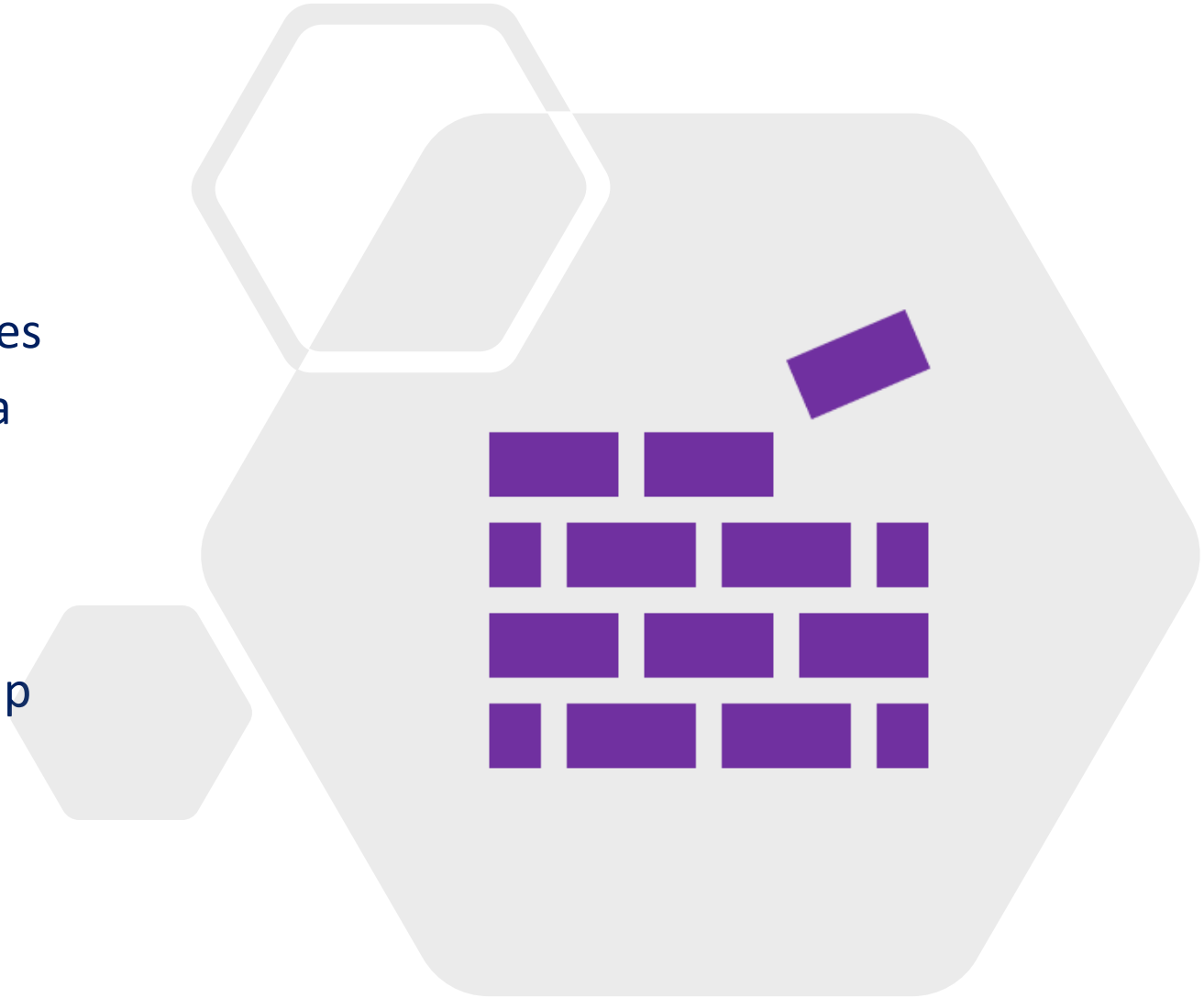
Making great sequences of maths learning

A great maths sequence has a balance of the 3 following elements…

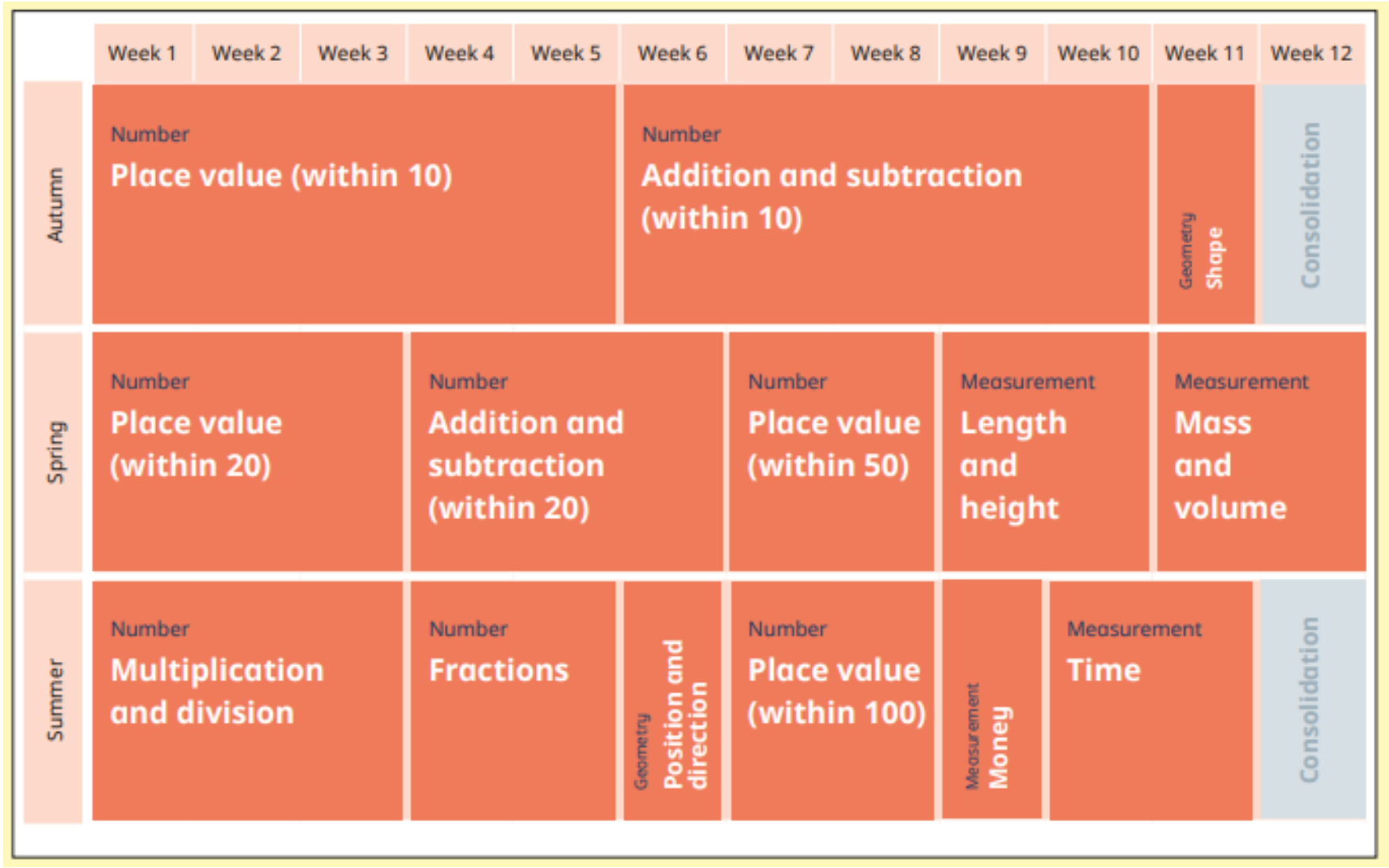


Sequences of learning

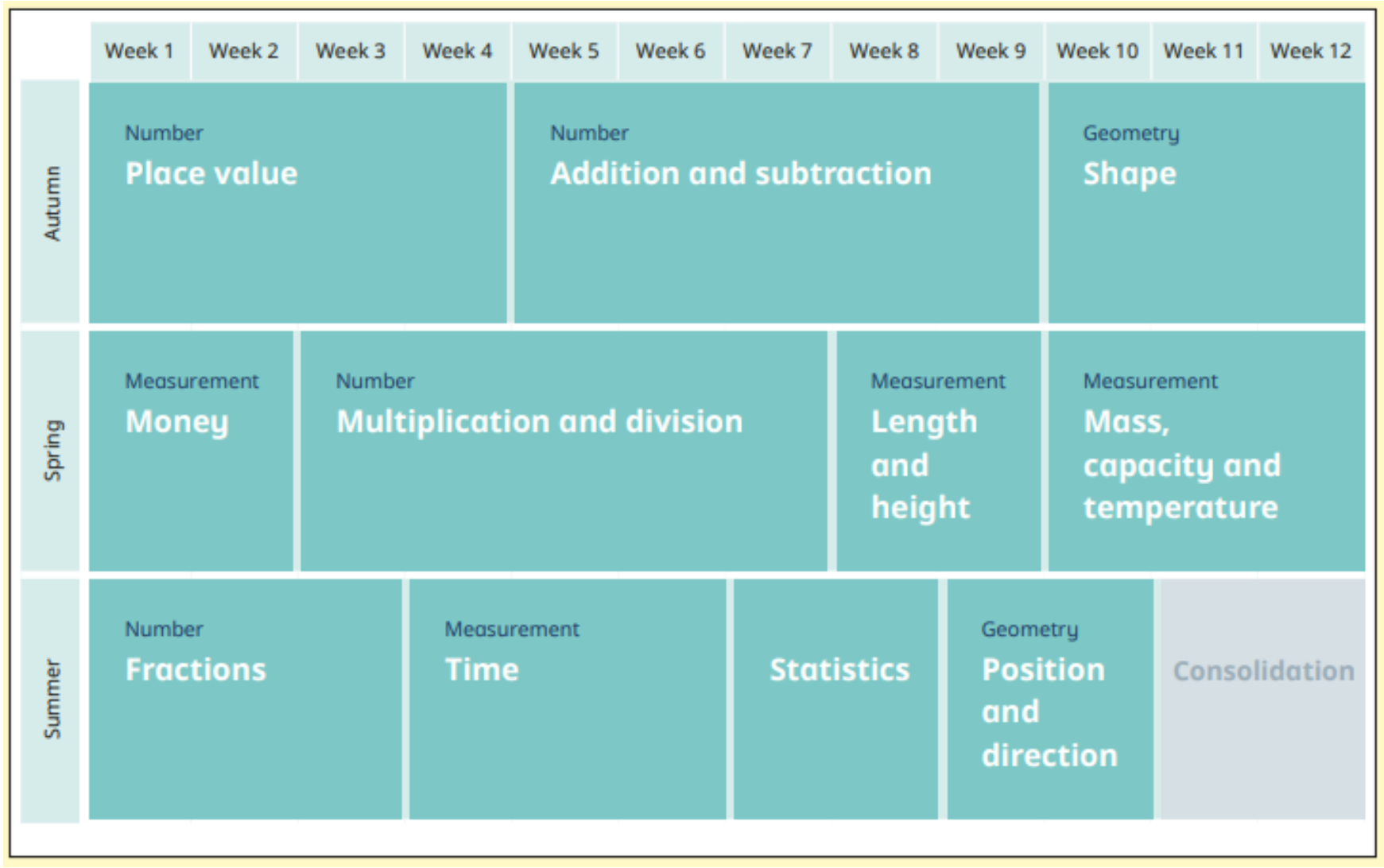
- We follow the White Rose block sequences
- We spend as long as necessary teaching a block until we are confident that our children are secure in their knowledge. This could mean blocks are shortened or extended.
- We use the White Rose small steps to help us sequence lessons within blocks
- We can combine small steps where appropriate so that our teaching is still challenging and engaging



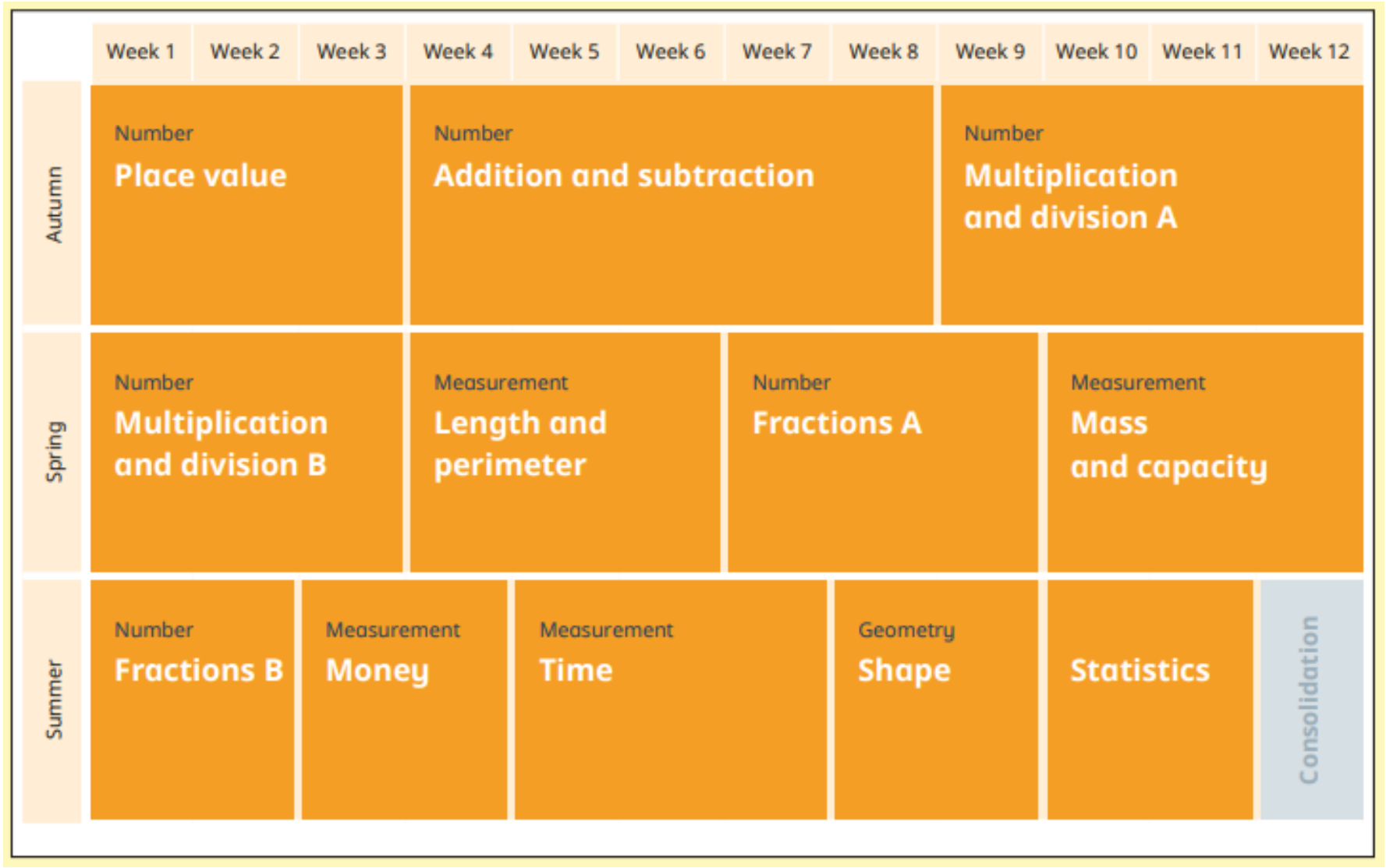
Year 1 Overview (WRM)



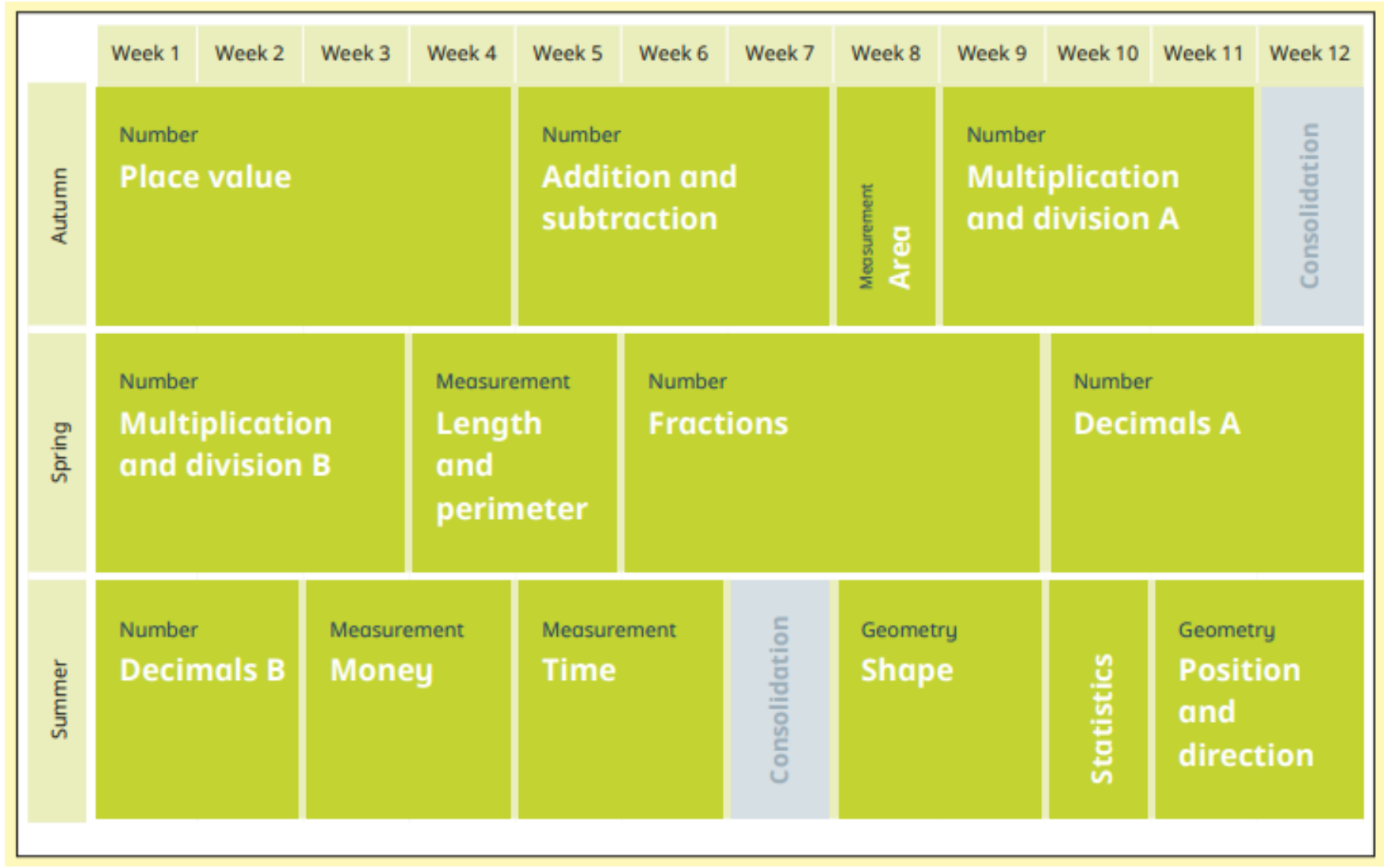
Year 2 Overview (WRM)



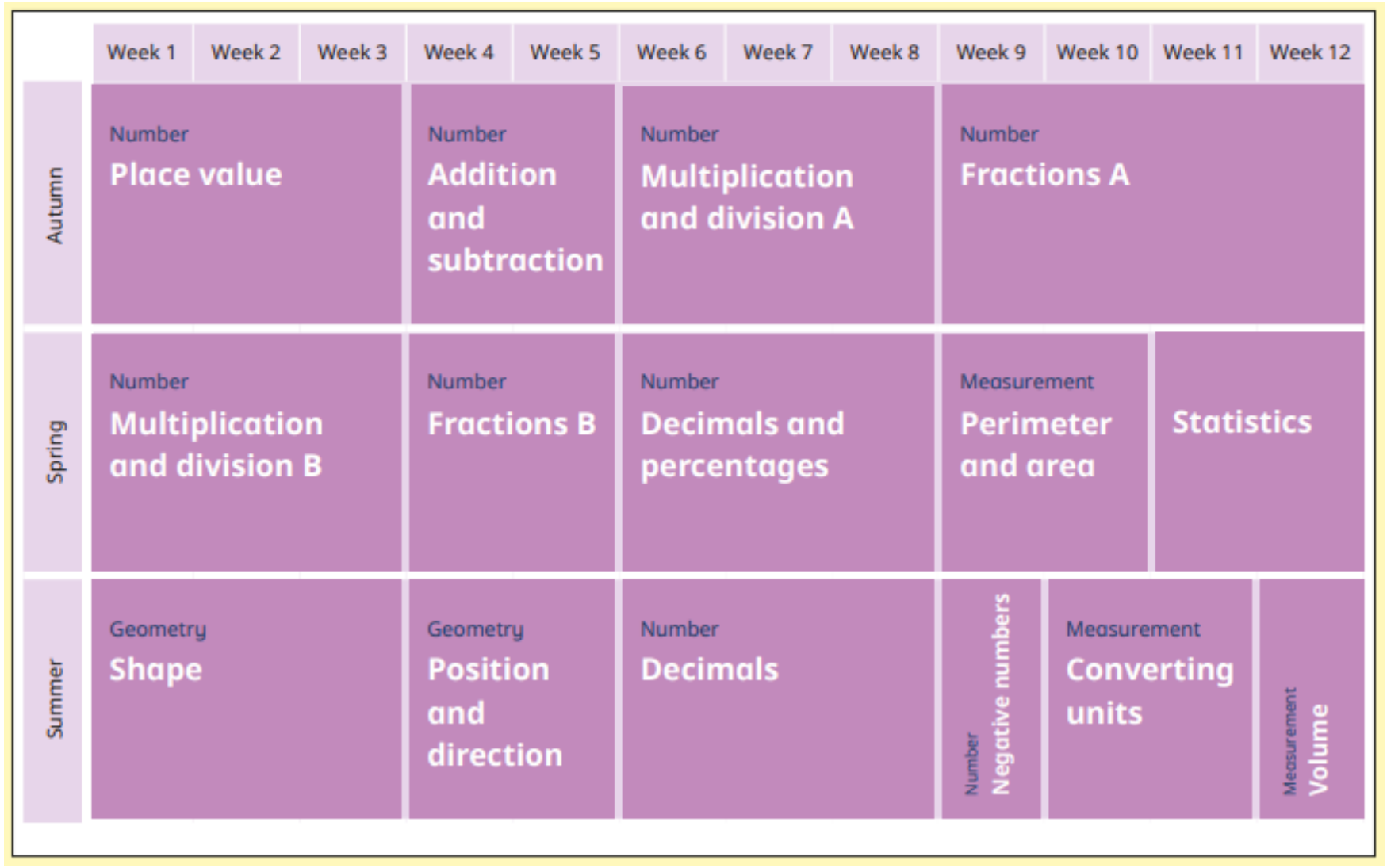
Year 3 Overview (WRM)



Year 4 Overview (WRM)

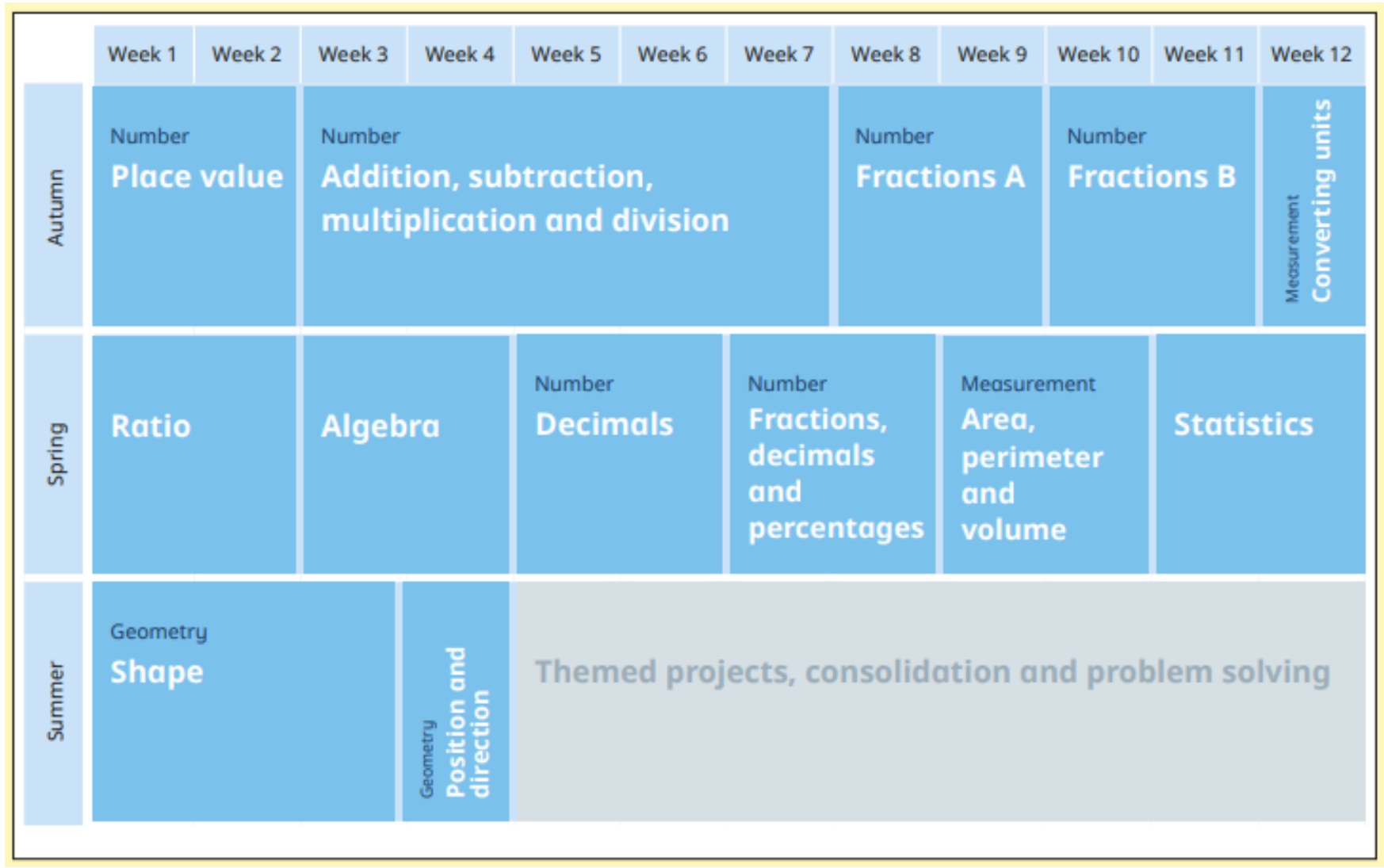


Year 5 Overview (WRM)



	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number Place value			Number Addition and subtraction		Number Multiplication and division A			Number Fractions A			
Spring	Number Multiplication and division B			Number Fractions B		Number Decimals and percentages			Measurement Perimeter and area		Statistics	
Summer	Geometry Shape			Geometry Position and direction		Number Decimals			Number Negative numbers	Measurement Converting units		Measurement Volume

Year 6 Overview (WRM)



Making maths lessons great

A really good maths lesson…

- Is engaging, creative and challenging for all
- Starts with a 10 minute ‘Refresh your maths memory’ session to secure mental number facts
- Ends with a 10 minute ‘Maths Talk’ session to develop reasoning
- Is pitched to the content of each year group (ARE) – all children have the opportunity to take part in ARE lessons
- Is accessible for all – the step is neither too big nor too small
- Supports children who are need a little more
- Has lots of talk and discussion in it
- Has bite-size chunks of teaching & learning so that children are active learners
- Makes it clear to children how and when they have been successful
- Uses appropriate models, images & representations to teach the concept (need to set out which models, images & representations we teach in each year group)
- Gives children access to a variety of resources to help them with their learning

Our maths lessons have 3 segments that link together…

Refresh your maths memory (10 mins)

Small step learning (40 mins)

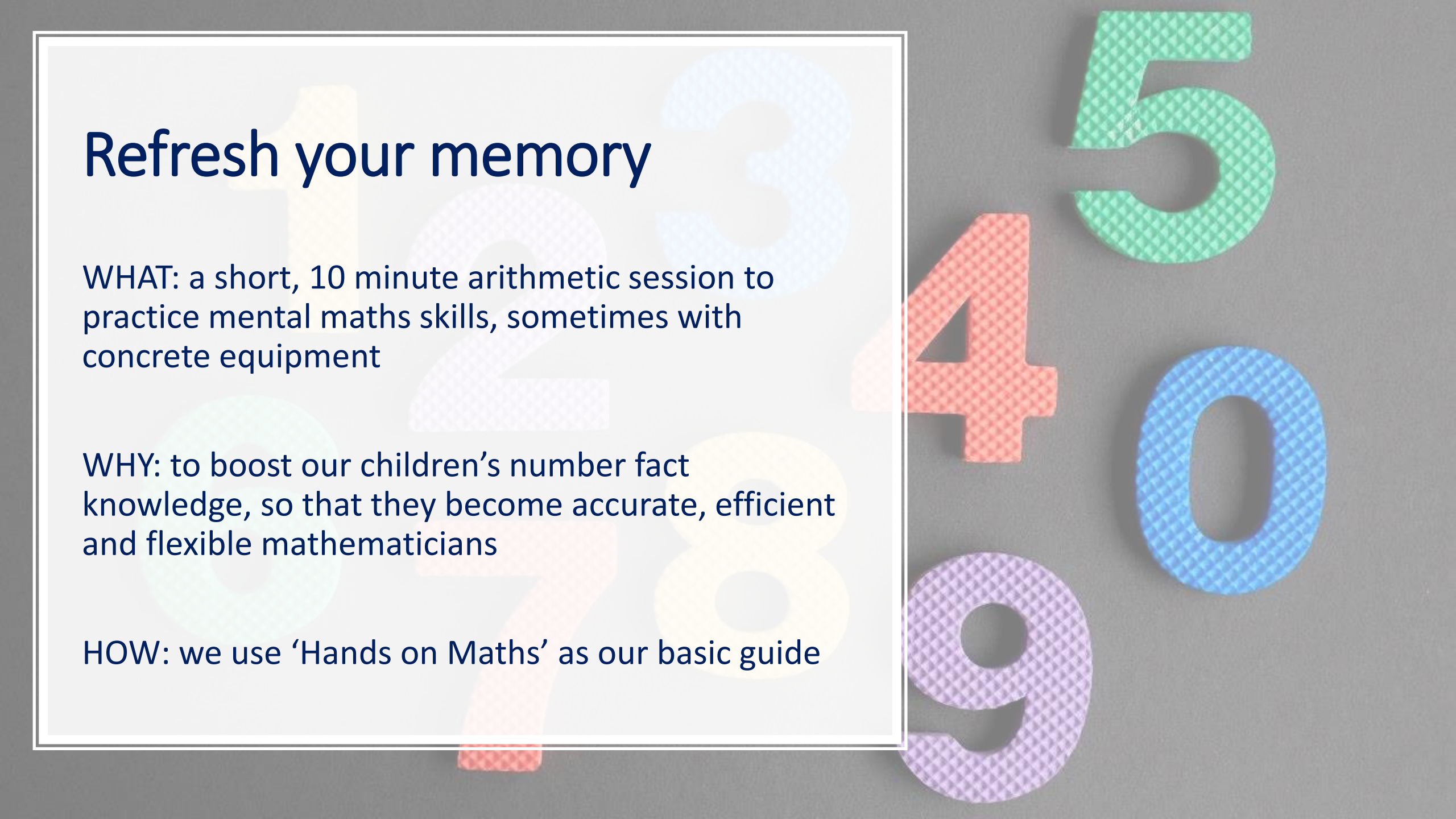
Let's talk maths (10 mins)

Refresh your memory

WHAT: a short, 10 minute arithmetic session to practice mental maths skills, sometimes with concrete equipment

WHY: to boost our children's number fact knowledge, so that they become accurate, efficient and flexible mathematicians

HOW: we use 'Hands on Maths' as our basic guide



Small step learning

WHAT: a 40 minute fluency, reasoning and/or problem solving session

WHY: to teach the NC outcomes in a carefully crafted sequence of lessons

HOW: we use White Rose Maths documents to identify the small steps our children need to take. We use WRM, Nrich, I See Reasoning, I See Problem solving, Classroom secrets, and our own bespoke resources to create learning opportunities for our children.

Let’s talk maths

WHAT: a short, 10-minute discussion session to check for understanding and/or pre-assess learning

WHY: to develop our children’s ability to talk about maths, discuss their mathematical understanding, reasoning and vocabulary

HOW: we use WRM Diagnostic questions as our basic resource