

Mathematics

National Curriculum Aims and Objectives:

The national curriculum for maths aims to ensure that all pupils:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Vision for Subject at Queenborough School:

A high-quality mathematics education will help pupils gain a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

Year 6

Terms 1 & 2

Oral and Mental calculation

- Read and write any integer and know what each digit represents.
- Read and write decimal notation for tenths and hundredths and know what each digit represents.
- Order and compare whole numbers up to 1 000 000, negative numbers and decimals.
- Count forwards and backwards from any number including decimals
- Know by heart and use all multiplication and division facts for tables up to 12×12 .
- Find and use all the pairs of decimals with a sum of 0.1, 1 or 10.
- Find and use related facts from those already known e.g. "If I know $3 \times 6 = 18$ or $10 + 90 = 100$...then what else do I know "
- Multiply and divide two-digit and single-digit numbers *-with jottings*.
- Double or halve any number-*use partitioning and jottings*.
- Multiply and divide two-digit decimals by a single digit number *-use jottings*.
- Multiply and divide whole numbers and decimals mentally by 10 or 100
- Convert between units of measurement by multiplying or dividing 10, 100 or 100
- Round whole numbers to the nearest 10, 100, 1000
- Round numbers with up to two decimal places to the nearest integer or number of decimal places
- Count in fractional steps including mixed numbers
- Find and use equivalent fractions.

<p>Week 1</p>	<p>Number and place value to solve problems</p> <ul style="list-style-type: none"> • Read and write numbers up to 10 000 000 • Order random numbers including decimal numbers up to 10 000 000 <i>on a number line</i> • Order and compare positive and negative numbers- <i>on a number line</i> • Determine the value of each digit in numbers up to 10 000 000-<i>use place value counters</i> • <i>Identify the value of each digit in numbers to three decimal places</i> • Round any whole number to the nearest 10, 100, 1 000 or 10 000 <i>using a number line.</i> • <i>Round decimals with three places to the nearest whole number</i> • Use negative numbers in context and calculate intervals across zero • ALGEBRA -<i>complete</i> or generate linear number sequences • ALGEBRA -describe linear number sequences • Solve number and practical problems that involve number and place value • ALGEBRA -<i>find</i> all the possibilities of combinations of two variables
<p>Week 2</p>	<p>Addition and subtraction to solve problems</p> <ul style="list-style-type: none"> • Estimate answers • <i>Consider the most appropriate strategy to solve a calculation: calculate mentally, use a jotting or a written method</i> • Use inverse to check answers to calculations • <i>Add whole numbers and decimals using a formal written method.</i> • Solve addition multi-step problems in contexts, deciding which operations and methods to use and why. • <i>Subtract whole numbers and decimals using a formal written method</i> • Solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why. • ALGEBRA- find pairs of number that satisfy number sequences involving two unknowns e.g. $x+y= 1.5$ • Understand how to find the average (mean) of a range of numbers • Use their knowledge of the order of operations (<i>BODMAS</i>) to solve problems • Solve problems involving a combination of addition, subtraction, multiplication and/or division
<p>Week 3</p>	<p>Multiplication and division to solve problems</p> <ul style="list-style-type: none"> • Estimate answers • <i>Consider the most appropriate strategy to solve a calculation: calculate mentally, use a jotting or a written method</i> • Use inverse to check answers to calculations • Multiply numbers with up to 4 digits by a two-digit whole number using a formal written method of long multiplication. • Multiply one-digit numbers with up to two decimal places by whole numbers • ALGEBRA find pairs of number that satisfy number sequences involving two unknowns e.g. $a \times b = 60$ • Divide numbers up to 4 digits by a two-digit number using a formal written method of short division <i>where appropriate</i> • Divide numbers up to 4 digits by a two-digit whole number using a formal written method of long division • Interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. • Divide one-digit numbers with up to two decimal places by whole numbers. • ALGEBRA- find pairs of number that satisfy number sequences involving two unknowns e.g. $100 \div a = b$

	<ul style="list-style-type: none"> • Use their knowledge of the order of operations (<i>BODMAS</i>) to solve problems involving a combination of addition, subtraction, multiplication and/or division • Solve problems which involve multiplication and/or division
Week 4	<p><i>Fractions to solve problems</i></p> <ul style="list-style-type: none"> • Identify and use common factors to simplify fractions • Identify and use common multiples to turn two or more fractions to the same denomination • Identify use prime numbers. • Compare and order fractions, including fractions >1 (<i>including on a number line</i>). • Estimate answers • <i>Consider the most appropriate strategy to solve a calculation: calculate mentally, use a jotting or a written method</i> • Add fractions with different denominators • Subtract fractions with different denominators • Add mixed numbers, using the concept of equivalent fractions • Subtract mixed numbers, using the concept of equivalent fractions • ALGEBRA- find pairs of number that satisfy number sequences involving two unknowns e.g. $x+y= 3/5$ • Link fractions with division • Find decimal fraction equivalents for a simple fractions • Solve problems involving fractions
Week 5	<p><i>Percentages to solve problems</i></p> <ul style="list-style-type: none"> • <i>Recognise the % symbol(year 5)</i> • <i>Understand that per cent relates to "number of parts per 100"(year 5)</i> • <i>Write percentages as a fraction with denominator 100 (year 5)</i> • <i>Write percentages as a decimal (year 5)</i> • Recall and use equivalences between simple fractions, decimals and percentages (<i>e.g. 50% is the same as 50/100 r 0.5</i>) • <i>Find simple percentages of amounts.</i> • Use percentages for comparison • Solve problems involving percentages
Week 6	<p><i>Ratio and proportion to solve problems</i></p> <ul style="list-style-type: none"> • <i>Understand ratio as unequal grouping or sharing</i> • <i>Understand proportion as scaling up or down</i> • 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 similar shapes where the scale factor is known or can be found. • Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples

<p>Week 7</p>	<p>Shape and position and direction to solve problems</p> <ul style="list-style-type: none"> • Draw 2-D shapes using given dimensions and angles-<i>using ruler and protractor.</i> • Build simple 3-D shapes, including making nets. • Compare and classify 2D and 3D shapes based on their properties and angle sizes -<i>regular and irregular</i> • Recognise angles where they meet at a point, are on a straight line, or are vertically opposite • Find unknown angles in any triangle, quadrilateral or other regular polygons. • Illustrate and name parts of circles, including radius, diameter and circumference • Know that the diameter is twice the radius • ALGEBRA-use simple formulae <i>expressed in words</i> • Solve problems involving shape including problems involving similar shapes where the scale factor is known or can be found
<p>Week 8</p>	<p>Measures-length and area and volume /capacity to solve problems</p> <ul style="list-style-type: none"> • <i>Practical opportunities to use measures</i> • <i>Introduce concept of thousandths in context of accurate measurement</i> • <i>Read and interpret scales on a range of measuring instruments</i> • Solve problems involving the calculation and conversion of units of measure using decimal notation up to three decimal places where appropriate • ALGEBRA- finds pairs of number that satisfy number sequences involving two unknowns e.g. $x + y = 250$ g • <i>Calculate the area of rectangles and squares-link to other shapes</i> • Calculate the area of parallelograms and triangles • Recognise that shapes with the same area can have different perimeter and vice versa • ALGEBRA -use simple formulae <i>expressed in words</i> • Use the formulae for the area of shapes <i>where possible</i> • <i>Solve problems involving measures</i>
<p>Week 9</p>	<p>Statistics to solve problems</p> <ul style="list-style-type: none"> • <i>Link pie charts to angles e.g. 360 degrees</i> • <i>Link pie charts to fractions</i> • <i>Link pie charts to percentages</i> • construct pie charts • construct line graphs • Interpret pie charts use these to solve problems • Interpret line graphs and use these to solve problems

Oral and Mental calculation

- Read and write any integer and know what each digit represents.
- Read and write decimal notation for tenths, hundredths and thousandths and know what each digit represents.
- Order and compare whole numbers up to 1 000 000 including negative numbers, and decimals.
- Count forwards and backwards from any number including decimals
- ALGEBRA -generate and describe linear number sequences
- Know by heart and use all multiplication and division facts for tables up to 12×12 .
- Find and use all the pairs of decimals with a sum of 0.1, 1 or 10.
- Find and use related facts from those already known e.g. " If I know $3 \times 6=18$ or $10 +90 =100$..then what else do I know "
- Multiply and divide two-digit and single-digit numbers -*with jottings*.
- Double or halve any number-*use partitioning and jottings*.
- Multiply and divide two-digit decimals by a single digit number -*use jottings*.
- Mentally multiply and divide two-digit decimals by a single digit number, e.g., $(O.t \times O$ or $O.t \div O)$
- ALGEBRA -find pairs of numbers that satisfy number sequences involving two unknowns eg $x+y=12$.
- Convert between units of measurement by multiplying or dividing 10, 100 or 1000
- Round whole numbers to the nearest 10, 100, 1000
- Round numbers with up to two decimal places to the nearest integer or number of decimal places
- Count in fractional steps including mixed numbers

Week 1**Number and place value to solve problems**

- Read and write numbers up to 10 000 000
- Order random numbers including decimal numbers up to 10 000 000 *on a number line*
- Order and compare positive and negative numbers- *on a number line*
- Determine the value of each digit in numbers up to 10 000 000-*use place value counters*
- *Identify the value of each digit in numbers to three decimal places*
- Round any whole number to the nearest 10, 100, 1 000 or 10 000 *using a number line*.
- *Round decimals with three places to the nearest whole number or to one decimal place*
- Use negative numbers in context and calculate intervals across zero.
- Generate and describe *and extend or complete* number sequences.
- Solve problems that involve all of the above

<p>Week 2</p>	<p>Addition and subtraction to solve problems</p> <ul style="list-style-type: none"> • Estimate answers • <i>Consider the most appropriate strategy to solve a calculation: calculate mentally, use a jotting or a written method</i> • <i>Add whole numbers and decimals using a formal written method.</i> • Solve addition multi-step problems in contexts, deciding which operations and methods to use and why. • <i>Subtract whole numbers and decimals using a formal written method</i> • Use inverse to check answers to calculations • Express missing number problems algebraically. • ALGEBRA- find pairs of number that satisfy number sequences involving two unknowns e.g. $x+y= 1.5$ • Know how to calculate and interpret the mean as an average • Solve problems which require answers to be rounded to specified degrees of accuracy • Use their knowledge of the order of operations (<i>BODMAS</i>) to solve problems involving a combination of addition, subtraction, multiplication and/or division. • Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. • Solve problems involving a combination of addition, subtraction, multiplication and/or division. I.e. Calculate and interpret the mean (average).
<p>Week 3</p>	<p>Multiplication and division to solve problems</p> <ul style="list-style-type: none"> • Estimate answers • <i>Consider the most appropriate strategy to solve a calculation: calculate mentally, use a jotting or a written method</i> • Use inverse to check answers to calculations • Multiply numbers with up to 4 digits by a two-digit whole number using a formal written method of long multiplication. <ul style="list-style-type: none"> • Multiply one-digit numbers with up to two decimal places by whole numbers • ALGEBRA- find pairs of number that satisfy number sequences involving two unknowns e.g. $a \times b= 36$ • Express missing number problems algebraically • Divide numbers up to 4 digits by a two-digit number using a formal written method of short division <i>where appropriate</i> • Divide numbers up to 4 digits by a two-digit whole number using a formal written method of long division • Interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. • Divide one-digit numbers with up to two decimal places by whole numbers. • Use their knowledge of the order of operations (<i>BODMAS</i>) to solve problems involving a combination of addition, subtraction, multiplication and/or division. • Solve problems which involve multiplication and/or division • RATIO AND PROPORTION- Solve problems involving unequal sharing and grouping using knowledge of multiples • RATIO AND PROPORTION- solve problems involving the relative size of two quantities where missing values can be found by using multiplication or division facts • Solve problems involving addition, subtraction, multiplication and /or division.

<p>Week 4</p>	<p>Fractions to solve problems</p> <ul style="list-style-type: none"> • Identify and use common factors to simplify fractions • Identify and use common multiples to turn two or more fractions to the same denomination • Identify use prime numbers. • Compare and order fractions (<i>such as 2/3, 3/4 and 5/6 by converting them to fractions with the same denominator</i>), including fractions >1 (<i>including on a number line</i>). • Estimate answers • <i>Consider the most appropriate strategy to solve a calculation: calculate mentally, use a jotting or a written method</i> • Add fractions with different denominators • Subtract fractions with different denominators • Add mixed numbers, using the concept of equivalent fractions • Subtract mixed numbers, using the concept of equivalent fractions • Link fractions with division • Find decimal equivalents for simple fractions • Solve problems involving fractions. • Multiply pairs of unit fractions, writing the answer in its simplest form (<i>using diagram or manipulatives</i>) • Divide a unit fraction by a whole number (<i>using diagrams or manipulatives</i>) • ALGEBRA- find pairs of number that satisfy number sequences involving two unknowns e.g. $x + y = 1/2$ • RATIO AND PROPORTION -Solve problems involving unequal sharing and grouping using knowledge of fractions eg 3/5 of the class are boys
<p>Week 5</p>	<p>Percentage solve problems</p> <ul style="list-style-type: none"> • Recall and use equivalences between simple fractions, decimals and percentages • <i>Find simple percentages of amounts.</i> • Use percentages for comparison • RATIO AND PROPORTION -Solve problems involving the calculation of percentages
<p>Week 6</p>	<p>Measures to solve problems</p> <ul style="list-style-type: none"> • <i>Practical opportunities to use measures</i> • <i>Introduce concept of thousandths in context of accurate measurement</i> • Solve problems involving the calculation and conversion of units of measure (including money and time), using decimal notation up to three decimal places where appropriate • ALGEBRA- find pairs of number that satisfy number sequences involving two unknowns e.g. $a \times b = \frac{1}{2} \text{ Kg}$ • Calculate, estimate and compare the volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3) • ALGEBRA -Use simple formulae <i>expressed in words</i> • Recognise when it is possible to use the formulae for the volume of shapes. • RATIO AND PROPORTION -Solve problems involving the calculation of percentages • <i>Tell the time on digital and analogue clock using the 24 hour clock</i>

	<ul style="list-style-type: none"> • <i>Read and use timetables using the 24 hour clock</i> • <i>Solve problems involving measures</i>
Week 7	<p><i>Shape and position and direction to solve problems</i></p> <ul style="list-style-type: none"> • <i>Describe positions on a coordinate grid (first quadrant).</i> • <i>Describe positions on the full coordinate grid (all four quadrants).</i> • <i>Draw and translate simple shapes on the coordinate plane,</i> • <i>Draw 2-D shapes using given dimensions and angles.</i> • <i>Recognise, describe and build simple 3-D shapes, including making nets.</i> • <i>Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons</i> • <i>RATIO AND PROPORTION -Solve problems involving similar shapes where the scale factor is known or can be found</i> • <i>Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius.</i> • <i>Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles</i> • <i>Solve problems with shapes and /or position and direction .</i>
Week 8	<p><i>Statistics to solve problems</i></p> <ul style="list-style-type: none"> • <i>Link pie charts to angles</i> • <i>Interpret and construct pie charts and use these to solve problems.</i> • <i>Interpret and construct line graphs using continuous data and use these to solve problems eg to convert between miles and kilometres</i> • <i>Solve comparison, sum and difference problems using information presented in all types of graph.</i>
Week 9	<p><i>Ratio and proportion to solve problems</i></p> <ul style="list-style-type: none"> • <i>Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts.</i>

Year 6

Terms 5 & 6

Oral and Mental calculation

- Read and write any integer and know what each digit represents.
- Read and write decimal notation for tenths, hundredths and thousandths and know what each digit represents.
- Order and compare whole numbers up to 1 000 000 including negative numbers, and decimals.
- Count forwards and backwards from any number including decimals
- Know by heart and use all multiplication and division facts for tables up to 12×12 .
- Find and use all the pairs of decimals with a sum of 0.1, 1 or 10.
- Find and use related facts from those already known e.g. " If I know $3 \times 6=18$ or $10 +90 =100$..then what else do I know "
- Multiply and divide two-digit and single-digit numbers *-with jottings*.
- Double or halve any number-*use partitioning and jottings*.
- Multiply and divide two-digit decimals by a single digit number *-use jottings*.
- Mentally multiply and divide two-digit decimals by a single digit number, e.g., $(O.t \times O$ or $O.t \div O)$.
- Convert between units of measurement by multiplying or dividing 10, 100 or 1000
- Round whole numbers to the nearest 10, 100, 1000
- Round numbers with up to two decimal places to the nearest integer or number of decimal places
- Compare and order fractions, including fractions >1 *on a number line*
- Count in fractional steps including mixed numbers

Weeks 1-5	Revision of topics based on end of term 4 assessment Statutory assessment
Week 6-10	Consolidation and extension of skills with mental and written calculations , fractions , algebra , ratio and proportion , decimals, measures , shape , position and direction in preparation for KS3

Non-negotiable requirements for the provision of Subject:

- Each classroom will have a visible number line to 100
- Each classroom will have a maths resource stacker with equipment that the children will have access to in any maths lesson

Promoting Pupils' Spiritual, Moral, Social and Cultural Development:

Spiritual Development

- Encouraging pupils to reflect and learn from reflection
- Develop a climate or ethos within which all pupils can grow and flourish, respect others and be respected
- Monitoring, in simple, pragmatic ways, the success of what is provided
- Promote teaching styles which:
 - Value pupils' questions and give them space for their own thoughts, ideas and concerns
 - Enable pupils to make connections between aspects of their learning
 - Encourage pupils to relate their learning to a wider frame of reference - for example, asking 'why?', 'how?' and 'where?' as well as 'what?'

Moral Development

- Providing a clear moral code as a basis for behaviour which is promoted consistently through all aspects of the school
- Developing an open and safe learning environment in which pupils can express their views and practise moral decision-making

Social Development

- Encouraging pupils to work co-operatively

Cultural Development

- Recognising and nurturing particular gifts and talents

Year 6

Suggested Activities

NUMBER	Children need to have the opportunity to
<p>Number and place value</p>	<ul style="list-style-type: none"> • Represent numbers in different ways • Continue to count backwards and forwards in a variety of steps and with a range of numbers and /or fractions • Complete and explore given number sequences. • Create their own number sequences • Use place value counters and place value charts to explore large numbers • Compare and order decimals including those with one , two or three decimal places • Adding negative numbers -use number line to show this operation • Think of as take away 8 and then give back 6 which is the same take away 2 -8+6= -2 • Start at negative 8 and add on positive 6 will result in negative 2 • Link rounding to estimating answers to calculations
<p>Addition, subtraction, multiplication and division</p>	<ul style="list-style-type: none"> • Give mixed problems so children have to identify the operation/s needed • Give real life and abstract problems that need either a constructed or selected response- multi choice , matching or true/false • Link calculations to measures , money , real life problems and number investigations • Explore missing number problems- possibly expressing the unknown as x or y in algebra • Include problems where children have to find some or all of the pairs of numbers that could work in the number sentence e.g. $x-y= 1.5$ • Find factors and multiples of different numbers • Use Sieve of Eratosthenes to explore prime numbers • Calculate averages (mean) using addition and division • Finding all possibilities problems where there are two variables
<p>Fractions (including decimals and percentages)</p>	<ul style="list-style-type: none"> • Use fraction ITP, counting sticks and number lines and spider diagrams to see connections • Order and position fractions on number lines • Useful to think of 0.1×0.1 as one tenth of one tenth = one hundredth • Continue to consider equivalent fractions - link to factors and multiples • Remember that to add fractions they need to all be the same type e.g. to add $2/3$ and $5/12$ they both need to have the same denominator, either thirds or twelfths and twelfths is the common one. • $2/3 + 1 1/4 =$.First convert $1 1/4$ into the improper fraction $5/4$. Neither 3 nor 4 will work as the denominator so a common one must be found - in this case 12.