Year 5 Progression Long Term Plans Key Concepts

National Curriculum 2014

Purpose of Study – National Curriculum 2014

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.

Aims

The National Curriculum for mathematics 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.

Who is this book for?

The purpose of this booklet is to outline the expected progression for each year group from the new framework for mathematics. It is important that this is used to ensure that the correct pitch of lessons is achieved alongside suitable differentiation for learning. It is designed to support the 2014 National Curriculum for Mathematics at Key Stages 1 and 2.

This booklet will be relevant and useful for all the following at Brodetsky Jewish Primary School:

- Class Teacher
- Teaching Assistants/Learning Support Assistants
- Volunteers
- Supply Staff
- Parents

Resources

In Years 3-6 planning will be based on the White Rose Maths Hub mastery schemes of learning, which combines the Singapore pedagogy with leading UK expertise and is correlated to the new National Curriculum.

Overview of Progression in Year 5

Number and place value

Children work with numbers up to at least 1,000,000, using knowledge of place value to work out the value of digits. They continue working with negative numbers in different contexts, and practise reading Roman numerals to 1000 (M), which helps them work out years written in Roman numerals. They continue using techniques introduced in earlier years for approximation and estimation.

Addition and subtraction

Children use columns in written addition and subtraction, accurately adding and subtracting numbers with more than four digits. They use mental methods to add and subtract increasingly large numbers, and use rounding to check their answers. With support they choose appropriate operations and methods, and work out the level of accuracy required to answer a particular problem. They will continue to develop this work in Year 6.

Multiplication and division

Children identify multiples and factors, and find all the factor pairs of a given number. With support, they use factors to help solve multiplication and division problems involving larger numbers, and they confidently use written methods to multiply and divide large numbers. They extend their mathematical vocabulary and understanding, beginning to work with prime numbers, prime factors, composite (non-prime) numbers, square and cubed numbers.

Fractions (including decimals and percentages)

Children compare fractions with denominators that are multiples of the same number (comparing $^{3}/_{7}$ with $^{6}/_{14}$). They also identify equivalent fractions of a given fraction including tenths and hundredths. They learn about mixed numbers and improper fractions, and understand how mixed numbers could be converted to improper fractions, and vice versa. With support and using practical equipment and diagrams, they multiply proper fractions and mixed numbers by whole numbers.

Children convert decimal numbers into fractions (0.65 = $^{65}/_{100}$). Extending their work from previous years, they use thousandths and make connections between these and tenths, hundredths and their decimal equivalents. They round decimals to the nearest whole number, and to one decimal place, and begin to work with numbers with three decimal places. Children begin to work with percentages and find solutions to problems using percentage and decimal equivalents of $^{1}/_{2}$, $^{1}/_{4}$, $^{1}/_{5}$, $^{2}/_{5}$, $^{4}/_{5}$, for example. This forms a basis for further work on percentages in Year 6.

Measurement

In Year 4, children calculated the perimeter of rectilinear shapes; they now extend this to composite (or compound) rectilinear shapes, and calculate the area of squares and rectangles. They begin to understand and estimate volume and capacity, and compare metric with common imperial units. They will build on this work in Year 6.

Geometry: properties of shapes

Children extend their work on angles from Year 4, estimating, measuring, comparing and drawing a variety of angles using degrees. They use given dimensions to help them draw shapes accurately, and use techniques learnt in the context of missing number problems to help them work out missing angles.

Geometry: position and direction

Building on work with coordinate grids from Year 4, children work out the position of shapes following reflection or translation, in the first quadrant.

Statistics

In Year 4, children were introduced to line graphs; now they use information from line graphs to solve problems. They practise completing and reading tables, including timetables

Year 5 Long Term Planning

Number and place value

- Children should identify the place value in large whole numbers.
- They should continue to use number in context, including measurement. Children extend and apply their understanding of the number system to the decimal numbers and fractions they have met so far.
- They should recognise and describe linear number sequences, including those involving fractions and decimals, and find the term-to-term rule.

Multiplication and division

- Children should practise and extend their use of the formal written methods of short multiplication and division (see National Curriculum Appendix 1). They apply all the multiplication tables and related division facts, commit them to memory and use them confidently to make larger calculations.
- They should use and understand the terms factor, multiple and prime, square and cube numbers.
- Children should interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding
- Children use multiplication and division as inverses to support the introduction of ratio in Year 6, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1000 in converting between units such as kilometres and metres. Distributivity can be expressed as a(b +c) = ab + ac in preparation for using algebra.

Measurement

- Children should use their knowledge of place value and multiplication and division to convert between standard units.
- Children should calculate the perimeter of rectangles and related composite shapes, including using the relations of perimeter or area to find unknown lengths. They calculate the area from scale drawings using given measurements.
- Children should use all four operations in problems involving time and money, including conversions.

Geometry: properties of shapes

- Children should become accurate in drawing lines with a ruler to the nearest millimetre, and measuring with a protractor. They use conventional markings for parallel lines and right angles.
- Children should use the term diagonal and make conjectures about the angles formed by diagonals and sides, and other properties of quadrilaterals, for example using dynamic geometry ICT tools.
- Children should use angle sum facts and other properties to make deductions about missing angles and relate these to missing number problems.

Statistics

- Children should connect their work on coordinates and scales to their interpretation of time graphs.
- They should begin to decide which representations of data are most appropriate and why.

Geometry: position and direction

- Children recognise/use reflection and translation in a variety of diagrams, including continuing to use a 2D grid and coordinates in the first quadrant. Reflection should be in lines parallel to the axes.

Addition and subtraction

- Children should practise using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency.
- They should practise mental calculations with increasingly large numbers to aid fluency.

Fractions (including decimals and percentages)

- Children should be taught throughout that percentages, decimals and fractions are different ways of expressing proportions. They extend their knowledge of fractions to thousandths and connect to decimals and measures.
- Children should connect equivalent fractions >1 that simplify to integers with division and fractions >1 to division with remainders, using the number line and other models, and hence move from these to improper and mixed fractions.
- Children should connect multiplication by a fraction to using fractions as operators (fractions of), and to division, building on work from previous years. This relates to scaling by simple fractions.
- Children should practise adding and subtracting fractions to become fluent through a variety of increasingly complex problems. They should extend their understanding of adding and subtracting fractions to calculations that exceed 1 as a mixed number.
- Children should read and write proper fractions and mixed numbers accurately and practise counting forwards and backwards in simple fractions.
- Children should continue to develop their understanding of fractions as numbers, measures and operators by finding fractions of numbers and quantities, writing remainders as fractions.
- Children extend counting from Year 4, using decimals and fractions including bridging zero, for example on a number line.
- Children should say, read and write decimal fractions and related tenths, hundredths and thousandths accurately and are confident in checking the reasonableness of their answers to problems.
- They should mentally add and subtract tenths, and one-digit whole numbers and tenths.
- They should practise adding and subtracting decimals including whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1. Children should go beyond the measurement and money models of decimals.
- Children should make connections between percentages, fractions and decimals and relate this to finding 'fractions of'. They recognise that percentages are proportions of quantities as well as operators on quantities.

Key Maths Concepts in Year 5

Introducing negative numbers in context

Children will have encountered negative numbers during Year 4, but in Year 5 they extend their understanding, meeting negative numbers in a range of different contexts.

The idea of negative numbers may seem counterintuitive in some ways – it's clear what we mean by 3 in the context of sweets, jumpers or sheep, but what about –3? Fortunately, there are several everyday contexts which will give children a sense of how useful negative numbers can be. Probably the most familiar context for negative numbers in daily life is temperature. Children will see negative numbers used on a thermometer scale for values below 0°, and they will have heard weather forecasters predicting an overnight drop in temperature, for example to –2°.

Children may also be familiar with negative numbers in terms of distances above and below sea level, such as a particular location might be –8 metres (8 metres below sea level). Or they may have used a lift in a large building where the ground floor is marked as 0 on the lift buttons, in which case basement levels may be called –1 and –2.

When introducing negative numbers, it's a good idea to use a vertical number line rather than a horizontal line, because this will help children to use accurate language to describe number relationships above and below zero – for example, they will naturally describe numbers as *falling*, *dropping* or *rising*, and will speak in terms of one number being below or above another. It can be helpful to display the vertical number line like a scale on a giant thermometer.

Refer to numbers less than zero as negative numbers, but allow children to say minus six, minus thirteen, for example.

Comparing percentages with fractions and decimals

Children will need to understand that a percentage is really a fraction with a denominator of 100, so 25% is equivalent to $^{25}/_{100}$. Children will begin to make connections between percentages and decimals when they look at patterns such as this:

15% = 0.15

43% = 0.43

75% = 0.75

The digits are the same, but the decimal point is in a different place. 15% is the same as $^{15}/_{100}$, so drawing on their knowledge of place value, children should begin to understand why the decimal equivalent of 15% is written 0.15.

Percentages below 10% can cause problems because, for example, 5% is not written 0.5 but 0.05 (0.5 being equivalent to 1/2 or 50%). However, place value should also help children avoid giving the wrong decimal equivalent for smaller percentages and fractions.