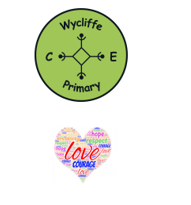
**How is Maths taught at Wycliffe CE Primary School?**



**Curriculum Learning Guide**

**Maths**

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| **Curriculum Intent** |
| **What do we want to achieve with our Maths curriculum?**  Intent, implementation and impact.  **Intent:**  At Wycliffe we have high expectations for all learners and believe that all children can succeed in Maths. Our intent is to provide a high quality mathematics education which creates a sense of enjoyment, curiosity and resilience about the subject for all children. We aim to ensure that all children:   * Become fluent in the fundamentals of mathematics leading to a deep understanding and the ability to recall and apply knowledge through increasingly complex problems. * Can reason mathematically by being able to explain and prove their findings using mathematical language. * Can solve problems using a step by step approach which encourages children to persevere in seeking solutions.   **Implementation**:  All children are supported to access age related questions with scaffolding and opportunities to dig deeper supporting and challenging all learners.  We use our working walls to support children’s learning and have appropriate resources readily available for children to access independently.  Children are encouraged to make connections that lead to a deep understanding using:   * concrete apparatus * pictorial representations * diagrams * mathematical models * symbols * language   **Impact:**  Our children will become fluent in the fundamentals of mathematics, developing the skills to tackle increasingly difficult problems over time and gain a conceptual understanding. They will be able to recall and apply their knowledge rapidly and accurately.  Through a Mastery approach, all children will develop the skills to reason mathematically, justifying and proving their arguments using mathematical language. They will learn how to solve problems by breaking them down into simpler steps and choosing the most effective mathematical models to help them seek solutions.  The expectation is that all children will experience all aspects of the mathematics curriculum coverage, with scaffolding to support those who progress more slowly and challenge of rich and sophisticated problems for those who grasp concepts rapidly.  **How will this be achieved?**  **Teaching Sequence**:  We have adopted a mastery approach to the teaching of mathematics by combining elements of our spiralling with that of the White Rose maths hub. Within our maths journey, all learners should be taught using the following steps:   * To deepen our pupils’ understanding and learning, teachers must teach in the following sequence:   + Teaching the skill – pupils need to be taught the skill, using models, images and representatives to embed their understanding of the concept.   + Application – pupils must be exposed to a variety of word problems looking at the concept from different angles.   + Reasoning – pupils to explain, prove and reason. They need to be able to use mathematical reasoning and links across maths to answer questions in the most logical and fluent way.   Throughout the teaching sequence, pupils will be asked to form links across maths to help deepen their understanding. Children will start each lesson with a mini varied recap on previous learning (spiralling) which helps children move their understanding to their long term memory. Because of this systematic and logical teaching approach is consistent throughout school, Children become used to the idea that they will follow the same structure for each mathematical unit, not just in their own year group but in every year group as they progress through the school. This is reinforced by the fact that all working walls follow the same design and are used in the same way.  **Marking and feedback**:  Throughout school, a simple code system when marking is in place (LI Met, VF and E). This has allowed our teachers to focus on the child’s learning journey rather spending unnecessary time giving detailed feedback. It is complimented by a next step/challenge where appropriate to consolidate learning. Because of the practical nature of maths at Wycliffe CE, when the pupil uses equipment as a tool, an E should be placed by the LI. Whilst marking their book, the teacher must think about grouping the children into those who have achieved today’s objectives and those that require extra support. This allows the child to be put in the correct group and ensures they have a clear journey that is tailored to meet their needs. When obvious mistakes are made, which the child will be able to address independently, the error is identified and the pupils would then be given the opportunity to correct their mistake at the beginning of the next lesson. A variety of marking is to be used (self (green pen reflection), peer and teacher). However, the teacher must look and monitor the accuracy of the marking and assess any misconceptions the child may have.  **Assessment**:  Our assessment of progress in mathematics is robust to ensure that all children make the required level of progress. At the start of the unit, children complete a ‘pre-learning’ assessment which identifies what they already know about the unit being taught. The daily spiralling of pre-taught concepts, allows teachers to constantly monitor pupils understanding. At the end of the unit, a ‘post-learning assessment’ is completed and each child details their own improvement. Both pre and post-learning assessments are marked to give the children positive feedback and next steps. Any child who has not made expected progress is quickly identified and interventions are put in place to ensure the knowledge gaps are filled.  **Oracy:**  Throughout all lessons, we have orally rich discussions using open ended questioning to allow pupils to explore and experiment. These purposeful dialogues with their critical friend, or as a class, deepens their understanding whilst ensuring there are no passive learners. Teachers are aware that children need to be taught and modelled sentence stems especially lower down school. Through the discussions, pupils will develop their fluency and deepen their understanding of the links across maths.  Possible questions: How do you know? Tell me more. Why do you think that? How did you get that answer? How do you know that answer is wrong? How do you know that answer is correct? Prove it! Give me an example. What would happen if….? What could you do to make it correct?  **Arithmetic**:  Our teachers are expected to include an element of arithmetic in every lesson along with a separate weekly arithmetic. This often takes the form of four rules and the inverse (depending on year group) in the spiral introductions. Fluency is an opportunity to practice the four operations regularly and usually forms the lesson starter. Fluency practice is marked within the lesson and the teacher leads a discussion of method with the class each day. At least once every two weeks, each class has an arithmetic lesson which involves completing a short arithmetic test.  **Times tables**: Excellent times table knowledge and instant recall of related facts is essential to efficient calculation methods – both mental and written. In recognition of this, and in preparation for, the year 4 times table check, we explicitly teach the times tables to the appropriate year groups and allow them ample time to practise and apply their understanding. Years 1 to 6 have a times tables card which allows them to learn at home and show what they can do to their teacher at school through a tiered, colour coded system (red = recall in order, blue = recall out of order and gold = recall out of order with division facts  **Problem Solving**:  At least twice every half term, each class has a specifically designated ‘problem solving’ lesson. These lessons use the STOPs resources and are designed to build on children’s ability to solve problems by providing them with a number of strategies that they can use when faced with an unfamiliar problem. The lessons contain elements of whole class teaching, group discussion, paired work before moving on to independent application. Problem solving is also taught within the teaching journey whilst children also revisiting previously taught problems during the spiralling.  **Spiralling (Low Stakes Testing):**  Spiralling takes place at the beginning of most lessons. This is an opportunity for pupils to revisit previous learning in a mini test or a reasoning and discussion question. Having a varied approach to this learning process deepens the connections and associations (R.Bjork 2017, “Creating Desirable Difficulties to Enhance Learning”). This variation leads to improved ability to remember learning and be able to use it effectively in new contexts. Research also shows that children generally forget newly taught concept on the first time, but if they exert effort to recall things, spaced over increasing intervals of time, they retain a lot more by moving their understanding to their long term memory. A variety of marking should be used, which should open the door for dialogue about how to answer questions. Teachers should always be aware of the pupils’ misconceptions and use this for future spiralling or reteach concepts if needed.  **Counting**: We understand the importance of our learners developing a fluency of number and an important way to do this is through counting. We regularly count with our children in a variety of age appropriate ways. See appendix 7.  **Mental methods:** Efficient mental methods are a key requirement for fluency in mathematics and to this end we have explicitly mapped the progression and development of these skills (see appendix 5). Each class has a visual representation of the relevant methods near the working wall  **Vocabulary**: There are three main ways in which children’s failure to understand mathematical vocabulary may show itself: children do not respond to questions in lessons, they cannot do a task they are set and/or they do poorly in tests. In order to avoid these, we teach the vocabulary for each unit during phase 1. See mathematical vocabulary document.  **Learn by hearts:** Theseare basic skills which are required in each year group. At the start of the year a list of the skills is sent home (see appendix 6) and the teacher selects a section of skills to work on each half term. The letter asks parent’s and carers to support their child’s mathematical development by helping to practice the skills – some ideas are provided.  **Inclusion:**  We take a mastery approach to the teaching of mathematics at Wycliffe CE Primary; a key part of this methodology is that all learners engage in all aspects of our curriculum. Where required, lessons and resources may be adapted and scaffolded to ensure that every learner can access every aspect of our wide ranging, challenging and engaging mathematical offering.  **Cross- Curricular Links**  Using mathematical skills and language in a wide range of contexts is key to the development of successful mathematicians. We therefore encourage as much cross curricular maths activity as possible in order to give our learners a true sense of the relevance of mathematical skills as well as an awareness of how mathematics underpins many other aspects of the curriculum. Examples of cross curricular maths could be:   * Role playing shops, cafes and other environments using money (FS) * Writing instructions involving measures (English) * Recording the results of investigations using data tables and / or graphs (Science) * An investigation of religious affiliation in our local area – calculating percentages and drawing pie charts (RE) * Practising key skills with children who are resistant to or struggle with desk- based learning (PE) * Conducting and recording market research (DT) * Studying / creating art work using geometric shapes based on Matisse, Mondrian, Picasso etc (Art) * Measuring and drawing a chalk outline of a Lancaster bomber on the playground (History) * Calculating distances – lengths, width, depths of rivers, seas and oceans (Geography)   Cross curricular work can be completed in the application stage of the maths unit or in any lesson in which the skills are used. Teachers should highlight the fact that maths skills are being used and encourage children to find other opportunities to apply mathematical knowledge and understanding across the curriculum. |

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| Contents of the Following pages |
| In order to fully map the progression in fluency, reasoning and problem solving, the teaching and planning of maths is based on the following progression documents, with White Rose being the mapping of NC objectives and the supporting documents setting out additional foci and expectations within teaching and learning in Maths at Wycliffe CE Primary:   1. Counting document 2. Mental methods progression (extracted from calculation policy) 3. Learn by hearts 4. Target strategies in maths problem solving and reasoning 5. Expectations in reasoning and problem solving by year group – EYFS to Y3 6. Expectations in reasoning and problem solving by year group – Y4 to Y6 7. White Rose Progression – all year groups 8. Calculation Policy 9. Fractions, Decimals and Percentages Policy 10. Models and Images Policy |

1. **Daily Counting**

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| **In order to develop fluent numeracy skills, it is important for children in all year groups to be given the opportunity to count regularly. This document lists ideas for counting aloud alongside year groups expectations from the 2014 National Curriculum.**  **It is recommended that children practise counting aloud every day relating the counting to its concepts as well as then counting in a variety of contexts to build agility with names of the numbers. Ensure that there are times when the counting includes concrete models and images of items to promote conceptual understanding and contextual application. Standard font is quoted from the NC programmes of study; *italic font shows additional ideas*.** | | | | | |
| **Focus** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5 and 6** |
| **Place value based counting** | **Up to 100 and beyond:** Forwards and backwards in 1s (beginning from any number) *Can respond to a ‘one more and one less’ scenario? i.e. when the count stops show, write, say next number.* | **Up to 100 and beyond:**  Forwards and backwards in 1s and 10s (beginning from any number) | **Up to 1 000 and beyond:** Forwards and backwards in 1s, 10s and 100s (beginning from any number) | **Up to 1 000 and beyond:** Forwards and backwards in 1s, 10s, 100s and 1000s (beginning from any number)  Count backwards through zero to include negative numbers (in 1s and 10s) | **Up to 1 000 000 then to 10 000 000:** Count forwards and backwards in steps of powers of 10 for any given number up to 1,000,000 i.e. in 1s, 10s, 100s and 1000s and in steps of 0.1, 0.01 and 0.001 (beginning from any number) |
| **Multiples**  *Models to use: towers of cubes, pendulum, counting stick, counting hoop, arrays, bead string.*  *Number tracks, place value grids, hundred square.* | (**2s)** 2, 4, 6, 8…  **(5s)** 5, 10, 15…  **(10s)** 10, 20, 30… | (**2s)** 2, 4, 6, 8…  **(3s)** 3, 6, 9…  **(5s)** 5, 10, 15…  **(10s)** 10, 20, 30… | *Review content from previous year groups*    **(4s)**  **(8s)**  **(50s)**  **(100s)** | *Review content from previous year groups*    **(6s)**  **(7s)**  **(9s)**  **(25s)**  **(1000s)** | *Review content from previous year groups*  *Count in square numbers up to 12x12 i.e. 1, 4, 9, 16, 25, …*  *Count forwards and backwards in relation to multiplying and dividing by 10 etc. to reinforce place value (ie 6, 60, 600, 6 000, 60 000, … and 23, 230, 2 300, 23 000, … and 604 000, 60 400, 6 040, 604, 60.4, 6.04, 0.604)* |
| **Times table facts to learn**  *Models to use: counting stick, counting hoop.(These are chanting tables NOT just chanting multiples)* | N/A | Two times table  Five times table  Ten times table | *Review content from previous year groups*  Three times table  Four times table  Eight times table | *Review content from previous year groups*  Six times table  Seven times table  Nine times table  Eleven times table  Twelve times table | *Review all times tables regularly* |
| **Contextual counting of multiples**  *Models to use: groups/bags of the real items and pictures of the real items in groups.* | Multiples of apples  Multiples of pencils  Multiples of seeds… etc. (in twos, fives and tens) | *Using single items to ‘stand for’ multiples of twos, fives and tens i.e. a tower of 10 cubes where each cube ‘stands for’ two – count up the tower pointing to one cube at a time: two, four, six, etc.* | *Multiples of capacity/volume in response to seeing items (liquids and small particles of solids) from smaller containers to larger ones i.e. 200ml, 400ml, 600ml…* | *Multiples of capacity/volume in response to seeing items (liquids and small particles of solids) from smaller containers to larger ones i.e. 250ml, 500ml, 750ml…* | *Review content from previous year groups* |
| **Fractions counting (including in the context of time)**  *Models to use: counting hoop and stick, washing line, pictures of shapes shown in fractions, clock face focusing just on the hour hand.* | **Up and down in halves to 10 and beyond- …**half, one, one and a half…  **½ hours-** …half past one, two o’clock, half past two, three o’clock… | **Up and down in quarters- …**three quarters, one whole, one and a quarter…  **¼ hours**- …quarter to three, three o’clock, quarter past three, half past three … | Count up and down in tenths *(heading for boundaries to support with rounding) i.e. ‘six tenths, seven tenths, eight tenths, nine tenths, one, one and one tenth… as well as ‘nought point eight, nought point nine, one, one point one…* | Practise counting in simple fractions and decimals, both forwards and backwards  Count up and down in hundredths | Continue practising forwards and backwards in simple fractions (from year 4)  Extend the counting from year 4 using decimals and fractions including bridging zero (negative decimal numbers)  *Listen to linear sequences involving fractions (i.e. 3, 3 ½, 4, 4 ½…) and be able to describe them finding the term to term rule (i.e. in this case add ½ )* |
| **Multiples of measures and time**  *Models to use: coins, pictures of coins on IWB, Clock face focusing just on minute hand, scales on measuring equipment, scales on graphs.* | **Multiples of coins:**  **(2ps)** two pence, four pence, six pence…  **(10ps)** ten pence, twenty pence…  **(5ps)** five pence, ten pence, fifteen pence…  ***Multiples of time:***  ***(5 minutes)*** *five minutes, ten minutes, fifteen minutes…* | **Multiples of coins:**  **(2ps)** two pence, four pence, six pence…  **(10ps)** ten pence, twenty pence…  **(5ps)** five pence, ten pence, fifteen pence…  ***(20ps)*** *twenty pence, forty pence, sixty pence…*  ***Multiples of time:***  ***(5 minutes)*** *five minutes, ten minutes, fifteen minutes…* | Forwards and backwards in 1s, 10s and 100s (beginning from any number) in contexts i.e. using 1p, 10p and 100p coins; steps of 1cm, 10cm and 1m, etc.  *Use a variety of scales and pictograms (2, 5 & 10) to count multiples* | *Review content from previous year groups* | *Review content from previous year groups* |
| **Chronology (not number-related)**  *Models to use: wall display of names in circles, hoop, calendar.* | Days of the week, months of the year, the four seasons (starting from different points) | *Review content from previous year groups* | *Review content from previous year groups* | *Review content from previous year groups* | *Review content from previous year groups* |
| **Sequences** | Counting in ones from any number (up to 100 and beyond) | Counting in tens from any number (up to 100 and beyond)  *Counting in twos from 1 (odd numbers)* | *Names of 3D shapes in order of increasing properties i.e. cylinder (3 faces), tetrahedron (4 faces), triangular prism (5 faces), etc.* | *Names of shapes in order of increasing numbers of vertices i.e. triangle, rectangle, pentagon, hexagon… (using images of the shapes)* | Listen to linear sequences (i.e. 1, 2, 4, 7, 12) and be able to describe them, finding the term to term rule (i.e. in this case each number in the sequence increases by totalling the two previous terms plus one) |

**2. Mental Methods Progression from Current Calculation Policy**

Blue – Explicitly stated (NC statements) Green – development towards mental maths *Italics – added comments*

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| **Year** | **Addition** | **Subtraction** | **Multiplication** | **Division** |
| **Reception** *Practical and experiential work undertaken developing conceptual understanding of number* | *.* The children are taught to ‘**count on’** e.g. to use a number track. | This is extended to ‘**counting back’** e.g. We made 5 mince pies. We ate 2 of them. How many are left? Count back 2 from 5: 4, 3. Say 5 take away 2 is 3. | counting in 2s, 10s and 5s in practical contexts |  |
| **Year 1**  *(Use a variety of equipment to secure conceptual understanding. Counting as a central focus)* | Continuing ‘count on’ method – progression in number and to crossing boundaries | Continuing ‘counting back’ method – progression in number and to crossing boundaries | doubling numbers and quantities | Relate division to **doubling and halving** |
| **Year 2**  (Use a variety of contexts and equipment such as money and measures to secure conceptual understanding) | * applying their increasing knowledge of mental and written methods   **add** numbers using concrete objects, pictorial representations, and mentally, including:   * a two-digit number and ones * a two-digit number and tens * two two-digit numbers * adding three one-digit numbers | add **and subtract** numbers using concrete objects, pictorial representations, and mentally, including:   * a two-digit number and ones * a two-digit number and tens * two two-digit numbers * adding three one-digit numbers | solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods  calculate mathematical statements for multiplication within the multiplication tables 2, 5, and 10, writing them using the multiplication (×) and equals (=) signs **(known facts)**  *2+2+2+2=8 is then described as ‘two, four times’ which is written as 2x4 (two multiplied by four)* | calculate mathematical statements for division within the multiplication tables of 2, 5 and 10, writing them using the division (÷) and equals (=) signs **(known facts)**  solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts. *(i.e. division is ‘grouping’ only for calculating and ‘sharing’ by 2 is only referred to during halving activities)* |
| **Year 3** | add and subtract numbers mentally, including:   a three-digit number and ones   a three-digit number and tens   a three-digit number and hundreds  (**place value and partitioning)**  *(where digits are greater than 5 and boundaries have to be crossed building on experiences in year 2)* | add and subtract numbers mentally, including:   a three-digit number and ones   a three-digit number and tens   a three-digit number and hundreds  (**place value and partitioning)**  *(where the smaller number contains digits greater than 5 so decomposition has to occur building on experiences in year 2)* | taught to recall and **use** multiplication and division facts for the 3, 4 and 8 multiplication tables  Pupils develop reliable ***mental*** methods for multiplication and division, starting with calculations of two-digit numbers by one-digit numbers  Use Base 10 and concrete resource- based practical work to develop conceptual understanding of multiplication | The children are given plenty of practical work and are encouraged to use mental strategies and informal pencil and paper or whiteboard jottings to support, record to explain their thinking.  Children are taught to solve division calculations by using multiplication strategies e.g. calculate 18÷3 by **counting on** in multiples of three or by recalling **tables facts** this could be modelled by looking at how many hops of 3 on a number line and/or bead string are needed to reach 18. The link between division and counting on in groups of the divisor should be made. This then progresses to dividing larger two-digit numbers i.e. 56÷4. |
| **Year 4** | Pupils continue to practise both mental methods and columnar addition and subtraction with increasingly large numbers to aid fluency. | Pupils continue to practise both mental methods and columnar addition and subtraction with increasingly large numbers to aid fluency. | Pupils should be taught to recall and use multiplication and division facts for multiplication tables up to 12 × 12.  *Practising partitioning numbers in different ways, in response to investigating in the context of a variety of divisors, supports children with understanding division* ***i.e. ‘Make the number 235 with base 10 resources. Now move the resources around to make different numbers that are equally divisible by 5.’ After exploration the children can begin to record such as: 200+30+5; 100+100+20+15; 100+100+10+10+5; etc. ‘Now move the same amount around into multiples of 4. What do you notice?’ 100+100+20+12 with 3 left over etc.*** |  |
| **LKS2** Mental methods.  Explicitly taught and strategies displayed in classrooms | * Adding a number less than 20. e.g 1546 + 12 **(Y3)** * **Adding multiples of 10,100 or 1000** e.g 3452 +20; 2637 + 500; 1500 + 1300; 2646 + 2000 **(Y3)** * Adding **near doubles** e.g 1599 + 1600 **(Y4)** * Adding **without crossing boundaries** e.g 3623 + 1111 **(Y4)** | * **Near numbers (counting on)**  e.g 1657-1653 = ? **(Y3)** * **Subtracting multiples of 10,100 or 1000** e.g. 3563 – 300 = ? **(Y3)** * Numbers including multiples of 1000 e.g. 2000-1563 = ? **(Y4)** * Numbers with multiples of 100 in both e.g.2500-2300 = ? **(Y4)** | * Calculations involving **tables facts** and with links to **place value** i.e. 8x11 and 3x20 | * Calculations involving using of **tables facts** and with links to **place value** i.e. 88÷11=8 and 60÷3 |
| **Year 5**  *(Base 10 and arrays support chn’s conceptual understanding)* | Any calculations that involve using **known facts, partitioning,** where the digits in an addition are all less than five, where a subtraction does not involve decomposition i.e. 5,678 – 1,222 | Any calculations that involve using **known facts, partitioning,** where the digits in an addition are all less than five, where a subtraction does not involve decomposition i.e. 5,678 – 1,222 | They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently  Any calculations where the **dividend is a multiple of the divisor**, **known facts** can be used and ‘carrying’ does not have to occur i.e. 8,884 ÷ 4; where the calculation demands moving a number in response to place value i.e. 452 x 1,000 | Any calculations where the dividend is a multiple of the divisor, known facts can be used and ‘carrying’ does not have to occur i.e. 8,884 ÷ 4; where the calculation demands moving a number in response to place value i.e. 452 x 1,000 |
| **UKS2**  **Year 5** | Perform mental calculations, including mixed operations and large numbers | Perform mental calculations, including mixed operations and large numbers | Perform mental calculations, including mixed operations and large numbers  **(Multiples of 10)** Where they are asked to multiply by 10, 100, 1000 they do it in their head e.g. 5x10; 7x100; 34x10; 56x100; 4.5x10; 7.6x100; etc.  Use **factors:**  3.2 x 30 3.2 x 10 3.2 x 3  156 ÷ 6 156 ÷ 3 = 52 52 ÷ 2 = 26  Use **partitioning**  7.3 x 11 = (7.3 x 10) + 7.3 = 80.3  **Flexible thinking (selecting the most appropriate strategy):** To calculate 24 x 15 multiply 24 x 10 and then halve to get 24 x 15, adding these results together. Record method as (24 x 10) + (24 x 5). Alternatively, they work out 24 x5 = 120 (half of 24 x 10), then multiply 120 x 3 to get 360  Scale up or down using **known facts** eg. if 3 oranges cost 24p, how much do 4 oranges cost? | Perform mental calculations, including mixed operations and large numbers  **(Multiples of 10)** Where they are asked to divide by 10, 100 or 1000 e.g. 50÷10; 340÷10; 24÷10; 300÷100; 246÷100; 23÷1000; etc.  Where the divisor is a **factor** of each part of the number e.g. 369÷3; 484÷2; 884÷4; etc.  Where the **dividend can be partitioned** in a different way to make multiples of the divisor they do it in their head e.g. 138÷6 which could be thought of partitioning 138 into 120 and 18 as each part is now equally divisible by 6 (this is a higher level skill and should not be expected for everyone)  (SD Progression in Calculations) |
| **UKS2**  **Year 6** | Builds on Y5 in a variety of contexts | | | |

**3. Learn by Hearts – coming soon!**

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|  | **Reception** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** | |
| Aut 1 | Recite the number names in order to 10 and beyond. | Recite the number names in order to 50 and beyond. | I know number bonds to 20. | I know number bonds for all numbers to 20. | I know number bonds to 100. | I know decimal number bonds to 1 and 10. | I know the multiplication and division facts for all times tables up to 12 × 12. | |
| Aut 2 | Begin to know the days of the week. | I know number bonds for each number to 6. | I know the multiplication and division facts for the 2 times table. | I know the multiplication and division facts for the 3 times table. | I know the multiplication and division facts for the 6 times table. | I know the multiplication and division facts for all times tables up to 12 × 12. | I can identify common factors of a pair of numbers. | |
| Spr 1 | Recognise numerals 0-10. | I know doubles and halves of numbers to 10. | I know doubles and halves of numbers to 20. | I can recall facts about durations of time. | I know the multiplication and division facts for the 9 and 11 times tables. | I can recall metric conversions. | I can convert between decimals, fractions and percentages. | |
| Spr 2 | Be able to partition numbers to 5 into two groups. | I know number bonds to 10. | I know the multiplication and division facts for the 10 times table. | I know the multiplication and division facts for the 4 times table. | I can recognise decimal equivalents of fractions. | I can identify prime numbers up to 20. | I can identify prime numbers up to 50. | |
| Sum 1 | Count in 10s to 100. | I can tell the time to the hour and half past. | I can tell the time to the nearest 5 minutes (including quarter past and quarter to). | I can tell the time to the nearest minute (including 12 and 24 hour clocks and Roman numerals). | I know the multiplication and division facts for the 7 times table. | I can recall square numbers up to 144 and their square roots. | Know the decimal  and percentage  equivalents of the  fractions ½, ¼, ¾, ⅓,  ⅔, tenths and fifths. | |
| Sum 2 | Count in 2s to 20. | I know number bonds for each number to 10. | I know the multiplication and division facts for the 5 times table. | I know the multiplication and division facts for the 8 times table. | I can multiply and divide single-digit numbers by 10 and 100. | I can find factor pairs of a number. | | Know the square  roots of square  numbers to 15 x 15. |

By the end of each half term, children should know the following facts and be able to recall them instantly.

1. **Target Strategies in Maths Problem Solving and Reasoning**

General Guidance about expected coverage in each year group, previous strategies and question types should be revisited in addition to introducing new content

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| **Year Group** | **Problem Solving Strategies to introduce**  (Links to STOPs) | | **Reasoning Question Types to introduce**  (Questions are exemplified in the NCTEM Reasoning document) |
| Year R | * Act It Out   Physically acting out the situation presented in a math problem so helps you better understand the  Problem. | * Trial and Error   Solve a problem by guessing the answer and then checking that the guess fits the conditions of the problem. | What comes next?  Can you find?  What’s the same, what’s different? |
| Year 1 | * Trial and Improvement   Solve a problem by removing improbable answers until the correct answer remains. | * Looking for Patterns   Solve a problem by looking for patterns, repetitions or sequences in the data. | Do, then describe / True or False?  Continue the pattern / Ordering  Missing numbers/ Missing symbols |
| Year 2 | * Simplify   When a problem is too complex to be solved in one step, it often helps to divide it into simpler problems and solve them separately. | | Connected calculations, Missing information, Ordering, Make up an example, Fact Families, Spot the Mistake  What do you Notice? |
| Year 3 | * Working Backwards   Starting with the end in mind helps you develop a strategy that leads to the solution by backing through the process. | * Make a List or Table   Solve a problem by writing the information in a more organised format to discover relationships and patterns among the data. | Possible Answers/Other possibilities  Working backwards/Use the Inverse/Undoing/Unpicking  What else do you know?, What the same, what’s different? / Odd one out |
| Year 4 | Revisit:   * Simplify * Looking for Patterns * Trial and Improvement | | What else do you know?/Use a fact  Continue the pattern/Complete the pattern / Convince me/Prove it (Written Form), Connected calculations  Always, sometimes, never / Make an estimate/ Size of an answer |
| Year 5 | * Algebraic   Where equations or formulas can help to make the solution clearer.  (Less focus on ‘Act it out’) | | Generalising/Explain thinking, Making Links/Application  Deep thinking/Shallow thinking Questions (formally known as hard or easy), The answer is…, Write more statements/Create another |
| Year 6 | All Strategies  (Less focus on ‘Act it out’ and ‘Trial and Error’) | | Another and another, Testing conditions (Hypothesis/Conjecture), Visualising |

1. **Expectations in Reasoning and Problem Solving by Year Group – EYFS to Year 3**

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| --- | --- | --- | --- | --- |
|  | **Reception** | **Year 1** | **Year 2** | **Year 3** |
| **Stages of reasoning**  **(Adapted from NRICH 5 Stages)** | 1. **Experiencing**   (Starts to experience reasoning ideas and may use and explore or start to describe or ask questions) | 1. **Describing**   (Tells what they did) |  | 1. **Explaining**   (Offers some reasons for what they did, may not be correct) |
| **Patterns** | -Copy and continue a simple pattern of objects and colours | -Order and arrange combinations of objects and shapes in patterns.  -Describe simple patterns and relationships involving numbers or shapes; decide whether examples satisfy given conditions. Predict what comes next | -Describe patterns and relationships involving numbers or shapes, make predictions and test these with examples. | -Identify patterns and relationships involving numbers or shapes, and use these to solve problems, giving reasons for decisions  -Explain the rules for sequences in words (e.g. 3, 5, 7: you add 2 each time) and give reasons as to how such rules were identified  -Begin to make ‘if…then…’ statements (e.g. if 2 + 4 = 6 then 6 – 2 = 4) |
| **Generalisation and**  **Explanation** | -Sort objects to simple criteria such as colour, comparative size to three sizes, etc and describe what they did.  -Practical mathematical activities involving sorting and comparing |  | -With assistance (through questioning or prompts), make a generalisation | -Begin to make generalisations based on patterns in mathematics (e.g. all even numbers end in either a 0, 2, 4, 6 or 8) and explain how they were reached.  -Begin to make conjectures (statements) about mathematics and develop the ability to explain to, and convince others (e.g. when continuing a pattern). |
| **Puzzles** |  | -Describe a puzzle or problem using numbers, practical materials and diagrams; use these to solve the problem and set the solution in the original context.  -Describe ways of solving puzzles and problems, explaining choices and decisions | -Describe solutions to puzzles and problems in an organised way; describe decisions, methods and results in pictorial, spoken or written form, using mathematical language and number sentences. | -Represent the information in a puzzle or problem using numbers, images or diagrams; use these to find a solution and present it in context, where appropriate using £.p notation or units of measure |
| **Approaches/**  **Flexibility of thinking** | -Naturally use mathematical ideas when moving items and playing | -Engage with others’ descriptions, compare... evaluate  -Adopt a suggested model or systematic approach and describe it  -Move between different representations of a problem, e.g. a situation described in words, a diagram, etc. | -Identify and record the information or calculation needed to solve a puzzle or problem; carry out the steps or calculations and check the solution in the context of the problem.  -Develop an organised approach as they get into recording their work on a problem  -Use classroom discussions to break into a problem, recognising and describing similarities to previous work | -Describe and explain methods, choices and solutions to puzzles and problems, orally and in writing, using pictures |
| **Enquiry** | Begin to understand the relevance of mathematical ideas to everyday situations by using them in role-play | Answer a question by selecting and using suitable equipment, and sorting information, shapes or objects; display results using tables and pictures | Follow a line of enquiry; answer questions by choosing and using suitable equipment and selecting, organising and presenting information in lists, tables and simple diagrams |  |

**6. Expectations in Reasoning and Problem Solving by Year Group – Year 4 - 6**

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|  | **Year 4** | **Year 5** | **Year 6** |
| **Stages of reasoning**  **(Adapted from NRICH 5 Stages)** | 1. **Convincing**   (Confident that their chain of reasoning is correct. May not be correct, but argument has more coherence) | 1. **Justifying**   (Making a correct logical argument with a complete chain of reasoning using because/therefore/so) | 1. **Proving**   (providing a mathematically sound argument, which may be based on generalisations) |
| **Patterns** | Identify and use patterns, relationships and properties of numbers or shapes  Investigate a statement involving numbers and test it with examples, explaining the relevance of the examples in the context of the original statement  Express the rules for increasingly complex sequences in words (e.g. 3, 6, 12, 24: you double each time) | Explore patterns, properties and relationships and propose a general statement involving numbers or shapes; identify examples for which the statement is true or false | Represent and interpret sequences, patterns and relationships involving numbers and shapes; suggest and test hypotheses; construct and use simple expressions and formulae in words then symbols. |
| **Generalisation and**  **Explanation** | Continue to make generalisations based on patterns in mathematics, giving supporting reasons.  Offer coherent explanations and reasons for their methods and solution as well as using examples and counter-examples to justify conclusions | Continue to make increasingly advanced generalisations based on logical reasoning around patterns in mathematics  Make conjectures (statements) about mathematics and further develop the ability to convince others using well developed chains of reasoning  Justify reasoning using diagrams, graphs and text; refine ways of recording using images and symbols.  Continue to make ‘if… then…’ statements with logical supporting reasoning | Continue to make increasingly advanced generalisations based on patterns in mathematics.  Give mathematically sound arguments when explaining reasoning and conclusions, using words, symbols or diagrams as appropriate  Make mathematically sound conjectures (statements) about mathematics using well developed logic and reasoning and use this to further develop the ability to convince others  Continue to make ‘if…then…’ statements, representing them using letters if able (e.g. if 2 + 4= 6,then 6 – 2 = 4 represented using letter s: if a + b = c then c – a = b). |
| **Puzzles** | Represent a puzzle or problem using number sentences, statements or diagrams; use these to solve the problem; present and interpret the solution in the context of the problem.  Report coherent solutions to puzzles and problems, giving explanations and reasoning orally and in writing, using diagrams and symbols. | Represent a puzzle or problem by identifying and recording the information or calculations needed to solve it; find possible solutions and justify them in the context of the problem. | Tabulate systematically the information in a problem or puzzle; identify and record the steps or calculations needed to solve it, using symbols where appropriate; interpret and prove accuracy of solutions in the original context. |
| **Approaches/**  **Flexibility of thinking** | Check as they work, spotting and correcting errors and  reviewing methods, is able to justify changes made | Begin to express missing number problems algebraically. (e.g. 6 + n = 12). | Use simple formulae expressed in words  Express missing number problems algebraically (e.g. 6 + n = 28).  Begin to use symbols and letters to represent variables (things that can change) and unknowns in mathematics situations which they already understand, such as missing numbers, missing lengths, arithmetical rules (e.g. a + b = b + a) and number puzzles (e.g. two numbers total 6, therefore a + b = 6). |
| **Enquiry** | Suggest a line of enquiry and the strategy needed to follow it giving reasons to support chosen approach; collect, organise and interpret selected information to find answers | Plan and pursue an enquiry; present evidence by collecting, organising and interpreting information; suggest extensions to the enquiry and justify reasons for such extensions | Suggest, plan and develop lines of enquiry; collect, organise and represent information, interpret results and review methods; identify and answer related questions |

1. **Calculation Policy**

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| WRITTEN ADDITION METHODS | | |
| Year 1 | Year 2 | Year 3 |
| **+ = signs and missing numbers**  3 + 4 = = 3 + 4  3 + = 7 7 = + 4  + 4 = 7 7 = 3 +  + ∇ = 7 7 = + ∇  Promoting covering up of operations and numbers using pictorial representations.  **Numbered number lines,**  Teacher will model the use of number lines and children will then use to help with their own addition calculations.  7 + 4 = 11  ­­­  **Extend to a blank number line (with 100 square to support adding the 10 if necessary)**  58 + 14  **+**10 +4  **58**  68 72 | **+ = signs and missing numbers**  Continue using a range of equations as in Year 1 but with appropriate, larger numbers.  **Pictorial, Written and mental addition of;**   * 2 digit number and a 1 digit number (23 +6) * 2 digit number and a tens (23 +20) * 2 two digit numbers (23 + 19) * Adding 3 one digit numbers (4 + 6 + 9)   **Written methods to include;**  **Partitioning and recombining**    20 + 3  10 + 2  30 + 5 = 35  **Next step:**  Add up to 2-digit numbers using written methods including column addition (without carrying)  *23 + 42*  23  + 42  65  Use equipment such as base ten to support children’s understanding. | **+ = signs and missing numbers**  Continue using a range of equations as in Year 2 but with appropriate, larger numbers.  **Written methods to include;**  **Add numbers with 3 digits, including using column addition**   * Add 2 numbers with 3-digits together using column addition without exchange between units and tens   *223 + 142*  223  + 142  365       * Add 3 numbers with 3-digits using column addition where the units or tens make more than 10     Use equipment such as base ten to support children’s understanding. |

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| WRITTEN ADDITION | | |
| Year 4 | Year 5 | Year 6 |
| **Written methods to include;**  **Add numbers using formal written methods with up to 4-digits**   * Add 2 numbers with 4-digits together using column addition without exchange between units and tens * Add 2 numbers with 4-digits together using column addition, where the units, tens or hundreds when added make more than 10. * Add 3 numbers with 4-digits using column addition where the units, tens or hundreds make more than 10     Model negative numbers using a number line.  Model time problems using a number line. | **Written methods to include;**  **Add and subtract whole numbers with up to 5 digits, including using formal written methods**   * Add 2 numbers with 5-digits together using column addition without exchange between units and tens * Add 2 numbers with 5-digits together using column addition, where the units, tens or hundreds when added make more than 10. * Add 3 numbers with 5-digits using column addition where the units, tens or hundreds make more than 10     Add numbers with up to three decimal places    Model negative numbers using a number line. Model time problems using a number line | **Written methods to include;**  As Year 5 but with larger numbers.  Children should also add negative integers on a number line.  **Children should be able to choose the most reliable and efficient methods for themselves.** |

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| WRITTEN SUBTRACTION | | | | |
| Year 1 | Year 2 | | Year 3 | |
| **Pictures / marks - Visual / practical activities**  Sam spent 4p. What was his change from 10p?    **- = signs and missing numbers**  7 - 3 = = 7 - 3  7 - = 4 4 = - 3  - 3 = 4 4 = 7 -  - ∇ = 4 4 = - ∇  **Number lines numbered;**  **11 – 4 = 7**  0 1 2 3 4 5 6 7 8 9 10 11  Counting back from 11 to 7 (counting on top of the line)  Recording by - drawing jumps on prepared lines  - constructing own lines  (Teachers model jottings appropriate for larger numbers)  **Extend to a blank number line (with 100 square to support subtracting the 10 if necessary)**  58 - 14  44 48 58  -4 -10 | **- = signs and missing numbers**  Continue using a range of equations as in Level 1 but with appropriate numbers.  Extend to 14 + 5 = 20 -  Find a small difference by counting up  Beginning with the ‘numbered’ number line to subtract from the largest number.  **Written methods to include;**  **When children are secure with counting back (Year 1), they may move onto subtracting by finding the difference (complementary addition):**  69 - 42  +10 +10 +7  42 52 62 69  **Next step:**  Subtract up to 2-digit numbers using written methods including column subtraction (without borrowing)  *89 - 42*  89  - 42  47    Use equipment such as base ten to support children’s understanding. | | **Find a small difference by counting up**  Continue as in Level 2 but with; - 3 digit number subtract a one digit - 3 digit number subtract a ten - 3 digit number subtract another 3 digit  As children become more familiar with working with larger numbers and at the teacher’s discretion (taking SEN into account) the column method of subtraction will be introduced.  **Written methods to include;**  **Subtract numbers with 3 digits, including using column subtraction**   * Subtract a 3-digit number from another using column subtraction which requires no exchange between the units, tens or hundreds   *289 - 142*  289  - 142  147   * Subtract a 3-digit number from another using column subtraction which requires exchange between the units, tens or hundreds     Use equipment such as base ten to support children’s understanding. | |
| WRITTEN SUBTRACTION | | | |
| Year 4 | | Year 5 | Year 6 |
| **Written methods to include; Add and subtract numbers using formal written methods with up to 4-digits**   * Subtract a 4-digit number from another using column subtraction which requires no exchange between the units, tens, hundreds or thousands * Subtract a 4-digit number from another using column subtraction which requires exchange between the units, tens, hundreds or thousands (or any two of these) * Use borrowing across to work out change from £20.00, £10.00 and £5.00.       Model negative numbers using a number line.  Model time problems using a number line. | | **Written methods to include; Add and subtract whole numbers with up to 5 digits, including using formal written methods**   * Subtract a 5-digit number from another using column subtraction which requires no exchange between the units, tens, hundreds or thousands * Subtract a 5-digit number from another using column subtraction which requires exchange between the units, tens, hundreds or thousands (or any two of these)     Subtract numbers with up to three decimal places    Model negative numbers using a number line.  Model time problems using a number line. | **Written methods to include;**  As Year 5 but with larger numbers.  Children should also subtract negative integers on a number line.  **Children should be able to choose the most reliable and efficient methods for themselves.** |

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| WRITTEN MULTIPLICATION | | |
| Year 1 | Year 2 | Year 3 |
| **With support and real objects solve multiplication calculations**   1. **Pictures and symbols**   There are 3 sweets in one bag.  How many sweets are there in 5 bags?    *(Recording on a number line modelled by the teacher when solving problems)*  Extension  For those children who can show multiplication calculations with pictures and symbols, introduce arrays as in Year 2. | **x = signs and missing numbers**  7 x 2 = = 2 x 7  7 x = 14 14 = x 7  x 2 = 14 14 = 2 x  x ∇ = 14 14 = x ∇ Arrays continued and repeated addition  * ⚫ ⚫ ⚫ 4 x 2 or 4 + 4 * ⚫ ⚫ ⚫   2 x 4  or repeated addition  2 + 2 + 2 + 2  **15 x 2 = 30** Partition ( 10 x 2) + ( 5 x 2)  20 + 10    = 30  **Number lines**  6 x 3 | **x = signs and missing numbers**  Continue using a range of equations as in Year 2 but with appropriate numbers.  **Written methods to include; Write and calculate using multiplication; 2-digit x one-digit; using mental and written methods**  **Grid method**  35 x 2= 70 (TU x U)  Partition and introduce the grid methods as early into Year 3 as possible. |

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| WRITTEN MULTIPLICATION | | |
| Year 4 | Year 5 | Year 6 |
| **x = signs and missing numbers**  Continue using a range of equations as in Year 2 but with appropriate numbers  **Written methods to include; Multiply 2-digit and 3-digit numbers by 1-digit number using formal written methods including long multiplication.** | **x = signs and missing numbers**  Continue using a range of equations as in Year 2 but with appropriate numbers  **Written methods to include; Multiply numbers up to 4-digits by a 1 or 2-digit number using formal methods, including long multiplication** | **x = signs and missing numbers**  Continue using a range of equations as in Year 2 but with appropriate numbers  **Written methods to include; Multiply 4-digit whole numbers by 2-digit whole numbers**  3721 x 14  Efficient methods – as in Year 5  **Compact method for decimals**  7 x 3.8 (1 decimal place)  7 x 3.86 (2 decimal places) |

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| WRITTEN DIVISION | | |
| Year 1 | Year 2 | Year 3 |
| **With support and real objects solve division calculations**  **Pictures / marks**  12 children get into teams of 4 to play a game. How many teams are there? | **÷ = signs and missing numbers**  6 ÷ 2 = = 6 ÷ 2  6 ÷ = 3 3 = 6 ÷  ÷ 2 = 3 3 = ÷ 2  ÷ ∇ = 3 3 = ÷ ∇   Understand division as sharing and grouping **Sharing** – 6 sweets are shared between 2 people. How many do they have each?    🚺 🚺  ⚫ ⚫ ⚫ ⚫ ⚫ ⚫  6 ÷ 2 can be modelled practically as:    **Grouping** – There are 6 sweets. How many people can have 2 each? (How many 2’s make 6?) | **÷ = signs and missing numbers**  Continue using a range of equations as in Level 2 but with appropriate numbers.  **Written methods to include; Write and calculate using division; 2-digit divide a one-digit; using mental and written methods** Understand division as sharing and grouping 18 ÷ 3 can be modelled as:  **Sharing** – 18 shared between 3 (see Year 2 diagram)  **Grouping** - How many 3’s make 18?   Remainders **16 ÷ 3**  **Sharing** - 16 shared between 3, how many left over?  **Grouping** – How many 3’s make 16, how many left over? |

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| WRITTEN DIVISION | | |
| Year 4 | Year 5 | Year 6 |
| **÷ = signs and missing numbers**  **Written methods to include; Divide 2-digit and 3-digit numbers by 1-digit number using formal written methods;- interpret remainders as integers.** Sharing and grouping initially **30 ÷ 6**   * **grouping** – groups of 6 taken away and the number of groups counted e.g. * **sharing** – sharing among 6, the number given to each person   **44 ÷ 4 = 11**    0 40 44  **Moving onto;** Bus stop method for short division | **÷ = signs and missing numbers**  **Written methods to include; Divide numbers up to 4-digits by a 1-digit number and 10 (with remainders).** Bus stop method for short division  Remainders  To be interpreted depending on the context such as money, decimals if appropriate etc Move onto chunking as long division when children are ready to move onto division by a 2 digit number.  E.g. 348 **÷** 12 | **÷ = signs and missing numbers**  **Written methods to include; Divide numbers up to 4-digits by a 2-digit whole numbers and recognise remainders as whole numbers, fractions, decimals or by rounding.**  Divide 4 digits by 2 digits.  **826 ÷ 12**    **Include fact boxes for; x1, x2, x5, x10, x20** Remainders Quotients expressed as fractions or decimal fractions  676 ÷ 8 = 84.5 |

1. **Fractions, Decimals and Percentages Policy**

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| Fractions, Decimals and Percentages Policy 2019  Use Singapore bar as a visual when and where needed. | | |
| Year 1 | | |
| Objective | Examples | Models and Images |
| **Recognising Fractions**  Recognise, find and name a half as one of two equal parts of an object or shape. |  | |  | | --- | | What is half of 8? Half of 8 is 4. | |  | |
| **Recognising Fractions**  Recognise, find and name a half as one of two equal parts of a quantity. | Choose a number of counters. Place them onto 2 plates so that there is the same number on each half.  When can you do this and when can’t you?  What do you notice? |
| **Recognising Fractions**  Recognise, find and name a quarter as one of four equal parts of an object or shape. |  |
| **Recognising Fractions**  Recognise, find and name a quarter as one of four equal parts of a quantity. | Choose a number of counters. Place them onto 4 plates so that there is the same number on each quarter.  When can you do this and when can’t you?  What do you notice?  Mary puts a quarter of these buttons in a box. How many does |
| Year 2 | | |
| **Counting in Fractional Steps**  Pupils should count in fractions up to 10, starting from any number and using the 1/2 and 2/4 equivalence on the number line. | **Spot the mistake What comes next?**  7, 7 ½ , 8, 9, 10 5 ½, 6 ½ , 7 ½ , …., ….  8 ½, 8, 7, 6 ½, 9 ½, 9, 8 ½, ……, …..  http://www.11plusforparents.co.uk/Maths/images/Fractions/frac3.gif… and correct it |  |
| **Recognising Fractions**  Recognise, find, name and write fractions 1/3, 1/4, 2/4 and 3/4 of shape. |  |
| **Recognising Fractions**  Recognise, find, name and write fractions 1/3, 1/4, 2/4 and 3/4 of a set of objects. |  |
| **Recognising Fractions**  Recognise, find, name and write fractions 1/3, 1/4, 2/4 and 3/4 of length. | Gemma has 60cm of ribbon.  If she cuts off half how much does she have left?  **True or false?**  Half of 20cm = 5cm  ¾ of 12cm = 9cm |
| **Recognising Fractions**  Recognise, find, name and write fractions 1/3, 1/4, 2/4 and 3/4 of numbers. | Find…  1/4 of 40  2/4 of 40  3/4of 40  4/4 of 40  Look at relationships between and the equivalent fractions.  Then try:  3/4 of 40 =  1/3 of 21 = |
| Year 3 | | |
| **Counting in Fractional Steps**  Count up and down in tenths. | 0.1, 0.2, 0.3, 0.4, 0.5, 0.6,  1/10, 2/10, 3/10, 4/10, 5/10, 6/10  0.7, 0.8, 0.9, 1.0  7/10, 8/10, 9/10, 10/10  7.6, 7.7, 7.8, 7.9, 8.0  7 6/10, 7 7/10 |  |
| **Recognising Fractions**  Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators. | Liz drank 1/3 of her drink. If there is 200ml left, how much drink was there to begin with?   |  |  |  | | --- | --- | --- | | 100 | 100 |  |   Harry ate 1/4 of the sweets. If there are 12 sweets left, how many sweets were there to start with?   |  |  |  |  | | --- | --- | --- | --- | | 4 | 4 | 4 |  | |
| **Recognising Fractions**  Recognise that tenths arise from dividing an object into 10 equal parts and in dividing one – digit numbers or quantities by 10. | 1/10 of 10=1  2/10 of 10=2  1/10 of 20=2  2/10 of 20=4  True or false- 3/10 of 20 = 5? |
| **Recognising Fractions**  Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators |  |
| **Recognising Fractions**  Recognise and show, using diagrams, equivalent fractions with small denominators |  |
| **Comparing and ordering Fractions**  Compare and order unit fractions, and fractions with the same denominators | http://s3.amazonaws.com/edcanvas-uploads/144337/local/1378905071/ORDERFRACTIONSPIC.jpg  Ordering without pictures  Order these fractions from smallest to largest:  1/7, 1/5, 1/10, 1/3 |
| **Addition of Fractions**  Add fractions with the same denominator within one whole (e.g. 5/7 + 1/7 = 6/7) | 5/7 + 1/7 = 6/7 |
| **Subtraction of Fractions**  Subtract fractions with the same denominator within one whole (e.g. 5/7 - 1/7 = 4/7) | 5/7 - 1/7 = 4/7 |
| **Problem Solving Fractions**  Solve problems that involve all of the above |  |
| Year 4 | | |
| **Recognising Fractions**  Recognise and show, using diagrams, families of common equivalent fractions | C:\Users\Cedwards55\Downloads\pizza.png**Odd one out.**  Which is the odd one out in each of these trio  3/4  9/12 4/6  9/12 10/15  2/3  Why?  **What do you notice?**  Find 4/6 of 24  Find 2/3 of 24  What do you notice?  Can you write any other similar statements? |  |
| **Counting in Fractional Steps**  Count up and down in hundredths; recognise that hundredths arise when dividing an object by 100 and dividing tenths by 10 | Spot the mistake  sixty tenths, seventy tenths, eighty tenths, ninety tenths, twenty tenths  … and correct it.  What comes next?  83/100, 82/100, 81/100, ….., ….., …..  31/100, 41/100, 51/100, ….., ….., |
| **Addition and Subtraction of Fractions**  Add and subtract fractions with the same denominator | 1/5 + 2/5 = 3/5  6/10 – 4/10 = 2/10 |
| **Comparing/Rounding Decimals**  Round decimals with 1 decimal place to the nearest whole number  Compare numbers with the same number of decimal places up to 2 decimal places | Do, then explain  Circle each decimal which when rounded to the nearest whole number is 5.  5.3 5.7 5.2 5.8  Explain your reasoning  Top tips  Explain how to round numbers to one decimal place?  Also see rounding in place value |
| **Equivalence including fractions and decimals**  Recognise and write decimal equivalents of any number of tenths or hundreds  Recognise and write decimal equivalents to 1/4 , 1/2 , 3/4 | **Complete the pattern by filling in the blank cells in this table:**   |  |  |  |  | | --- | --- | --- | --- | | 1  10 | 2  10 | 3  10 |  | | 10  100 | 20  100 |  | 40  100 | | 0.1 |  | 0.3 |  |   **Another and another**  Write a decimal numbers (to one decimal place) which lies between a half and three quarters?  … and another, … and another, …  **Ordering**  Put these numbers in the correct order, starting with the smallest.  1/4  0.75 5/10  Explain your thinking |
| **Multiplication and Division of Decimals**  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 | **Undoing**  I divide a number by 100 and the answer is 0.3. What number did I start with?  **Another and another**  Write down a number with one decimal place which when multiplied by 10 gives an answer between 120 and 130.  ... and another, … and another, … |
| **Problem Solving Fractions**  Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number  Solve simple measure and money problems involving fractions and decimals to 2 decimal place. | ¾ of the class are going on a school trip. There are children in the class. How many children are not going on the school trip?  A jacket in a shop costs £25. It is reduced in the sale by 20%. What is the new price of the jacket? |
| Year 5 | | |
| **Recognising Fractions**  Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents  (appears also in Equivalence)  Continue the pattern | **What do you notice?**  One tenth of £41  One hundredth of £41  One thousandth of £41  What do you notice?  0.085 + 0.015 = 0.1  0.075 + 0.025 = 0.1  Continue the pattern for the next five number sentences.  **True or false?**   * 1. of a kilometre is 1m.   2. of 2 kilometres is 2m.   3. of 3 Kilometres is 3m (see below)   3km- 3000m. below this has been shared equally into 10 parts. Each part representing 0.1   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |   300 + 300 + 300= 900m so 0.3 of 3km is 3m is false.  0.25 of 3m is 500cm.  2/5 of £2 is 20p (see below)  e.g. Singapore Bar Method   |  |  |  |  |  | | --- | --- | --- | --- | --- | | 40p | 40p | 40p | 40p | 40p |   40 + 40 = 80p so 2/5 of £2 is 20p is false. |  |
| **Ordering and comparing Fractions**  Ordering and comparing decimals. | Put these numbers into ascending/descending order.  Which digit do you have to look at to work this out?  5.51, 3.75, 7.35, 5.73, 3.77  Give an example of a fraction that is more than three quarters.  Now another example that no one else will think of.  Explain how you know the fraction is more than three quarters.  Imran put these fractions in order starting with the smallest. Are they in the correct order?  Two fifths, three tenths, four twentieths  How do you know? |
| **Ordering and comparing Fractions**  Read, write, order and compare numbers with up to three decimal places (Cover during PV) | **Missing symbol**  Put the correct symbol < or > in each box  4.627 4.06  12.317 12.31  What needs to be added to 3.63 to give 3.13?  What needs to be added to 4.652 to give 4.1? |
| **Comparing/Rounding Decimals**  Round decimals with two decimal places to the nearest whole number and to one decimal place (PV Week) | **Do, then explain**  Circle each decimal which when rounded to one decimal place is 6.2.  6.32 6.23 6.27 6.17  Explain your reasoning  **Top tips**  Explain how to round decimal numbers to one decimal place?  *Also see rounding in place value* |
| **Equivalence including fractions and decimals**  Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths | **Odd one out.**  Which is the odd one out in each of these collections of 4 fractions  6/10  3/5 18/20 9/15  30/100 3/10 6/20 3/9  Why?  **What do you notice?**  Find 30/100 of 200  Find 3/10 of 200  What do you notice?  Can you write any other similar statements? |
| **Equivalence including fractions and decimals**  Read and write decimal numbers as fractions (e.g. 0.71 = 71/100)  Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents | **Complete the pattern**   |  |  |  |  | | --- | --- | --- | --- | | 71  100 | ??  100 | ??  100 | ??  100 | | 0.71 | 0.81 | ??? | ??? |   Complete the table.  **Another and another** Write a fraction with a denominator of one hundred which has a value of more than 0.75?  … and another, … and another, … |
| **Equivalence including fractions and decimals**  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 as a decimal fraction | **Ordering**  Put these numbers in the correct order, starting with the largest.  7/10, 0.73, 7/100, 0.073 71%  Explain your thinking  Which is more:  20% of 200 or 25% of 180?  Explain your reasoning. |
| **Addition and Subtraction of Fractions**  Add and subtract fractions with the same denominator and multiples of the same number | **What do you notice?**  ¾ and ¼ = 4/4 = 1  4/4 and ¼ = 5/4 = 1 ¼  5/4 and ¼ = 6/4 = 1 ½  Continue the pattern up to the total of 2. |
| **Recognise and convert Fractions**  Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number (e.g. 2/5 + 4/5 = 6/5 = 11/5) | Can you make up a similar pattern for subtraction?  The answer is 1 2/5 , what is the question |
| **Multiplication and Division of Decimals**  Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams | **Continue the pattern**  ¼ x 3 =  ¼ x 4 =  ¼ x 5 =  Continue the pattern for five more number sentences. How many steps will it take to get to 3?  5/3 of 24 = 40  Write a similar sentence where the answer is 56. The answer is 2 ¼ , what is the question  Give your top tips for multiplying fractions.  **Undoing**  I divide a number by 100 and the answer is 0.33 What number did I start with?  **Another and another** Write down a number with two decimal places which when multiplied by 100 gives an answer between 33 and 38.  ... and another, … and another, … |
| **Problem Solving Fractions**  Solve problems involving numbers up to three decimal places | Applying RUCSAC to FDP problems |
| **Problem Solving Fractions**  Solve problems which require knowing percentage and decimal equivalents of 1/2, 1/4, 1/5, 2/5, 4/5 and those with a denominator of a multiple of 10 or 25. | Applying RUCSAC to fractions, decimals and percentages word problems |
| Year 6 | | |
| **Compare and order Fractions**  Compare and order fractions, including fractions >1. | **Assessment**: Match equivalent fractions, on cards or interactive games e.g 3/4 = 75/100 = 12/16  Finding the LCM of the denominators e.g. 3/5, 1/4, 2/8 = ?/40  Is 3/5 > 2/8?  Review mixed and improper fractions e.g. 2 2/3 = 8/3  Is 1 1/2 > 14/8  Sam put these fractions in order starting with the smallest. Are they in the correct order?  Thirty three fifths  Twenty three thirds  Forty five sevenths  How do you know?  Give an example of a **fraction** that is greater than 1.1 and less than 1.5.  Now another example that no one will think of. Explain how you know. |  |
| **Identify value of digits in decimals**  Identify the value of each digit to three decimal places and multiply and divide numbers by 10, 100  and 1000 where the answers are up to three decimal places.  Multiply one-digit numbers with up to two decimal places by whole numbers. | **PLACE VALUE HAS TO BE SOLID AT THIS POINT**  **Assessment:**  **True or false?**  In all of the numbers below, the digit 6 is worth more than 6 hundredths.  3.6 3.063 3.006  6.23 7.761  3.076  Is this true or false?  Change some numbers so that it is true  Show that 6.543 is equivalent to 6 543/1000 – what needs to be added to make a whole thousand?  What needs to be added to 6.543 to give 7?  What needs to be added to 3.582 to give 5?  Suggest a fraction between 3.62 and 3.63  Circle the two decimals which are closest in value to each other.  0.9 0.09 0.99 0.1 0.01  Circle two decimals that make up a whole  0.324, 0.538, 0.119, 0.676  Convert a larger metric unit to a smaller e.g. 3.125Km = 3125m  What do you notice?  ½ x ¼ = |
| **Simplify using common factors**  Use common factors to simplify fractions; use common multiples to express fractions in the same denomination. | **Odd one out**.  Which is the odd one out in each of these collections of 4 fraction  s¾  9/12 26/36  18/24  4/20 1/5 6/25 6/30  Why?  **What do you notice?**  8/5 of 25 = 40  5/4 of 16 = 20  7/6 of 36 = 42  Can you write similar statements? |
| **Equivalence including fractions and decimals**  Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. 3/8). | **Complete the pattern**   |  |  |  |  | | --- | --- | --- | --- | | 1  8 | 2  8 | 3  8 | 4  8 | | 0.375 | ??? | ??? | ??? |   Complete the table.  **Another and another** Write a unit fraction which has a value of less than 0.5?  … and another, … and another, … |
| **Equivalence including fractions and decimals**  Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts. | Ordering  Recognise patterns in equivalent fractions, e.g. for one half,  one third, one quarter, one fifth and one tenth.  Recognise that a fraction can be:  reduced to an equivalent fraction by dividing both  numerator and denominator by the same number, which is  called cancelling, e.g.  5 = 5 ÷ 5 = 1  20 20 ÷ 5 4  Which is larger, 1/3 or 2/5? Explain how you know  Understand decimals up to 3 places.  5.251, 5.3, 5.708, 5.009, 5.15  Suggest a decimal fraction between 4.17 and 4.18  Put the following amounts in order, starting with the largest.  23%, 5/8, 3/5, 0.8 |
| **Addition and Subtraction of Fractions (Different denominators)**  Add and subtract fractions with different denominators and mixed numbers, using the  concept of equivalent fractions . | **Another and another**  Write down two fractions which have a difference of 1 2/… and another, … and another, …  **Another and another**  Write down2 fractions with a total of 3 4/5.  … and another, … and another, … |
| **Multiply and Divide proper Fractions**  Multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. 1/4 × 1/2 = 1/8).  Divide proper fractions by whole numbers (e.g. 1/3 ÷ 2 = 1/6 ). | **Continue the pattern**  1/3 ÷ 2 = 1/6  1/6 ÷ 2 = 1/12  1/12 ÷ 2 = 1/24  The answer is 1/8 , what is the question (involving fractions / operations)  Give your top tips for dividing fractions. |
| **Converting Decimals and Fractions using Division**  Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction  (e.g. 3/8) .  Use written division methods in cases where the answer has up to two decimal places. | When I divide a number by 1000 the resulting number has the digit 6 in the units and tenths and the other digits are 3 and 2 in the tens and hundreds columns. What could my number have been?  **Undoing**  I multiply a number with three decimal places by a multiple of 10. The answer is approximately 3.21  What was my number and what did I multiply buy? |
| **Problem Solving using Fractions**  Solve problems which require answers to be rounded to specified degrees of accuracy. | **Assessment:**  **Do, then explain**  Write the answer of each calculation rounded to the nearest whole number  75.7 × 59  7734 ÷ 60  772.4 × 9.7  20.34 × (7.9 – 5.4)  **What’s the same, what’s different?**  … when you round numbers to one decimal place and two decimal places?  *Also see rounding in place value* |

1. **Models and Images Policy**

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| **Addition** | | |
| **Year 1** | **Year 2** | **Year 3** |
| **+ = signs and missing numbers**    3 + 4 = = 3 + 4  3 + = 7 7 = + 4  + 4 = 7 7 = 3 +  + ∇ = 7 7 = + ∇  3 + 4 is the same as 7 as modelled using Numicon  Use Numicon to further understand the equivalence in a number sentence.  Promoting covering up of operations and numbers.  **Using Number lines**  http://www.mathematic.ws/wp-content/uploads/2009/04/number-line.png(Teacher model number tracks and lines with numbers and with missing numbers)  http://www.kenttrustweb.org.uk/UserFiles/kict/Image/Numeracy/Control_Technology/doubleline.gif  7 + 4 = 11 Children go up in 1s |  |  |

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| **Addition** | | |
| **Year 4** | **Year 5** | **Year 6** |
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| **Subtraction** | | |
| **Years 1 and 2** | **Years 3 and 4** | **Years 5 and 6** |
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| **Multiplication** | | |
| **Year 1** | **Year 2** | **Year 3** |
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| **Multiplication** | | |
| **Year 4** | **Year 5** | **Year 6** |
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| **Division** | | |
| **Year 1** | **Year 2** | **Year 3** |
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| **Division** | | |
| **Year 4** | **Year 5** | **Year 6** |
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