

Thorntree Primary School

Mathematics Policy



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What is Maths?

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides 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. (National Curriculum 2014)

Aims:

The purpose of mathematics in Thorntree Primary School is to develop:

- a positive attitude towards mathematics and an awareness of the relevance of mathematics in the real world
- competence and confidence in mathematical knowledge, concepts and skills
- an ability to solve problems, to reason, to think logically and to work systematically and accurately.
- initiative and an ability to work both independently and in cooperation with others
- an ability to communicate mathematics
- an ability to use and apply mathematics across the curriculum and in real life
- an understanding of mathematics through a process of enquiry and experiment
- children's fluency, reasoning and problem solving skills through a series of small steps in concepts

What does mathematics look like at Thorntree Primary School?

Concrete, Pictorial, Abstract

Across school, maths is presented to all groups of learners in different ways to ensure children gain a deep understanding of concepts. Children are supported in their learning through concrete and pictorial resources. These resources are available for all children to use and access within lessons. Abstract problems are given to children to ensure they can apply the concepts they have been taught out of context.

Secure Understanding of Multiplication and Division Facts

School uses and tracks children's understanding of multiplication and division facts through the use of times tables booklets and the PIXL times table app. The subject leader monitors the children's progress at age related knowledge through the collection of data from the PIXL app and through monitoring of the times table chart scheme.

EY

In Early Years, children are immersed in mathematics within their learning areas. Concepts are taught throughout the week which are then reinforced through activities designed to be accessed during independent play. Children are supported through the

use of resource such as Numicon to give them the experience of what numbers actually look like.

To ensure pupils enter Y1 ready to access the National Curriculum, staff at Thorntree Primary School recognise that it is vital to ensure that the following ELGs are met:

- Children count reliably with numbers from 1 to 20.
- They place them in order.
- They say which number is one more or one less than a given number.
- Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer.
- They solve problems, including doubling, halving and sharing.

Y1-Y6

At Thorntree Primary School, we believe strongly that all children, regardless of ability, should experience the same high quality teaching. Therefore, we do not stream pupils within mathematics. This is to ensure that all pupils receive appropriate challenge and are able to value their own potential. Maths is designed to ensure all pupils experience fluency, reasoning and problem solving activities to either, develop, consolidate or master their learning. Within lessons, teachers set pupils off at their own pace which may mean certain groups of children start independent work from the outset; equally it may mean that certain groups of learners receive adult guidance and scaffolding throughout a whole session. There may be sessions where different groups of children are working on different tasks and lessons where all pupils work on the same tasks. Where the children work on the same task, these are 'Low ceiling, high threshold tasks' meaning that all abilities can access the task in some form. The differentiation comes through skilled teaching to move the children's understanding and reasoning forward.

When is Mathematics taught?

-8:40am-9am This session focuses on arithmetic skills from Y1-Y6. Pupils are given opportunities to learn and master a range of arithmetic skills. These are based on year group objectives and usually inform learning throughout that particular week in maths.

-10:10am-11:10am This is the main mathematics lesson of the day. Within this session, teachers will provide opportunities to use a range of mathematical equipment to allow pupils to access fluency, reasoning and problem solving tasks. There is no lesson structure requirement for this session. However, usually, teachers start with an oral/mental starter before their main teaching. It is vital that teachers see lessons as learning episodes rather than structural teaching. This way, our teachers respond to need.

-1pm-1:15pm This session is where all pupils use their rapid recall board to consolidate a range of age appropriate skills. This is modelled by the teacher in the first instance before pupils work independently. At this point in the day, children also have

the opportunity to work on developing their confidence and knowledge of their times tables and rapid recall of multiplication facts through our whole school maths challenge.

Our Curriculum

Staff at Thorntree Primary School are given a suggested overview of their particular year group for mathematics. However, this is simply a guide. At Thorntree Primary School, we use diagnostic gap analysis to identify weaknesses within cohorts. These areas are then prioritised by the teacher when planning. Small steps planning is used to ensure that all children can access their age related objective. However, we still recognise that the National Curriculum is statutory, and therefore, appendix 1 is an overview of the National Curriculum.

Methods

Appendix 2 shows the calculation methods for each area of maths in a link to the PIXL calculation model policy. It also gives a suggested progression in the way that fractions are taught.

Assessment in Maths

Pupils are assessed weekly by class teachers and evidence is recorded in teacher assessment files. Workbooks are also used as an indication of the progress pupils are making. Pupils are also tested throughout the academic year to support the teacher assessment judgement using PIXL tests. These tests provide the test strengths and weaknesses of each individual child and allow a plan to be devised to address gaps. In EY, children are assessed against the ELGs through workbook evidence and observations within sessions. Maths is discussed with SLT at pupil progress meetings.

How is mathematics communicated?

The subject leader of maths, alongside SLT, is responsible for the monitoring maths. Regular lesson observations, book looks and data analysis are used to inform the current standards within maths. This information is then communicated with governors through a formal written report and presentation. Timescales and deadlines can be found in our current whole school monitoring plan.

Appendix 1

Year 1 Maths Key Objectives Taken from the National Curriculum

1	Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number
2	Count, read and write numbers to 100 in numerals
3	Read, write and interpret mathematical statements involving addition (+), subtraction (−) and equals (=) signs
4	Given a number, identify one more and one less
5	Represent and use number bonds and related subtraction facts within 20
6	Add and subtract one-digit and two-digit numbers to 20, including zero
7	Recognise, find and name a half as one of two equal parts of an object, shape or quantity
8	Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.
9	Measure and begin to record length/height, weight/mass, capacity/volume & time
10	Recognise and know the value of different denominations of coins and notes
11	Sequence events in chronological order using language
12	Recognise and use language relating to dates, including days of the week, weeks, months and years
13	Tell the time to the hour and half past the hour and draw the hands on a clock face to show these times
14	Recognise and name common 2-D shapes (e.g. Square, circle, triangle)
15	Recognise and name common 3-D shapes (e.g. Cubes, cuboids, pyramids & spheres)

Year 2 Maths Key Objectives

Taken from the National Curriculum

1	Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
2	Recognise the place value of each digit in a two-digit number
3	Compare and order numbers from 0 up to 100; use $<$, $>$ and $=$ signs
4	Use place value and number facts to solve problems; recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
5	Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: $TU+U$, $TU+T$, $TU+TU$ and $U+U+U$
6	Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.
7	Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
8	Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) and equals ($=$) signs
9	Recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity
10	Write simple fractions for example, $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$.
11	Recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value
12	Tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times
13	Identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line.
14	Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces
15	Interpret and construct simple pictograms, tally charts, block diagrams and simple tables

Year 3 Maths Key Objectives

Taken from the National Curriculum

1	Count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number.
2	Compare and order numbers up to 1000
3	Add and subtract numbers mentally, including: HTU+U, HTU+T and HTU+H
4	Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
5	Estimate the answer to a calculation and use inverse operations to check answers
6	Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
7	Count up and down in tenths;
8	Recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
9	Compare and order unit fractions, and fractions with the same denominators
10	Recognise and show, using diagrams, equivalent fractions with small denominators
11	Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
12	Add and subtract fractions with the same denominator within one whole [for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$]
13	Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)
14	Measure the perimeter of simple 2-D shapes
15	Add and subtract amounts of money to give change, using both £ and p in practical contexts
16	Tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks
17	Estimate and read time with increasing accuracy to the nearest minute
18	Identify horizontal and vertical lines and pairs of perpendicular and parallel lines
19	Identify whether angles are greater or less than a right angle
20	Interpret and present data using bar charts, pictograms and tables

Year 4 Maths Key Objectives

Taken from the National Curriculum

1	Count backwards through zero to include negative numbers
2	Recognise the place value of each digit in a four-digit number
3	Round any number to the nearest 10, 100 or 1000
4	Recall multiplication and division facts for multiplication tables up to 12×12
5	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
6	Recognise and use factor pairs and commutativity in mental calculations
7	Multiply two-digit and three-digit numbers by a one-digit number using formal written layout
8	Recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.
9	Recognise and write decimal equivalents to $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$
10	Find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths
11	Round decimals with one decimal place to the nearest whole number
12	Compare numbers with the same number of decimal places up to two decimal places
13	Convert between different units of measure; estimate, compare and calculate different measures, including money in pounds and pence
14	Find the area of rectilinear shapes by counting squares
15	Solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days
16	Compare and classify geometric shapes, including quadrilaterals and triangles, based on properties and sizes
17	Complete a simple symmetric figure with respect to a specific line of symmetry.
18	Describe positions on a 2-D grid as coordinates in the first quadrant
19	Describe movements between positions as translations of a given unit to the left/right and up/down
20	Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs

Year 5 Maths Key Objectives

Taken from the National Curriculum

1	Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
2	Read Roman numerals to 1000 (M) and recognise years written in Roman numerals
3	Recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³)
4	Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
5	Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
6	Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
7	Establish whether a number up to 100 is prime and recall prime numbers up to 19
8	Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
9	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
10	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
11	Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number
12	Compare and order fractions whose denominators are all multiples of the same number
13	Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
14	Add and subtract fractions with the same denominator and denominators that are multiples of the same number
15	Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
16	Read and write decimal numbers as fractions
17	Round decimals with two decimal places to the nearest whole number and to one decimal place
18	Read, write, order and compare numbers with up to three decimal places
19	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
20	Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints
21	Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
22	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
23	Use the properties of rectangles to deduce related facts and find missing lengths and angles
24	Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.
25	Identify 3-D shapes, including cubes and other cuboids, from 2-D representations
26	Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles
27	Draw given angles, and measure them in degrees (°)
28	Identify angles at a point and one whole turn (total 360°); at a point on a straight line and $\frac{1}{2}$ a turn (total 180°)
29	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
30	Complete, read and interpret information in tables, including timetables

Year 6 Maths Key Objectives Taken from the National Curriculum

1	Use negative numbers in context, and calculate intervals across zero
2	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
3	Use their knowledge of the order of operations to carry out calculations involving the four operations
4	Use common factors to simplify fractions
5	Compare and order fractions, including fractions > 1
6	Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
7	Multiply simple pairs of proper fractions, writing the answer in its simplest form
8	Divide proper fractions by whole numbers
9	Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction
10	Multiply one-digit number with up to two decimal places by whole numbers
11	Use written division methods in cases where the answer has up to two decimal places
12	Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison
13	Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.
14	Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts
15	Solve problems involving similar shapes where the scale factor is known or can be found
16	Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.
17	Use simple formulae
18	Generate and describe linear number sequences
19	Express missing number problems algebraically
20	Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places
21	Convert between miles and kilometres
22	Calculate the area of parallelograms and triangles
23	Calculate, estimate and compare volume of cubes and cuboids using standard units
24	Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius
25	Find unknown angles in any triangles, quadrilaterals, and regular polygons
26	Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles
27	Describe positions on the full coordinate grid (all four quadrants)
28	Draw and translate simple shapes on the coordinate plane, and reflect them in the axes.
29	Interpret and construct pie charts and line graphs
30	Calculate and interpret the mean as an average

Progress in Fractions/ [PIXL Policy \(click for link\)](#)

	Finding fractions	Counting	Equivalence	Calculation	Compare and order
R	Halving objects or sets of objects in a problem-solving context				
1	Recognise, find and name half and quarter of a set of objects, a shape or a quantity (including length) Link to time (half past) .				
2	Recognise, find, name and write $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$ and $\frac{1}{3}$ of sets of objects, a shape, a quantity, a length or a measure Link to 2 times table and time (quarter past) .	Count in halves and quarters up to 10 from any given number	Recognise and show the equivalence of $\frac{1}{2}$ and $\frac{2}{4}$		
3	Recognise, find, write and use fractions with small denominators (unit and non-unit) of sets of objects, a shape, numbers (on a number line) and a quantity (using division). Show this using diagrams . Link to 3, 4, 5, 8 & 10 times table .	Count in tenths , making links with place value and division as well as length	Recognise and show equivalent fractions with small denominators	Add and subtract fractions with the same denominator (within one whole)	Compare and order unit fractions with the same denominator

4	<p>Solve fraction problems using harder fractions including tenths, hundredths and non-unit fractions where the answer is a whole number.</p> <p>Link finding a fraction of an amount to division. Use link to measurement and money. Know how to show fractions on a number line. Make connections between fractions of length, of shape and quantity. Simplify using factors and multiples.</p> <p>Link to 6, 7, 9, 11 and 12 times table.</p>	<p>Count in hundredths, making links with place value and division as well as length and money</p>	<p>Recognise and write families of common equivalent fractions, using diagrams.</p> <p>Recognise and write decimal equivalence of any number of tenths or hundredths.</p> <p>Recognise and write decimal equivalence to $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{3}{4}$.</p>	<p>Add and subtract fractions with the same denominator (not within one whole)</p>	
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5	<p>Continue to develop understanding of fractions as numbers, measures and operators, by finding fractions of numbers and quantities. Recognise mixed numbers and improper fractions and convert from one from to the other, and write mathematical statements greater than 1 as a mixed number</p>	<p>Count in thousandths making links with place value, division, decimals and measurement. Count in simple fractions.</p>	<p>Identify, name and write equivalent fractions, represented visually, including tenths and hundredths. Read and write decimal numbers as fractions. Write percentages as fractions with denominator of 100. Solve problems using percentage and decimal equivalents of fractions with a denominator of a multiple of 10 or 25.</p>	<p>Add and subtract fractions with the same denominator and multiples of that number. Multiply proper fractions and mixed numbers by whole numbers, using diagrams.</p>	<p>Compare and order fractions, where the denominators are multiples of the same number</p>
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6	<p>Use common factors to simplify fractions.</p> <p>Use common multiples to express fractions in the same denomination.</p>		<p>Use equivalent fractions to add and subtract fractions with different denominators, starting with fractions where the denominator of one fraction is a multiple of the other.</p> <p>Associate a fraction with division and calculate decimal fraction equivalents for a simple fraction.</p> <p>Recall and use equivalences between simple fractions, decimals and percentages.</p>	<p>Add and subtract fractions with different denominators and mixed numbers.</p> <p>Multiply simple pairs of proper fractions, writing the answer in its simplest form, using a variety of images and linked to shapes, numbers, fractions as an operator and sets of objects.</p> <p>Divide proper fractions by whole numbers.</p>	<p>Compare and order fractions, including fractions greater than 1.</p>
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