How our Maths curriculum is constructed

Our **'progression'** details how our pupils learn the National Curriculum content. Each objective in our progression document requires pupils to master key skills and techniques in order to understand the significance of the knowledge they have learned and can remember, some people call this **'disciplinary knowledge'**, and the knowledge and skills are sequentially organised.

In Key Stage 1 and Key Stage 2 we use the White Rose maths scheme supplemented by additional resources (eg NRICH). Subitising is at the heart of the maths curriculum in FSU, which has been designed and developed based on the Maths Education Programme.

'Overview' details what is taught and when.

The progression document and our skills and techniques are sequenced small building blocks to enable children to meet the expected standard in each year group. To assess pupils meeting the expected standard, end of unit and end of term end points White Rose unit assessments, weekly maths tests in Key Stage 2 and PUMA assessments in Key Stage 2 are used to support teacher assessments.

Protected characteristics and British Values are actively promoted at Appledore School by how we act, treat one another and in what we learn. Names and images in White Rose resources evidence diversity, protected characteristics and British Values.

Maths Curriculum Overview

	FSU	Y1	Y2	Y3	Y4	Y5	Y6
Autumn 1	Teaching of numbers 1-5. Subitising.	Place Value	Place Value	Place Value Addition and Subtraction	Place Value Statistics (within Science) Area and Perimeter	Place Value Addition & Subtraction	Place Value Addition, Subtraction, Multiplication & Division Fractions Converting Units Ratio Algebra Decimals Fractions, Decimals & Percentages Area, Perimeter & Volume Statistics Shape Position & Direction Project
Autumn 2	Teaching of numbers 6-10 2D shape Number bonds to 5	Addition & Subtraction Shape	Addition and Subtraction Shape	Multiplication & Division	Addition and Subtraction Multiplication & Division	Multiplication & Division Fractions	
Spring 1	Addition	Place Value Addition & Subtraction	Money Multiplication & Division	Multiplication & Division Length & Perimeter	Multiplication & Division Length KM and M	Multiplication & Division Fractions	
Spring 2	Subtraction 3D shape	Length & Height Mass & Volume	Length & Height Mass, Capacity & Temperature	Fractions Mass & Capacity	Fractions Decimals	Decimals & Percentages Perimeter & Area Statistics	
Summer 1	Doubles Halving Odds and evens	Multiplication and division Fractions Position & Direction	Fractions Time	Fractions Money Time	Decimals Money Time	Shape Position & Direction Decimals	
Summer 2	Place Value Counting in 2s	Place Value Money Time	Statistics Position & Direction	Shape Statistics	Shape Position & Direction	Negative Numbers Converting Units Volume	

Mathematics (Ma1/1a – Ma31/6a)

	FSU	1	2	3	4	5	6
PV Counting (1)	a) Verbally count beyond 20, recognising the pattern of the counting system	a) Count to & across 100, forwards & backwards, beginning with 0 or 1, or from any given number b) Count numbers to 100 in numerals; count in multiples of 2s, 5s & 10s	a) Count in steps of 2, 3 & 5 from 0, and in 10s from any number, forward & backward	a) Count from 0 in multiples of 4, 8, 50 & 100; find 10 or 100 more or less than a given number	a) Count in multiples of 6, 7, 9, 25 & 1000 b) Count backwards through zero to include negative numbers	a) Count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000 b) Count forwards & backwards with positive & negative whole numbers, including through zero	
PV Represent (2)	a) have a deep understanding of numbers to 10 including the composition of each number. b) Subitise to 5. c) Automatically recall number bonds to 5 and some numbers to 10 including double facts.	a) Identify & represent numbers using objects & pictorial representations b) Read & write numbers to 100 in numerals c) Read & write numbers from 1-20 in numerals & words	a) Read & write numbers to at least 100 in numerals & in words b) Identify, represent & estimate numbers using different representations including the number line	a) Identify, represent & estimate numbers using different representations b) Read & write numbers up to 1000 in numerals & in words	a) Identify, represent & estimate numbers using different representations b) Read Roman numerals to 100 (I-C) & know that over time the numeral system changed to include the concept of zero & place value	a) Read, write (order & compare)numbers to at least 1,000,000 & determine the value of each digit b) Read Roman numerals to 1000 (M) & recognise years written in Roman numerals	a) Read, write (order & compare) numbers up to 10,000,000 and determine the value of each digit
PV Use & Compare (3)	a) Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.	a) Given a number, identify 1 more & 1 less	a) Recognise the place value of each digit in a 2-digit number (10s & 1s) b) Compare & order numbers from 0 up to 100; use <, > & = signs	a) Recognise the place value of each digit in a 3-digit number (100s, 10s & 1s) b) Compare & order numbers up to 1000	a) Find 1000 more or less than a given number b) Recognise the place value of each digit in a 4-digit number (1000s, 100s, 10s 7 1s)	a) (Read, write) order & compare numbers to at least 1,000,000 & determine the value of each digit	a) (Read, write) order & compare numbers to at least 10,000,000 & determine the value of each digit

					c) Order & compare numbers beyond 1000		
PV Problems & Rounding (4)			a) Use place value & number facts to solve problems	a) Solve number problems & practical problems involving these ideas	a) Round any number to the nearest 10,100 or 1000 b) Solve number & practical problems that involve all of the above & with increasingly large positive numbers	a) Interpret negative numbers in context b) Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10,000 & 100,000 c) Solve number problems & practical problems that involve all of the above	a) Round any whole number to a required degree of accuracy b) Use negative numbers in context, & calculate intervals across zero c) Solve number & practical problems that involve all of the above
Addition & Subtraction: Recall, Represent, Use (5)	a) Explore and represent patterns within numbers up to 10 including odds and evens, double facts and how quantities can be distributed equally.	a) Read, write & interpret mathematical statements involving addition (+), subtraction (-) & equals (=) signs b) Represent & use number bonds & related subtraction facts within 20	a) Recall & use addition & subtraction facts to 20 fluently & derive & use related facts up to 100 b) Show that addition of two numbers can be done in any order (cumulative) & subtraction of one number from another can not c) Recognise & use the inverse relationship between addition and subtraction & use this to check calculations & solve number problems	a) Estimate the answer to a calculation & use inverse operations to check answers	a) Estimate and use inverse operations to check answers to a calculation	a) Use rounding to check answers to calculations & determine, in the context of a problem, levels of accuracy	

Addition & Subtraction: Calculations (6)	a) Explore and represent patterns within numbers up to 10 including odds and evens, double facts and how quantities can be distributed equally.	a) Add & subtract 1-digit & 2-digit numbers to 20, including zero	a) Add & subtract numbers using concrete objects, pictorial representations & mentally, including: -a 2-digit number & 1s -a 2-digit number and 10s -2-digit numbers -adding three 1-digit numbers	a) Add & subtract numbers mentally, including: -a 3-digit number & 1s -a 3-digit number & 10s -a 3-digit number & 100s b) Add & subtract numbers with up to 3-digits, using formal written methods of column addition & subtraction	a) Add & subtract numbers with up to 4 digits using the formal written methods of columnar addition & subtraction where appropriate	a) Add & subtract numbers with more than 4 digits, including using formal written methods (columnar addition & subtraction) b) Add & subtract numbers mentally with increasingly large numbers	a) Perform mental calculation, including with mixed operations & large numbers b) Use their knowledge of the order of operations to carry out calculations involving the four operations
Addition & Subtraction: Solve Problems (7)	a) Explore and represent patterns within numbers up to 10 including odds and evens, double facts and how quantities can be distributed equally.	a) Solve 1-step problems that involve addition and subtraction, using concrete objects & pictorial representations, & missing number problems such as 7=□-9	a) Solve problems with addition & subtraction: -using concrete objects & pictorial representations, including those involving numbers, quantities & measures -applying their increasing knowledge of mental & written methods	a) Solve problems, including missing number problems, using number facts, place value & more complex addition & subtraction	a) Solve addition & subtraction 2-step problems in contexts, deciding which operations & methods to use & why	a) Solve addition & subtraction multi-step problems in contexts. Deciding which operations to use & why b) Solve problems involving addition, subtraction, multiplication & division & a combination of these. Including understanding the meaning of the equals sign	a) Solve addition & subtraction multi-step problems in contexts, deciding which operations & methods to use & why
Multiplication & Division: Recall, Represent, Use (8)			a) Recall & use multiplication & division facts for the 2, 5&10 multiplication tables, including recognising odd & even numbers b) Show that multiplication of two numbers can be	a) Recall and use multiplication & division facts for the 3,4&8 multiplication tables	a) Recall multiplication & division facts for multiplication tables up to 12x12 b) Use place value, known & derived facts to multiply & divide mentally, including: multiplying by 0&1;	a) Identify multiples & factors, including finding all factor pairs of a number & common factors of two numbers b) Know and use the vocabulary of prime numbers, prime factors &	a) Identify common factors, common multiples & prime numbers b) Use estimation to check answers to calculations & determine, in the context of a problem, an

			done in any order (commutative) & division of one number by another cannot		dividing by1: multiplying together three numbers c) Recognise & use factor pairs & commutativity in metal calculations	composite (non-prime) numbers c) Establish whether a number up to 100 is prime & recall prime numbers up to 19 d) Recognise & use square numbers & cube numbers &notation for squared (^{2}) & cubed (^{3})	appropriate degrees of accuracy
Multiplication & Division : Calculations (9)			a) Calculate mathematical statements for multiplication & division within the multiplication tables & write them using the multiplication (x), division (÷) & equals (=) signs	a) Write & calculate mathematical statements for multiplication & division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental & progressing to formal written methods	a) Multiply 2-digit & 3-digit numbers by a 1-digit number using formal written methods	a) Multiply numbers up to 4-digits by a 1-digit number using formal written method, including long multiplication for 2-digit numbers b) Multiply & divide numbers mentally drawing upon known facts c) Divide numbers up to 4-digits by a 1-digit number using the formal written method of short division & interpret remainders appropriately for the context c) Multiply & divide whole numbers & those involving decimals by 10, 100 & 1000	a) Multiply multi-digit numbers up to 4 digits by a 2-digit whole number using the formal written method of long multiplication b) Divide numbers up to 4-digits by a 2-digit whole number using the formal written method of long division & interpret remainders as whole number remainders, fractions, or by rounding, as appropriate to the context c) Divide numbers up to 4-digits by a 2-digit whole number using the formal written method of short division where appropriate,

							interpreting remainders according to the context d) Perform mental calculations, including with mixed operations and large numbers
Multiplication & Division : Solve Problems (10)	a) Explore and represent patterns within numbers up to 10 including odds and evens, double facts and how quantities can be distributed equally.	a) Solve 1-step problems involving multiplication & division by calculating the answer using objects, pictorial representations & arrays with the support of the teacher	a) Solve problems involving multiplication & division using materials, arrays, repeated addition, mental methods & multiplication & division facts, including problems in contexts	a) Solve problems, including missing number problems, involving multiplication & division, including positive integer scaling problems & correspondence problems in which n objects are connected to m objects	a) Solve problems involving multiplying & adding, including using the distributive law to multiply 2-digit numbers by 1-digit, integer scaling problems & harder correspondence problems such as n objects connected to m objects	a) Solve problems involving multiplication & division using their knowledge of factors & multiples, squares & cubes a) Solve problems involving multiplication & division, including scaling by a simple fractions & problems involving simple rates	a) Solve problems involving addition, subtraction, multiplication & division
Multiplication & Division : Combined Operations (11)						a) Solve problems involving addition, subtraction, multiplication & division & a combination of these, including understanding the meaning of the equals sign	a) Use their knowledge of the order of operations to carry out calculations involving the four operations
Fractions: Recognise & Write (12)		a) Recognise, find & name half as one of two equal parts of an object, shape or quantity b) Recognise, find & name a quarter as one of four equal	a) Recognise, find, name & write fractions 1/3, 1/4, 2/4 & 3/4 of a length, shape, set of objects or quantity	a) Count up & down in tenths: recognise that tenths arise from dividing an object into ten equal parts and in dividing 1-digit numbers or quantities by 10	a) Count up & down in hundredths: recognise that hundredths arise when dividing an object by one hundred & dividing tenths by ten	a) Identify, name & write fractions of a given fractions, represented visually, including tenths & hundredths b) Recognise mixed numbers &	

		parts of an object, quantity or shape		b) Recognise, find & write fractions of a discrete set of objects: unit fractions & non-unit fractions with small denominators c) Recognise & use fractions as numbers: unit fractions & non-unit fractions with small denominators		improper fractions & convert from one form to the other & write mathematical statement .1 as a mixed number (eg 2/5+4/5=6/5=1 6/5)	
Fractions Compare (13)			a) Recognise the equivalence of 2/4 and 1/2	a) Recognise & show, using diagrams, equivalent fractions with small denominators b) Compare & order unit fractions & fractions with the same denominator	a) Recognise & show, using diagrams, families of common equivalent fractions	a) Compare & order fractions whose denominators are all multiples of the same number	a) Use common factors to simplify fractions; use common multiples to express fractions in the same denomination b) Compare & order fractions, including fractions >1
Fractions: Calculations (14)			a) Write simple fractions (eg ½ of 6 = 3)	a) Add & subtract fractions with the same denominator within one whole (eg 5/7 + 1/7 = 6/7)	a) Add & subtract fractions with the same denominator	a) Add & subtract fractions with the same denominator and denominators that are multiples of the same number a) Multiply proper fractions & mixed numbers by whole numbers, supported by materials & diagrams	a) Add & subtract fractions with different denominators & mixed numbers, using the concept of equivalent fractions a) Multiply simple pairs of proper fraction, writing the answer in its simplest form (eg 1/4 x 1/2 =1/8) a) Divide proper fractions by whole numbers (eg 1/3 ÷2 = 1/6)

Fractions: Solve Problems (15)				a) Solve problems that involve all of the above	a) Solve problems involving increasingly harder fractions to calculate quantities, & fractions to divide quantities, including non-unit fractions where the answer is a whole number		
Decimals: Recognise & Write (16)					a) Recognise & write decimal equivalents of any number of tenths or hundredths b) Recognise & write decimal equivalents to 1/4 , 1/2, 3/4	a) Read & write decimal numbers as fractions (eg 0.71 = 71/100) b) Recognise & use thousandths & relate them to tenths, hundredths and decimal equivalents	a) Identify the value of each digit in numbers given to three decimal places
Decimals: Compare (17)					a) Round decimals with one decimal place to the nearest whole number b) Compare numbers with the same number of decimal places up to two decimal places	a) Round decimals with two decimal places to the nearest whole number and to one decimal place b) Read, write, order & compare numbers with up to three decimal places	
Decimals: Calculations & Problems (18)					a) Find the effect of dividing a 1- or 2-digit number by 10 & 100, identifying the value of the digits in the answer as ones, tenths & hundredths	a) Solve problems involving number up to three decimal places	a) Multiply & divide numbers by 10, 100 & 1000 giving answers up to three decimal places b) Multiply 1-dgit numbers with up to tow decimal places by whole numbers

							c) Use written division methods in cases where the answer has up to two decimal places d) Solve problems which require answers to be rounded to specified degrees of accuracy
Fractions, Decimals & Percentages (19)					a) Solve simple measures & money problems involving fractions & decimals to two decimal places	a) Recognise the per cent symbol (%) & understand that per cent relates to 'number of parts per hundred' & write percentages as a fraction with denominator 100 & as a decimal b) Solve problems which require knowing percentage & decimal equivalents of ½, ¼, 1/5, 2/5, 4/5 & those fractions with a denominator of a multiple of 10 or 25	a) Associate a fraction with division & calculate decimal equivalent fractions (eg 0.375) for a simple fraction (eg 3/8) b) Recall & use equivalences between simple fractions, decimals & percentages, including different contexts
Ration & Proportion (20)							a) Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication & division facts b) Solve problems involving the calculation of percentages (eg of

							measures & such as 15% 0f 360) & the use of percentages for comparison c) Solve problems involving similar shapes where the scale factor Is known or can be found d) Solve problems involving unequal sharing & grouping using knowledge of functions & multiples
Algebra (21)		a) Solve one step problems that involve addition & subtraction, using concrete objects and pictorial representations, & missing numbers problems such as 7=□-9	b) Recognise & use the inverse relationship between addition & subtraction & use this to check calculations & solve missing number problems	c) Solve problems including missing number problems			a) Use simple formulae b) Generate & describe linear number sequences c) Express missing number problems algebraically d) Find pairs of numbers that satisfy and equation with two unknowns e) Enumerate possibilities of combinations of two variables
Measurement: Using Measures (22)		a) Compare, describe & solve practical problems for: -lengths & heights (eg	a) Choose & use appropriate standard units to estimate & measure length /height in any direction (m/cm); mass (kg/g);	a) Measure, compare, add & subtract length (m/cm/mm), mass (kg/g), volume /capacity (l/ml)	a) Convert between different units of measure (eg km to m, hr to mins) b) Estimate, compare and	a) Convert between different units of metric measure (eg km & m, m & cm, cm & mm, g & kg, l & ml)	a) Solve problems involving the calculation & conversion of units of measure using decimal notation up

		long(er)/short(er), double/half -mass/weight (eg heavy/light, heavier than/lighter than) -capacity & volume (eg full/empty, more than/less than, half/quarter full) -time (eg quicker / slower, earlier/later) b) Measure & begin to record the following: -lengths & heights -mass/weight -capacity & volume -time (hours, minutes, seconds)	temperature (°C); capacity (l/ml)to the nearest appropriate unit , using rulers, scales, thermometers & measuring vessels b) Compare & order lengths, mass, volume /capacity & record the results using >, < & =		calculate different measures	b) Understand & use appropriate equivalences between metric units & common imperial units such as inches, pounds & pints c) Use all four operations to solve problems involving measure (eg length, mass, volume, money) using decimal notation, including scaling	to 3 decimal places where appropriate b) Use, read, write & convert between standard units, converting measurements of length, mass, volume & time from a smaller unit of measure to a larger unit, & vice versa, using decimal notation to up to 3 decimal places c) Convert between miles & km
Measurement: Money (23)		a) Recognise & know the value of different denominations of coins & notes	a) Recognise & use symbols for pounds (£), pence (p); combine amounts to make a particular value b) Find different combinations of coins that equal the same amounts of money c) Solve simple problems in a practical context involving addition & subtraction of money of the same unit, including giving change	a) Add & subtract amounts of money to give change, using both £ & p in practical contexts	a) Estimate, compare & calculate different measures, including money in pounds & pence	a) Use all four operations to solve problems (eg money)	
Measurement: Time (24)		a) Sequence events in chronological order using language (eg before, after, next,	a) Compare & sequence intervals of time	a) Tell & write the time from an analogue clock, including using Roman numerals	a) Read, write & convert time between analogue & digital 12 & 24 hour clocks	a) Solve problems involving converting between units of time	a) Use, read, write & convert between standard units converting measurements of

		first, today, yesterday, tomorrow, morning, afternoon & evening) b) Recognise & use language relating to dates, including days of the week, weeks, months & years c) Tell the time to the hour & half past the hour & draw the hands on a clock face & show these times	b) Tell & write the time to 5 minutes, including quarter past/to the hour & draw hands on a clock face to show these times c) Know the number of minutes in an hour & the number of hours in a day	from I to XII, & 12 hr & 24hr clocks b) Estimate & read time with increasing accuracy to the nearest minute; record & compare time in terms of seconds, minutes & hours: use vocabulary such as o'clock, am/pm, morning, noon & midnight c) Know the number of seconds in a minute & the number of days in each month, year & leap year Compare durations of events (eg to calculate the time taken by particular events or tasks)	b) Solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days		time from a smaller unit of measure to a larger unit & vice versa
Measurement: Perimeter, Area, Volume (25)				a) Measure the perimeter of simple 2-D shapes	a) Measure & calculate the perimeter of a rectilinear figure (including squares) in cm & m b) Find the area of rectilinear shapes by counting squares	a) Measure & calculate the perimeter of composite rectilinear shapes in cm & m b) Calculate & compare the area of rectangles (including squares) & including using standard units, square cm (cm^2) & square meters (m^2) & estimate the area of irregular shapes	a) Recognise that shapes with the same areas can have different perimeters & vice versa b) Recognise when it is possible to use formulae for area & volume of shapes c) Calculate the area of parallelograms & triangles

						c) Estimate the volume (eg using 1cm^3 blocks to build cuboids (including cubes)) & capacity (eg using water)	d) Calculate, estimate & compare the volume of cubes & cuboids using standard units, including cubic cm (cm^3) & cubic meters (m^3) & extending to other units (eg mm^3 & km^3)
Geometry 2-D Shapes (26)		a) Recognise & name common 2-D shapes (eg rectangles (including squares), circles & triangles)	a) Identify & describe the properties of 2-D shapes, including the number of sides & line symmetry in a vertical line b) Identify 2-D shapes on the surface of 3-D shapes (eg a circle on a cylinder & a triangle on a pyramid) c) Compare & sort common 2-D shapes & everyday objects	a) Draw 2-D shapes	a) Compare & classify geometric shapes, including quadrilaterals & triangles, based on their properties & sizes b) Identify lines of symmetry in 2-D shapes presented in different orientations	a) Distinguish between regular & irregular polygons based on reasoning about equal sides & angles b) Use the properties of rectangle sto deduce related facts & find missing lengths & angles	a) Draw 2-D shapes using given dimensions & angles b) Compare & classify geometric shapes based on their properties & sizes c) Illustrate & name parts of circles, including radius, diameter & circumference & know that the diameter is twice the radius
Geometry 3-D Shapes (27)		a) Recognise & name common 3-D shapes (eg cuboids (including cubes), pyramids & spheres)	a) Recognise & name common 3-D shapes (eg cuboids (including cubes), pyramids & spheres) b) Compare & sort common 3-D shapes & everyday objects	a) Make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations & describe them		a) Identify 3-D shapes, including cubes & other cuboids, from 2-D representations	a) Recognise, describe & build simple 3-D shapes, including making nets

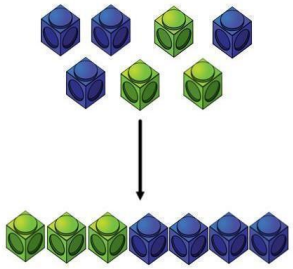
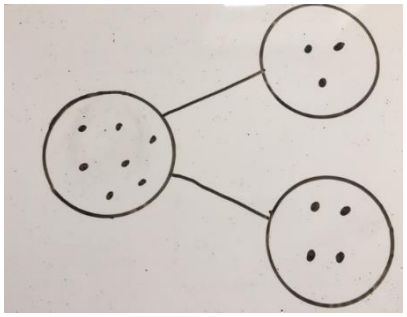
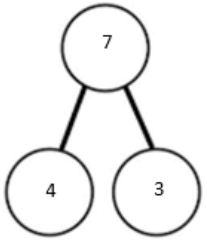
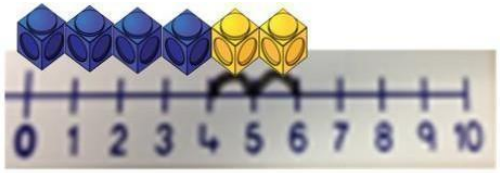
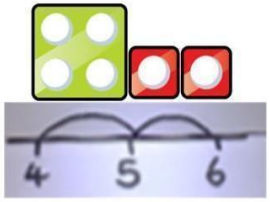
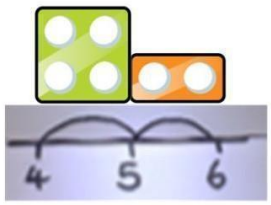
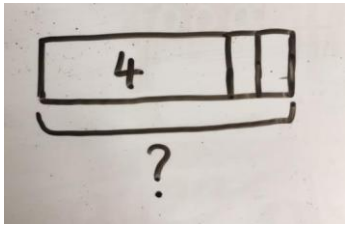
Geometry: Angles & Lines (28)				a) Recognise angles as a property of shape or description of a turn b) Identify right angles, recognise that two right angles make a ½ turn, three make ¾ of a turn & four a complete turn; identify whether angles are greater than or less than a right angle c) Identify horizontal & vertical lines & pairs of perpendicular & parallel lines	a) Identify acute & obtuse angles & compare & order angles up to two right angles by size b) Identify lines of symmetry in 2-D shapes presented in different orientations c) Complete a simple symmetric figure with respect to a specific line of symmetry	a) Know angles are measured in degrees; estimate& compare acute, obtuse & reflex angles b) Draw given angles & measure them in degrees c) Identify: -angles at a point & one whole turn (total 360°) -angles at a point on a straight line & ½ a turn (total 180°) -other multipes of 90°	a) Find unknown angles in any triangles, quadrilaterals & regular polygons b) Recognise angles where they meet at a point, are on a line, or are vertically opposite, & find missing angles
Geometry: Position & Direction (29)		a) Describe position, direction & movement, including whole, half, quarter & three quarter turns	a) Order & arrange combinations of mathematical objects in patterns & sequences b) Use mathematical vocabulary to describe position, direction & movement in a straight lie & distinguishing between rotation as a turn & in terms of right angles for quarter, half & three-quarter turns (clockwise & anti-clockwise)		a) Describe positions on a 2-D grid as coordinates in the first quadrant a) Describe movements between positions as translations of a given unit to the left/right and up/down a) Plot specified points and draw sides to complete a given polygon	a) Identify, describe & represent the position of a shape following a reflection or translations, suing the appropriate language, & know that the shape has not changed	a) Describe positions on the full coordinate grid (all four quadrants) b) Draw & translate simple shapes on the coordinate plane, & reflect them in the axes

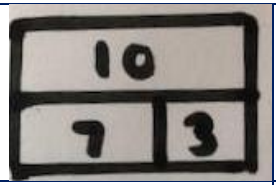
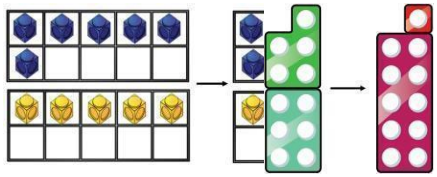
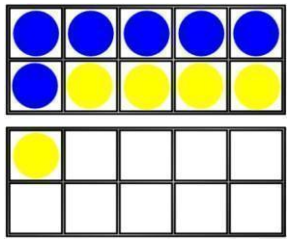
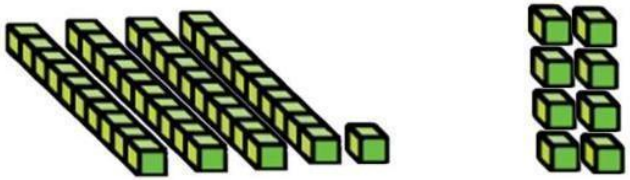
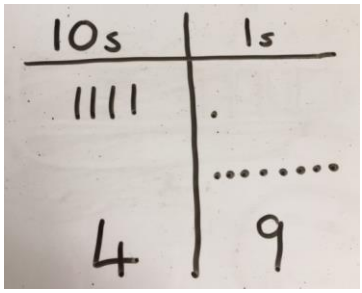
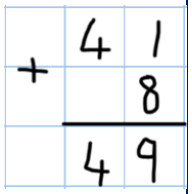
Statistics: Present & Interpret (30)			a) Interpret & construct simple pictograms, tally charts, block diagrams & tables	a) Interpret & present data using bar charts, pictograms & tables	a) Interpret & present discrete & continuous data using appropriate graphical methods, including bar charts & time graphs	a) Complete, read & interpret information in tables, including timetables	a) Interpret & construct pie charts & lie graphs & use these to solve problems
Statistics: Solve Problems (31)			a) Ask & answer simple questions by counting the number of objects in each category & sorting the categories by quantity b) Ask & answer questions about totalling & comparing categorical data	a) Solve 1-step & 2-step questions (eg 'How many more' & 'How many fewer') using information presented in scaled bar charts, pictograms & tables	a) Solve comparison, sum & difference problems using information presented in bar charts, pictograms, tables & other graphs	a) Solve comparison, sum & difference problems using information presented in a line graph	a) Calculate & interpret the mean as an average

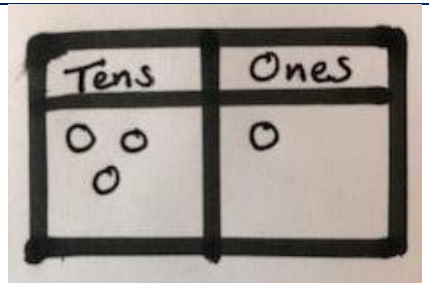
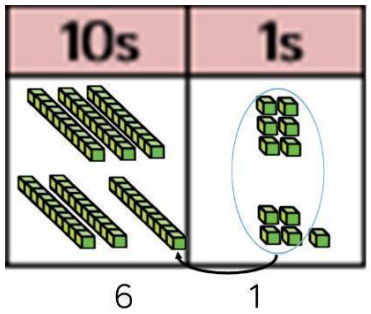
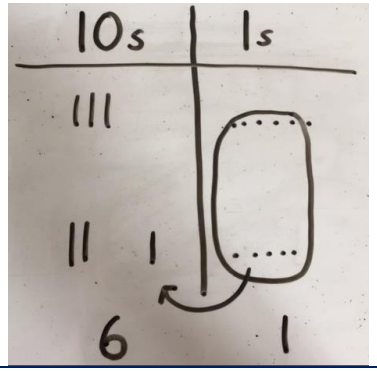
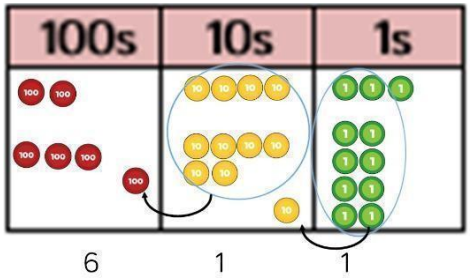
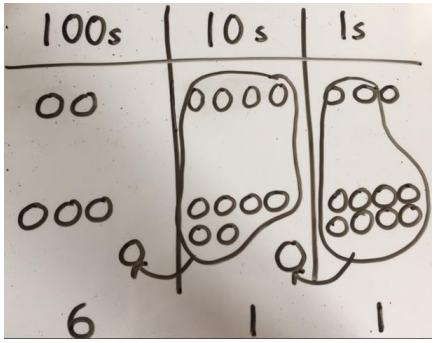
Maths Calculation Progression

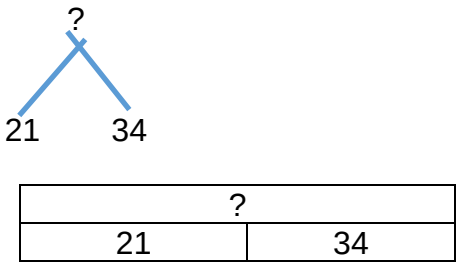
Addition

Key Language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to', 'is the same as'

Concrete	Pictorial	Abstract
Combining two parts to make a whole (use other resources too e.g. eggs, shells, teddy bears, cars, sticky notes). 	Children to represent the cubes using dots or crosses. They could put each part on a part whole model too. 	4 + 3 = 7 Four is a part, 3 is a part and the whole is seven. 
Counting on using number lines using cubes or Numicon.   	A bar model which encourages the children to count on, rather than count all. 	The abstract number line: What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? 4 + 2 

		
Regrouping to make 10; using ten frames and counters/cubes or using Numicon. 6 + 5 	Children to draw the ten frame and counters/cubes Children to draw the ten frame and counters/cubes.  Children to draw the ten frame and counters/cubes	Children to develop an understanding of equality e.g. 6 + □ = 11 6 + 5 = 5 + □ 6 + 5 = □ + 4
TO + O using base 10. Continue to develop understanding of partitioning and place value. 41 + 8 	Children to represent the base 10 e.g. lines for tens and dot/crosses for ones. 	41+8 1 + 8 = 49 41 1+8=9 40+9=49 40 1  36 + 25 +25 61 1 5

		
TO + TO using base 10. Continue to develop understanding of partitioning and place value. 36 + 25 	Children to represent the base 10 in a place value chart 	Looking for ways to make 10 30+20=50 5+5=10 5+10+1=61
Use of place value counters to add HTO + TO, HTO + HTO etc. When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred. 	Chidren to represent the counters in a place value chart, circling when they make an exchange. 	243 +368 611 1 1
Conceptual variation: different ways to ask children to solve 21 + 31		

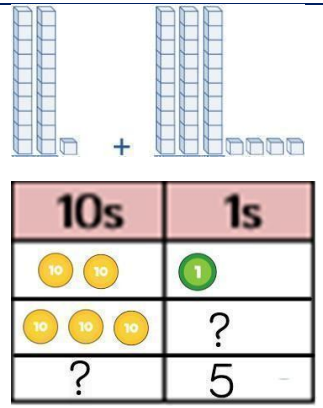


Word problems:
In year 3, there are 21 children and in year 4, there are 34 children.

21 + 34 = 55
Prove it
How many children in total?

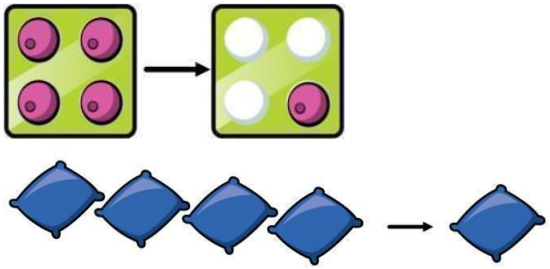
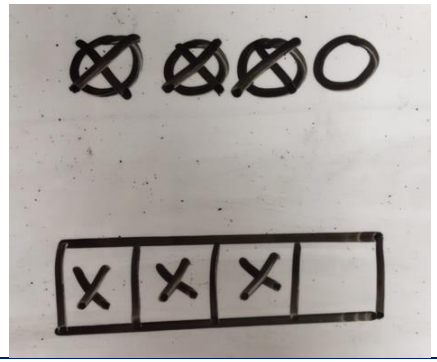
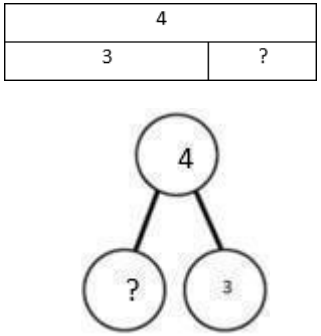
21
+34
21+34= ?
? = 21+34

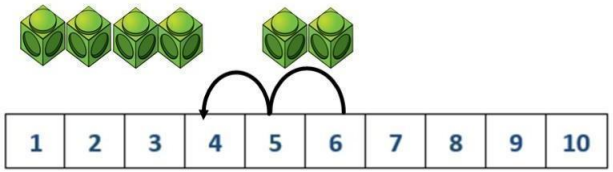
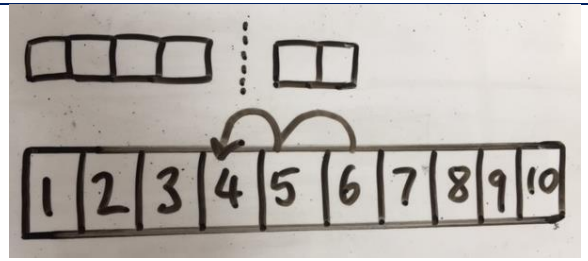
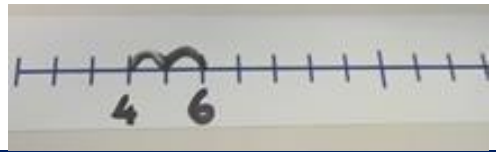
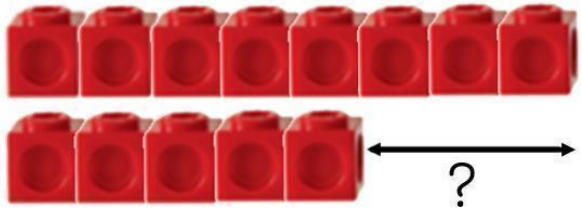
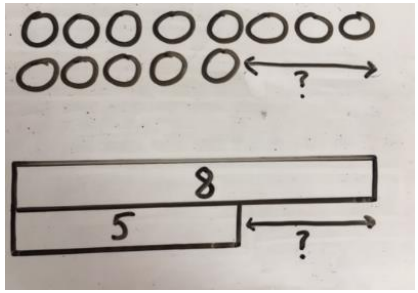
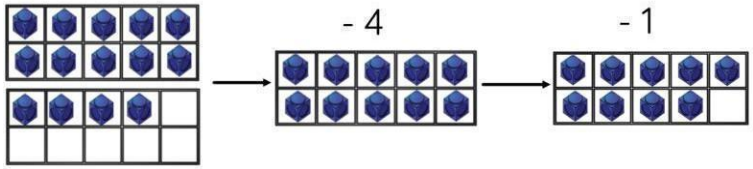
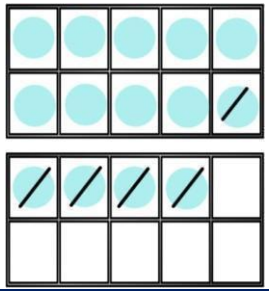
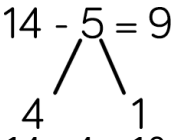
Calculate the sum of 21 and 34

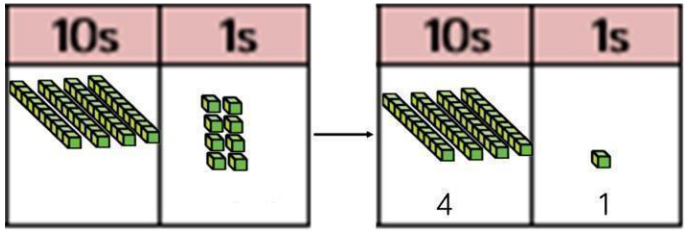
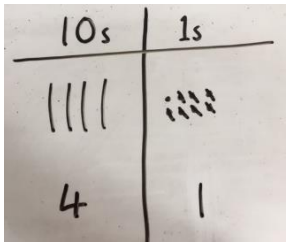
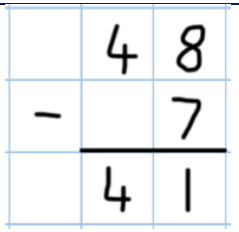
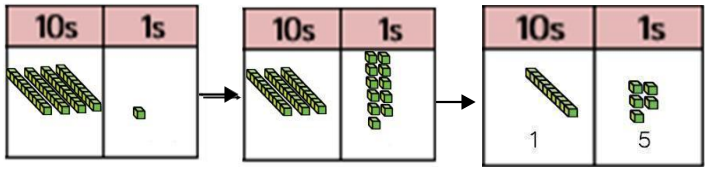
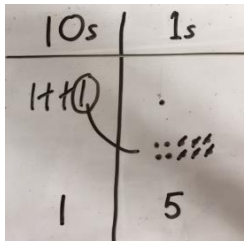
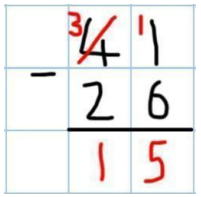
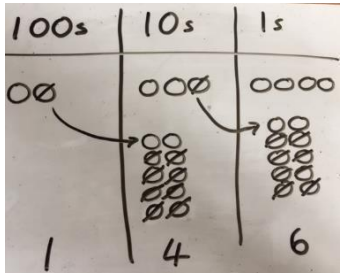
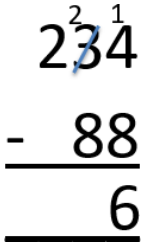


Subtraction

Key Language: take away, less than, the difference, subtract, minus, fewer, decrease

Concrete	Pictorial	Abstract
Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used). 4 – 3 = 1 	Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used. 	4 - 3 = ? ? = 4 – 3 
Counting back (using number lines or number tracks with or without Numicon alongside) children start with 6 and count back 2. 6 – 2 = 4	Children to represent what they see pictorially, eg	Children to represent the calculation on a number line or number track and show their jumps. Encourage children to use an empty number line

		 
Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used). Calculate the difference between 8 and 5. 	Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate. 	Find the difference between 8 and 5. 8 – 5, the difference is ? Children to explore why 9 – 6 = 8 – 5 = 7 – 4 have the same difference
Making 10 using ten frames. 14 – 5 	Children to present the ten frame pictorially and discuss what they did to make 10. 	Children to show how they can make 10 by partitioning the subtrahend.  14 – 4 = 10 14 – 4 = 1= 10 – 1 = 9
Column method using base 10. 48-7	Children to represent the base 10	Column method or children could count back 7.

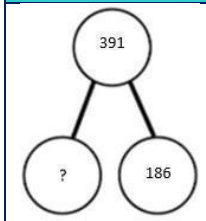
	 pictorial Children to represent the base 10 pictorially	
Column method using base 10 and having to exchange. 41 – 26 	Represent the base 10 pictorially, remembering to show the exchange. 	Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because 41 = 30 + 11. 
Column method using place value counters. 234 – 88 100s | 10s | 1s ** | *** | *** 100s | 10s | 1s * | **** **** **** | *** *** ***	Represent the place value counters pictorially; remembering to show what has been exchanged. 	Formal column method. Children must understand what has happened when they have crossed out digits. 

	*	* **

100s	10s	1s
*	*** *	*** * **

1 4 6

Conceptual variation: different ways to ask children to solve 391 - 186



391	
186	?

Raj spent £391, Timmy spent £186. How much more did Raj spend?

Calculate the difference between 391 and 186.

= 391 – 186

? = 391 - 186

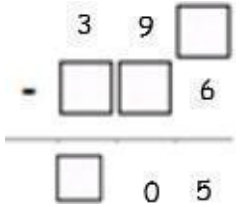
391

-186

What is 186 less than 391?

Missing digit calculations

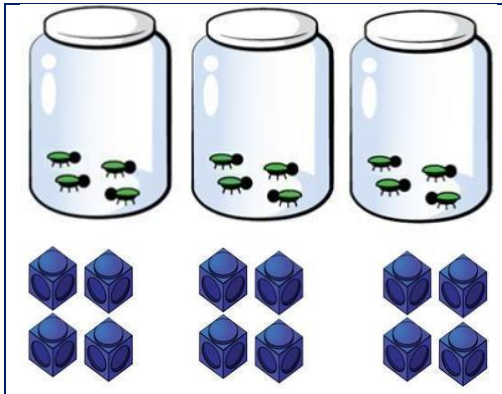
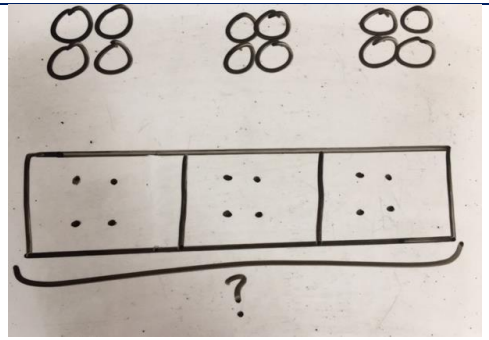
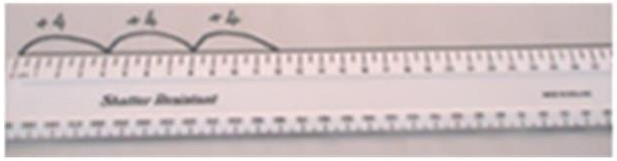
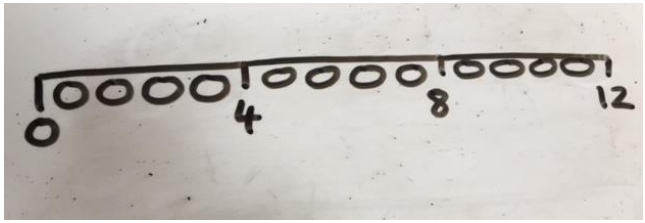
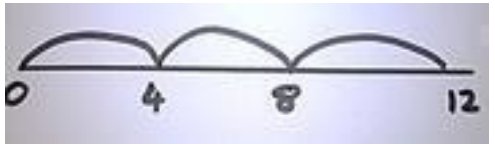
Missing digit calculations

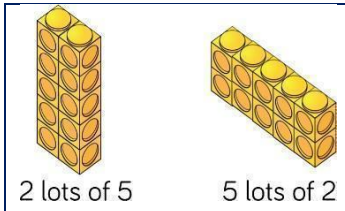
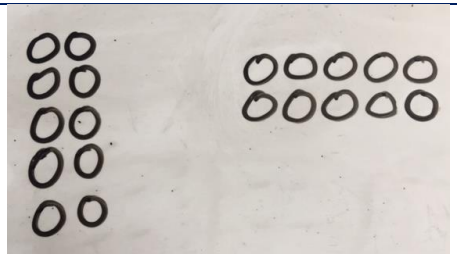
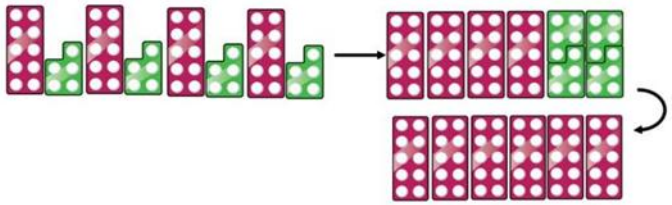
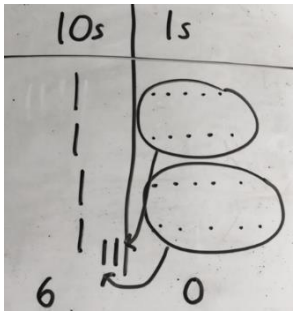
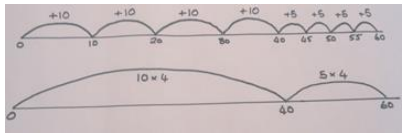
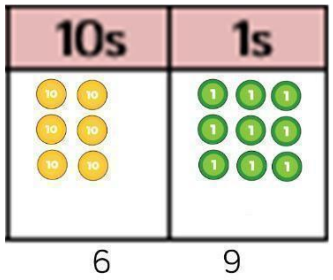
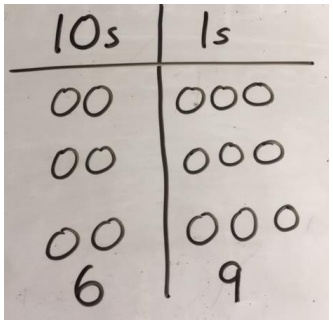


Multiplication

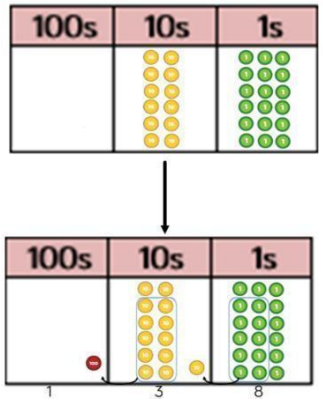
Key Language: doubled, times, multiplied by, the product of, groups of, lots of, equal groups

Concrete	Pictorial	Abstract
Repeated grouping/repeated addition 3 x 4 4 + 5 + 4 There are 3 equal groups, 4 within each group	Children to represent the practical resources in a picture and use a bar model.	3 × 4 = 12 4 + 4 + 4 = 12

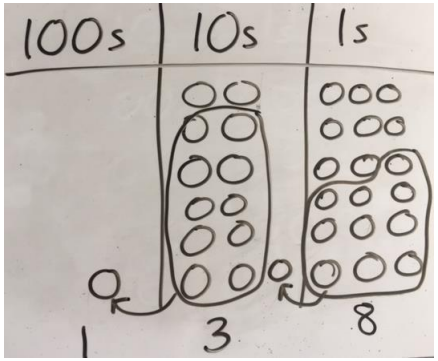
		
Number lines to show repeated groups 3 x 4   Cuisenaire rods can be used too.	Represent this pictorially alongside a number line 	Abstract number line showing three jumps of four 3 x 4 = 12 
Use arrays to illustrate commutativity **<u>counters</u>** and other objects can also be used. 2 × 5 = 5 × 2	Children to represent the arrays pictorially.	Children to be able to use an array to write a range of calculations. 10 = 2 x 5 5 x 2 = 10 2 + 2 + 2 +2 +2 =10 10 = 5 + 5

		
Partition to multiply using Numicon, base 10 or Cuisenaire rods. 4 x 15 	Children to represent the concrete manipulatives pictorially. 	Children to be encouraged to show the steps they have taken. 4 x 15 10 5 10 x 4 = 40 5 x 4 = 20 40 + 20 = 60 A number line can be used 
Formal column method with place value counters (base 10 can also be used.) 3 × 23 	Children to represent the counters pictorially. 	Children to record what it is they are doing to show understanding 3 x 23 3 x 20 = 60 3 x 3 = 9 60 + 9 = 69 23 × 3 69

Formal column method with place value counters
6 x 23



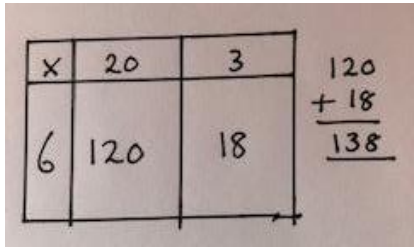
Children to represent the counters/base 10, pictorially e.g. the image below.



Formal written method

$$\begin{array}{r} 6 \times 23 = \\ 23 \\ \times\ 6 \\ \hline 138 \\ \hline 1\ 1 \end{array}$$

Grid method to show how multiplication can be partitioned



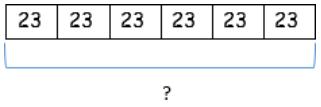
When children start to multiply 3d × 3d and 4d × 2d etc., they should be confident with the abstract:

To get 744 children have solved 6 × 124.
To get 2480 they have solved 20 × 124.

$$\begin{array}{r} 1\ 2\ 4 \\ \times\ \ \ 2\ 6 \\ \hline 7\ 4\ 4 \\ 2\ 4\ 8\ 0 \\ \hline 3\ 2\ 2\ 4 \\ \hline 1\ 1 \end{array}$$

Answer: 3224

Conceptual variation: different ways to ask children to solve 6 x 23



Mai had to swim 23 lengths, 6 times a week.
How many lengths did she swim in one week?

With the counters, prove that 6 x 23

Find the product of 6 and 23
6 × 23 = ?
? = 6 × 23

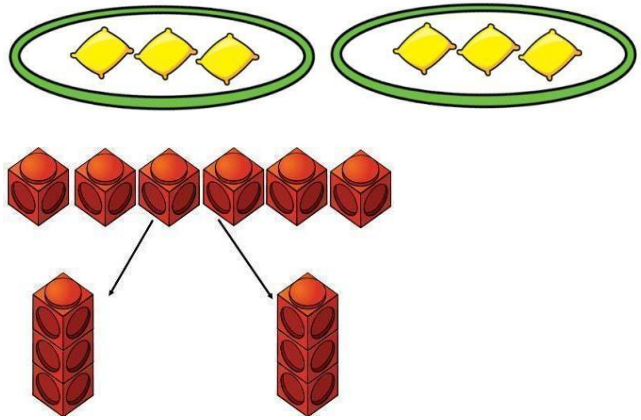
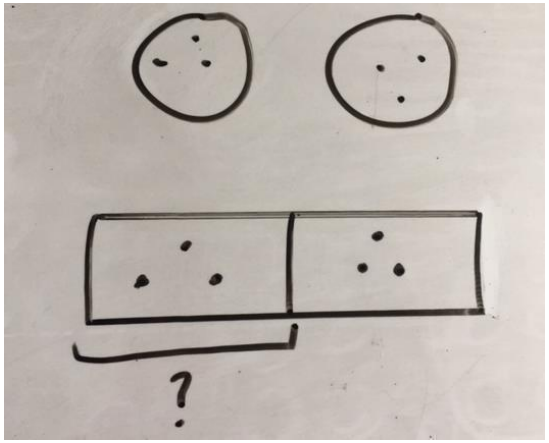
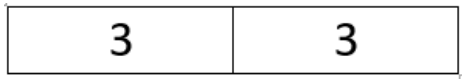
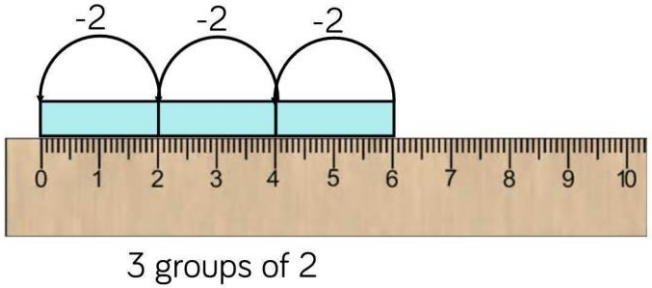
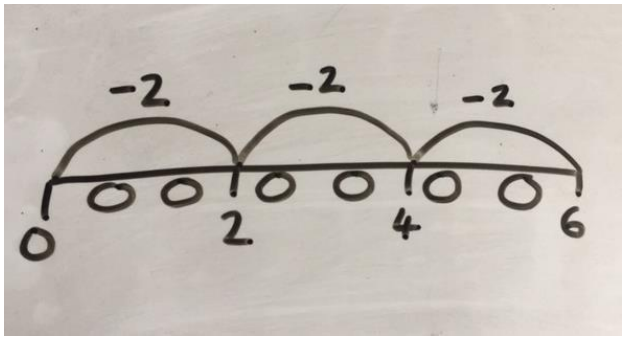
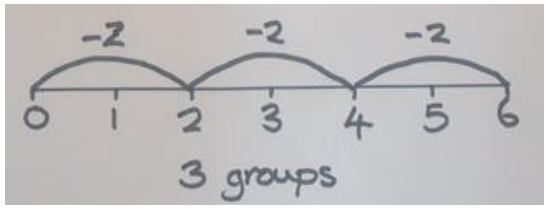
$$\begin{array}{r} 6 \\ \times\ 23 \\ \hline \end{array} \qquad \begin{array}{r} 23 \\ \times\ 6 \\ \hline \end{array}$$

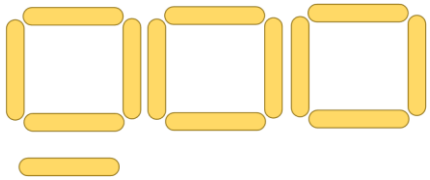
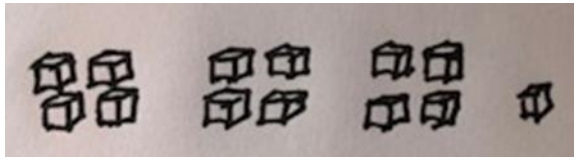
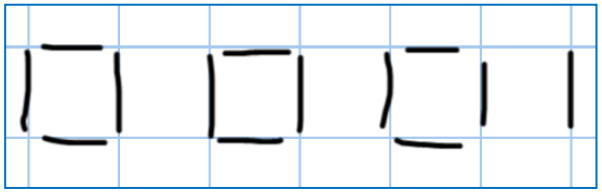
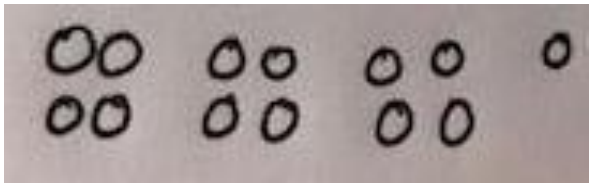
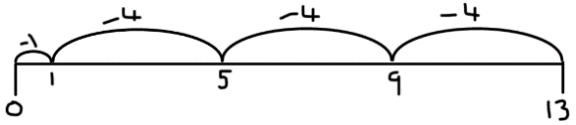
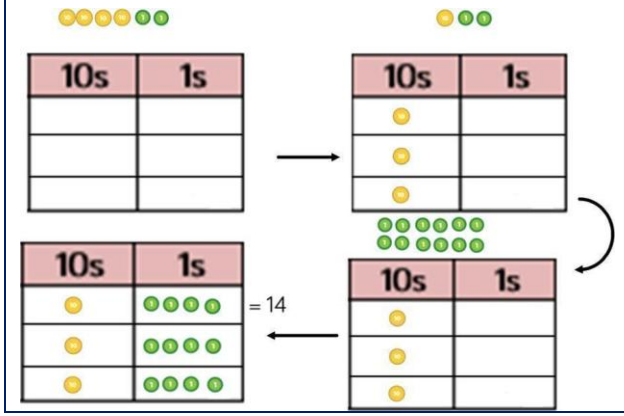
What is the calculation?
What is the product?

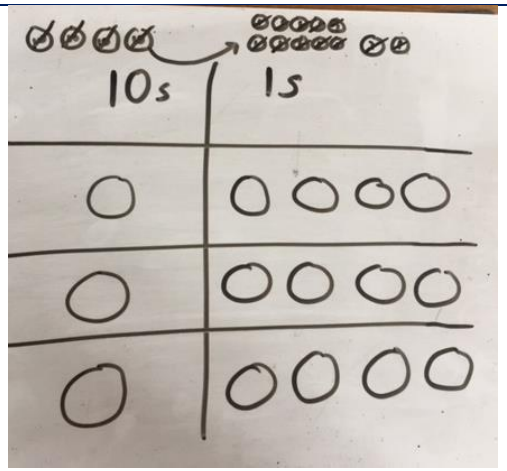
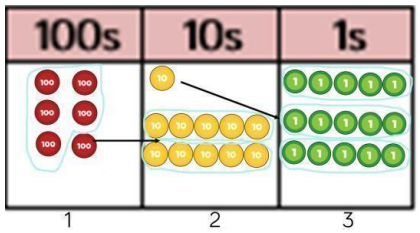
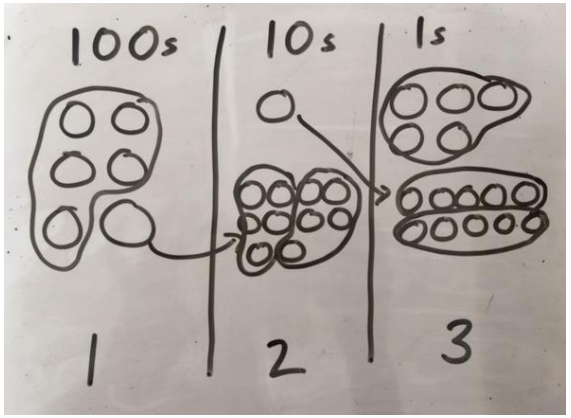
	= 138		

Division

Key Language: share, group, divide, divided by, half

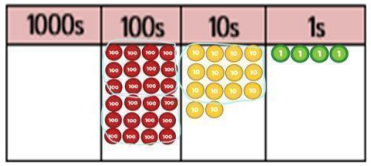
Concrete	Pictorial	Abstract
Sharing using a range of objects. 6 ÷ 2 	Represent the sharing pictorially. 	6 ÷ 2 = 3  Children should also be encouraged to use their 2 times tables facts
Repeated subtraction using Cuisenaire rods above a ruler. 6 ÷ 2 	Children to represent repeated subtraction pictorially. 	Abstract number line to represent the equal groups that have been subtracted. 

2d ÷ 1d with remainders using lollipop sticks. Cuisenaire rods, above a ruler can also be used. 13 ÷ 4 Use of lollipop sticks to form wholes- squares are made because we are dividing by 4.  There are 3 whole squares, with 1 left over. Base 10 may also be used 	Children to represent the lollipop sticks pictorially.  There are 3 whole squares, with 1 left over. Children represent the base 10 pictorially 	13 ÷ 4 – 3 remainder 1 Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line. ‘3 groups of 4, with 1 left over’ 
Sharing using place value counters. 42 ÷ 3 = 14 	Children to represent the place value counters pictorially.	Children to be able to make sense of the place value counters and write calculations to show the process. 42 ÷ 3 42 = 30 + 12 30 ÷ 3 = 10 12 ÷ 3 = 4 10 + 4 = 14

		
Short division using place value counters to group. 615 ÷ 5  1.Make 615 with place value counters. 2.How many groups of 5 hundreds can you make with 6 hundred counters? 3.Exchange 1 hundred for 10 tens. 4.How many groups of 5 tens can you make with 11 ten counters? 5.Exchange 1 ten for 10 ones. 6.How many groups of 5 ones can you make with 15 ones?	Represent the place value counters pictorially. 	Children to the calculation using the short division scaffold. $5\overline{)615}$ = 123

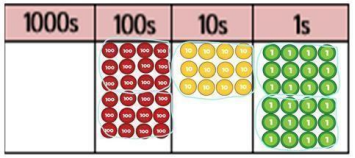
Long division using place value counters
2544 ÷ 12

We can't group 2 thousands into groups of 12 so will exchange them.



After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.

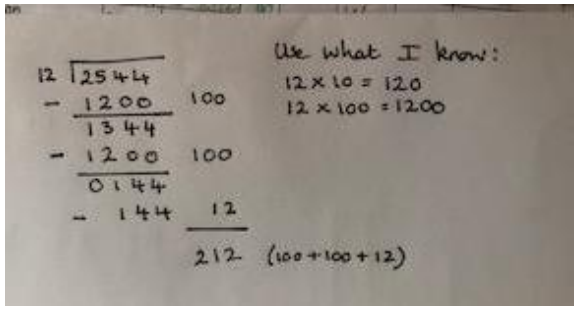
$$\begin{array}{r} 021 \\ 12\overline{)2544} \\ \underline{24} \\ 14 \\ \underline{12} \\ 2 \end{array}$$



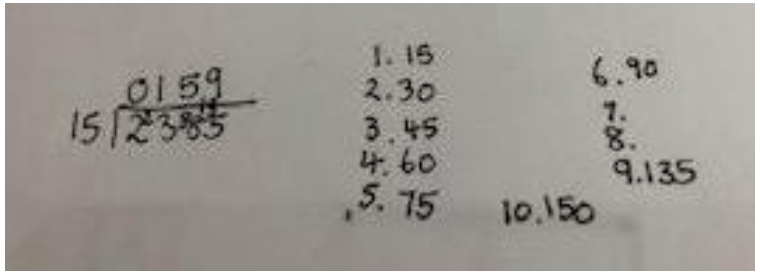
After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 group of 12, which leaves no remainder.

$$\begin{array}{r} 0212 \\ 12\overline{)2544} \\ \underline{24} \\ 14 \\ \underline{12} \\ 24 \\ \underline{24} \\ 0 \end{array}$$

Chunking



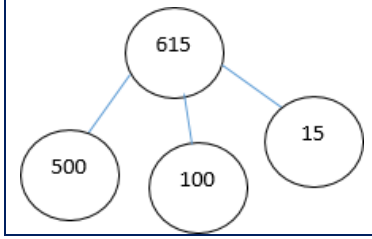
Create a tally/chart of tables you don't know. Work with 1 to 5 and 10 then complete others as needed



Encourage children to notice patterns to speed up the process and avoid unnecessary calculating:

2x, 3x, 4x (double 2x) 5x (2x + 3 x) 6x (double 3x) 10x easy – 9x (1 x less than 10x) 8x (double 4x) 7x (3x + 4x)

Conceptual variation: different ways to ask children to solve 615 ÷ 5

Using the part whole model below, how can you divide 615 by 5 without using short division?  	I have £615 and share it equally between 5 bank accounts. How much will be in each account? 615 pupils need to be put into 5 groups. How many will be in each group?	$5 \overline{)615}$ 615 ÷ 5 = ? ? = 615 ÷ 5	What is the calculation? What is the answer?