Thorner's Maths Map

PRE-SCHOOL

We know:

That research shows that children who are eligible for free school meals are 4.6 months on average behind other children by the end of the Early Years Foundation Stage, and that this gap will double by the end of Primary, and double again by the end of Secondary.

But there's hope. The Educational Endowment Foundation says implementing an early numeracy programme is one high-impact, very low cost way to close the gap, and that on average, early numeracy approaches have a positive impact on learning equivalent to approximately six additional months' progress for early mathematics outcomes.

Therefore, in our pre-school we use a range of strategies to promote numeracy and model counting such as:

Games

Use numbers in natural conversations, introducing them in context helps children learn what they mean.

Sing with children and recite poetry and rhymes to playfully introduce number.

Talk with children and encourage children to talk with one another. Keep the conversation going by asking open, inviting questions, making comments, and inviting children to think and share their number ideas.

Rhymes/Books

Read to and discuss books with children daily, taking time to go over any number content and act out parts through books with great illustrations and characters that provide clues to numbers and their links.

Number

We also begin the discrete teaching of early number by looking at and rehearsing the key first numbers through a range of stimulating games, songs and circle time activities to introduce these first numbers.

RECEPTION

We use White Rose.

In Reception

KS1

In KS1 we use White Rose work and text books alongside other materials from MNP and other providers to embed key numeracy skills and strategies.

In KS1 we further embed the concrete, pictorial, abstract (CPA) strategy at the heart of White Rose's approach to maths mastery.

CPA is:

- An essential technique of maths mastery that builds on a child's existing understanding
- A highly effective framework for progressing pupils to abstract concepts like fractions
- Involves concrete materials and pictorial/representational diagrams
- Based on research by psychologist Jerome Bruner
- Along with bar modelling and number bonds, it is an essential maths mastery strategy

CPA Approach Explained | Learn the Concrete, Pictorial, Abstract Method (mathsnoproblem.com)

It is important to recognise that the CPA model is a progression. By the end of KS1, children need to be able to go beyond the use of concrete equipment to access learning using either pictorial representations or abstract understanding. What is important, therefore, is that all learners, however young, can see the connections between each representation.

KS2

In KS2 we use White Rose work and text books alongside other materials from MNP and other providers such as the corresponding Maths Teasers texts which provide Depth/Mastery and Investigative Challenges to the children as they progress through a topic to encourage them to use key numeracy skills and strategies to solve problems.

The White Rose approach encourages teachers to vary the apparatus that children use in class. For example, students might one day use counters, another day they might use a ten frame. Likewise, children are encouraged to represent the day's maths problem in a variety of ways. For example, drawing an array, a number bond diagram or a bar model.

By systematically varying the apparatus and methods used to solve a problem, children can craft powerful mental connections between the concrete, pictorial, and abstract phases.

When teaching young children numbers, counters and multi-link cubes are more commonly used in the UK. However, concrete materials are frequently shelved by the time children reach KS2 — many teachers believe them to be too childish or distracting. Removing concrete materials exposes children to abstract concepts too early. As a result, they miss out on the opportunity to build a conceptual mathematical understanding that can propel them through their education.

Our Maths Skills Progression Map outlines a child's journey through these key components of maths knowledge and skills.

Thorner's School - Maths Skills Progression

	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Number and Place Value	Recognising numbers to 5. Count reliably to 5. Sorting/comparing to 5. Recognising numbers to 10. Count reliably to 10. Sorting/comparing to 10. Recognising numbers to 20. Count reliably to 20. Sorting/comparing to 20. Counting irregular arrangements to 10. Odds and evens.	Count to 100 (0-10, 0-20, 0-40 then to 100). Read and write numbers to 100 (in order above). Compare and order numbers from 0 to 100 (in order above). Make different number bonds for numbers up to 10. Make number stories. Complete number patterns. Use place-value charts and part whole model to show numbers in tens and ones. Count in twos, fives and tens to 100. Say a number that is 1 more or 1 less than a 2 digit number.	Count to 100. Read and write number to 100. Compare and arrange numbers within 100. Make and complete number patterns.	Count to 1000. Count in hundreds, tens and ones. Count in jumps of fifty. Count in jumps of four and eight. Tell the value of a digit in a number. Compare and arrange numbers within 1000. Complete number patterns.	Count to 10,000. Count in thousands, hundreds, tens and ones. Count in jumps of 25. Count in sixes, sevens and nines. Tell the number that a digit stands for. Compare and arrange numbers within 10,000. Describe and complete number patterns. Round numbers and estimate sum and difference.	Read and write numbers to 1,000,000. Tell the place value of a digit in a number. Compare and arrange numbers with 1,000,000. Count forwards and backwards in steps of 1,000, 10,000 and 100,000. Round to the nearest 10, 100, 1000, 10,000 and 100,000.	Read and write numbers to 10 million. Compare and arrange numbers within 10 million. Tell the place value of a digit in a number to 10 million. Round numbers to the nearest 10, 100, 1000, 10,000, 100,000 and 1,000,000.
Addition and Subtraction	Number bonds to 5. One more/one less to 5. Number bonds to 10. One more/one less to 10. Number bonds to 20. One more/one less to 20. Using quantities and objects, add and	Add by counting on. Add by making 10. Add by adding ones. Make addition stories. Write addition equations. Subtract by crossing out. Subtract using number bonds.	Add two 2-digit numbers without renaming followed by with renaming. Subtract two 2-digit numbers without renaming followed by with renaming. Add three numbers. Explain methods for addition and subtraction.	Add and subtract numbers up to 1000 without renaming followed by with renaming. Solve word problems involving addition and subtraction up to 1000.	Add and subtract numbers up to 10,000 without renaming followed by with renaming. Solve word problems involving addition and subtraction up to 10,000. Add and subtract numbers mentally.	Add and subtract whole numbers with more than 4 digits. Use rounding to check answers. Solve word problems involving addition, subtraction, multiplication and division, and a combination of these.	Perform mental calculations. Use estimation to check answers to calculations Use the order of operations. Solve word problems involving addition, subtraction, multiplication and division, and a

	subtract single digit numbers and count on and back to find the answer.	Subtract by counting back. Subtract by subtracting ones. Make subtraction stories. Write subtraction equations. Make a family of addition and subtraction facts. Solve word problems involving addition and subtraction.	Solve word problems involving addition and subtraction.				combination of these.
Multiplication and Division	Halving. Sharing. Doubling. Beginning to group and count in 2s, 5s and 10s.	Make equal groups. Add equal groups to find the total number of objects. Group things equally. Share things equally.	Know the 2, 5 and 10 times table. Write multiplication and division equations. Divide a number by 2, 5 and 10. Write a family of multiplication and division facts. Recognise odd and even numbers. Solve word problems using the 2, 5 and 10 times tables.	Know the three, four and eight times table. Divide a number by three, four and eight. Solve multiplication and division word problems involving the three, four and eight times tables.	Multiply and divide by six, seven, nine, eleven and twelve. Divide to find quotient and remainder. Solve word problems involving multiplication and division of all known times tables. Multiply and divide without regrouping and then with regrouping.	Find multiples and common multiples. Find factors and common factors. Identify prime and composite numbers. Recognise square and cubed numbers and use the notation for both. Multiply numbers up to 4 digits by one digit number. Multiply numbers up to 3 digits by a two-digit number. Multiply and divide numbers by 10, 100 and 1000. Divide three digit and four-digit numbers. Solve word problems involving addition, subtraction, multiplication and	Multiply and divide numbers up to 4 digits by two-digit whole number. Interpret remainders in division. Identify common factors, common multiples and prime numbers. Solve problems involving the calculation and conversion of units of measure.

						division, and a combination of these.	
Fractions	Halving. Sharing. Doubling.	Show a half of a shape or number. Show a quarter of a shape or number. Group/share things to get a half or a quarter.	Make and show halves, quarters and thirds. Name and write fractions. Name fractions that make one whole. Comparing and order fractions. Count wholes with halves, quarters and thirds. Find part of a set or a quantity.	Count in tenths. Make number pairs form one whole. Add and subtract two fractions. Find and list equivalent fractions. Write a fraction in its simplest form. Find part of a set and fraction of a number. Write fractions on a number line. Write fractions that are greater than one whole. Solve word problems involving fractions.	Count in hundredths. Write and show mixed numbers on a number line. Find equivalent fractions. Simplify fractions and mixed numbers. Add and subtract fractions. Solve word problems involving fractions.	Find equivalent fractions of a given fraction. Recognise mixed numbers and improper fractions and convert from one form to the other. Add and subtract fractions. Multiply proper fractions and mixed numbers by whole numbers.	Find equivalent fractions using common multiples. Simplify fractions using common factors. Add and subtract fractions. Multiply proper fractions. Divide proper fractions by whole numbers. Relate division of whole numbers to fractions and decimals.
Decimals					Recognise and write tenths and hundredths. Compare numbers with the same number of decimal places. Complete number patterns involving decimals. Round decimals with one decimal place to the nearest whole number. Recognise and write decimal	Read, write, compare and order decimals up to three decimal places. Write fractions as decimals. Round decimals with two decimal places to the nearest whole number and to one decimal place. Solve problems involving decimals up to 3 decimal places.	Relate division of whole numbers to fractions and decimals. Tell the place value of digits in a decimal number. Multiply and divide decimals with one-digit and two-digit whole numbers.

					equivalents of ¼, ½ and ¾. Divide a one or two digit number by 10 and 100. Solve simple measure and money problems involving decimals.		
Percentage						Recognise the percent symbol. Find percentages of a given number. Interpret a percentage as a fraction or an amount.	Calculate the percentage of a number or a quantity. Use percentage to compare or describe changes.
Length and Height	Use every day language to talk about size or distance. Compare quantities and objects to solve problems. Order by height and length.	Compare the length and height of objects. Measure the length and height of objects.	Measure in metres and centimetres. When to use centimetres or metres to measure length and height. Measure and draw lines. Solve word problems on length and height.	Write length in metres, centimetres and kilometres. Convert length from metres to centimetres and vice versa. Convert length in kilometres to metres and vice versa. Solve further word problems on length and height.	Measure and estimate length and height. Convert units of length and height.	Convert measurements of length and height. Solve problems involving measurement.	
Area and Perimeter				Measure the total length around the shape. Find the perimeter of figures using a square grid. Find the perimeter of figures in centimetres and metres.	Measure perimeter in different units.	Find the perimeter and area of a figure. Use scale diagrams to find the perimeter and the area of a figure. Estimate the area of a figure.	Find the perimeter and area of rectangles, triangles and parallelograms. Use formula to find the area of rectangles, triangles and parallelograms.

				Find the perimeter of squares and rectangles.			Use the area of rectangles to find the area of other types of polygons.
Volume and Capacity	Use everyday language to talk about capacity. Compare quantities and objects to solve problems. Order by capacity.	Compare volume and capacity. Use half and quarter to describe volume. Find volume and capacity of objects.	Compare volume. Measure volume in litres and millilitres. Solve problems on volume and capacity.	Write and measure volume and capacity in millilitres and litres. Other word problems on volume and capacity.	Measure and estimate volume and capacity. Convert units of volume.	Find and compare the volumes of solids. Find to compare the capacity of rectangular boxes. Estimate volume and capacity. Solve word problems involving volume and capacity.	Find the volume of solids by counting unit cubes. Calculate the volume of cubes and cuboids in standard units. Solve problems involving volume capacity.
Geometry	Use everyday language to talk about shape. Recognise, create and describe patterns with common shapes. Explore characteristics of everyday objects and 2-D and 3-D shapes and use mathematical language to describe them.	Name solids and shapes. Look for shapes in solids. Group shapes. Make and complete patterns with shapes.	Name and describe 2-D and 3-D shapes. Identify the number sides and vertices of the shape. Identify the lines of symmetry of a shape. Sort and group shapes in different including their properties.	Recognise and find angles in shapes. Find a right angle, an acute angle and an obtuse angle. Compare the size of angles.	Compare and order angles. Compare and classify triangles and quadrilaterals. Identify lines of symmetry in 2-D shapes. Complete a simple symmetrical figure with respect to a specific line of symmetry.	Identify acute angles, right angles, obtuse angles and reflex angles. Draw and measure given angles. Identify angles on a straight line and angles that meet at a point. Find unknown angles in squares and rectangles. Identify 3-D shapes from 2-D drawings.	Recognise angles that meet at a point, angles on a straight line, and vertically opposite angles. Find unknown angles in triangles, quadrilaterals and regular polygons. Identify the radius, diameter, circumference and centre of a circle. Draw 2-D shapes using given dimensions and angles. Identify and draw nets of 3-D shapes.
Mass	Use everyday at language to talk about weight. Order weight.	Compare the mass of objects. Find the mass of objects.	Measure mass in kilograms and grams. Compare and order mass. Solve word problems involving mass.	Read the scales for mass in kilograms and grams. Solve word problems involving mass.	Measure and estimate mass. Convert units of mass.	Convert measurements of mass. Solve problems involving measurements.	

Temperature			Read a thermometer. Measure and write down the temperature.			Tell the temperature. Solve problems involving measurements.	
Money	Use everyday language to talk about money.	Recognise coins and notes.	Count an amount of money and show amounts of money in different ways. Exchange coins and notes. Compare amounts of money. Calculate change. Solve word problems involving money.	Name the amount of money in pounds and pence. Add and subtract money in pounds and pence. Calculate change in pounds and pence. Solve word problems involving money.	Count an amount of money and write it using decimals. Compare different amounts of money. Round money to the nearest £ and to the nearest £10. Estimate total amounts of money. Solve word problems involving money.		
Time	Use every day language to talk about time.	Tell the time to the nearest hour and half hour. Compare different times. Sequence events in time order. Recognise dates on the calendar.	Tell and write the time to 5 minutes. Your hands on a clock face to show time. Find the duration of time. Compare and sequence intervals of time. Know the number of minutes in an hour and the number of hours in the day.	Tell and write the time in a.m. and in p.m. Tell her at the time using 'past' and 'to'. Tell and write time on different types of clocks. Measure time in seconds, hours and minutes. Change minutes to seconds, and seconds to minutes. Know the number of days each month, year and leap year.	Tell time using the 24 hour clock. Change time from minutes to seconds, hours to minutes, years to months and months to years. Solve word problems involving time.	Convert measurements of time. Solve problems involving measurements.	
Graphs			Read information from pictograms, block diagrams, tally charts and tables.	Draw picture graphs and bar graphs. Read and interpret bar graphs.	Use a table to show information. Draw, read and interpret tables, picture graphs, bar	Read and interpret information in the timetable. Read, interpret and complete	Calculate interpret the mean as an average. Draw and read pie charts and graphs.

			Solve problems using information from pictograms, block diagrams, tally charts and tables.	Solve problems using information from paragraphs.	graphs and line graphs. Solve problems using information from tables and graphs.	information in a table. Read and interpret information from a line graph. Solve problems using information from a line graph.	Solve problems using information provided by graphs.
Position and Movement	Use every day language to talk about position. Order by distance and position.	Name positions in a race and in a queue. Name positions from the left and from the right. Use words such as before, after, next to, last and between to name positions. Describe positions, movements and turns.	Move an object using half turns, quarter turns, three-quarter turns and whole turns. Move objects anticlockwise and clockwise.		Describe position using coordinates. Plot points and form figures on a grid. Describe movement including translation of figures.	Write the coordinates of points. Describe translations and reflections. Find a position of a shape after translation or after reflection.	Use coordinate grids with negative numbers. Describe positions of points with coordinates. Draw, translate and reflect simple shapes on the coordinate plane.
Ratio							Compare quantities and numbers using ratios. Solve problems involving ratios.
Negative Numbers							Add and subtract negative numbers. Use negative numbers in context. Solve problems involving negative numbers.
Algebra							Right and evaluate algebraic expressions. Write and use formulae to solve equations.
Roman Numerals					Read and write Roman numerals for 1 to 20.	Read and write Roman numerals up to 1000.	

					Read and write Roman numerals to 100.	Write years in Roman numerals.	