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Progression of skills

Mathematics (For EYFS, see bottom of document)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Place Value Counting	- count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number -Count numbers to 100 in numerals; count in multiples of twos, fives and tens Autumn 1 Spring 1 Spring 3 Summer 4	-count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward Autumn 1	-count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number Autumn 1 Autumn 3	-count in multiples of 6, 7, 9, 25 and 1000 -count backwards through zero to include negative numbers Autumn 1 Autumn 4	-count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 -count forwards and backwards with positive and negative whole numbers, including through zero Autumn 1 Summer 4	
Place Value: Use PV and compare	-given a number, identify one more and one less Autumn 1 Spring 1 Spring 3 Summer 4	-recognise the place value of each digit in a two-digit number (tens, ones) -compare and order numbers from 0 up to	-recognise the place value of each digit in a three-digit number (hundreds, tens, ones) -compare and	-find 1000 more or less than a given number -recognise the place value of each digit in a four-digit number (thousands, hundreds, tens,	-(read, write) order and compare numbers to at least 1 000 000 and determine the value of each digit Autumn 1	-(read, write), order and compare numbers up to 10 000 000 and determine the value of each digit

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Progression of skills

		100; use <, > and = signs Autumn 1	order numbers up to 1000 Autumn 1	and ones) -order and compare numbers beyond 1000 Autumn 1		Autumn 1
Place Value: Problems and Rounding		-use place value and number facts to solve problems Autumn 1	-solve number problems and practical problems involving these ideas Autumn 1	-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 Autumn 1	- interpret negative numbers in context - round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000 - solve number problems and practical problems that involve all of the above Autumn 1	-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 Autumn 1
Addition and Subtraction: Calculations	-add and subtract one-digit and two digit numbers to 20, including zero Autumn 2	-add and subtract numbers using concrete objects, pictorial	- add and subtract numbers mentally, including: three-digit number and ones	- add and subtract numbers with up to 4 digits using the formal written methods of columnar addition	- add and subtract whole numbers with more than 4 digits, including using formal written methods	-perform mental calculations, including with mixed operations

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Progression of skills

	Spring 2	representations and mentally, including: ➢ a two-digit number and ones ➢ a two-digit number an tens ➢ two two-digit numbers ➢ adding three one digit numbers Autumn 2	- 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 Autumn 2	and subtraction where appropriate Autumn 2	(columnar addition and subtraction) - add and subtract numbers mentally with increasingly large numbers Autumn 2	and large numbers - use their knowledge of the order of operations to carry out calculations involving the four operations Autumn 2
Addition and Subtraction: Solve Problems	-solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = □ – 9 Autumn 2	-solve problems with addition and subtraction: using concrete objects and pictorial representationsi ncluding those involving numbers, quantities and measures -applying their increasing	-solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction Autumn 2	-solve addition and subtraction two step problems in contexts, deciding which operations and methods to use and why Autumn 2	-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 and a	-solve addition and subtraction multi step problems in contexts, deciding which operations and methods to use and why

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Progression of skills

	Spring 2	knowledge of mental and written methods Autumn 2			combination of these, including understanding the meaning of the equals sign Autumn 2	Autumn 2
Multiplication and Division: Recall, Represent, Use		-recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers -show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot Spring 2	-recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables Autumn 3 Spring 1	-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 Autumn 4 Spring 1	-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 -recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})	-identify common factors, common multiples and prime numbers - use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy Autumn 2

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Progression of skills

					Autumn 3	
Multiplication and Division: Calculations		- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs Spring 2	-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 Autumn 3 Spring 1	-multiply two-digit and three-digit numbers by a one-digit number using formal written layout Spring 1	- 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 Autumn 3 Spring 1	- 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

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Progression of skills

						-perform mental calculations, including with mixed operations and large numbers Autumn 2
Multiplication and Division: Solve Problems	-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 Summer 1	-solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts Spring 2	-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 Spring 1	-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 Spring 1	-solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes -solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates Autumn 3 Spring 1	-solve problems involving addition, subtraction, multiplication and division Autumn 2

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Progression of skills

Multiplication and Division: Combined Operations					-solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign Spring 1	- use their knowledge of the order of operations to carry out to carry out calculations involving the four operations Autumn 2
Fractions: Recognise and Write	-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 Summer 2	-recognise, find, name and write fractions $^{1}_{3}$, $^{1}_{4}$, $^{2}_{4}$ and $^{3}_{4}$ of a length, shape, set of objects or quantity Summer 1	-count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers by10 -recognise,find and write fractions of a discrete set of objects: unit fractions and non unit fractions with small denominators	count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten. Spring 4 Summer 1	- 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 [for example, $^{2}_{5}$+	

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Progression of skills

			-recognise and use fractions as numbers: unit fractions and non unit fractions with small denominators Spring 3		$\frac{4}{5}=\frac{6}{5}=1\frac{1}{5}$] Autumn 4	
Fractions: Compare		- Recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$ Summer 1	-recognise and show, using diagrams, equivalent fractions with small denominators -compare and order unit fractions, and fractions with the same denominators Spring 3	-recognise and show, using diagrams, families of common equivalent fractions Spring 3	- compare and order fractions whose denominators are all multiples of the same number Autumn 4	-use common factors to simplify fractions; use common multiples to express fractions in the same denomination - compare and order fractions, including fractions > 1 Autumn 3
Fractions: Calculations		-write simple fractions for example, $\frac{1}{2}$of 6 = 3 Summer 1	- add and subtract fractions with the same denominator within one whole [for example,	-add and subtract fractions with the same denominator Spring 3	- add and subtract fractions with the same denominator and denominators that are multiples of the same	-add and subtract fractions with different denominators and mixed numbers,

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Progression of skills

			$\frac{5}{7}+\frac{7}{7}=\frac{6}{7}$ $\frac{}{1}$] Summer 1		number -multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams Autumn 4 Spring 2	using the concept of equivalent fractions -multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $\frac{1}{4}\times\frac{1}{2}=\frac{1}{8}$] • divide proper fractions by whole numbers [for example $\frac{1}{3}\div 2=\frac{1}{6}$] Autumn 3 Autumn 4
Fractions: Solve Problems			- solve problems that involve all of the above Spring 3	-solve problems involving increasingly harder fractions to calculate		

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Progression of skills

			Summer 1	quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number Spring 3		
Decimals: Recognise, Write, Compare				-recognise and write decimal equivalents of any number of tenths or hundredths -recognise and write decimal equivalents to $\frac{1}{4}, \frac{2}{4}, \frac{3}{4}$ $\frac{1}{1}$ - 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	-read and write decimal numbers as fractions [for example, 0.71 = $\frac{71}{100}$] -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	- identify the value of each digit in numbers given to three decimal places Spring 3

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Progression of skills

				Spring 4 Summer 1	three decimal places Spring 3 Summer 3	
Decimals: Compare				- solve simple measure and money problems involving fractions and decimals to two decimal places Spring 3 Spring 4 Summer 1	-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 $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{2}{5}, \frac{4}{5}$ and 1 those fractions with a denominator of a multiple of 10 or 25 Spring 3	-associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, $\frac{3}{8}$] -recall and use equivalences between simple fractions, decimals and percentages, including in different contexts Spring 3 Spring 4

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Progression of skills

Ratio and Proportion						- solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts -solve problems involving the calculation/use of percentages for comparison - solve problems involving similar shapes where the scale factor is known or can be found - solve problems involving unequal sharing and grouping using knowledge of

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Progression of skills

						fractions and multiples Spring 1
Algebra	-solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = □ – 9	-recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems	-solve problems, including missing number problems			- 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 Spring 2
Measurement: Using Measures	-compare, describe and solve practical problems for: ➢ lengths and heights	choose and use appropriate standard units to estimate and measure length/heigt in	- measure, compare, add and subtract: lengths (m/cm/mm); mass(kg/g); volume/	Convert between different units of measure [for example, kilometre to metre; hour to	- convert between different units of metric measure -understand and use approximate equivalences	-solve problems involving the calculation and conversion of units of measure,

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Progression of skills

	➢ mass/weight ➢ capacity and volume ➢ time - measure and begin to record the following: ➢ lengths and heights ➢ mass/weight ➢ capacity and volume ➢ time (hours, minutes, seconds) Spring 4 Spring 5 Summer 6	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 = Spring 3,4	capacity(l/ml) Spring 2 Spring 4	minute] - estimate, compare and calculate different measures Spring 2 Summer 3	between metric units and common imperial units such as inches, pounds and pints -use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling Spring 4 Summer 5 Summer 6	using decimal notation up to 3 d.p. 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 3 d.p. - convert between miles and kilometres Autumn 5

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Progression of skills

Measurement: Money	• recognise and know the value of different denominations of coins and notes Summer 5	- recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value - find different combination 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 Spring 1	-add and subtract amounts of money to give change, using both £ and p in practical contexts Summer 2	-estimate, compare and calculate different measures, including money in pounds and pence Summer 2	-use all four operations to solve problems involving measure [for example, money] Summer 3	
Measurement: Time	- sequence events in chronological order using language [for example, before and after, next,	-compare and sequence intervals of time - tell and write the time to five minutes, including	- tell and write the time from an analogue clock, including using Roman numerals from I to XII,	- read, write and convert time between analogue and digital 12- and 24-hour clocks -solve problems	- solve problems involving converting between units of time	-use, read, write and convert between standard units, converting

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Progression of skills

	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 Summer 6	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 Summer 2	and12-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,leap year - compare durations of events [for example to calculate the time taken by particular events or tasks] Summer 3	involving converting from hours to minutes; minutes to seconds; years to months; weeks to days Summer 3	Summer 5	measurements of time from a smaller unit of measure to a larger unit, and vice versa Autumn 5

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Progression of skills

Measurement: Perimeter, area and Volume			- measure the perimeter of simple 2-D shapes Spring 2	- measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres - find the area of rectilinear shapes by counting squares Autumn 3 Spring 2	- 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 (cm^2) and square metres (m^2) and estimate the area of irregular shapes - estimate volume [for example, using blocks to build cuboids] and capacity [for example, using water] Spring 4, Summer 6	-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

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Progression of skills

						Spring 5
Geometry: 2-D Shapes	-recognise and name common 2-D shapes [for example, rectangles (including squares), circles and triangles] Autumn 3	- identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line -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 shapes and everyday objects Autumn 3	- draw 2-D shapes Summer 4	-compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes -identify lines of symmetry in 2-D shapes presented in different orientations Summer 4	-distinguish between regular and irregular polygons based on reasoning about equal sides and angles. -use the properties of rectangles to deduce related facts and find missing lengths and angles Summer 1	-draw 2-D shapes using given dimensions and angles -compare and classify geometric shapes based on their properties and sizes -illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius Summer 1

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Progression of skills

Geometry: 3-D Shapes	-recognise and name common 3-D shapes [for example, cuboids (including cubes), pyramids and spheres] Autumn 3	-recognise and name common 3- D shapes [for example, cuboids (including cubes), pyramids and spheres] -compare and sort common 3-D shapes and everyday objects Autumn 3	-make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them Summer 4		- identify 3-D shapes, including cubes and other cuboids, from 2-D representations Summer 1	-recognise, describe and build simple 3-D shapes, including making nets Summer 1
Geometry: Angles and Lines			-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	-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 Summer 4	- know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles -draw given angles, and measure them in degrees -identify: -angles at a point and one whole turn (total 360°) - angles at a point on a straight line and $\frac{1}{2}$a turn (total 180°)	-find unknown angles in any triangles, quadrilaterals, and regular polygons -recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles

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Progression of skills

			less than a right angle -identify horizontal and vertical lines and pairs of perpendicular and parallel lines Summer 4		other multiples of 90° Summer 2	Summer 1
Geometry: Position and Direction	- describe position, direction and movement, including whole, half, quarter and three-quarter turns Summer 3	-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 ani in terms of right		- 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 Summer 6	- 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 Summer 2	-describe positions on the full coordinate grid (all four quadrants) - draw and translate simple shapes on the coordinate plane, and reflect them in the axes Summer 2

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Progression of skills

		angles for quarter, half and three-quarter turns (clockwise and anti clockwise) Summer 4				
Statistics: Present and Interpret		-interpret and construct simple pictograms, tally charts, block diagrams and simple tables Summer 3	- interpret and present data using bar charts, pictograms and tables Summer 5	-interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs Summer 5	- complete, read and interpret information in tables, including timetables Spring 5	- interpret and construct pie charts and line graphs and use these to solve problems Spring 6
Statistics: Solve Problems		-ask & answer simple questions by counting the number of objects in each category and sorting the categories by quantity - ask&answer questions about totalling and comparing categorical data Summer 3	- 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 Summer 5	-solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs Summer 5	-solve comparison, sum and difference problems using information presented in a line graph Spring 5	- calculate and interpret the mean as an average Spring 6

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Progression of skills

EYFS

Statutory Framework states 'Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers. By providing frequent and varied opportunities to build and apply this understanding - such as using manipulatives, including small pebbles and tens frames for organising counting - children will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built. In addition, it is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures. It is important that children develop positive attitudes and interests in mathematics, look for patterns and relationships, spot connections, 'have a go', talk to adults and peers about what they notice and not be afraid to make mistakes.'

(NCTEM website)

Cardinality and Counting	Counting: saying number words in sequence Children need to know number names, initially to five, then ten, and extending to larger numbers, including crossing boundaries 19/20 and 29/30. Counting back is a useful skill, but young children will find this harder because of the demand it places on the working memory. Counting: tagging each object with one number word Children need lots of opportunities to count things in irregular arrangements. For example, how many play people are in the sandpit? How many cars have we got in the garage? These opportunities can also include counting things that cannot be seen, touched or moved. Counting: knowing the last number counted gives the total so far Children need the opportunity to count out or 'give' a number of things from a larger group, not just to count the number that are there. This is to support them in focusing on the 'stopping number' which gives the cardinal value. Subitising: recognising small quantities without needing to count them all Subitising is recognising how many things are in a group without having to count them one by one. Children need opportunities

Progression of skills

	to see regular arrangements of small quantities, e.g. a dice face, structured manipulatives, etc., and be encouraged to say the quantity represented. Children also need opportunities to recognise small amounts (up to five) when they are not in the 'regular' arrangement, e.g. small handfuls of objects. Numeral meanings Children need to have the opportunity to match a number symbol with a number of things. Look for opportunities to have a range of number symbols available, e.g. wooden numerals, calculators, handwritten (include different examples of a number, e.g. , ,). Conservation: knowing that the number does not change if things are rearranged (as long as none have been added or taken away) Children need the opportunity to recognise amounts that have been rearranged and to generalise that, if nothing has been added or taken away, then the amount is the same
Comparison	More than / less than Children need progressive experiences where they can compare collections and begin to talk about which group has more things. Initially, the groups need to be very obviously different, with one group having a widely different number of things. Collections should also offer challenges, such as including more small things and fewer large things, to draw attention to the numerosity of the comparison, i.e. the number of things, not the size of them. Identifying groups with the same number of things Children need the opportunity to see that groups could consist of equal numbers of things. Children can check that groups are equal, by matching objects on a one-to one basis. Comparing numbers and reasoning Children need opportunities to apply their understanding by comparing actual numbers and explaining which is more. For example, a child is shown two boxes and told one has 5 sweets in and the other has 3 sweets in. Which box would they pick to keep and why? Look for the reasoning in the response they give, i.e. 'I would pick the 5 box because 5 is more than 3 and I want more.' If shown two numerals, children can say which is larger by counting or matching one-to-one. Children can compare numbers that are far apart, near to and next to each other. For example, 8 is a lot bigger than 2 but 3 is only a little bit bigger than

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	2. Knowing the 'one more than/one less than' relationship between counting numbers Children need opportunities to see and begin to generalise the 'one more than/one less than' relationship between sequential numbers. They can apply this understanding by recognising when the quantity does not match the number, i.e. if a pack is labelled as 5 but contains only 4, the children can identify that this is not right. Support children in recognising that if they add one, they will get the next number, or if one is taken away, they will have the previous number. For example: 'There are 4 frogs on the log, 1 frog jumps off. How many will be left? How do you know?'
Composition	Part–whole: identifying smaller numbers within a number (conceptual subitising – seeing groups and combining to a total) Children need opportunities to see small numbers within a larger collection. 'Number talks' allow children to discuss what they see. For instance, with giant ladybirds: 'There are 5 spots altogether. I can see 4 and 1, I can see 3 and 2, and I can see 1 and 1 and 1 and 1 and 1.' Encourage exploration of all the ways that 'five' can be and look. Children are encouraged to look closely at numbers to see what else they can see. This reinforces the concept of conservation. Inverse operations Children need opportunities to partition a number of things into two groups, and to recognise that those groups can be recombined to make the same total. Encourage children to say the whole number that the 'parts' make altogether. A number can be partitioned into different pairs of numbers Children need opportunities to explore a range of ways to partition a whole number. The emphasis here is on identifying the pairs of numbers that make a total. Children can do this in two ways – physically separating a group, or constructing a group from two kinds of things. A number can be partitioned into more than two numbers Children need opportunities to explore the different ways that numbers can be partitioned, i.e. into more than two groups. Situations to promote this include increasing the number of pots to put a given amount into, e.g. planting ten seeds into three or

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	more pots. A number can be partitioned into more than two numbers Children need opportunities to explore the different ways that numbers can be partitioned, i.e. into more than two groups. Situations to promote this include increasing the number of pots to put a given amount into, e.g. planting ten seeds into three or more pots.
Pattern	Continuing an AB pattern Children need the opportunity to see a pattern, to talk about what they can see, and to continue a pattern. At first, they will do this one item at a time, e.g. red cube, blue cube, red cube…verbalising the pattern helps. Children may then be asked to say what they would add next to continue it. Copying an AB pattern Copying a pattern can be difficult for children if they have to keep comparing item by item. AB patterns are easiest – when presented to children, these should contain several repeats, to ensure that the pattern unit is evident. Discuss the nature of the pattern: how has the pattern been made? Patterns can have a range of features such as varying objects, size or orientation. Make their own AB pattern As children progress from continuing to copying patterns, they can be challenged to change the sample pattern or to create their own. A range of objects can be provided for children to decide what the features of the pattern are going to be. Children may find it easier to make a pattern with the same colours as the original but with different objects. For example, copying a red–blue cube pattern with red and blue dinosaurs is easier than with yellow and green cubes. Patterns can involve different aspects and modes such as sounds, words or actions: some children will need suggestions, while others will think of their own. Spotting an error in an AB pattern When working with AB patterns, children also need the opportunities to spot and correct errors. It is easiest to spot an extra item, then a missing item, then items swapped around. When presented with an AB pattern, children can be encouraged to describe it to make sure it is right. Then, to detect an error, they can track the pattern from the start. To begin with, children may know there is something wrong, but might not be able to say what the error is. They then might take several attempts to correct it, before being able to repair the error in one move.

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	Identifying the unit of repeat The key aspect of understanding patterns is identifying the smallest part of the pattern, or the 'unit of repeat' You can draw children's attention to this when building patterns by picking up a unit at a time, e.g. a blue block and a red block together, and describing this as a 'redblue pattern', rather than a red, blue, red, blue, red, blue pattern. Children can also be asked to show the pattern unit which repeats, e.g. show two blocks, a red and a blue Continuing an ABC pattern Once children are secure with alternating patterns, they can tackle more complex pattern structures. Continuing a pattern which ends mid-unit As children work on patterns involving more elements, they can be challenged to continue patterns which do not end after a whole unit of repeat. Provide experiences where the given pattern stops mid-unit. Make their own ABB, ABBC patterns As with the first stages of making an AB pattern, the same range of experiences needs to be provided when the unit of repeat extends. A range of objects can be provided for children to decide what the features of the pattern are going to be. Patterns may include varied items and modes, such as sounds and actions. Spotting an error in an ABB pattern When working with ABB patterns, children also need the opportunities to spot and correct errors Symbolising the unit structure As children become more experienced with patterncontinuing, -extending and -creating, encourage them to record the patterns that they make. Initially this might be straightforward representations, but over time these recordings may become more iconic, e.g. a red dot representing the red dinosaur, a squiggle or the letter R for red dinosaur. As this progresses, encourage the children to symbolise their patterns in a range of ways, and to use these symbols to continue the pattern to demonstrate their understanding of the pattern. Children may, with adult direction, pick up on the coding of patterns as AB, ABB, ABBC, etc. One additional level of challenge is to create symbols for movement/sound patterns, as the children need to construct a symbol with less concrete/visual support.
Shape and Space	Developing spatial awareness: experiencing different viewpoints

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	Children need opportunities to move both themselves and objects around, so they see things from different perspectives. This will support them in visualising how things will appear when turned around and imagining how things might fit together. They need to make constructions, patterns and pictures, and select shapes which will fit when rotated or flipped in insert boards, shape sorters and jigsaws. These experiences will support them in noticing the results of rotating and reflecting images, and in visualising these. Developing spatial vocabulary Children need opportunities to be exposed to and to use the language of position and direction: position: 'in', 'on', 'under' direction: 'up', 'down', 'across'. Children also need opportunities to use terms which are relative to the viewpoint: 'in front of', 'behind', 'forwards', 'backwards' ('left' and 'right' to be used later on as ideas develop). Create as many opportunities as possible to explore this language, taking advantage of play in the outdoors to explore sequences of body movements (following obstacle courses, directing a friend, etc.). Shape awareness: developing shape awareness through construction Through play – particularly in construction – children have lots of opportunities to explore shapes, the attributes of particular shapes, and to select shapes to fulfil a particular need. Support this exploration by discussing items built by children in terms of how towers are built and why certain shapes are chosen to make a tower, and the space that has been created within an enclosure. Ask: 'How did you make that tower?', 'Why were those blocks good ones to use?' Representing spatial relationships Small world play and model building provide lots of opportunities for children to describe things being 'in front of', 'behind', 'on top of' etc., and to consider objects from different perspectives. Drawing representations of these relationships is a further challenge. These drawings may include a simple representation of a three-dimensional object from a different viewpoint. For example, 'can you draw your construction from above, looking down on it?' Identifying similarities between shapes Children need opportunities to construct and create things that represent objects in their environment. As they do this, they should notice shape properties of the object that they want to represent; encourage them to think about the appropriateness of the shapes they choose. Examples of this may include representing a ball as a circle, building a train from wooden rectangular

	blocks, or using a curved block for the elephant's trunk. Showing awareness of properties of shape At this stage, children show increasing intentionality in their selection of shapes, for example using cylinders to represent wheels because they can roll. Draw children's attention to specific properties by using specific language in everyday situations, while children may use informal language. Properties may include: • curvedness • numbers of sides and corners (2D) or edges, faces and vertices (3D) • equal sides • parallel sides • angle size, including right angles • 2D shapes as faces of 3D shapes. In play, children show that they are utilising this knowledge by gathering specific items that are needed for their construction, e.g. making a bed for a teddy and gathering blocks of equal length to make the rectangle; taking time with constructing corners so the shapes fit together to make a right angle. Describing properties of shape As children construct, and appear to be utilising, the properties of shapes, informally ask them about their constructions and representations. Children may use comparisons such as 'ball-shaped' or 'house-shaped', or start to discriminate between shapes, e.g. a 'fat' triangle and a 'pointy' triangle, using informal language. With shapes such as triangles and rectangles, ensure that children are used to seeing a range of examples, and the same shape in different orientations, as well as different sizes, colours and materials. Developing an awareness of relationships between shapes As children become more confident with specific shapes, encourage them to spot shapes within shapes. You might talk about small triangles making a bigger triangle or identifying 2D faces of 3D shapes. Pattern blocks are a useful resource, since children can point out the shapes they have used to make their whole pattern: Also encourage children to predict what will happen when paper is cut or folded, or shapes are combined. Ask: 'What shapes will we see?', 'What will happen if we fold the square in half?'
Measures	Recognising attributes In this first stage, children are able to recognise the specific attributes of (for example) length – that a stick is long; adults are tall. Their initial recognition may be a descriptor and over-applied (all straight things are long, and if it is not straight it cannot be long;

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	all adults are tall). Children may use gestures or words to start to compare amounts of continuous quantities (length, capacity, weight), pointing to items that are big, tall, full or heavy. Children learn this vocabulary from the adults around them. Adults can seek opportunities to extend and refine conversations about things that are long, tall, high, heavy, full, etc. rather than just 'big'. At this point children may not be using comparative language such as, 'You are taller than me.' Comparing amounts of continuous quantities Children can find something that is longer/shorter or heavier/lighter than a given reference item. They will utilise strategies such as direct comparison, e.g. placing objects side by side to determine which is longer. Children compare sizes, lengths, weights and capacities verbally and begin to use more specific terms, such as 'taller than', 'heavier than', 'lighter than', and 'holds more than', as well as more general comparative phrases, such as 'not enough', 'too much', and 'a lot more'. When comparing lengths directly, children need to ensure that they align the starting points, and compare like-forlike, e.g. straightening skipping ropes before comparing lengths. When comparing capacities directly, children can pour from one container to another to find which holds more, or find one that is the same. However, children may conclude that if one container overflows that must mean 'bigger'. Ensure that children have opportunities to see a jug of coloured water poured into a range of container shapes. Ask: 'What do you think will happen if we pour this tall thin jugful into this short fat dish?' Comparing weight can be tricky to conceptualise. One way is to identify that greater mass is shown by a greater downward pull. Ask children to hold a carrier bag; encourage them to notice it feels as though their hand is being pulled down when something heavy is put in it. Place a carrier bag in each hand and identify which one is heavier, by discussing which arm feels more pulled down. Show this using a simple spring balance or a box attached to elastic bands; identify that the elastic is being stretched by being pulled down, just like our arms. Explore the link to the balance scales to show that the heavier side goes down. If possible, exemplify this with a see-saw. Ensure that children are presented with large, light things and small, heavy things, to prevent the overgeneralisation that big means heavy and small means light. Showing awareness of comparison in estimating and predicting After children have had lots of practical experiences of comparing attributes, they can begin to estimate and to predict. For instance, they can start to consider which container would be best to store a specific item in: 'Which box should Teddy have?', 'What will fit in here?' Comparing indirectly

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	Children can then move onto using one thing to compare with two others, if, for example, asked to put things in order of height, weight or capacity. This may involve using a 'go between', for instance pouring a jugful of water into two bottles to see which holds more. Problems may be posed such as: 'I would like to move this table outside – do you think it will fit through the door?' Recognising the relationship between the size and number of units Before children use standard units of measure, they begin to compare units of different sizes in practical contexts. One example may be in the water tray, where children realise it will take them longer to fill a bucket using teaspoons than bottles. Another example would be to fill identical containers with different-sized objects, e.g. small balls or large balls. These sorts of playful experiences enable children to make the generalisation that the smaller the unit the more we need of them, or the bigger the unit the less we need of them. These experiences can be extended by encouraging estimations: 'How many tennis balls do you think will fit in this tub?' Then check this by filling it. 'What if I try to fill it with ping pong balls? Will our answer stay the same? If not, why not?' In practical situations, these sorts of questions can be asked to support children in their justification of the choice of equipment. For example: 'What can I use to help fill the water tray? Which bag shall I use for my shopping? Which box would be best to store these buttons? Why did you think that is a good choice?' Beginning to use units to compare things Experiences can be provided where children use units to 'measure' and compare. It is better to provide identical bricks, centimetre cubes or metre sticks so they can count physical units, rather than repeating the use of one item as with using hands or feet. In order to measure accurately, they need to ensure there are no gaps between units of measure. Using standard units helps children make connections with measuring in 'real life'. Young children also enjoy using height charts, measuring tapes, rulers, digital scales and timers, although will not yet fully understand how they work. Beginning to use time to sequence events Time is an abstract aspect to measure, and tricky in a range of ways. Although their age may be the most familiar number they know, children may have little sense of the unit of a 'year', and few may know the date of their birthday. In order to tell the time, children need a sense of number, space and time, the ability to count, and some notion of fractions (for half and quarter hours). In the Early Years we begin by drawing children's attention to sequencing of activities, important times in their day, and some sequences of time that are significant to them. Vocabulary that supports the understanding of this concept includes the positional language of 'before', 'after', 'next', and the relative terms 'yesterday' and 'tomorrow'. Knowing days of the week also

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	helps children to keep track of time. Direct children's attention to the short hand, pointing to a number on a clockface, and identify what we are doing at that time. Beginning to experience specific time durations Children need to experience specific time spans in order to start to develop an overall sense of time. Initially, this may be based on familiar activities such as the number of 'sleeps' before an event. A class calendar may support this by highlighting certain events ('How many sleeps until the chicks start to hatch?', 'How many sleeps until my birthday?', 'How many sleeps until we go to the park?'). Discuss the number of sleeps getting smaller and what this means. By using timers in play, children can start to explore what they can do in a certain time period. For example: 'I wonder how long it takes you to run around the track?', 'How would we know if you were getting quicker?'. Identify that, in this case, the smaller the number of seconds the quicker you are getting (this is tricky for a child, as usually bigger numbers are 'better'). Children may also have the opportunity to see how many things they can do in a minute. For example: 'How many play people can you rescue from the pit?' (Wrap fabric around a water tray to create small gaps through which people can be rescued.)