

ROYDS HALL PRIMARY PHASE MATHEMATICS NON-NEGOTIABLES

Mathematics skills should be taught when linked to projects, where possible, to ensure real world application

Key Skills

To be able to solve problems using range of strategies.

To reason mathematically, following a line of enquiry.

Mathematical language and targets

Mathematics

	Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
Number (Number and Place value)	Count reliably with numbers from one to 20 Place numbers in order Say which is one more and one less than a given number	Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number Count, read and write numbers to 100 in numerals; Count in multiples of 2s, 5s and 10s given a number, identify 1 more and 1 less identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least read and write numbers from 1 to 20 in numerals and words.	Count in steps of 2, 3 and 5 from zero and in tens from any number. Recognise the place value of any 2 digit number. Identify numbers and answers on a number line. Compare and order numbers from 0 up to 100 and use <> and = signs Read numbers to at least 100 in numerals and words.	Count in multiples of 4, 8, 50 and find 100 more or less than a given number. Recognise the value of each digit in 3 digit numbers. Compare and order numbers to 1000. Read and write numbers up to 1000 in numbers and words. Solve a range of practical number problems.	Count in multiples of 4, 8, 50 and find 100 more or less than a given number. Recognise the value of each digit in 3 digit numbers. Compare and order numbers to 1000. Read and write numbers up to 1000 in numbers and words. Solve a range of practical number problems.	Count in multiples of 6,7,9 and 1000. Find 1000 more or less than a given number. Recognise the place value of 4 digit numbers. Order and compare numbers beyond 1000. Round numbers to the nearest 10, 100 or 1000. Read roman numerals to numerals to 100. Know how to solve problems using basic number concepts.	Read, write an order numbers to 1, 000,000 and know the value of each digit. Count forwards and backward in steps of 10 up to 1,000,000. Interpret negative numbers, counting forwards and backwards in steps of 10. Round up to the nearest number including some decimals. Read roman numerals to 1000 (M) and recognise years written in roman numerals	Read, write and order numbers to 10, 000,000 and know the value of each digit. Round any whole number accurately and to whole decimal places. Identify prime numbers and know how to calculate them. Use negative numbers in context, and calculate across zero. Solve number and practical problems confidently.	Understand place value for decimals, measures and integers of any size. Order positive and negative integers, decimals and fractions Know prime numbers, square numbers, factors, multiples and prime factorisation. Understand how to round numbers by estimating and then checking answers. (round to decimal places, or a percentage)

Number
(Addition and subtraction)

<p>Use objects to add and subtract two single digit numbers</p> <p>Count on and back to find the answers</p>	<p>Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs</p> <p>Represent and use number bonds and related subtraction facts within 20 add and subtract one-digit and two digit numbers to 20, including 0</p> <p>Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = ? - 9$</p>	<p>Use objects to solve problems with addition and subtraction.</p> <p>Solve simple addition and subtraction questions mentally.</p> <p>Recall and use addition facts to 20 fluently. Add and subtract two digit numbers and ones, tens and then units.</p> <p>Recognise that adding is the inverse of subtraction.</p>	<p>Add and subtract numbers mentally, including: a three digit number and ones e.g. $349+6+$ and three digit numbers and tens and hundreds.</p> <p>Confidently use column addition to add and subtract.</p> <p>Estimate the answers to calculations. Know that adding is the inverse of subtraction.</p>	<p>Add and subtract up to 4 digit numbers.</p> <p>Use a range of methods to calculate including column addition.</p> <p>Estimate answers and use inverse operations confidently.</p> <p>Solve a range of calculations, choosing the correct operation.</p>	<p>Add and subtract whole numbers with more than 4 digits using column addition and subtraction.</p> <p>Add and subtract large increasingly large numbers mentally.</p> <p>Add and subtract when solving multi-step problems and explain methods.</p>	<p>Solve problems involving addition and subtraction.</p> <p>Perform mental calculations quickly.</p> <p>Know how to solve multi step problems in a range of contexts.</p> <p>Use estimation to check the answers to calculations.</p>	<p>Use addition and subtraction confidently (decimals, fractions, integers, positive and negative numbers)</p> <p>Use a range of strategies confidently and independently.</p> <p>Add and subtract using missing numbers or parts of calculations.</p>
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Number
(Multiplication
and division)

<p>Solve problems including doubling, halving and sharing</p>	<p>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</p>	<p>Recall multiplication facts for the 2,5 and 10 times tables including odd and even numbers. Calculate simple multiplication and division using \times / and $=$. Show division by using arrays, repeated addition, mental methods and problem solving.</p>	<p>Recall multiplication and division facts for the 3, 4 and 8 times tables. Write and calculate mental calculations using multiplication and division. Solve simple missing number problems.</p>	<p>Recall multiplication facts to 12×12. Use place value to multiply and divide mentally. Recognise and use factor pairs. Multiply and divide 2 and 3 digit numbers using written methods. Solve word problems involving multiplying and dividing.</p>	<p>Identify multiples and common factors of numbers. Know the vocabulary of prime numbers and composite numbers (nonprime) Calculate prime numbers up to 100 and recall prime numbers to 19. Recognise square and cube numbers and know how to calculate them.</p>	<p>Multiply up to 4 digit number using a range of methods including long multiplication. Divide up to 4 digit numbers and interpret as whole numbers. Divide up to 4 digit numbers by using short and long division. Perform mental calculations quickly. Identify common multiples and factors.</p>	<p>Use multiplication and division confidently (decimals, fractions, integers, positive and negative numbers) Know relationships between numbers including the inverse. Understand how to calculate the square roots of numbers. Use mathematical knowledge to explain and reason effectively.</p>
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Number
(Fractions and
decimals)

Recognise, find and name a half as 1 of 2 equal parts of an object, shape or quantity	Find small fractions and name them easily.	Count up and down in tenths and know that a whole is made of ten equal parts.	Recognise and show equivalent fractions.	Compare and order fractions confidently.	Use common factors to simplify fractions and express fractions.	To order decimals and fractions using symbols <>
recognise, find and name a quarter as 1 of 4 equal parts of an object, shape or quantity	Represent key fractions of a length, shape, set of objects or quantity.	Recognise simple fractions and know their value.	Count up and down in hundredths and tenths.	Identify and find equivalent fractions and represent these visually.	Compare and order fractions using <>	Know how to calculate fractions of amounts easily and convert these to decimals and percentages.
	Write simple fractions and find values e.g. 1/6 of 6 = 3	Show, using diagrams, equivalent fractions.	Add and subtract fractions with the same denominator.	Add and subtract fractions (that are multiples of the same number)	Add and subtract fractions with similar and mixed denominators.	Interpret fractions as percentages of operators.
	Begin to recognise some equivalent fractions.	Recognise fractions as numbers e.g. 1/2 is 50.	Round decimals to the nearest decimal place or whole number.	Multiply proper fractions by whole numbers.	Multiply proper fractions by whole numbers.	Convert fractions to decimals and know corresponding fractions and decimals.
		Add and subtract fractions with the same denominator. E.g. 1/4 + 1/4 =	Compare and order decimals with up to two decimal places.	Read and write decimal numbers as fractions.	Divide proper fractions by whole numbers.	
		Compare and order key fractions with the same denominators.	Solve simple measures i.e. money problems involving up to two decimal places.	Round decimals to the nearest whole number.	Calculate fractions, decimals and percentages and know equivalences.	
		Solve problems involving all of the above.		Read, write and order numbers with up to three decimal places.	Round all of the above to the nearest whole number or decimal place.	
				Write percentages as decimals and fractions.		
				Solve problems by converting fractions to decimals.		

Measurement / Geometry

Use every day language to talk about size, weight, capacity, position, distance, time and money	recognise and name common 2-D and 3-D shapes, including: 2-D shapes [for example, rectangles (including squares), circles and triangles] 3-D shapes [for example, cuboids (including cubes), pyramids and spheres]	Choose and use appropriate unites to measure length/ height (m/cm)	Measure, compare, add and subtract lengths (m/cm/mm), mass (kg/g) and volume/capacity (l/ml)	Convert between different units of measure (e.g. Kilometre to metre, hour to minute)	To convert between different units of measure eg kilometer and metre.	Solve problems involving the converting measurements.	Calculate problems involving perimeter and area (simple and more complex shapes including circles and some volume)
Compare quantities and objects	describe position, direction and movement, including whole, half, quarter and three-quarter turns	Compare and order lengths, mass and volume/capacity.	Measure the perimeter of simple 2D shapes. Add simple amounts of money to give change. Using both £ and p.	Measure and calculate the area of squares and rectangles Know how to represent area by using cm ² .	Understand and know conversions between metric and imperial measurements. Measure and calculate the perimeter of simple shapes in centimetres and metres.	Convert between standard units and metric including; length mass, volume and time.	To interpret line scale drawings.
Solve problems		Recognise and use £ and p signs and make a value.	Tell and write the time in an analogue clock including telling the time using roman numerals, and 12 and 24 hour clocks.	Find the area of shapes by counting squares. Estimate, compare and calculate different measures including pounds and pence.	Calculate and compare the area of rectangles. Estimate volume and capacity (e.g by using 1cm ² blocks to estimate)	Recognise that shapes have the same area but different perimeters. Begin to calculate the volume of simple shapes and calculate compare and estimate the volume of cubes and cuboids.	Use a ruler and compass constructions to construct shapes. Draw points, lines, parallel and perpendicular lines, angles from a given point.
Recognise, create, and describe patterns		Find different combinations of coins that equal the same amounts of money.	Estimate time with accuracy to the nearest minute, hour, am, pm.	Compare and classify geometric shapes including; quadrilaterals and triangles, based on proportions and sizes.	Solve problems involving converting units of time. Solve a range of problems involving measure including mass, length volume and money.	Calculate the area of parallelograms and triangles. Draw 2D shapes using simple angles.	Draw translations, rotations and reflections of shapes confidently. Calculate angles, missing angles and know the degrees of a shape.
Explore characteristics of everyday objects		Solve simple problems including adding and subtracting money.	Understand midnight and midday.	Know about simple lines of symmetry and create own shapes to show this.	Identify 3D shapes including cubes and cuboids from 2D representations.	Solve problems involving the properties of shapes.	
Use mathematical language to describe shapes		Compare and sequence times (12 and 24 hour)	Know the number of seconds in a minute and minutes in an hour.	Describe positions on a grid in the first quadrant. Describe movements between positions and translations.	Know a range of angles and compare angle sizes. Draw given angle accurately	Build simple 3D shapes including nets. Find missing angles in a range of shapes. Illustrate and name parts of circles including radius, diameter and circumference.	
		Tell and write time accurately to five minutes.	Know the number of days in each month and year and leap year.	Plot points to draw given shapes including	Know angle son a point,	Calculate the averages	
		Know the number of hours in a day and minutes in an hour.					
		Identify the properties of 2D					

			(sides, lines of symmetry) and 3D shapes (edges, vertices and faces) Compare and sort 2D and 3D shapes. Identify 2D shapes on the surface of 3D shapes.	Draw 2D and some 3D shapes. Identify right angles and know they are 90 degrees. Identify horizontal and vertical lines.	polygons.	whole turn and right angles.	of charts, including mean, median and mode.	
Probability, ratio and proportion							Solve problems with proportion which include missing numbers. Solve problems which include the calculation of percentages. Solve problems using unequal amounts using knowledge of fractions and percentages.	Record frequency of outcomes and derive simple probability. Understand that probabilities of all possible outcomes sum to 1. Organise data using diagrams, tables and grids.
Statistics			Interpret and construct simple pictograms, block diagrams and tally charts. Answer simple questions by counting the number of objects in each quantity. Ask and answer questions about totaling data.	Interpret bar charts, pictograms and tables. Solve one and two step problems posing questions such as how many more? Have a simple understanding of scales in charts.	Present data in a clear and concise way. Know how to construct bar charts and time graphs. Solve problems by taking information from bar charts, pictograms, tables and other graphs.	Complete read and interpret information in a range of tables, including timetables. Show comparisons, sum and difference problems using information presented in a line.		Represent statistics using graphs, grouped data and measures such as mean median and mode. Construct and interpret; pie charts, diagrams, frequency tables and bar charts. Know the relationships between the variables when interpreting data.

Algebra							<p>To use simple formulae in algebra</p> <p>To generate and describe linear number sequences.</p> <p>To express missing number problems.</p> <p>Find pairs of numbers that satisfy an equation.</p> <p>Find possibilities of two calculations.</p>	<p>Understand how to interpret simple algebraic notation. (See curriculum for more detail)</p> <p>Substitute numerical value and calculate simple formulas.</p> <p>Work with co-ordinates in all four quadrants.</p> <p>Understand simple calculations and find numerical values.</p>
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