

## Mathematics at Oakley Vale Primary School

### The National Curriculum

Oakley Vale Primary School highly supports and follows the aims of the National Curriculum. We aim to provide every child with a high-quality mathematics education therefore providing 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.

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 develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **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.

### Foundation Stage (Reception)

Reception follows the Early Years Foundation Stage Curriculum. Mathematics in Reception involves providing children with opportunities to develop and improve their skills in counting, understanding and using numbers, calculating simple addition and subtraction problems; and to describe shapes, spaces, and measures. Children have the opportunity to practise and apply their mathematics skills inside and outside in a range of play related activities. Reception also take part in a daily adult led mathematics sessions.

### Key Stage One (Year 1 and year 2)

The principal focus of mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and the four operations, including with practical resources [for example, concrete objects and measuring tools].

At this stage, pupils should develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching should also involve using a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.

By the end of year 2, pupils should know the number bonds to 20 and be precise in using and understanding place value. An emphasis on practice at this early stage will aid fluency.

Pupils should read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

### **Lower Key Stage Two (Year 3 and year 4)**

The principal focus of mathematics teaching in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

At this stage, pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number.

By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.

Pupils should read and spell mathematical vocabulary correctly and confidently, using their growing word reading knowledge and their knowledge of spelling.

### **Upper Key Stage Two (Year 5 and year 6)**

The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.

At this stage, pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them.

By the end of year 6, pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.

Pupils should read, spell and pronounce mathematical vocabulary correctly.

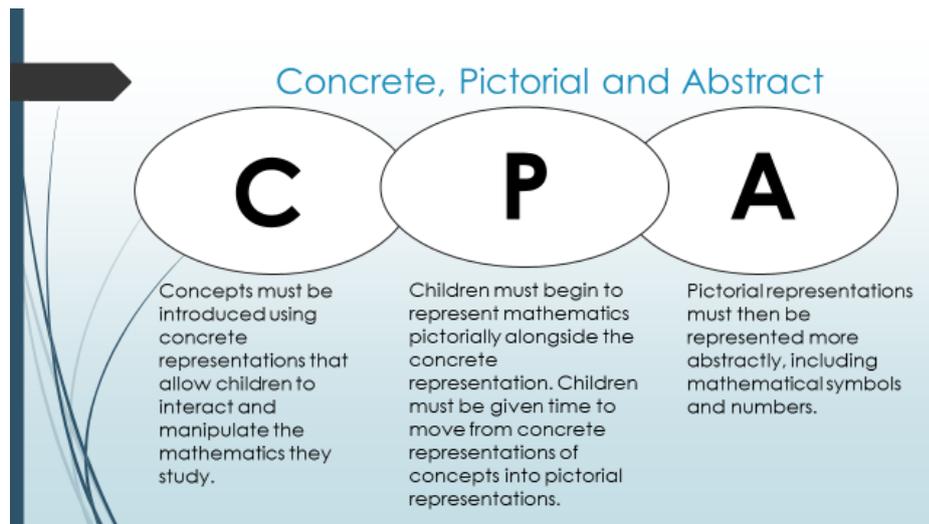
### **Oakley Vale's Whole School Approach to Mathematics**

Oakley Vale Primary School follows a whole school 'Mastery Approach' to teaching mathematics. The learning of a new skill requires time, practise, patience and resilience. The mastery approach gives our pupils time to become fluent and confident mathematicians. Our children are given the time they require to practise, apply and embed learning.

Mathematic learning at Oakley Vale is divided into blocks or units of study where pupils spend extended periods of time learning, applying, developing, rehearsing and embedding subject matter until they are fluent.

Each year group has a learning overview to ensure each year group has the appropriate coverage. The overviews detail what learning objectives need to be covered when and for how long. Teacher's assessment for learning and assessment of learning need to inform these overviews further.

The mastery approach places a high value on the importance of representation in mathematics. Teachers introduce and develop mathematical knowledge and understanding by following the CPA (concrete, pictorial, abstract) approach. Our children use a range of everyday objects to calculate and represent aspects of mathematics. We believe that anything can be used as a mathematics resource, from socks to sticks.



### **Planning Mathematics**

Teachers plan daily mathematics lessons, ensuring that five mathematics lessons are planned for each full week. As part of the maths plan teachers plan a daily 'starter' task for the children to consolidate and practise aspects of previously taught areas of mathematics. These starter tasks need to include aspects of promoting fluent mental maths skills.

Learning objectives need to be taken from the whole school Mastery scheme of work. Learning objectives need to be written on the maths plan as a WALT for example:

WALT - Add numbers up to 4 digits.

Amazing -

Epic -

Legendary -

Under the WALT needs to include details of the differentiated outcomes (WILF) for the lesson. The differentiated outcomes range from amazing through to epic through to legendary. Legendary is the highest level of outcome planned for the lesson.

	Starter	WALT/ WILF	Key Learning	Differentiated Work	Plenary
Monday		WALT – A – E – L –			
Tuesday		WALT – A – E – L –			
Wednesday		WALT – A – E – L –			
Thursday		WALT – A – E – L –			
Friday		WALT – A – E – L –			

## Oakley Vale's Mathematics Planning Template

The WALT and WILF are shared with the children at the start of each maths lesson, the children are asked to reflect on their own achievement during the lesson. At the end of the session children need to be asked to use the WILF to self-assess their work by writing A, E or L at the top of their maths work.

The weekly mathematics plans need to reflect the teacher's understanding of the children's development through concrete, pictorial and abstract elements following assessment for learning.

### Planning for Mastery

As well as referring to the school mastery scheme of work, teachers need to refer to the guidance produced by the National Excellence Centre in Teaching Mathematics (NCETM) called 'Teaching for Mastery' for their year group's support guidance on how to effectively plan lessons which deepen the children understanding of aspects of mathematics.

**MASTERY**

- Year 1 Mastery

Walt – To add and subtract 1 digit and 2 digit numbers to 20, including 0.

$3 + \underline{\quad} = 10$      $10 - \underline{\quad} = 3$      $13 + \underline{\quad} = 20$      $20 - \underline{\quad} = 13$

What do you notice? (concrete – represent using coloured cubes, pictorial – represent using lines and circles, coloured bar model or drawing a number line, abstract – missing number sentences)

Possible differentiation

LA – accurately calculate the answers up to 10.

A – work out missing numbers.

HA – Work out the missing numbers and talk about the number patterns. Apply the number pattern to another number up to 20.

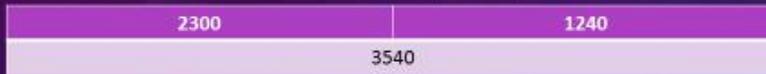
Deeper understanding

If you know one fact, what other facts do you know?

$3+2$   
 $5$   
 $10-5$

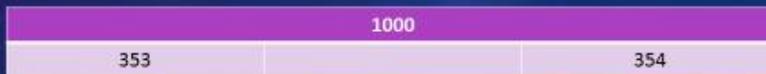
# MASTERY

- Year 4 – Mastery
- Walt – add and subtract numbers with up to 4 digits.



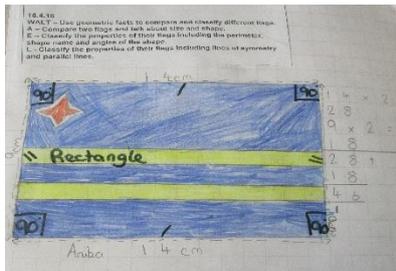
Write down the number sentences you can see in this bar model.

- Concrete – use base ten equipment to represent largest number and split into the two boxes, pictorial - draw the base ten equipment in 3 boxes, abstract, numbers in bar model.
- Possible differentiation – increasing amounts of numbers and increasing amounts of boxes.
- Deeper understanding – identify the missing numbers in this bar model.



## Cross Curricular Opportunities

At Oakley Vale we plan as many quality cross curricular opportunities as possible to ensure our children are using and applying, in a real life context, aspects of mathematics they have already been taught. Where possible the cross curricular links need to be linked with each year groups learning journey theme to monopolise on the children's current interests and learning at that time.



### Problems

- Try and link your mathematical problems to your curriculum, for example...
- LO: to count in multiples of 8.
- Florence Nightingale needs to make sure she gives the correct liquid medication to her patients. The men need to have 8ml more than the ladies.

<ul style="list-style-type: none"> <li>• Lady's age</li> <li>• 18 years old =</li> <li>• 19 years old =</li> <li>• 20 years old =</li> </ul>	<ul style="list-style-type: none"> <li>• Men's age</li> <li>• 18 years old =</li> <li>• 19 years old =</li> </ul>
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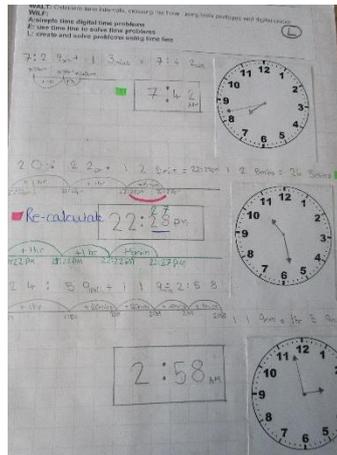
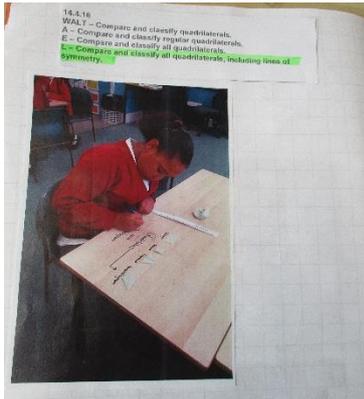
Teachers at Oakley Vale need to plan a range of problems to extend and challenge the children mathematically including word problems, open ended problems and real life problems.

At Oakley Vale we believe that problem solving is:

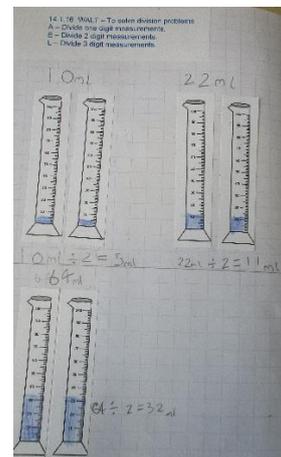
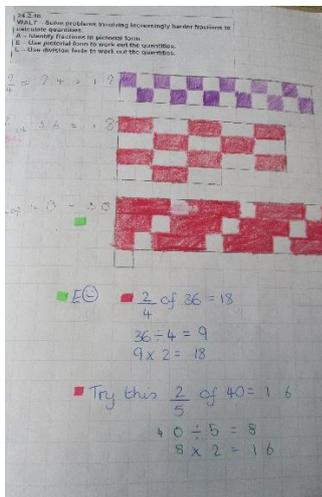
- seeking solutions not just memorising procedures,
- exploring patterns not just memorising formulas,
- formulating opinions and conclusions, not just doing exercises.

## Feedback in Mathematics

Where possible and appropriate verbal feedback will take place during mathematics lessons to ensure all children are supported and challenged during their learning time. Teachers will ensure each child has a WALT and WILF for the lesson in their books. When teachers mark the children's mathematics books they need to highlight in green whether the child worked at amazing, epic or legendary level during the lesson. Pink highlighter needs to be used to highlight any miss-calculations or aspects which need to be checked.



Pink highlighter should also be used to extend the children's learning further through marking by providing the child with an additional challenge to respond to. The children need to show their response to the marking in their maths books by regularly responding to pink marking with children's green pens.



The books need to show a mixture of photos to evidence the practical teaching of mathematics, pictorial representations as well as abstract evidence. There needs to be evidence in the maths books of deep marking with questions to extend the children's understanding as well as areas to re-calculate to ensure we address misconceptions with our marking.

Any miss-spelt mathematic vocabulary written in the maths books should be highlighted in yellow highlighter for the children to correct and practise whilst responding to marking.

## Monitoring

Mathematics teaching and learning is closely monitored throughout the year through regular observation of lessons, learning walks, planning scrutinies, book scrutinies, pupil progress meetings, data analysis and pupil voice.

## Assessment and Tracking

'The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace.' National Curriculum.

'By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.' National Curriculum.

Oakley Vale Primary School uses the Sheffield assessment system to track the children's attainment and progress through the learning objectives in each year group. The Sheffield assessment tracking indicates whether each child is beginning to show understanding against the learning objective, progressing well against the learning objective or have embedded knowledge and understanding of the learning objective.

Each year group's tracking is monitored throughout the year by members of the senior leadership team to ensure attainment and progress rates are relative to age related expectations at various points in the year. At each data collection point pupil progress meetings take place to identify any pupils who may need additional targeted support or challenge.

Vulnerable Groups	Mathematics Year 4	Class	Maths Group	Step from end of previous year	Number & Place Value									
					Count in multiples of 6, 7, 25 and 1000	Find 1000 more or less than a given number.	Count backwards through zero to include negative numbers	Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and units)	Order and compare numbers beyond 1000.	Identify, represent and estimate numbers using different representations	Round any number to the nearest 10, 100 or 1000.	Solve number and practical problems that involve all of the above and with increasingly large positive numbers	Read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include	
PP	Name	Adders												
EAL	Name	Adders												
EAL	Name	Adders												

Example of the Oakley Vale Mathematics assessment tracking.

## Reporting to Parents

Parents are provided with regular feedback on their child's mathematical progress and attainment by using the Sheffield tracking system to print off corresponding parental reports indicating whether their child is beginning, progressing or embedded against each maths learning objective. The report includes a target for the children to work toward. At the end of the year parents receive a written report with a summary statement detailing their overall attainment at the end of the year against age related expectations.

 		<b>Maths Report - March 2016</b>	
Name			
<b>Number &amp; Place Value</b> Count in multiples of 6, 7, 25 and 1000. Find 1000 more or less than a given number. Count backwards through zero to include negative numbers. Recognise the place value of each digit in a four-digit number. Order and compare numbers beyond 1000. Identify, represent and estimate numbers using different representations. Round any number to the nearest 10, 100 or 1000. Solve number and practical problems that involve all of the above and with increasingly large positive numbers. Read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept	<b>Fractions, Decimals and %</b> Recognise and write decimal equivalents of any number of tenths or hundredths. Recognise and write decimal equivalents to 1/4, 1/2, 3/4. Divide a one or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths. Round decimals with one decimal place to the nearest whole number. Compare numbers with the same number of decimal places up to two decimal places. Solve simple measure and money problems involving fractions and decimals to two	<b>Properties of Shape</b> Compare and classify geometric shapes, including quadrilaterals and triangles, identifying acute and obtuse angles and compare and order angles up to two right angles by size. Identify lines of symmetry in 2-D shapes presented in different orientations and complete a simple symmetric figure with respect to a specific line of symmetry. <b>Position &amp; Direction</b> Describe positions on a 2-D grid as coordinates in the first quadrant. Describe movements between positions as translations of a given unit to the left/right and up/down. Plot specified points and draw sides to complete a given polygon.	
<b>Addition &amp; Subtraction</b> Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction. Estimate and use inverse operations to check answers to a calculation. Solve addition and subtraction two-step problems in contexts, deciding which operations and	<b>Measurement</b> Convert between different units of measure (for example, kilometre to metre; hour to minutes; centimetres to millimetres). Find the area of rectilinear shapes by counting squares. Estimate, compare and calculate different measures, including money in pounds and pence. Read, write and convert time between analogue and digital 12- and 24-hour clocks. Solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to	<b>Statistics</b> Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts. Solve comparison, sum and difference problems using information presented in bar	
<b>Multiplication &amp; Division</b> Recall multiplication and division facts for multiplication tables up to 12 x Multiply mentally including by 0 and 1 Divide mentally by 1 Multiply three numbers mentally. Recognise and use factor pairs and commutativity in mental calculations. Multiply two-digit and three-digit numbers by a one-digit number using formal written layout. Solve problems involving $\times$ and $\div$ , including multiply 2 digit numbers by 1 digit, problems when $n$ objects are			
		<b>Year group</b>	4
		<b>Effort</b>	Excellent
		<b>Teacher</b>	NM

Oakley Vale's mathematics mid-year parental report.

## Mathematics Homework (To be introduced in September 2016)

At Oakley Vale Primary School we reward children for making additional effort to learn key mathematical facts at home. Reception and Year 1 are required to practise key number bonds at home, where as key stage two are required to practise multiplication and division facts at home. Parents are asked to record in their child's learning log when they have spent some time practising their mathematics facts, this will then be recorded on a record sheet in class. Once a child has 40 ticks on their record sheet they are awarded with a special mathematics certificate in the whole school assembly.

The children are also given a learning journey themed homework each half term where the children can choose their homework task. Children and parents will be given the option of choosing a mathematics task to complete.

Written May 2016      Reviewed - July 2016      To be reviewed - May 2017