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**BURNBRAE PRIMARY NUMERACY PROGRESSION**

**Acknowledgement**

This programme is extensively based on proven approaches and strategies defined within the Maths Recovery and New Zealand programmes. The former, founded on years of research by Dr Robert Wright, Professor in Maths Education within Southern Cross University in Australia and colleagues, is now internationally renowned in responding to problems of children's failure in early numeracy and primary mathematics and has been used extensively by many nations, including New Zealand, to develop their own standards and teaching approaches in mathematics.

**GUIDANCE**

The Numeracy Progression sets out a clear set of learning experiences and outcomes from the following Curriculum for Excellence numeracy / mathematics organisers:

**Number and number processes including** addition, subtraction, multiplication, division and negative numbers

**Estimation and rounding**

**Multiples, factors and primes**

**Patterns and relationships**

**Expressions and equations**

The purpose of this document is to provide a continuum of learning both within a level and through the Early, First and Second levels. The developmental stages of learning in numeracy are clearly documented and this will support teachers when identifying starting points for children. The progression is intended to assist teachers as they plan their mathematics curriculum.

Each level begins with a list of the Curriculum for Excellence Experiences and Outcomes which will be experienced by the pupils.

The ‘Points to Consider’ section provides detailed descriptions of key mathematical ideas or concepts which pupils will need to know in order to achieve this level and provides clear and concise guidance for teachers.

Each level is divided into three lateral stages [\*, \*\* and \*\*\*] to show how the learning and teaching progresses within a level. These are developmental stages and not aligned to any particular year group. Pupils will progress through these stages i.e. from \* to \*\* and then to \*\*\* as and when they are ready and able to do so.

The progression is organised into different domains [written in red type] e.g. ‘Number Word Sequences’, ‘Read/ Write Numbers’, ‘Structuring Numbers – Grouping and Place Value’ etc. **Each mathematics lesson should include teaching and learning from between 3 and 5 domains at a time.** Time should be given for children to understand new ideas and concepts and have plenty of practice to deeply embed these skills and knowledge. New domains can be added once children are confident with a previous domain. TEACHERS ARE ASKED TO NOTE THAT WHILST THERE IS A LATERAL PROGRESSION FROM \* TO \*\*\* THERE IS NOT A VERTICAL PROGRESSION THROUGH THE PROGRAMME UNLESS CLEARLY INDICATED BY USE OF ARROWS. (These have been colour coded to show which particular learning intentions have to be followed in a linear route before moving across to the next column). Teachers will decide when it is appropriate to introduce a new domain based on pupils’ prior learning.

The Numeracy progression focuses on developing increasingly sophisticated and refined mathematical understanding, fluency, logical reasoning, analytical thought and problem solving skills based on international research.

**The language used in this document to show a multiplication statement needs to be clarified and a decision will have to be made in schools as to the way each teacher interprets these in their own class. A consensus is important, for example, in this document 5 x 4, (‘five times four’) means five sets of four. 5 is the number of equal sets and 4 is the size of each set.**

**Burnbrae Numeracy Progression**

**EARLY LEVEL**



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| **Early** | **Experiences and outcomes** | **Early** |

I am developing a sense of size and amount by observing, exploring, using and communicating with others about things in the world around me. **MNU 0-01**

I have explored numbers, understanding that they represent quantities, and I can use them to count, create sequences and describe order. **MNU 0-02a**

I use practical materials and can ‘count on and back’ to help me to understand addition and subtraction, recording my ideas and solutions in different ways. **MNU 0-03a**

I can share out a group of items by making smaller groups and can split a whole object into smaller parts. **MNU 0-07a**

I have spotted and explored patterns in my own and the wider environment and can copy and continue these and create my own patterns. **MTH 0-13a**

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| **Early** | **Points to consider** | | | **Early** | |
| * The key focus in **pre-counting** is an understanding of the concept **more, less** and **the same** and an appreciation of how these are related. Children at the early stages of Early level develop these concepts by comparison and no counting is involved. * Children often have some concept of ‘more’; this needs to be extended and refined. ‘Less’ is a more difficult concept and understanding can be developed by pairing the terms less and more to help develop an understanding of the relationship between the two. * The **number ranges** e.g. 1 – 5 are guides only and should be adapted to suit the needs / ability levels of the pupils in your class. * **Representing numbers** in a variety of ways is essential for developing number sense e.g....      * **Counting** is an important component of number and the early learning of operations. There is a distinction between counting by rote (not necessarily having a **one-to-one correspondence**) and counting with understanding. * Teaching the ‘**Strategy of Counting’** i.e. each object is counted once and only once by moving each object as you count is essential for success. | | | * **Order-irrelevance principle**: When counting the number of objects in a set, the order they are counted in is irrelevant, as long as each object is counted and pupils know and understand that the last number is ‘the count’. Sometimes an item is counted more than once by pupils or two items are counted for one number, e.g.... se-ven so lots of practice is required.   plastic-farm-animalsCan start at any animal – the **count stays the same**.   * Once children become very familiar with counting collections they realise that numbers can be used to count **anything**. * The **teen numbers** are often the most difficult for pupils. The oral language pattern of teen numbers is the reverse of the usual pattern of ‘tens first and **then** ones’, e.g....13 is ‘thir’ ‘teen’ and 31 is ‘thirty’ ‘one’. There is often difficulty distinguishing between 12 and 21. Confusion can also arise when saying ty and teen endings. * Children can and should become skilful at associating number words with numerals in **the** teens long before they understand that the left hand digit (‘1’) stands for the number ‘ten’. * **Subitising** involves immediately recognising the number of objects in a small collection without having to count the objects e.g. the dots on a dice. The pattern should be flashed to avoid the temptation to count. 7 is generally the most anyone can individually recognise in one pattern. | | |
| **Early** | **Points to consider** | | | **Early** | |
| * **Collections** should be presented in a variety of ways.      * **Addition and Subtraction** needs to move from counting and combining concrete materials to using abstract methods e.g. hiding materials behind screens and in boxes to develop the pupils’ ability to visualise and internalise before introducing written number sentences. * Numeral tracks, numeral rolls and hundred squares are all excellent tools to support children’s understanding of **number sequences, forwards and backwards.** * Addition and subtraction problems should be related to **real-life experiences** and stories. * Wherever possible, addition and subtraction should be taught simultaneously to reinforce the concept of the **inverse operation**. | | | * **Subtraction** typically covers three different situations: * ‘**Taking away’** from a group (need to be confident at this before being introduced to the next two). * ‘**Comparing**’ two groups – find the difference to a numeric value not any other attributes - see example of towers below. * Finding ‘**how many more or less’** are in a group.   1456410-colorful-block-to-build-towers-and-houses   * Children may have difficulty linking their ideas   about addition and subtraction to situations  involving the comparison of collections,  e.g.... how much bigger is the tallest tower?   * All activities should involve children **manipulating concrete materials** to begin with and then gradually removing these by **flashing** (a quick look) the materials/ tool and then **screening** (hiding). The fact that the materials/ tools are still there can support children’s imagery, through **visualisation** and eventually help embed the basic facts or strategies. * **Division** -there are two forms of division: **sharing** and **grouping**. * When sharing a collection of objects fairly, children should understand that their share is the same as everyone else’s share i.e. that all **fair shares are equal**. * Children should also have an understanding that within real life situations some shares may have some items ‘left over’ or ‘a **remainder**’ and that they then need to think about how they are going to deal with this. | | |
| **Early** | **Points to consider** | | | **Early** | |
| * After children have shared objects equally, the process can be INVERSED to begin to develop the **link between division and multiplication.** This can be done by pupils first sharing a group of objects and then putting back together all of the shares to form one collection. * Children may be able to represent division-type situations by sharing out or **forming equal groups**, but become confused about what to count to solve the problem, often choosing to count all the items. Rich discussion and experiences, putting ‘sharing problems’ into context ( listening to and making up their own stories), will support their development * Pupils may deal out an equal number of items or portions in order to share, but do not use up the whole quantity or attend to the equality of the size of the portions. This is perfectly acceptable and should be supported by discussion with the child if one share having more (or not using the whole up) is fair. * **Multiplication** - pupils will begin to use forward and backward number word sequences using the multiples of 2 and 5. They begin counting these using a rhythmic count 1, **2**, 3, **4,** 5, **6**, 7, **8**… and progress to skip counting - **2, 4, 6, 8.** | | | * At this level children learn that building two collections by matching one to one leads to collections of equal size, and can ‘fix’ one collection to make it match another in size. e.g.... show a row of three vehicles and ask the child if they can make a second row of three vehicles to match.   Description: http://image.made-in-china.com/2f0j00dZEtYwSPnzqb/Promotion-Pull-Back-Toy-Car-0415-.jpg  Children may ‘**skip count’** but do not realise it gives the same answer as counting by ones and, therefore do not trust it as a strategy to find out ‘how many?’ e.g..., for above they may count in 2s – 2, 4, 6 but then not rely on this answer and so then count the cars individually.   * **Modelling** (using concrete materials to represent the numbers in the sum), drawing and writing mathematical problems should be encouraged at this level e.g.... when told a story about black horses and white horses, they represent the horses with black and white counters or cubes. * They may ‘act out’ or draw a picture to **represent a small number** of things, e.g.... they pretend to be the horses and act out the story. * Formal writing of number sentences is introduced at First Level. | | |
| **Early** | | **Suggested Written Recording** | | | **Early** |

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| **At Early Level children’s written recording can be nurtured by the provision of a mathematically rich environment which helps them to explore the world of mathematics. A wide range of resources (pens, clipboards, post-its, notebooks) should be readily available to encourage children to record their own mathematical thinking. The following points are important when considering what, when and where they should be recording.** | | |
| Children need to be free to choose how they will represent and communicate their own mathematical understanding. | | Recording can be temporary, for example on a white/chalk board, scrap paper and post-it-notes or stored more permanently in a designated maths jotter/folder. Photos may be taken of this as and when appropriate.      *‘exploring telephone numbers’* |
| Between the ages of 3 and 4 years of age children will begin to attribute mathematical meanings to the marks they make on paper. | ‘Emergent’ and ‘individual’ mathematical graphics and open ended discussions should be encouraged to help children make sense of the sometimes confusing symbols and abstract nature of mathematics. |
| Children are encouraged to give their own meanings to their graphics (drawings, writing, symbols, and marks). |

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| **Early** | **Suggested Written Recording** | **Early** |

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| Once children represent quantities that are counted, they begin to explore calculations. | Supportive and encouraging adults can support children’s own ways of exploring their mathematical thinking so that they make strong connections with their own understanding  [https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcQahPAT-A8vEOa9GRzdKWbR0RpGtW3bVfIBmvr9wK4YZiDeifPC](http://www.google.co.uk/imgres?start=115&um=1&hl=en&biw=1920&bih=908&tbm=isch&tbnid=F2UoqJMRbDvB5M:&imgrefurl=http://kiddiwinksnurseries.com/enabling/&docid=oa3yMK4MQ_q_aM&itg=1&imgurl=http://kiddiwinksnurseries.com/images/achieve.jpg&w=950&h=300&ei=0tJtUZjvOOeY1AWK9YHoBw&zoom=1&ved=1t:3588,r:57,s:100,i:175&iact=rc&dur=1963&page=4&tbnh=126&tbnw=334&ndsp=43&tx=216&ty=69) | | Young children are very good at making sense of their solutions through their own marks and symbols. Children need to make sense of maths in their own ways rather than being required to ‘colour-in’ or complete worksheets designed by teachers. |
| Children do not need to record their mathematics if they can work something out mentally, neither do they need to record something they have already worked out in a practical context with resources. | |
| *‘8 more sleeps until mummy comes home.’ This pupil has recorded 8 tally marks to represent this and recognises the numeral 8.*  Children will integrate  standard symbols and  written methods as they  develop their understanding. | Numerals will be written as labels for collections, to represent quantities that have not been counted as well as those that have been counted. | Un-ruled jotters have a distinctive advantage over lined/ squared books in that pupils are not restricted by lines and have the space to choose whether to use pictures, numbers, words or a combination of these to record their thinking.    *Can 8 be shared equally between 2?* | |

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| \*  **Early**  Progress will be evident when pupils can: | \*\*  **Early**  Progress will be evident when pupils can: | \*\*\*  Progress will be evident when pupils can: |
| **Number Word Sequences** | **Number Word Sequences** | **Number Word Sequences** |
| Recite some number word sequences but not always in order. | Recite number word sequences forwards, in order, in the range of at least 0-20, from any given number. | Recite number word sequences forwards, in order, in the range of at least 0-30 from any given number. |
| Join in reciting number word sequences backwards through songs and free play opportunities; listen to staff modelling backward number word sequences. | Recite number word sequences backwards, in order, in the range of at least 0 - 20, from any given number. | Recite number word sequences backwards, in order, in the range of at least 0-30 from any given number. |
| Understand the concept of before and after, e.g. point to a number before on a horizontal/vertical number line or name the person who is behind them in a line. | Begin to have an awareness of the number word just before and just after a given number in the range of 0-20 (count back) and 0-20 (count on). | Say the number word just before and after a given number in the range of at least 0-30. |
| Say the next 2, 3, 4 numbers in a number word sequence. |
| Join in with stories, rhymes and songs with predictable rhythms. | | Begin to say multiples of two (in the range of 0-20) and five (in the range of 0 – 50) forwards and backwards, altering the start number. |
| **Numbers in the environment, counting and ordering.** | **Read/Write numbers up to 10** | **Read/Write numbers up to 20** |
| Begin to understand ordinal names, first and last, e.g. describe who is first/ last to go on the slide. | Use some ordinal names (first, second, etc…) | Read and use the ordinal names to at least ‘tenth’. |
| Identify and name some numbers, distinguishing number names from other words, e.g. recognise their age on a birthday card. | Read numeral sequences (to at least ten). | Read numeral sequences (to at least twenty). |
| Sequence numerals (forwards and backwards to at least ten – altering the start number). | Sequence numerals (forwards and backwards to at least twenty – altering the start number). |
| Identify and represent some numbers within 5 by making marks/ drawings. Distinguish numerals from other written symbols. | Identify and represent some numbers to at least 10 (including zero) using numerals, words, symbols and objects, including fingers. | Identify and represent all numbers to at least 20 (including zero) using numerals, words, symbols, pictures and objects (including fingers). |
| **\***  **Early**  **Progress will be evident when pupils can:** | **\*\***  **Early**  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** |
| **Numbers in the environment, counting and ordering.** | **Read/Write numbers up to 10** | **Read/Write numbers up to 20** |
| Recognise numbers from 0-5 (find number within a group) and name numbers in their environment e.g.... bus, house, class names. | Recognise most numbers from 0-10 (find number within a group) and name numbers they find around them. | Recognise numbers from 0-20 (find numbers within a group) and in a variety of contexts, including on classroom charts, computer keyboard etc. |
| Explore the order of the number sequence 1-3, and beyond e.g....    *Children build patterns with concrete materials so they can see the numbers are increasing by one. They may comment that pattern is getting bigger/ taller.* | Identify one missing number in a sequence up to 10, e.g.... 5, 6, \*, or 8, 9, \*, (on a numeral track). | Identify missing numbers, in a sequence up to 20, e.g.... 16, \*, \*, 19, 20 (on a numeral track). |
| Identify the missing number from a sequence of 1 – 5 [practical materials used where possible] e*.g. If one piece of the train puzzle was missing, would they know which number was missing?* | | Find a number between two 2 digit numbers within 20, e.g.... *Give me a number between 11 and 15? Can you think of another?* |
| **Structuring Numbers - Grouping** | **Structuring Numbers - Grouping** | **Structuring Numbers - Grouping** |
| Be able to see at a glance how many there are in a small collection and attach number names  yet may not be able to say the number names in order. This is called **SUBITISING.** | Subitising (‘seeing’ without counting) small collections (e.g.... 1 - 5) using concrete materials. | Explain flashed domino patterns up to 6 and explain what they see and describe it in another way. |
| Recognise quantities from domino/pair/irregular patterns (subitising). Start to recognise numbers up to 10 and beyond when combining two or more patterns. |
| **\***  Early  **Progress will be evident when pupils can:** | **\*\***  Early  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** |
| **Structuring Numbers -Grouping** | **Structuring Numbers -Grouping** | **Structuring Numbers -Grouping** |
| Count and copy a sequence of individual sounds, up to 3 claps, beats (this is known as a temporal sequence). | Count and copy a sequence of individual sounds, up to 5 claps, beats (temporal sequences). | Count and copy a temporal sequence of claps, beats up to at least 10 - individual and groups of claps. |
| Use fingers and beats to represent numbers in stories and songs. | Use finger patterns to keep track of temporal sequences (like beats of a drum or jumps)  *e.g. Use your fingers to count how many beats are made on this drum.* | Use finger patterns to show patterns of 0-10, doubles |
| Make finger patterns up to 5 by looking at their fingers.  Description: http://img.gawkerassets.com/img/17r2nhmg9n26mjpg/original.jpg | Make finger patterns up to 5 and beyond in different ways by looking at their fingers.  *e.g.*  *Put I finger up on one hand and 4 on the other,*  *2 fingers up on one hand and 3 on the other,*  *0 fingers up on one hand and 5 on the other.* | Make finger patterns up to 10 in different ways without looking at their fingers.  *e.g. make different combinations of ten.* |
| Use a wide variety of collections to make small sets up to five N.B. what is important here is that the pupil collects the correct amount in each set rather than necessarily the same type of article e.g. three apples, four bananas and two grapes. | | Use 5 as an anchor in forming numbers from 6 – 10 e.g. ‘eight is three more than five’, using ten frames and bead strings. |
| Understand that collections can be made up of smaller collections, e.g. 7 can be made up of  2 + 2 + 3 or 5 +2 and 4 + 2 +1= 7 Description: Die with sides 01, 02, 04 |
| **\***  Early  **Progress will be evident when pupils can:** | **\*\***  Early  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** |
| **Counting and comparing collections** | **Counting and comparing collections** | **Counting and comparing collections** |
| Find groups of the same theme within a collection, e.g. pigs in farmyard toys, or from box of plastic fruit find 5 bananas, 5 apples, 5 lemons. | Match objects in a collection to see which group has the most or the fewest. | Estimate the number of objects in a group of up to 20 objects and count to check. |
| Use vocabulary such as bigger, smaller and ‘the same’ to compare groups of items. | Find and describe items that are the same and different within a collection, e.g. ‘horses’ and ‘not horses’. | Count the different groups in a collection to decide which has the most or fewest, within 20. |
| Sort objects using familiar or given criteria*, e.g. colour, size, family, etc.* | Sort objects into groups using simple given criteria and be able to explain how they did this, e.g. colour, size, family, etc. | Compare and order groups of numbers by deciding the criteria for themselves and be able to articulate their criteria for sorting, *e.g.... bigger than 5, less than 10 (within 20).* |
| Compare two groups of objects and identify which is the smallest/largest group. | | Compare two groups of objects to determine ‘how many more’ and use appropriate vocabulary: *altogether (within 10).* |
| **Counting Strategies, Emergent Addition and Subtraction – Beginning to count one –to-one** | **Counting Strategies, Early Addition and Subtraction – Count one-to-one** | **Counting Strategies, Addition and Subtraction**  **Facts to 10 – Counting from one** |
| Show an awareness of counting a collection using some number names but not always reliably.  (Staff model touching and moving an object to count it). | Count up to 10 visible items by touching each item in turn, count becoming more reliable/stable (see ‘points to consider’). | Understand that ten ones can be bundled up and become one ten. Pupils can also connect symbols and words to recognise tens and ones e.g. understand that 17 sweets packaged into bags of ten means one bag of sweets and 7 left over or can be represented as below. |
| **\***  Early  **Progress will be evident when pupils can:** | **\*\***  Early  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** |
| **Counting Strategies, Emergent Addition and Subtraction – Beginning to count one –to-one** | **Counting Strategies, Early Addition and Subtraction – Count one-to-one** | **Counting Strategies, Addition and Subtraction**  **Facts to 10 – Counting from one** |
| Show an awareness of counting a collection using some number names but not always reliably.  (Staff model touching and moving an object to count it.) | Can count items in a collection and know that if items are added to a collection there will be a change in the size of the set.  E.g. What will happen if we add a brick to the tower? Will it get taller or smaller? | Can combine two or more groups of objects to model and solve addition and use appropriate vocabulary; *makes, join, altogether*.  (*They may start to count by counting both groups separately and then start at one again when combining the count)*  *e.g. 3+2 = 1, 2, 3 1, 2 then 1,2,3,4,5, They will then progress to counting the first group and carry on the count to the last counter in other group,(e.g.... 3+2= 1,2,3 4,5.* |
| Count out a requested number of items.  *e.g. please find 4 acorns in the woods and place them on the green plate.* | | Can count items from two collections with one of  the collections screened (hidden) – see ‘points to consider’. |
| Recognise that when they make a collection (within 5) and then hide the same collection, the amount has stayed the same. | | Can count items when both collections are  screened (hidden) but will count all the items starting from one. |
| Begin to understand the concept of ‘one more’ and ‘one less’ by staff modelling the language  E.g. one child goes to the toilet or goes home early. There is now one less child on the carpet, or there’s space for ‘one more’ at the snack table. | Count on in ones to add (within 10) and back in steps of one to subtract (within 5) with support materials e.g. ‘Here are five pencils. I add one more - how many have I now?’ Use stories e.g. The Hungry Caterpillar’. | Count on in ones to add (within 20) and back in  steps of one to subtract (within 10) with support materials. |

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| **\***  Early  **Progress will be evident when pupils can:** | **\*\***  Early  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** |
| **Counting Strategies, Emergent Addition and Subtraction – Beginning to count one –to-one** | **Counting Strategies, Early Addition and Subtraction – Count one-to-one** | **Counting Strategies, Addition and Subtraction**  **Facts to 10 – Counting from one** |
| Know that if an item is taken away from a collection then the size of the collection will change.  *e.g. I’m going to take an oatcake from this plate. Will I have ‘the same’ left on the plate or ‘more’ or ‘fewer’?* | | Separate and take part of a group of objects away within 10, to model subtraction and use appropriate vocabulary i.e. ‘Take away’.  *(They need to be confident at take away before attempting comparing - please see ‘points to consider’)* |
| Recognise doubles in concrete materials but not necessarily work out their value e.g. notice ladybird has two dots on both wings. | Recognise doubles up to value of 6 i.e. *1+1=2, 2+2=4 and 3+3 = 6* and begin to use the word ‘doubles’ or ‘halves’ and ‘doubling’ or ‘halving’ in everyday situations. | Recognise doubles up to value of 10 - *double 1, 2, 3, 4, and 5.* |
| **Early Multiplication and Division** | **Early Multiplication and Division** | **Early Multiplication and Division** |
| Distribute items or portions in order to ‘share’, but may not be concerned with fair shares. | Understand a request to share in a social sense and distributes items or portions e.g. sharing the train set [may not be an equal share].  Introduce the notion of a ‘fair share’. | Understand the concept that fair sharing means all shares are equal. |

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| Respond to grouping and sharing questions by drawing, acting, guessing and checking by using concrete materials.    ***‘****In picture one can the Queen of Hearts and Alice get equal amounts of jam tarts? How many will they both have?* | | Use the term ‘group’ to describe a collection of objects; e.g. we have a bowl of grapes –let’s take groups of 5 out and see how many groups we have? |
| Group and share using concrete materials – see points to consider. |
| Model equal groups or equal rows i.e. can place equivalent number of materials on top or next to groups/rows. (Will solve problem by counting in ones). |
| **\***  Early  **Progress will be evident when pupils can:** | **\*\***  Early  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** |
| **Early Multiplication and Division** | **Early Multiplication and Division** | **Early Multiplication and Division** |
| Notice groupings that occur in everyday contexts or notice groupings in stories e.g. Noah’s Ark. Adult models the language of counting in 2s, 5s and 10s.  http://t3.gstatic.com/images?q=tbn:ANd9GcQVhSIPit-K0TGOoaV8IB0wJy12p6jpzZJR2qm4xpy4Z7X20Est | | Recognise unequal amounts of objects in a group or row. |
| Notice the number of objects in a group or a row after a sharing or grouping and label them, e.g. (3 groups with 4 in each group- see points to consider).    4  4  12  4 |
| Find pairs of items and match them, e.g. sort a bag of baby shoes and put them together. Adult models counting in 2s. | | Represent grouping and sharing informally using pictures, numerals and words *e.g. 10 grapes are shared amongst 5 children. How many each? Pupil works out solution by drawing a picture or acting out situation [can take photo to support thinking]. Write the number each child gets.* |
| **Mental Agility - Basic Facts – One to one counting** | **Mental Agility - Basic Facts – One to one counting** | **Mental Agility - Basic Facts** |
| Develop an understanding about counting a wide variety of objects into different sized sets. Begin to understand that the last number counted tells the size of the set. Develop an understanding that the number in a set stays the same unless items are added or taken away. | | Recall addition and subtraction facts to five, *e.g. 2+1, 3+1, 3-2, 4-1…etc.* |
| Recall doubles to 10, *e.g.1+1, 2+2, 3+3, 4+4, 5+5* |
| **Patterns and Relationships** | **Patterns and Relationships** | **Patterns and Relationships** |
| Recognise a pattern in a song or story and use this to learn the lyrics or predict the repetitive features.  e.g. Going on a bear hunt. | | Confidently predict repetitive features in a poem, story or song. |
| Use appropriate language to describe patterns in their environment. *e.g. I’ve got a stripey pattern on my jumper. Who else is wearing anything stripey?* | | Recognise simple patterns in concrete objects, e.g. girl/boy in a line. Children sit/ stand in a circle and can continue the pattern. |

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| **Patterns and Relationships** | **Patterns and Relationships** | **Patterns and Relationships** |
| Explore a variety of concrete materials. Make simple patterns (which may be random) and talk about them.    e.g. a flowery pattern | Begin to recognise simple AB colour patterns. | Recognise, discuss, duplicate and create simple colour sequences**.**  e.g.  http://4.bp.blogspot.com/_L6L5ejtPM2M/TIasxTouvsI/AAAAAAAADOo/WN4DjkO68_s/s320/pattern.jpg |
| Recognise and discuss simple size sequences**.**  Big, little, big, little http://www.creativetots.com/blog/wp-content/uploads/2009/10/IMG_19011-1024x768.jpg | Recognise, discuss, duplicate and create simple numeric sequences**.**  e.g. **1,2,1,2,1,2** |
| **Solve Simple Number Stories** | **Solve Simple Number Stories** | **Solve Simple Number Stories** |
| Solve simple stories by subitising, acting out, using concrete materials or by drawing a picture.  e.g. children and objects represent characters and events in stories such as The Three little Pigs, Five Little Ducks etc | | Solve simple stories by subitising, acting out, using concrete materials or by drawing a picture.  e.g. ‘Kate has two cows and Jordan has three cows. How many cows are there altogether?’ can be acted out. |
| Make marks, subitise, draw pictures and sing songs to record ideas about number problems and stories.  [School+May+June+007](http://4.bp.blogspot.com/-b4D9vWMjkYs/TeeSkrpGROI/AAAAAAAAAk4/tXIr2grD8_w/s1600/School+May+June+007.JPG)  Children draw a picture of the frogs jumping off the log. | Informally record addition and subtraction using role play, singing songs, drawings, marks and possibly numerals and letters to represent answers. | Record addition and subtraction informally using role play, concrete materials, subitising, singing, drawings, numerals and words.  **No formal algorithms or ‘chimney sums’ should be introduced at this level.** |
| Enjoy working independently or with a partner/ small group to explore the world of number and investigate problems. | Enjoy the challenge of problem solving and be able to communicate their findings to others. | Enjoy developing mathematical ideas by trying to explain the solution to a problem; begin to have own ideas on what to do next. |

**Burnbrae Numeracy Progression**



**FIRST LEVEL**

|  |  |  |
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| **First** | **Experiences and outcomes** | **First** |

*I can share ideas with others to develop ways of estimating the answer to a calculation or problem, work out the actual answer, and then check my solution by comparing it with the estimate.* ***MNU 1-01a***

*I have investigated how whole numbers are constructed, can understand the importance of zero within the system and can use my knowledge to explain the link between a digit its place and its value.* ***MNU 1-02a***

*I can use addition, subtraction, multiplication and division when solving problems, making best use of the mental strategies and written skills I have developed****. MNU 1-03a***

I can continue and devise more involved repeating patterns or designs, using a variety of media. **MTH 1-13a**

Through exploring number patterns, I can recognise and continue simple number sequences and can explain the rule I have applied. **MTH 1-13b**

I can compare, describe and show number relationships, using appropriate vocabulary and the symbols for equals, not equal to, less than and greater than.

**MTH 1-15a**

When a picture or symbol is used to replace a number in a number statement, I can find its value using my knowledge of number facts and explain my thinking to others.

**MTH 1-15b**

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| **First** | **First**  **Points to consider** | | | |  |
| * Saying one, two or three **number words forwards** forms an important basis for counting on strategies (**counting –up- from and counting –up-to**). Children may choose to use their fingers to keep track. They typically will have more difficulty when crossing a decade, e.g. three numbers after 68. * The use of tools such as numeral rolls, numeral tracks and hundred squares are very beneficial for promoting visualisation and help to support children when internalising the number sequences. * Scaled number lines are an invaluable tool for children to show their understanding of number sequences and the relation numbers have with each other. They can have increments marked regularly or just at the beginning and end. (Number lines with marked intervals will be easier to use! Only some children at first level will be comfortable using the last 2 examples).     Make-20-3     * Reversing 2 digit numbers can still be a problem for children who are using the sound of the number, e.g. 16 and 61, both start with the six sound. * Children need to be taught that ‘ty’ **words mean ‘tens’** (e.g. sixty means six tens) and decoding ones and tens notation (e.g. fifty eight means five tens and eight ones). | | | * Children can have difficulty with 3 digit numbers with a **zero in the tens** column especially whilst their knowledge of place value is not wholly secure. * **Zero is used as a place holder**. It indicates that there is none of a particular quantity and holds the other digits in their place. * It is important that children are able to see numbers being represented on a tens frame using both the five- wise and pair pattern. This supports their understanding of **5 and 10 as an anchor** to making larger numbers and supports their doubling capabilities.      * Other tools like the Rekenrek, bead strings, dot cards and counters all help to support children’s number sense moving from concrete, to visualisation and then into understanding the abstract. | | |
| **First** | **Points to consider**  **First** | | | |  |
| * **Traditionally in Highland we have called the first column on the right the ‘units’ column. From now on children should be taught to use the term ‘ones’ instead so that they can talk about ten ones being the same as one unit of ten.** * Developing children’s early knowledge of tens and ones is a forerunner to the development of place value knowledge. It is very important that they have plenty of experience of counting large collections (within 100) and grouping these into 10s. * Lolly sticks organised into bundles of ten and then hundreds support early knowledge of **place value** rather than the use of traditional Dienes apparatus. This is because children benefit significantly from creating the units of ten themselves. * Children should be able to **split** (partition) 2 and 3 –digit numbers into **standard form** (e.g. 369 = 300 + 60 + 9) without reference to actual quantities (concrete materials). * It is also vital that they are able to **split 2 and 3 digit numbers into non-standard** form. They should understand that the number 237 has 23 tens and 7 ones and 237 ones. This will support their mental agility enormously in second level. For example - the sum 237 – 176 becomes 23 tens – 17 tens and 7-6, which leaves 6 tens and 1 one which equals 61. They will still need support materials at this stage. * Children need to use the strategy of **starting with the larger number** when combining two or more collections and understand this is a more efficient use of time. They also need to **keep track** of the number of objects in the second, smaller collection. * Children should keep track of their count using fingers or a temporal count (sequence of sounds) e.g. they hear themselves make three counts – eleven, twelve, thirteen. | | | * Once children have mastered **counting on or counting back** to solve simple addition or subtraction problems at the early (\*) stages of First level they can move on to ‘**Part, Part –Whole’** strategies instead of counting. Numbers can be partitioned (split) and recombined to make ten to solve an addition or subtraction problem.   9 + 6= 9 + (1 + 5) = (9+1) + 5 =15   * **Part, Part, Whole (PPW)** involves seeing numbers as being made up of two or more parts. This is a major conceptual achievement at the Early and First level. A strong understanding of PPW has been shown to increase understanding of subsequent work with place value, number concepts and word problems. * It isn’t vital that children learn the word ‘**commutative**’ but it is important that they learn how to use the strategy i.e. 2 + 3 = 3 + 2. * Children need to learn to use equal groupings or parts to help count   collections. Simply learning how to **skip count** by reciting every second or every third number, or by jumping along a number line may not help them to realise that they are in fact ‘counting all.’   * The sequence for how children learn to say multiple counts starts with children **counting rhythmically** and identifies number patterns, e.g. 1, 2, **3**  4, 5, **6**  7, 8, **9**… This in turn enables them to use skip counts and counting by ones , e.g. **3, 6, 9, 12**, 13,14,**15**  16,17,**18.** With practice they move onto skip counting in multiples, e.g. 3, 6,9,12,15,18,21. * Children need to be able to keep a double count in multiplicative situations by representing one group (e.g. by holding up four fingers) and counting repetitions of that same group, simultaneously keeping track of the number of groups and the number in each group. e.g. 2, (**1**) 4, (**2**) 6, (**3**) 8, (**4**) … How many 2s are there in 8? | | |
| **First** | **First**  **Points to consider** | | | |  |
| * Multiplication is a binary operation, i.e. it acts on two numbers (bi – means two). In the operation 5 x 3, 5 is the multiplier (how many of) and 3 is the multiplicand (of what). Pupils will first see multiplication as repeated addition and so see 6 lots of 3 as 3 + 3 + 3 + 3+ 3+ 3 not as   6 x 3.   * Introducing arrays will support pupil’s ability to move from repeated addition to multiplicative strategies. Displaying a number problem in equal rows and equal columns allows the exploration of factors and multiples. Arrays help pupils visualise an increasing range of useful strategies that will support their ability to mentally solve multiplication and division problems.   There are 3 rows of 6  There are 6 rows of 3 | | | **A word of warning!**  There is a routine to follow when introducing any new learning intention/ strategy.   * Concrete materials are always used to introduce the new strategy/ knowledge. * When children are confident using the materials, these are screened to encourage children to visualise the materials and to help build images in their mind. * Imaging materials acts as a bridge between using materials and being able to answer abstract questions. * They will then need a period of time devoted to reinforcing and consolidating this new strategy/ knowledge. It may be necessary for the children to go back to the materials either to manipulate them or to be used for checking answers and help build confidence. * Once they have a secure understanding using imaging they can move on to number problems using abstract questions without the use of materials/ pictures. * The level of complexity of the tasks should be increased to show that the children have understood the strategy and can apply it to unfamiliar situations. Numbers that are too large to track in their heads forces them to connect to the number properties. * It is very important for children to be encouraged to talk about how they found a solution to a given problem. It is also important for the teacher to keep a track of what the thinking behind the solution is! Listening to the strategy used by a child will give teachers a huge insight into the level of sophistication a child has used. For example, when asking a child to work out 25 + 6, there is a big difference between the child who counts up in ones from 25 to 31, the one who starts at 25, adds 5 and then 1 to make 31 and the one who knows 5 + 6 = 11, so 20 + 11 = 31. | | |
| **First** | **First**  **Points to consider** | | | |  |
| * **Writing number stories** helps children visualise mathematical facts and integrate mathematics being learned into their own lives and experiences. When children write a number story, they are devising their own images for the numbers in an abstract number problem. These number stories can be presented in a variety of ways. * Children should be actively encouraged to listen attentively to maths stories and then be asked to draw solutions or act out the solution e.g. 3 grey seals are on the beach and are soon joined by 2 more. How many seals are now on the beach? * Children should also be given a picture of the solution and asked to draw, tell or act out the number story. The answer is five cows, what’s the story? Children should share different responses from group/class.      * **Written number sentences** which include symbols and numerals could be included once they are proficient with using models to represent their stories. * Children should be familiar with everyday vocabulary, such as ‘groups of’, ‘lines of’, ‘bags of’, boxes of’ ‘packets of’, **‘**sets of’ alongside the mathematical terminology. This vocabulary should support children when working out if the problem is e.g. a multiplication or division problem. * Children also need to experience number problems where the answer is not always on the right hand side e.g. = 3 + 8 * The ‘**equal sign’** initially means ‘find the answer’. For example, 2 dogs plus 3 dogs equals how many dogs, 2 + 3 =? However, during First Level children need a broader definition of ‘equals’. To work out 8 + 7 using a ‘jump to next decade’ strategy, children need to understand that 8 + 7 = 8 + (2 +5) = 10+ 5 = 15. Here ‘equals’ means ‘is the same as’. Both sides balance. | | | * Children should also be asked to represent a story with objects or on a **think board** *(e.g. substitute counters for cows to solve the problem ‘Three cows were put in a field with four other cows. How many cows were there in the field?’)* * EXAMPLES OF THINK BOARDS Specific key areas are designated to ‘show strategies used’, ‘show with a picture’, ‘show with a story’, and ‘show using materials’.     There were four cats in the house and dad bought four more.  How many are there altogether?  SAM_1583-zx6asd-300x225  Eight people live in my house and 6 people live next door.  How many people live in both houses altogether | | |
| **First** | | **Suggested Written Recording** | | **First** | |

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| **WHILST THE MAIN EMPHASIS IN THIS NUMBER PROGRESSION IS ON USING MENTAL STRATEGIES TO SOLVE NUMERICAL PROBLEMS, IT IS IMPORTANT THAT WE REALISE THAT WRITTEN RECORDING IS AN IMPORTANT PART OF NUMERACY.**  **The following points are important when considering what, when and where pupils should be recording:** | | | | | | |
| Empty Number lines are a good way for children to show their ‘thinking’. Pupils should show their thinking / solution on the number line AFTER the problem has been mentally calculated.  **43 + 35 = 40 + 30 + 3 + 5** | | Mathematics is an  activity of the mind!  Written calculations can be used by pupils to reduce the mental load, to communicate their ideas to others and to provide a window into a child’s thinking. | | **6 + 7 = 6 + 6 + 1= 12 + 1 = 13** | | |
| Not all recording needs to be kept but they should be acknowledged as being very valuable as they help to reinforce the very important links that children make between oral, mental and written work. A simple copy of ‘jottings’ or main ideas could be transferred into a maths jotter if necessary. | Subtraction on an ‘empty number line’ starts at the right hand side of the line. | | It is important that children are proficient at using a wide range of recording methods. These should be modelled by the teacher to support the child’s mathematical thinking. | | | Be careful not to value ‘neat’ and ‘ordered’ recording over higher order mathematical ideas or informal jottings that make sense to the child. |
| **The Split Strategy**  Pupils have an understanding of the value of each digit and split them before adding the tens together and then the ones, and then recombine to get the answer. |
| There is the danger when recording on squared paper that children focus too heavily on the digits and not the number as a whole, it is recommended that children do not use squared paper at this level. | As children develop mathematically it is important they record and use mathematical vocabulary, terminology and symbolism. | **TU + TU possibly moving into HTU + TU or HTU+HTU** Example of vertical expanded method adding most significant digit first | | | Informal written recording should  take  place regularly. |

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| **First** | **First**  **Suggested Written Recording** |  |

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| **WHILST THE MAIN EMPHASIS IN THIS NUMBER PROGRESSION IS ON USING MENTAL STRATEGIES TO SOLVE NUMERICAL PROBLEMS, IT IS IMPORTANT THAT WE REALISE THAT WRITTEN RECORDING IS AN IMPORTANT PART OF NUMERACY.**  **The following points are important when considering what, when and where pupils should be recording.** | | | | |
| Pupils use of standard symbols and conventions, for example numbers 0-9, equals sign and operation signs, will become more precise when recording their own explanations about a calculation. | Using paper and pencil for **informal jottings** can help keep a track of calculations if the numbers are large. | **TU + TU possibly moving into HTU + TU or HTU+HTU**  Example of horizontal expanded method, using splitting | | A jotting area can be created by dividing the page in the maths jotter rather than using a separate book. This helps the pupil and teacher understand how the calculation was undertaken. |
|  | | Recording their own ideas on paper with words, numbers, symbols, diagrams and pictures is part of pupils’ exploration of number.  See think boards in  ‘Points to Consider’ | It is important for children to establish connections between practical experiences, symbols, language and patterns. | **5 x 3 = 3 + 3 + 3 + 3 + 3**  **3 x 5= 5 +5 + 5** |
| Introducing standard algorithms before pupils have fully established partitioning strategies can slow down the development of mental problem solving skills and number sense. | **3 + 3 + 3 = 9 3 x 3 = 9** | | Children at this level begin to understand that diagrams and equations often provide a more efficient means of communicating ideas than textual explanations. | |

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| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** |
| **Number Word Sequences** | **Number Word Sequences** | **Number Word Sequences** |
| Recite number word sequences forwards, in order, in the range of at least 0-100, from any given number, e.g. *20 21 22 23 24 …*  *68, 69, 70, 71, 72* | Begin to recite number word sequences forwards, by ones, tens and hundreds in the range of at least 0-1000 from any given number e.g.  *123,124,125, 126…*  *560, 570, 580, 590…*  *620, 720, 820, 920…* | Confidently recite number word sequences forwards, by ones, tens and hundreds in the range of at least 0-1000, from any given number e.g. *567, 568, 569, 570…*  *456,466, 476, 486…*  *378, 478, 578, 678…* |
| Recite number word sequences backwards, in order, in the range of at least 0-100, from any given number,  *e.g. 91, 90, 89, 88… 56, 55, 54, 53, 52* | Begin to recite number word sequences backwards, by ones, tens and hundreds in the range of at least 0-1000 and beyond, from any given number *e.g. 546,545, 544, 543…*  *710, 700, 690, 680…*  *890, 790, 690, 590…* | Confidently recite number word sequences backwards by ones, tens and hundreds in the range of at least 0-1000, and beyond, from any given number, *e.g. 765, 764, 763…*  *828, 818, 808, 798…*  *971, 971, 771, 671…* |
| Say decade number word sequence forwards and backwards in the range of at least 0-100,  *e.g. 10 to 60 or 90 to 50,* | Say forward number word sequences in multiplesof 2s, 10s, 5s and 3s in the range of at least 0-100,  *e.g. 2s - 14, 16, 18, 20, 22 5s = 25, 30, 35, 40, 45, 50,* | Say forward number word sequences in multiples of 2s, 10s, 5s, 3s and 4s, in the range of at least 0 -100,  *e.g. 30, 33, 36, 39…* |
| Say forward/ backward number word sequences in multiples of 2 and 5 in the range of 100 e.g.  *2, 4, 6, 8… 66, 64, 62, 60…*  *5, 10, 15, 20… 85, 80, 75, 70…*  *10, 20, 30, 40… 90, 80, 70, 60…* | Say backward number word sequences in multiples of 2s, 10s, 5s and 3s in range of at least 0-100,  *e.g. 43, 42, 30, 28….. 60, 57, 54, 51, 48…* | Say backward number word sequences in multiples of 2s, 10s, 5s, 3s and 4s, in range of at least 0-100,  e.g. 48, 44,40,36,32… |
| Quickly recall the number word just before and after a given number in the range of at least 0-100.  *e.g. 28 -29 34 - 35 78 – 79*  *56 -55 86 - 85 91 - 90* | Say the number words just before and after a given number in the range of 0-1000 in 1s and 10, (on and off the decade).  *e.g. 699 - 700 699 – 709*  *801 – 800 801 – 791* | Quickly recall the number words just before and after a given number in the range of at least 0-1000 in 1s, 10s and 100s, (on and off the decade/hundred).  *e.g. 599 - 600 599 – 609 599 - 699*  *901 – 900 901 – 891 901 – 801* |

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| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** | |
| **Number Word Sequences - continued** | **Number Word Sequences - continued** | **Number Word Sequences - continued** | |
| Say the next 2, 3, 4 numbers in a number word sequence in the range of at least 0-100. e.g. *say the next three numbers after 34 or before 65*. | Say the next number word before and after in a multiple number sequence in 2s, 5s and 3s. | Say the next number word before and after in a multiple number sequence in 2s, 5s, 3s and 4s. | |
| Count the number of jumps forwards and backwards from a to b (on a numeral track or numeral roll). Should not cross the decades.  *e.g. How many jumps from 22 to 25 or 95 to 92?* | Count the number of jumps forwards and backwards from a to b (on a numeral track showing multiples of 2, 10, 5 or 3). Examples should cross decades.  *e.g. How many jumps from 28 to 36 in 2s?* | Can count the number of jumps forwards and backwards from a to b (on a numeral track showing multiples of 2, 10, 5, 3 or 4)  *e.g. How many jumps from 36 to 60 in 4s?* | |
| **Read/Write numbers to 100** | **Read/Write numbers to 1000** | **Read/Write numbers to 1000** | |
| Read and use the ordinal names to at least ‘twentieth’. | Read, write and use the ordinal names to at least ‘thirty- first’ e.g. when reading calendar dates. | Confidently read, write and use all ordinal names recognising the pattern in the ending. | |
| Identify, say and represent all numbers to at least 100 (including zero) using numerals and words. | Identify, say and represent all numbers to at least 1,000 (including zero) using numerals and words. | | |
| Recognise (find number within a group), read and write all the numbers to at least 100 and possibly beyond. | Recognise (find number within a group), read and write most of the numbers to 1000. See ‘points to consider’ for particular difficulties children may have. | Recognise (find number within a group), read and write all the numbers to 1,000. | |
| Sequence numerals in the range of at least 0-100 including crossing decades.  *e.g. If given the cards 45-55, child required to lay them out in order from smallest to largest number and largest to smallest 63, 62, 61, 60, 59, 58* | Sequence numerals in the range of at least 0-1000, without crossing into the next hundred, (see ‘points to consider’).  e*.g. if given cards within three hundred (not crossing into next hundred) child required to lay out sequence of cards in order.*  *e.g. 217, 218……227* | Sequence numerals in the range of at least 0-1000 and be able to confidently cross the next hundred. | |
| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** | |
| **Read/Write numbers to 100 -continued** | **Read/Write numbers to 1000 - continued** | **Read/Write numbers to 1000 - continued** | |
| Sequence decade numerals in the range of at least 0-100.  *e.g. put the cards 20-70 in order* | Sequence and name multiples of hundred numeral cards in order (in the range of 100-1000).  *e.g. 100, 200, 300, 400 …900 600, 500, 400, 300* | Sequence and name multiples of hundred numeral cards in order (in the range of 100-1000 and beyond).  *e.g. 800, 900, 1,000, 1,100, 1,200* | |
| Sequence on the decade numerals in the range of at least 0-1,000 *e.g.* | Sequence off the decade numerals in the range of at least 0-1000. *e.g.* | |
| Begin to sequence multiples of 2 and 10 using numerals in the range of 10 and 50 respectively *e.g.*  *2s – 2, 4, 6, 8, 10 … 10s – 10, 20... 50 (possibly beyond*) | Sequence multiples in 2s, 10s, 5s, and 3s using numerals in the range of at least 0-100 *e.g.*  *3, 6, 9, 12.15…* | Sequence multiples in 2s, 10s, 5s, 3s and 4s using numerals up to 100 *e.g.*  *4, 8, 12, 16, 20….* | |
| Count on and back from an unscreened numeral to find a given numeral on a screened numeral track.  *e.g. Start at 51, count back 5 places. What number have you reached? (46)* | Count on and back in multiples of 2, 5, 3 or 4 from an unscreened numeral to find a given numeral on a screened numeral track.  e.g. *Start at 56, count back 5 places in 2s. What number have you reached? (46)* | Count on and back in multiples of 100 from an unscreened numeral to find a given numeral on a screened numeral track.  *e.g. Start at 656, count back 5 places in 100s. What number have you reached? (156)* | |
| Identify missing 2 digit numbers visually within 100. Place numbers on a simple number line.    *e.g. 100, \*\*, 98, 97, 96, \*\*, \*\*, 93, \*\*, 91*  *45, 46, \*\*, \*\*, 49, \*\*, \*\*, 52, 53* | Identify missing 3 digit numbers visually within 1000. Place numbers on a scaled number line in order.  *e.g. 345, 346, \*\*\*, 348, \*\*\*, \*\*\*, 351*  *501, \*\*\*, \*\*\*, 498, 497, \*\*\*, 495* | Identify missing 3 digit numbers visually within 1000 (in multiples of 10). Place numbers on a scaled number line in order.  *e.g. 645, 655, \*\*\*, 675, \*\*\*, \*\*\*, 705*  *501, \*\*\*, \*\*\*, , 471, \*\*\*, 451* | |
| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** | |
| **Read/Write numbers to 100 -continued** | **Read/Write numbers to 1000 - continued** | **Read/Write numbers to 1000 - continued** | |
| Find a number between two 2 digit numbers within 100.  e.g. give me a number which *comes between 67 and 70? Can you think of another?* | Find a number between two 3 or 4-digit numbers within 1000.  e.g.... *give me a number comes between 567 and 570? Can you think of another?* | Find a number exactly half way between two 3 or 4-digit numbers within 1000.  e.g.... *between 567 and 575?* | |
| Order a set of two-digit numbers in ascending or descending order. Present this information on a scaled number line or hundred square, (see ‘points to consider’).  *e.g.... put these numbers in order from left to right – 34, 56, 18, 22, 98* | Order a set of three-digit numbers in ascending or descending order. Present this information on a scaled number line, (see ‘points to consider’).  *e.g.... put these numbers in order from left to right – 915, 98, 416, 221, 667*  *(Do not include numbers with zero in the tens or ones column).* | Can order a set of three-digit numbers in ascending or descending order. Present this information on an empty number line, (see ‘points to consider’).  e.g.... put these numbers in order from left to right – 805, 698, 410, 22, 667 | |
| **Structuring Numbers – Grouping and Place Value** | **Structuring Numbers – Grouping and Place Value** | **Structuring Numbers – Grouping and Place Value** | |
| Start to combine more than two visual patterns [subitising] to 10.  Description: Die with sides 04, 05, 01 | Start to combine more than two visual patterns [subitising] to 20.  [Description: An orthographic illustration of a die displaying sides 3, 5, and 6.](http://etc.usf.edu/clipart/39200/39201/die_03_05_06_39201.htm) | Recognise and record partitions to 100 using materials and written methods. E.g.    *Standard Notation 100 = 46 + 54*  *Expanded Notation 100 = 40 + 6 + 50 + 4* | |
| Recognise and describe the five-wise and pair-wise ten frames and these to fluently partition numbers in the range of 1 to 10, (see ‘points to consider’.    *5 in the lower row and 4 in the upper row.* | Use 10 as an anchor in forming numbers from 11 to 20, *e.g.... thirteen is three more than ten,’ using two tens frames, bead strings to 20 and Rekenreks.*      On right you can see 12 beads, ten and two more. | Use decades as an anchor in forming numbers within 100.  *e.g.... Fifty- seven is seven more than fifty and three away from 60.* | |
| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** | |
| **Structuring Numbers – Grouping and Place Value** | **Structuring Numbers – Grouping and Place Value** | **Structuring Numbers – Grouping and Place Value** | |
| Describe the number of tens in decades,  *e.g.... how many tens in 50?*  There are 5 tens in 50. | Describe the number of twos that are in numbers up to 20, fives that are in numbers up to 50.  *e.g.... There are 6 groups of 2 in 13 and one left over*    *There are 6 groups of 5 in 33 and 3 left over.* | | |
| Apply an understanding of place value and the role of zero to Identify, say and represent numbers up to 100, *e.g.... know that the value of the digits in 20 are worth 2 tens or twenty and zero ones.*  and | Apply an understanding of place value and the role of zero to Identify, say and represent numbers up to 1000, using numerals, words and objects.    *Arrow cards, numeral cards and digit cards are very useful materials.* | | |
| Record all the possible digit combinations for 2-digit numbers and order from smallest to largest and largest to smallest.  e.g...*. 2, 3 = 23 and 32 6 and 9 = 69 and 96* | Record all the possible digit combinations for 2 and 3 single digit numbers and order from smallest to largest and largest to smallest,.  *e.g.... 678 =678, 687, 768, 786, 867, 876* | | Systematically record all the possible digit combinations for 2 and 3 single digit numbers, starting with the smallest number.  e.g.... 739= 379, 397, 739,793, 937, 973 |
| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | | **\*\*\***  **Progress will be evident when pupils can:** |
| **Structuring Numbers – Grouping and Place Value** | **Structuring Numbers – Grouping and Place Value** | | **Structuring Numbers – Grouping and Place Value** |
| Show they are familiar with grouping and counting in tens and explain it’s a more efficient way to count a larger collection. Connect these into words and symbols.  *Count the tens first and add the*  *ones 10, 11, 12, 13, 14, 15, 16, 17, 18*  *instead of counting in ones*.    *10, 20, 30, 40, 50, 51, 52, 53, 54, 54, 55, 56* | Efficiently make and draw 2 and 3 digit numbers in standard hundred, tens and ones form and connect these into words and symbols.  e.g. using materials such as bundles of sticks or dot strips in ones and bundles/strips of ten, convert into words and symbols.    *9 bundles of ten I hundred, 3 tens*  *and 7ones = 97 and 3 ones* | | Make or draw collections of a given size to 1,000s using hundreds, tens and ones. Convert into words and symbols.  e.g. using materials such as sticks of ones and bundles of ten/hundreds and hundreds dot patterns/ ten strips, convert into words and symbols.      *One hundred bundle,9 bundles of ten and 7ones = 197* |
| Begin to make and draw collections of a given size to 100s using tens and ones. Convert into words and symbols.  *e.g. Using materials such as bundles of sticks – see ‘Points to Consider’.*    *6 bundles of ten and 7ones = 67* | Efficiently make and draw 2 digit numbers in non-standard form and convert tens into ones and vice versa:  e.g.... 36 ones can look like this    *or one ten and 26 ones or 36 ones.* | | Make and draw 3-digit numbers in non-standard form. Convert hundreds into tens and hundreds and tens into ones and vice versa.    *e.g. 330= 2 hundreds and 13 tens or 33 tens or 330 ones.* |
| Increase and decrease by tens on decade (within 100) | Efficiently Increase and decrease by tens on/ off the decade.  e.g. *Place 3 ten strips on the table. Add one ten strip, add a 3 dot strip and two more ten strips. How many dots altogether? [ 63]* | |
| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | | **\*\*\***  **Progress will be evident when pupils can:** |
| **Structuring Numbers – Grouping and Place Value** | **Structuring Numbers – Grouping and Place Value** | | **Structuring Numbers – Grouping and Place Value** |
| Increase and decrease by tens off the decade e.g.    15 add ten **=** 25 add two tens **=** 45 | Increase and decrease by 100s on the century to 1,000 e.g.  *6 hundred, 7 hundred, etc…* | | Increase and decrease by hundred off the century e.g.  *100 square and 2 ten dot strips. Add multiples of 100 squares and keep count, 120, 220, 320…* |
| Increase by tens and ones, e.g.    24 add ten = 34 add 3 ones =37 | Efficiently increase and decrease by tens  and ones e.g.  = 57  *Children are told what number is under the screen but have to visualise it and then add one ten and three ones.* | | Efficiently increase and decrease by 10s and  100s off the century and off the decade, without seeing any materials.  *e.g. 32, 142, 262….902* |
| Estimate first and then use counting in 2s, 5s and 10s to work out how many in a collection of concrete materials *(e.g. grouping in pairs and tens] –see points to consider.* | Estimate first and then use counting in 5s, 10s and 100s to work out how many in a collection of concrete materials. | | Estimate first then count a large collection by systematically counting in 10s, 20s, 25s, and 100s. |
| **Rounding and Estimating** | **Rounding and Estimating** | | **Rounding and Estimating** |
| Describe whether a number is closer to zero, ten or twenty by using a tool such as a tens frame or a number line.  8 is closer to ten than zero 7 is closer to ten than zero | Round numbers to the nearest ten when estimating.  *e.g. 32 to 30 and 57 to 60 and explain their answer.* | | Round numbers to the nearest ten or hundred when estimating.  *e.g. 345 to 350 or 300*  *875 to 880 or 900* |
| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | | **\*\*\***  **Progress will be evident when pupils can:** |
| **Mental Agility - Basic Facts** | **Mental Agility - Basic Facts** | | **Mental Agility - Basic Facts** |
| Recall quickly **5 plus facts within 10**  *e.g. 5 + 1, 5 + 2, 5 + 3, 5 + 4*  Instantly recall **subtraction facts using 5 plus facts**, *e.g.*  *9 – 5 = 4, because 9 is 5 plus 4*  *6 – 5 = 1 because 6 is 5 plus 1*  *7 – 5 = 2 because 7 is 5 plus 2* | Know by heart and recall quickly **5 plus facts within 14** and **subtraction** **facts using 5 plus facts**  *e.g. 5 + 6, 5 + 7, 5 + 8, 5 + 9,*  *14 -5, 13 – 5, 12 – 5* | | |
| Recall quickly **all the addition facts within 10**  *e.g. 7+2, 3 plus 6, 5 add 5, 6 and 4,* | Know by heart and recall quickly all the **addition facts within 20**  *e.g. 17 + 2, 13 plus 6, 15 add 5, 16 and 4,* | | |
| Recall quickly **subtraction facts to 10 ( bonds of 10 only)**  *e.g. 10 - 4 = 6, 10 – 7 = 3, 10 – 2 = 8* | Know by heart and recall quickly **all subtraction facts within 10.**  *e.g. 9 take away 6, 7 minus 5, plus bonds to 10.* | | Know by heart and recall quickly **all subtraction facts within 10 and number bonds to 20**  *e.g. 9 – 7, 8 – 4, 7 - 5*  *20 – 12 = 8, 20 – 6 = 14, 20 – 16 = 4* |
| Instantly recall **multiples of 10** facts that add **to 100**,(number bonds of 100)  *e.g.10 +90, 50 + 50, 30 + 70.* | | |
| Understand that when you **add zero** to any number it does not change the value of the set. | Understand and explain that when you **add or subtract zero** to/from any number it does not change the value of the set. | | |
| Recall most **doubles (answer within 20)** *and* ***halves of ten*** *and below e.g. 6 +6, 7+7, ½ of 6 is 3.* | Instantly recall **doubles (answer within 20)** *and all corresponding* ***halves***  *e.g. ½ of 16 =8, ½ of 18 is 9.* | | |
| Know ‘**ten plus’** facts, e.g.10 +4, 7+10. | Can instantly **add/ subtract 10 to any 2 digit number**. *e.g. 23 + 20 say 33,43*  *43 – 20 say 33, 23* | | |
| Continue **rhythmic counting, skip counting** and **grouping.** | Instantly **recall multiplication facts** for the  **2** times tables up to 10  **5** times tables up to 25 | | Instantly **recall multiplication facts for the 2, 5 and 10 times** table (up to X10) and the **corresponding division facts.** |
| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | | **\*\*\***  **Progress will be evident when pupils can:** |
| **Expressions and Equations** | **Expressions and Equations** | | **Expressions and Equations** |
| Use the terms ‘is equal to’, or ‘is same as’ and understand that both sides need to balance.  Use the terms ‘more than’ and ‘less than’ to compare 2 digit numbers and small collections.  *e.g.... 14 is equal to 10 + 4 143 = 120 + 23*  *11 is less than 14* | | | Use the symbols for ‘is less than’ (<) and ‘is greater than’ (>) to show the relationship between two numbers.  Knows the symbol for ‘not equal’ (≠) and can use it to describe sides of a number sentence that do not balance. |
| Model, draw and represent number problems; record addition and subtraction informally but begin to include symbols and numerals. | Record written number sentences, including the symbols (+, –) to represent the operations of addition and subtraction. | | Explain and record methods for adding and subtracting using appropriate symbols to represent addition and subtraction. |
| Record multiplication problems using the terms ‘groups of’, ‘lots of’, ‘sets of’, ‘shared equally’ and ‘remainders’. | Begin to use symbols (x, ÷) to represent the operations of multiplication and division. | | Confidently use the symbols (x, ÷) to represent the operations of multiplication and division. |
| **Counting strategies -Addition and Subtraction**  **Counting on/ back in ones** | **Counting strategies -Addition and Subtraction**  **Part Whole Strategies** | | **Counting strategies -Addition and Subtraction**  **Part Whole Strategies** |
| Can **add or subtract multiples of ten** to/from any multiple of ten, within 100.  *e.g.*  *20+30 30+40 30-10 60-30 60-50 80-50*  *20 + 30 = 2 tens and 3 tens = 5 tens =50* | Solve addition sums by **adding ones and tens** using a **split strategy** (answers within 99 - where the ones column does not add up to ten or more).  *e.g.*  *34 + 55 - 3 tens and 4 ones add 5 tens and 5 ones = 8 tens and 9 ones = 89.* | | Solve addition sums by **adding ones and tens** using a **split strategy** - where the tens column does not add up to ten or more and children understand 3-digit numbers.  *e.g. 234 + 28, 345 + 47, 678 + 14, 619 + 25* |
| Can **add or subtract multiples of ten** to/from any two digit number, within 100, using a **split strategy**.  e.g.  12 + 30 3 tens add 1 ten and 2 ones = 4 tens and 2 ones  50 + 23 5 tens add 2 tens and 3 ones = 7 tens and 3 ones  45 -20 4 tens and 5 ones take 2 tens = 2 tens and 5 ones  71 -60 7 tens and 1one take 6 tens = 1 tens and 1 one | Solve subtraction sums by **subtracting ones and tens,** using a **split strategy** (need enough in ones column to start with so number of ones being subtracted is fewer than or equal to the number of ones from which subtraction is made).  *e.g. 65-42, 65 – 40 – 2 or 60 – 40 = 20, 5 – 2 = 3, 20 + 3 = 23*  *82 -61, 82 – 60 = 22, 22 – 1 = 21 or 80 – 60 = 20, 2 – 1 = 1*  *20 + 1 = 21* | | Solve subtraction sums by **subtracting ones and tens,** using a **split strategy** (need enough in ones column to start with so number of ones  being subtracted is fewer than or equal to the number of ones from which subtraction is made)  *e.g. 250 – 30, 256 – 56, 433 - 21* |
| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | | **\*\*\***  **Progress will be evident when pupils can:** |
| **Counting strategies -Addition and Subtraction**  **Counting on/ back in ones** | **Counting strategies -Addition and Subtraction**  **Part Whole Strategies** | | **Counting strategies -Addition and Subtraction**  **Part Whole Strategies** |
| Understand that **addition is commutative**:   * The order of the numbers can be rearranged to make counting on easier.   *e.g. 2 + 6 is the same as 6+ 2*  **Start at the largest number!** | Use the **commutative** property to:   * add three or more numbers, by **making pairs of ten**, *e.g. 2 + 6 + 8, 4 + 7 + 6*   *7 + 9 + 1 + 1, 5 + 2 + 6 + 5*   * Put largest number first, e.g. 6 + 13 = 13 + 6   3 + 48 = 48 + 3 | | |
| Solve simple addition/ subtraction sums by **adding on/counting back** from the largest number in jumps of one. | **Jump through the next decade** addition and subtraction sums. (**Split** second number into 2 parts to jump to/back to nearest decade).  *e.g. 8 + 5 = 8 + 2 + 3 = 10 + 3*  *15 + 8 = 15 + 5 + 3 = 20 + 3*  *13 – 6 = 13 – 3 – 3 = 10 -3*  *16 + = 21, 16 - = 4*  the document or the summary of an interesting point. You can position the text box anywhere in the document. Use the Drawing Tools tab to change the formatting of the pull quote text box.]  the document or the summary of an interesting point. You can position the text box anywhere in the document. Use the Drawing Tools tab to change the formatting of the pull quote text box.]    *(*Make sure the number to be added is always 9 or less).  These could be recorded on an empty number line - see ‘Points to Consider’. | | **Jump through the next decade** addition and subtraction sums. (**Split** second number into smaller parts to jump to/back to nearest decade and beyond).    *(Can now jump through more than one decade)*  *These could be recorded on an empty number line - see ‘Points to Consider’.* |
| Split small numbers and represent them in a variety of ways using concrete materials.  *e.g. think of five and three more as the same as two fours.* | **Regroup** to solve problems efficiently i.e. can group numbers together and spot which numbers cancel each other out  *e.g. 2 + 3 + 7 – 9 ( They realise that 2 + 7 makes 9 and then remove the 9 to leave the 3)*  *e.g. 9 + 5 + 4 – 7 – 2 (the 9 minus the 2 and 7 cancel each other out leaving the 5 and the 4)* | | |
| Identify a double plus one pattern  *e.g. on a Rekenrek or tens frame spot that 5 is made from double 2 add 1.* | **Use a known fact to work out a new one**  Use knowledge of doubles to 10 to discover **near doubles within ten.**  *e.g.* 3 + 5 is same as double 3 + 2  4 + 5 is same as double 4 + 1 | | **Use a known fact to work out a new one.**  Use knowledge of doubles to 20 to discover **near doubles.** |
| **Use known simple facts to discover an unknown fact**  *e.g. I know 20 + 4 = 24 so 21 + 4 = 25* | | **Use known simple facts to discover an unknown fact** *e.g. I know 60 + 42 is 102 because I know 60 + 40 is 100* |
| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | | **\*\*\***  **Progress will be evident when pupils can:** |
| **Early Algebraic Understanding**  **Addition and Subtraction through Number Stories** | **Early Algebraic Understanding**  **Addition and Subtraction through Number Stories** | | **Early Algebraic Understanding**  **Addition and Subtraction through Number Stories** |
| Understand that addition and subtraction can be described using everyday language (e.g. take away, from, combine and join). | Recognise and understand the language used to describe addition and subtraction (e.g. combine, join, sum, add, plus, take away, from, difference between and subtract). | | Select an appropriate operation to solve different addition and subtraction situations by carefully interpreting the problem. |
| Understand that subtraction cannot be ‘turned around’.  e.g. we can take 4 away from 6 but when we take 6 away from 4 we get a different answer…you’ll meet this later! | Understand that subtraction cannot be ‘turned around’.  e.g. we can take 8 away from 36 but when we take away 36 from 8 we get a different answer…negative numbers are for later! | | Understand that subtraction cannot be ‘turned around’.  e.g. we can take 24 away from 86 but when we take 86 away from 24 we get a different answer… negative numbers are for later! |
| Connect addition and subtraction problems and the symbolic representations of them.  *e.g. use a think board (see ‘Points to Consider’) to show the story, materials, picture, diagram and the number sentence for the sum.* | Connect addition and subtraction problems and the symbolic representations of them.  *e.g. use a think board(see ‘Points to Consider’) to show the story, materials, picture/diagram and the number sentence.* | | Connect addition and subtraction problems and the symbolic representations of them.  *e.g. use a think board (see ‘Points to Consider’) to show the story, materials, picture/diagram and the number sentence.* |
| Use the part-part-whole (see ‘points to consider’) notion of numbers, using concrete materials.  *e.g. ‘Use colour cubes to make the following*   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |   3 + 4 = 7 or 4 + 3 = 7 | Understand that subtraction is the inverse of addition. **Change subtraction to addition.** e.g. *13 – 6. What do I add to 6 to make 13? 6 + = 13*  the document or the summary of an interesting point. You can position the text box anywhere in the document. Use the Drawing Tools tab to change the formatting of the pull quote text box.]    *e.g. I had some toy cars and gave thirteen to my friend and had two left. How many cars did I have to start with?’ may be thought of as 􀂅 – 13 = 2 but can be worked out using 13 + 2 = 􀂅*   |  |  | | --- | --- | | 13 | 2 | | ? | | | | Use ‘part-part-whole’ diagrams to show the link between addition/subtraction word problems with a ‘transformed’ number sentence.  *e.g. I had some strawberries and ate fourteen. There were thirty- five left. How many strawberries were there to start with?’ may be thought of as* 􀂅 *– 35 = 14 but can be worked out as 35 + 14 =* 􀂅*)*       |  |  | | --- | --- | | 35 | 14 | | ? | | |
| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | | **\*\*\***  **Progress will be evident when pupils can:** |
| **Early Algebraic Understanding**  **Addition and Subtraction through Number Stories** | **Early Algebraic Understanding**  **Addition and Subtraction through Number Stories** | | **Early Algebraic Understanding**  **Addition and Subtraction through Number Stories** |
| Identify the whole amount and the parts within addition and subtraction sums and write number sentences. (One part needs to be 5 or less)  *e.g.*   * *5 girls and 3 boys went ice- skating. There were 8 children altogether. 5 + 3 = 8* * *8 children went ice-skating. 5 were girls. How many were boys? 8 - 5 =* | Identify the whole amount and the parts within addition and subtraction sums to 100 and write appropriate number sentences. (Should only cross one decade)  *e.g.*   * *48 men and 8 women entered the caber toss competition. How many people entered altogether? 48 + 8 =* * *48 pages from the class story were read in one week. There are 56 pages in the entire book so how many pages are left? 48 + 􀂅* =56. | | Identify the whole amount and the parts within addition and subtraction sums to 100 and write appropriate number sentences. (Numbers can cross more than one decade)  e.g.   * There were 27 goats and 38 pigs on the farm. How many animals are there altogether?   27 + 38 =   * The pigs and the goats on the farm make a total of 65 animals. If there are 38 pigs, how many sheep are there? 65 *–* 􀂅 = 38 or 65 – 38 = |
| Write addition and subtraction number sentences to match the meaning of the problem.  e.g. *for ‘I had some strawberries for lunch and ate three. There were five left. How many strawberries were there to start with?’ Say or write* 􀂅 *– 3 = 5* | Say or write sensible addition and subtraction story problems to match given number sentences.  e.g. for ‘There were twenty three children at the party and six went home early. How many children were still at the party?’ Say or write 23 – 6 = 􀂅 | | N Write sensible addition and subtraction story problems to match given number sentences.  e.g. *for ‘Sue invited 68 friends to her party but only 45 went. How many of her friends did not go?’*  *Write 68 – = 45*  the document or the summary of an interesting point. You can position the text box anywhere in the document. Use the Drawing Tools tab to change the formatting of the pull quote text box.] |
| Represent a story with objects or on a think board.  *e.g. Substitute counters for cows to solve the problem - Three cows were put in a field with fourteen other cows. How many cows were in the field altogether?* | Find the difference between quantities by adding or subtracting.  *e.g. Tom had 15 marbles and Luke had 7. How many more will Luke need to have the same as Tom?*  *Can be written as* 􀂅 *+ 7 = 15 and 15 – 7 =* 􀂅 | | Find the difference between quantities by adding or subtracting.  e.g. Ann has read 25 pages of a book which has 80 pages. How many pages will she need to read to finish the book?  Can be written as 25 + 􀂅 = 80 and 80 – 25 = 􀂅 |
| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | | **\*\*\***  **Progress will be evident when pupils can:** |
| **Multiplication and Division** | **Multiplication and Division** | | **Multiplication and Division** |
| Begin to solve a **multiplication problem by using skip counting** and understand that each successive count relates to putting sets of the same number together.  e.g. 5, 10, 15 is 3 groups of 5 and another group of 5 will make 20.      3 sets of 2 make 6 | Recognise and represent **multiplication as repeated addition, groups and arrays (rows and columns).**  *3 + 3 + 3 + 3 = 12* | | Record an **array as a multiplication sentence** and work out how many there are in total.    ***8 + 8 + 8 = 24*** |
| Begin to understand the **connection between repeated addition and multiplication.**  *e.g. 4 + 4 + 4 + 4 + 4 is the same as 5 x 4*  *5 rows of 4 = 5 x 4*  *3 scuba divers catch 2 fish eac. How many fish do they catch altogether? 2 + 2 + 2 = 6.*  *They also can record this as ‘3 groups of 2 is 6’.* | | Use **repeated addition or subtraction** to work out an unknown multiplication fact from a known fact.  *e.g. Child knows that 5 x 4 = 20. To make 6 x 4 another strip of 4 must be added, so 20 + 4 = 24. To make 4 x 4 a strip of four must be removed, so 20 – 4 = 16.* |
| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | | **\*\*\***  **Progress will be evident when pupils can:** |
| **Multiplication and Division** | **Multiplication and Division** | | **Multiplication and Division** |
| Use multiplication for situations involving repeating equal quantities.  *e.g. draw four oranges and then another four oranges. This is the same as two lots of four oranges.* | Use multiplication for situations involving repeating equal quantities.  *e.g. Jenny gets £5 pocket money each week. How much does she have after 6 weeks? can be written as repeated addition.* | | Use multiplication for situations involving repeating equal quantities.  e.g. ‘*Raspberries are £3 a box. How much do 6 boxes cost?’ can be written as repeated addition or multiplication if the amounts are represented in an array. 3 counters are placed in a row to represent the cost for one punnet and 5 more rows are added to solve the problem below.* |
| Recognise equal-sized groups found in everyday situations.  *e.g. Look for equal-sized groups such as stacks of class chairs. Count how many in each group and how many altogether.*    4 stacks of chairs  5 chairs in each stack  4 stacks of 5 chairs  5, 10, 15, 20 – skip count | Use materials, concrete or symbolic to form small equal-sized groups.  *e.g. ‘Use blocks to make 5 towers with 3 blocks in each. How many blocks there are altogether?’* *Can the 15 blocks be rearranged in towers of equal size to again equal 15?*  (*Useful to have vertical and flat groups)* | | Use arrays to show equal-sized groups that make the same quantity and note the commutative property.  *e.g. ’Group 12 blocks into equal sized rows. How many ways can you do it? Record the number combinations:* |
| Use the rows and columns in arrays to represent the number of groups and the number of objects in each group,  *e.g.*  ANd9GcQ48oxoLdLjnNflLL1oy7wOorARTsOlJu91FSoWDBQk6k8IzAPF-Q 3by4  *Four groups of three represents three rows of four* | |
| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | | **\*\*\***  **Progress will be evident when pupils can:** |
| **Multiplication and Division** | **Multiplication and Division** | | **Multiplication and Division** |
| Solve simple **division problems by sharing** into equal groups, e.g....  *Share 8 star biscuits shared amongst 4 children.* | Use **division for situations involving sharing** among an object or a group of objects – (sharing amongst 2, 3, 5 and 10).  *e.g....Share 15 cards between three people.* | | Use **division for situations involving sharing** or partitioning a collection – sharing amongst 2, 3, 4, 5, and 10)  *e.g....*  S*hare 35 lollies between five friends.*    *.* |
| Understand that some collections of objects can be shared evenly and some collections have objects left over.  *e.g.... One apple would be left over if seven apples were shared between two people.* | | Understand that collections of objects can be shared evenly and some collections have objects left over*.*  *e.g.... Twenty eight pencils were shared between 3 groups of children. Each group received 9 pencils and one was left over.* |
| Solve simple **division problems by grouping** collections into sets of particular size.  *Divide 8 star biscuits onto plates with 4 on each plate. How many plates (groups) will we have?* | Begin to understand the **connection between repeated subtraction and division by grouping**.  *e.g. Fiona has 15 large sunflower seeds that she puts into packets with three seeds in each. How many packets does she fill?* | | |
| Begin to use an **addition strategy to solve a division by grouping** by imaging.  e.g. McKay Bakers have made a fresh batch of 18 rolls and place them in bags of 3. How many bags will they need? 3 + 3 + 3 + 3 + 3 + 3 = 18 | | |
| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | | **\*\*\***  **Progress will be evident when pupils can:** |
| **Multiplication and Division** | **Multiplication and Division** | | **Multiplication and Division** |
| Comment on the patterns that skip-counting  sequences make on a hundreds board and predict other numbers in a sequence in a forwards or backwards direction, whilst looking at a partially filled in pattern    e.g. in this sequence of 3s, will 82 be covered? | **Use known facts to solve an unknown fact**  Solve multiplication facts about the two times table from their knowledge of doubling.  e.g. Double 7 is 14 so 2 x 7 = 14; double 8 is 16 so 2 x 8 is 16 | | |
| **Use known facts to solve an unknown fact**  Solve multiplication facts about the ten times table using their knowledge of the ‘ty’ words.  e.g. Four tens are forty because ‘ty’ means ten so 4 x 10 is 40. | | |
| **Use known facts to solve an unknown fact**  Begin to solve multiplication facts about the five times table from their knowledge of place value.  e.g. Understand that four tens is the same as eight fives.  4 x 10 =40 so 8 x 5 = 40 | | |
| **Use repeated addition and known facts to work out multiplication problems** | | |
| **\***  First  **Progress will be evident when pupils can:** | **\*\***  First  **Progress will be evident when pupils can:** | | **\*\*\***  **Progress will be evident when pupils can:** |
| **Patterns and Relationships** | **Patterns and Relationships** | | **Patterns and Relationships** |
| Describe and explain number sequences and patterns, understanding the pattern for the ‘teen’ numbers and then extending this to other multiples of 10.  *e.g.* 1**1**, 1**2**, 1**3, 14, 1**5 etc. 1-9 is being repeated.  Look on a number line/ hundred square and predict which number will come next. | Understand repeating patterns in the tens and ones columns and use this to explain patterns in the decades. (0-9 numbers are repeated).  *e.g.* 2**1**, 2**2**, 2**3**, 2**4**…. and 3**1**, 3**2**, 3**3**, 3**4**….  **2**0, **3**0, **4**0, **5**0, **6**0 … | | Understand repeating patterns in the hundreds, tens and ones columns and use this to explain patterns in the hundreds and thousands. |
| Understand that the next number in a sequence of ones is adding one and the one before is removing one. | Understand that the next number in a sequence of multiples is adding that multiple and the number before is removing one multiple. | | |
| Recognise that within the 10 times table, the ones digit is always a zero. | Recognise that all the products of the two times table are even.  Recognise that multiplying by an even number gives an answer which is always even. | | Recognise that the 5 times table products end alternately in 5 and 0.  Recognise and describe patterns in the 2,5 and 10 times tables. |
| Explore sequential patterns from previous term and are able to reproduce given pattern.  e.g. carry on this pattern. | Anticipate further items within any given pattern, ensuring consistency and that the pattern has been accurately repeated. | | Anticipate further items within any given pattern, ensuring consistency and that the pattern has been accurately repeated. Can identify shape in given ordinal position.  e.g. What shape will be in the 14th position? |
| Invent their own pattern with numbers and communicate the ‘rule’ so that someone else can continue it.  *e.g. 1, 3, 5, 7 ‘Add on 2 each time’* | Confidently describe a ‘rule’ for continuing a more complex number sequence.  *e.g.* 4,8,16 ‘The rule is going up by 4 or adding on 4’ | | Describe, predict and record rule for spatial patterns. |
| Use materials to compare and order e.g. make 3 different sized towers of cubes and then place towers in ascending order. | Classify odd and even numbers up to 20 and beyond as appropriate and be able to describe the rule – evens can be shared equally whereas odds can’t. | | Classify odd and even numbers up to 100 and beyond and is able to describe the rule (move to linking the equal sharing to being the same as the two times table). |

**SECOND LEVEL**

**Burnbrae Numeracy Progression**



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| **Second** | **Second**  **Experiences and outcomes** | |  |
| * *I can use my knowledge of rounding to routinely estimate the answer to a problem then, after calculating, decide if my answer is reasonable, sharing my solution with others.* ***MNU 2-01a***      * *I have extended the range of whole numbers I can work with and having explored how decimal fractions are constructed, can explain the link between a digit, its place and its value****. MNU 2-02a***      * *Having determined which calculations are needed, I can solve problems involving whole numbers using a range of methods, sharing my approaches and solutions with others.* ***MNU 2-03a***      * *I have explored the contexts in which problems involving decimal fractions occur and can solve related problems using a variety of methods.* ***MNU 2-03b***        * *Having explored the need for rules for the order of operations in number calculations, I can apply them correctly when solving simple problems.*  ***MTH 2-03c***      * *I can show my understanding of how the number line extends to include numbers less than zero and have investigated how these numbers occur and are used****.***   ***MNU 2-04a***     * Having explored the patterns and relationships in multiplication and division, I can investigate and identify the multiples and factors of numbers. **MTH 2-05a**      * Having explored more complex number sequences, including well-known named number patterns, I can explain the rule used to generate the sequence, and apply it to extend the pattern. **MTH 2-13a**      * I can apply my knowledge of number facts to solve problems where an unknown value is represented by a symbol or letter. **MTH 2-15a** | | | |
| **Second** | **Second**  **Points to consider** | |  |
| * Within this level, most children will understand and use the **cyclical pattern** in whole numbers and so can read the number below.      * To find the quantity that a digit represents, the value of the digit is multiplied by the value of the place e.g. in 3264 the 3 represents 3 x 1,000, 2 represents 200 because it is 2 x 100, the 6 represents 6 x 10 and the 4 represents 4 x 1. This is a really important feature of place value at Second Level because children need to recognise the **relative magnitude of numbers** i.e. that 5730 is ten times as much as 537. * There is a constant multiplicative relationship between the places, with the values of the positions increasing in powers of ten, from right to left…hence the **DECIMAL** system. * It is important that they understand that the maximum number in any place is 9 and that this applies to decimal places too. * Children need to have experienced a variety of activities that help develop the idea that there are numbers between consecutive whole numbers e.g. between 3 and 4 there are 9 numbers in the tenths range just for starters – 3.1, 3.2, 3.3……3.9 * Children need to thoroughly understand fractions before they are introduced to decimal fractions. They need to understand that fractions arise from division of whole numbers and that decimal fractions are special cases of fractions, as their denominators are always a power of ten. | | Place value houses   * As an introduction to **decimals** the following definition should be used. ‘The digit to the immediate right of the decimal point is in the tenths column’ and ‘The digit that is two places to the right of the decimal point is in the hundredths column’ etc. * It is **strongly recommended** that decimals are initially introduced by saying how many tenths there are e.g. 2.8 should be read as ‘two and eight tenths’, not 2 point 8. * However, having establishing that they understand the place value within decimals, pupils should be able to demonstrate that they know that decimal numbers are said differently to whole numbers. They should go on to say and read any decimal number e.g. for 347.37 pupils should say ‘347 point 37’ but should know, through discussion, that 347.37 is equivalent to and, written as a mixed number, it is 347 and 37 hundredths. * Children sometimes confuse a decimal point and think of it as separating two whole numbers. This is a very common misconception; possibly because of the early introduction of money notation and that the point separates pounds and pence. * Children should understand that **decimal fractions arise out of division** and that when any unit needs to be broken up it needs to be divided into ten equal parts. (It is useful to use visuals where the unit that can be broken into ten equal pieces is wrapped as a whole). * The digits to the right of the ones column have decreasing values in powers of ten with the first place representing tenths, the second hundredths, and so on, and can represent infinitely small numbers. | |
| **Second** | **Second**  **Points to consider** | |  |
| * During this level children will need to be given ample opportunity to **solve problems and develop a wide range of strategies** to support the necessary mental calculations needed to solve them. Children must be able to discuss the strategies they have used to solve problems. * When setting problems, always set them out in a **horizontal form**. This will encourage a more flexible response. One drawback to textbook questions is that they are often set out in vertical form and this encourages children to follow a more procedural approach rather than an intuitive one. * **Writing number stories** and representing what a story will look like using diagrams and number sentences is very important for children to be able to contextualise the numbers. This is just as relevant at second level as it is in early and first. * When asking children to **write their own stories**, it is useful to downgrade the level of difficulty in a question so they can concentrate on the language that needs to be included in their story to match the number sentence that they write. For example, 13 x 6 =? and ‘208 people went to a football match and sat in the first 6 rows, how many people were in each row?’ do not match. The number sentence should be 208 ÷ 6 = * It is very important that children **estimate answers** before attempting to solve a problem by calculating. They should then use their estimate to assess if their final result was reasonable. * Some children will find it difficult to use the **inverse relationship** between addition and subtraction to choose the more efficient strategy between counting on or counting back for solving particular problems. They need to be able to re-interpret 47 – 26 as, ‘what do you have to add to 26 to get to 47’ and so count by tens and ones. | | * Another useful strategy when dealing with numbers that look tricky is to change them by adding or subtracting an amount to make the numbers more manageable. This ‘**transformation’ strategy** ( or ‘Same Difference’ strategy for subtraction) works as long as you: * add/subtract the same amount to both sides for a subtraction * add to one side and take exactly the same amount off the other side for an addition. * We know that children have to go through many counting experiences before they **trust** that the order in which they **count** does not affect the final amount and so learn that starting at the largest number is the most efficient. The same idea underpins why facts for subtraction, multiplication and division can be relied upon. If offered a variety of rich experiences to construct number problems using concrete materials they will begin to trust the associations between the four operations. * This trust enables children to recall a ‘**family of facts’** from just one calculation. For example, if they have worked out that 18 X6 is (10 X 6) + (8 X 6) = 60 + 48 = 108, then they will also know that 6 X 18 = 108 108 ÷ 18 =6 and 108 ÷6= 18. * A **prime number** can only be divided by one and itself i.e, has two factors. One is not a prime number because it has only one factor i.e. itself.   For children to understand negative numbers they need to understand that there are a set of whole numbers called integers. The set of integers consists of the ‘Natural Numbers’ {0, 1, 2, 3 …} and their non-zero negatives (-1, -2, -3 ...). Zero is an integer, 2.6 and are not. | |

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| **Second** | **Second**  **Suggested Written Recording** | |  |
| * Children will need to record their calculations using a range of symbols and numbers. They will also use a wide range of jottings including empty number lines and arrow notation to show jump strategies and drop down notation for split strategies. Definitions of the seven most common strategies are given below:  1. ***Jump to the next decade***   Begin from one number, jump to the nearest decade, jump tens, and  then jump the remaining ones.   1. ***Jump***   Begin from one number, jump tens then jump ones (or ones and  tens).   1. ***Split***   Split tens and ones, add/subtract them separately, and then  recombine.   1. ***Split Jump***   Split tens and ones, add/subtract tens first, then add first lot of ones  and then second ones. E.g. 48 + 94 = 90 + 40 130 138   1. ***Over jump***   Begin from one number, overshoot the jump, and then compensate   1. ***Compensation***   Change one or both numbers, add/subtract, and then compensate.   1. ***Transformation.***   Change both numbers while preserving the result, and then  add/subtract.   * **The aim at this level is for children to have a flexible approach to the use of different strategies and be able to consider the efficiency. Written strategies should be used when the numbers get too big to calculate mentally.** | | * As children become fluent with empty number line notation and split notation, more formal arrow notation can be used. It is certainly more compact and moves closer to more conventional notations, such as the semi- formal column sum and the standard algorithm (chimney sum!). These need to be used with more precision especially when considering the meaning of the equals sign.      * Working with equations such as 4 x 5 = 10 + 6 + 4 helps develop the understanding that the same quantity is shown on both sides of the equals sign, rather than one side showing an instruction for an operation and the other the answer.   It would be useful if teachers were to show pupils that ‘balance’ is preserved provided we carry out the same operation to both sides of the equation. This then paves the way for a more formal treatment of equation solving when pupils move into Third Level.  Informal Jottings   * Children should be encouraged to record jottings. This is where a mental strategy has been used but some initial calculations are jotted down to avoid having to remember them. Keeping track of all the necessary parts allows space in the brain to apply to solving the problem. * Problems should be chosen which help children to apply combinations of mental strategies and which link with other areas of mathematicse.g. John has dug up his old lawn and wants to reseed it. His lawn is rectangular and measures 11.7 metres by 4.8 metres. He needs 70 grams of grass seed for every square metre of lawn. Grass seed is sold in 1 kg boxes. How many boxes should John buy? | |
| **Second** | **Second**  **Suggested Written Recording** | |  |
| **Written strategies should be used when the numbers get too big to**  **calculate mentally**, i.e. when numbers have more than 3-digits  Semi-formal Strategies for addition and subtraction   * These are well- organised, standardised, written strategies. This strategy requires reasoning with whole numbers. For example, the pupil calculates 500 + 200 = 700, not 5 + 2 = 7. They are generally set out in columns and still involve children doing multi-digit calculations mentally, but the writing systematically records intermediate results, and keeps them organised. It is essentially a split method where the hundreds, tens and ones part of each number are added separately, and then these sub-totals are added. The writing helps to keep track of the calculations, while actually adding the numbers together remains a mental task. It is not crucial where the subtotals are placed as they are added together as whole numbers       See how this practice with decomposition  supports the ‘contracted form’ to the right. | | **Written strategies should be used when the numbers get too big to**  **calculate mentally**, , i.e. when numbers have more than 3-digits  Formal Algorithms for addition and subtraction   * **Formal algorithms should ideally be introduced once children have a clear understanding of place values within addition and subtraction calculations through using a ‘nested view’ of numbers i.e. understand that ‘nested’ within thousands are hundreds, tens and units.**   **For example, how many tens are there in 347? If a child recognises that there are 34 tens or 2 hundreds and 14 tens then they can tackle the problem through use of a formal algorithm. If they do not understand this core concept, they should not be working through a column sum.**    Formal algorithms are probably the most familiar written computational methods. They are sometimes referred to as standard or traditional algorithms. Algorithm means a step-by-step procedure for computing a standard task. In the formal algorithms, mental calculations mainly involve 1-digit numbers. Using this method requires pupils to follow a precise procedure, working from right to left, and so on. It also involves a precise layout of the writing, aligning the digits in columns.  Description: cid:image003.png@01CE410F.74416240 | |

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| **Second** | **Second**  **Suggested Written Recording** | |  |
| Semi-formal Strategies for multiplication  These are well- organised, standardised, written strategies.  Children can begin to use the ‘**empty number lines’** efficiently by making bigger jumps.    Or use the **grid method** (provide children with opportunities to create arrays for two-digit x one-digit multiplication as this leads them into recording the ‘grid method’ effectively). E.g.14 x 3 =      e.g. 127 x 4 | | Semi-formal Strategies for division  **Chunking -** pupil repeatedly takes away ‘chunks’ of the large number, where each ‘chunk’ is an easy multiple of the divisor, until the large number has been reduced to zero or the remainder is less than the divisor. At the same time the pupil keeps track of the total amount of ‘chunks’ subtracted, which eventually becomes the final result of the sum.      Ensure pupils have a clear layout and that they understand the  process for chunking to divide a single-digit number before  moving into dividing by a two-digit number. | |

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| **Second** | **Second**  **Suggested Written Recording** | |  |
| **Order of Operations**  Where a calculation contains only addition and subtraction, the operations should be carried out in the order they appear.  Where a calculation contains only multiplication and division, the operations should be carried out in the order they appear.  Where a calculation contains a combination of the 4 operations, multiplication and division take priority over addition and subtraction.  Pupils should also set out their working correctly. When a calculation requires more than one operation, there are rules for ensuring that the operations  are done in the correct order. | | | |
| Example 1  This calculation contains only addition and subtraction. In this case, the operations are carried out in the order they appear:  =  =  =  =  = 8  Example 2  This calculation contains only multiplication and division. In this case, the operations are carried out in the order they appear:  =  =  =  = | | Example 3  In a calculation containing a mixture of the 4 operations the rule is that multiplication and division should be carried out before addition and subtraction.  = ( is done before even though the subtraction  appears first)  =  =  Example 4 (Problem solving)  Which operations should go in the boxes to make the equation true? 24 3 4 2 = 0  Example 5 (Problem solving)  How many ways can you find to make the number 42? Each calculation should contain at least one multiplication/division and one addition/subtraction. | |

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| **\***  Second  **Progress will be evident when pupils can:** | **\*\***  Second  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** | |
| **Number Word Sequences 10,000 and tenths** | **Number Word Sequences to 100,000 & hundredths** | **Number Word Sequences to million & thousandths** | |
| **Count on and back missing numbers to 10, 000**  Count number word sequences **forward** and **backwards** in steps of 1000, 500, 100, 50, 20, 10 and 1 from different starting points within 10 000.  *e.g.*   * *6,000, 5,000, 4,000, 3,000, 2,000…* * *2,300, 3,300, 4,300, 5,300, 6,300…* * *1,500, 2,000, 2,500, 3,000, 3,500, 4,000…* * *3,020, 3,040, 3,060, 3,080…..* * *3,456, 3,476, 3,496…*   and backwards | **Count on and back to 100,000**  Count number word sequences **forward** and **backwards** in steps of 100,000, 50,000, 10,000, 5,000, 1,000, 500, 100, 50, 20 and 10  *e.g.*   * *1s - 3,456, 3,457, 3,458 and 6,002, 6,001, 6,000…* * *10s – 3,380, 3,390, 3,400 3,410 and 6,220 6,210, 6,200…* * *100s – 4,800, 4,900, 5,000 and 3,060, 2,960, 2,860, 2,760…* * *1000s - 8,000, 9,000, 10,000 and 32,000, 31,000, 30,000* | **Count on and back to a million**  Extend this to count number word sequences **forwards** and **backwards** in steps in ten thousand and one hundred thousand to a million.  *e.g.*   * *340,000, 350,000, 360,000 and 750,000, 740,000…* * *800,000, 900,000, 1,000,000 and 2,600,000,*   *2,500,000, 2,400,000* | |
| Say the number word just before and after a 2, 3 and 4 digit number in the range of 0-10,000 and be confident when crossing into the next century/thousand.  e.g. 2,400, 2,399, 2398, or next four numbers after 7998, 7999, 8000, 8001 4001, 4000, 3999, 3998 | Say the number word just before and after a 4, 5 and 6 digit number in the range of 0-100,000. | Confidently say the number word just before and after a 4, 5 and 6 digit number in the range of 0-1,000,000. | |
| Understand decimals as numbers rather than as ways of representing money and measures.  Count in decimal amounts to one decimal place, forwards and backwards from any given number understanding the value of each digit  *e.g. 2.3, 2.4, 2.5… 8.7, 8.6, 8.5, 8.4…* | Count in decimal amounts to two decimal places forwards and backwards from any given number, understanding the value of each digit.  *e.g. 2.34, 2.33, 2.32, 2.31…*  *19.21, 19.20, 19.19, 19.18…* | Count in decimal amounts to three decimal places forwards and backwards from any given number, understanding the value of each digit.  *e.g. 2.345, 2.346, 2.347, 2.348…*  *87.234, 87.233, 87.232, 87.231…* | |
| **\***  Second  **Progress will be evident when pupils can:** | **\*\***  Second  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** | |
| **Read/Write numbers to ten thousand and decimal numbers to tenths** | **Read/Write numbers to a hundred thousand and decimal numbers to hundredths** | **Read/Write numbers to a million and beyond and decimal numbers to thousandths** | |
| Say the number word that is 0.1 before and after a number in the decimal (tenths) pattern, understanding the value of each digit.  e.g. What’s after 2.6? Answer = 2.7 | Say the number word that is 0.01 before and after a number in the decimal (2 places) pattern, understanding the value of each digit.  *e.g. What’s after 3.56? Answer = 3.57* | Say the number word that is 0.001 before and after a number in the decimal (3 places) pattern, understanding the value of each digit.  *e.g. What’s the number after 2.415? Answer = 2.416* | |
| Use the convention for reading, writing and saying ordinal numbers beyond 100 *e.g. ‘It was the 253rd anniversary of Robert Burns’ birthday in the year 2012.’* | Confidently use the convention for reading, writing and saying ordinal numbers beyond 100 e.g. ‘In the Year 2015 the National Library of Scotland will have its 320th anniversary. | Fluently use the convention for reading, writing and saying ordinal numbers beyond 1000,  *e.g. ‘In 2013 it will be the 1,170th anniversary of Kenneth MacAlpine uniting the Scots and Picts as one nation’.* | |
| Read, write and say whole numbers beyond ten thousand (inserting a comma between each cycle of three digits from right to left). *e.g. 9,885* | Read, write and say whole numbers in the range of hundred thousand and beyond (inserting a comma between each cycle of three digits from right to left) e.g. 21,850 | Confidentlyread, write and say whole numbers in the range of a million and beyond (Inserting a comma between each cycle of three digits from right to left) *e.g. 2,109,850* | |
| Identify and represent whole numbers up to ten thousand and beyond using numerals, words and number lines. | Identify and represent whole numbers up to hundred thousand using numerals, words and number lines. | Confidently identify and represent whole numbers to a million and beyond using numerals, words and number lines. | |
| **\***  Second  **Progress will be evident when pupils can:** | **\*\***  Second  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** | |
| **Read/Write numbers to ten thousand and decimal numbers to tenths** | **Read/Write numbers to a hundred thousand and decimal numbers to hundredths** | **Read/Write numbers to a million and beyond and decimal numbers to thousandths** | |
| Sequence numerals up to and beyond 10,000  *e.g. 20,000, 30,000, 40,000, 50,000*  *87,000, 77,000, 67,000, 57,000* | Confidently sequence numerals up to and beyond 100,000  *e.g. 600,000, 700,000, 800,000, 900,000*  *820,000, 720,000, 620,000, 520,000* | Confidently sequence numerals up to and beyond 100,000  *e.g. 456,000, 556,000, 656,000, 756,000*  *832,000, 732,000, 632,000, 532,000* | |
| Use place value to compare and order numbers up to and beyond 10,000,  *e.g. 7,896 is bigger* *than 7,096 because there is an 8 in* *the hundreds place rather than a 0.* | Use place value to order larger whole numbers in ascending or descending order up to and beyond 100,000,  *e.g. 25,296 is bigger than* *24,987 because there is a 5 in the* *thousands place rather than a 4.* | Use place value to order larger whole numbers in ascending or descending order up to and beyond 100,000,  e.g. 765,296 is bigger than 754,998 because there is a 6 in the ten thousands place rather than a 5. | |
| Place whole numbers up to 10,000 on a scaled number line, using varied intervals: | Place whole numbers up to 100,000 on a scaled number line, using varied intervals: | Place whole numbers up to 1,000,000 on a scaled number line, using varied intervals: | |
| Confidently read, write and say decimal numbers to one decimal place,  e.g. *3.8 is ‘three ones and 8 tenths’ and is read as ‘three point eight*’. | Confidently read, write and say decimal numbers to two decimal places,  *e.g. 1.46 is* *‘one and 4 tenths and 6 hundredths’ or ‘one and 46 hundredths’ and is read as ‘ one point four, six’* | Confidently read, write and say decimal numbers to three decimal places,  e.g. *4.953 is ‘4 ones, 9 tenths 5 hundredths and 6 thousandths’ or 4 ones and 956 thousandths’ etc. and is read as ‘four point nine, five, three’.* | |
| **\***  Second  **Progress will be evident when pupils can:** | **\*\***  Second  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** | |
| **Read/Write numbers to ten thousand and decimal numbers to tenths** | **Read/Write numbers to a hundred thousand and decimal numbers to hundredths** | **Read/Write numbers to a million and beyond and decimal numbers to thousandths** | |
| Identify and represent decimal numbers up to one decimal place using numerals, words and pictures, understanding the value of each digit e.g. | Identify and represent decimal numbers up to two decimal place using numerals, words and pictures, understanding the value of each digit e.g. | Identify and represent decimal numbers up to three decimal places using numerals and words, understanding the value of each digit.  ***e.g.***  ***28.945***  ***twenty-eight point nine, four, five***  ***two tens eight ones and 945 thousandths*** | |
| Sequence decimal numbers to one decimal place. | Sequence decimal numbers to two decimal place e.g. | Sequence decimal numbers to three decimal place e.g. | |
| Compare and order decimals to one decimal place (largest/smallest)  *e.g. ask children to hang decimal numbers to one place, in order , on a washing line from 0.1 o 0.9* | Compare and order decimals to two decimal places (largest/smallest)  *e.g. put these numbers in order from largest to smallest; 2.45, 2.54, 2.53, 2.05 [ 2.54, 2.53, 2.45, 2.05]* | Compare and order decimals to three decimal places (largest / smallest)  *e.g. understand that a book coded 360.341 under the Dewey system will come before a book coded 360.56* | |
| Locate decimal numbers to 1 place on a scaled number line, using tenths. | Locate decimal numbers to 2 places on a scaled number line, using hundredths. | | |
| **\***  Second  **Progress will be evident when pupils can:** | **\*\***  Second  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** | |
| **Structuring Numbers – Grouping and Place Value** | **Structuring Numbers – Grouping and Place Value** | **Structuring Numbers – Grouping and Place Value** | |
| Recognise exact partitions of 1,000 and record in standard/expanded notation (standard and non-standard place value). | Recognise exact partitions of 10,000 and record in expanded notation (standard and non- standard place value). | Recognise exact partitions of a million and record in expanded notation (standard and non-standard place value). | |
| **\***  Second  **Progress will be evident when pupils can:** | **\*\***  Second  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** | |
| **Structuring Numbers – Grouping and Place Value** | **Structuring Numbers – Grouping and Place Value** | **Structuring Numbers – Grouping and Place Value** | |
| Convert hundreds and thousands into groups of 10, 100 and 1,000.  *e.g. 2,000 is 20 hundred and / or 200 tens*  *1,600 is 16 hundred and / or 160 tens*    *How many tens are there in 258? 25 tens and 8 ones.*  *(When a concrete representation such as beans and ten beans in a canister are used, as above, children can describe how each column to the left is ten times bigger.)* | Convert a number in the thousands and ten thousands into groups of 10, 100 and 1,000 and know that there may be a remainder.  *e.g. 4794 - there will be 479 tens and 4 remainder or 47 hundreds and 94 remainder.*  *46,830 is 4,683 tens or 468 hundreds and 3 tens left over* | Convert a number up to one million into groups of 10, 100 and 1,000.  e.g. There are 367,889 tens in 3,678,890,  There are 8,459 hundreds in 845,956  There are 567 thousands in 567,923 | |
| Show groupings of two, three, four, five and ten within numbers to 100 and show any remainders.  *e.g. the number of threes in 19 is 6 with 1 remainder, fives in 58 are 11 with 3 remainder.* | | Show groupings of all numbers to 10 within numbers to 100 and show any remainders.  *e.g. sixes in 45, sevens in 52, eights in 68* | |
| Recognise the place to the right of the decimal point as tenths and understand they can be partitioned *e.g. 3.8 as*    *6.3 as* | Recognise the two places to the right of the decimal point as tenths and hundredths and understand they can be partitioned  *e.g. 1.46 as* | Recognise the three places to the right of the decimal point are tenths, hundredths and thousandths and can be partitioned,  e.g. .953 as | |
| **\***  Second  **Progress will be evident when pupils can:** | **\*\***  Second  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** | |
| **Structuring Numbers – Grouping and Place Value** | **Structuring Numbers – Grouping and Place Value** | **Structuring Numbers – Grouping and Place Value** | |
| Recognise that ten tenths make one whole and explain how many tenths are in a number to one decimal place.  *e.g.... tenths in 1.3 is 13* | Recognise that a hundred hundredths make a whole, ten hundredths make a tenth and explain how many hundredths and tenths are in a number given to 2 decimal places.  *e.g. 10 tenths or 103 hundredths in 1.03 25 tenths or 257 hundredths in 2.57* | | |
| **Rounding and Estimating** | **Rounding and Estimating** | | **Rounding and Estimating** |
| Confidently round whole numbers to the nearest 10 or 100.  *e.g. 342 to 340 1,278 to 1,280 – nearest 10*  *1,578 to 1,600 3,839 to 3,800 – nearest 100* | Round whole numbers to the nearest 10, 100 or 1,000.  *e.g. 4,790 to 5,000*  *28,399 to 28,000* | | Confidently round whole numbers to nearest 10, 100 or 1,000.  *e.g. 3785 rounds to 3,790 (nearest 100*  *to 3,800 (nearest 100)*  *to 4,000 (nearest 1,000)* |
| Round numbers having one decimal place to the nearest whole number.  *e.g.... round 3.6 to 4 17.2 to 17* | Round numbers having two decimal places to the nearest whole number.  *e.g.... round 3.48 to 3 16.83 to 17* | | Round numbers having up to two decimal places to the nearest whole number or tenth.  *e.g.... 5.47 rounded to nearest tenth - 5.5*  *nearest whole - 5*  *6.79 rounded to nearest tenth - 6.8*  *nearest whole - 7* |
| Given two numbers in the range 0-10,000 identify the number which is halfway between them  *e.g. an interval of 4,000 (what’s halfway between 3,000 & 7,000?)*  *e.g. an interval of 50 (what’s halfway between 250 & 300?)*  *e.g. an interval of 20 (what’s halfway between 4520 & 4540)* | Given two numbers in the range 0-100,000 identify the number which is halfway between them  *e.g. an interval of 60,000 (what’s halfway between 20,000 & 80,000?)*  *e.g. an interval of 8,000 (what’s halfway between 7,246 and 15,246*  *e.g. an interval of 1500 (what’s halfway between 7500 and 9000*  *e.g. an interval of 120 (what’s halfway between 84,560 and 84,680* | | Given two numbers in the range 0-1,000,000 identify the number which is halfway between them  *e.g. an interval of 400,000 (what’s halfway between 225,000 and 625,000?)*  *e.g. an interval of 30,000 (what’s halfway between 130,600 and 160,600?*  *e.g. an interval of 1500 (what’s halfway between 7500 and 9000*  *e.g. an interval of 120 (what’s halfway between 84,560 and 84,680*  *e.g. an interval of 1.6 (what’s halfway between 2 and 3.6?)* |
| **\***  Second  **Progress will be evident when pupils can:** | **\*\***  Second  **Progress will be evident when pupils can:** | **\*\*\***  **Progress will be evident when pupils can:** | |
| **Mental Agility - Basic Facts** | **Mental Agility - Basic Facts** | | **Mental Agility - Basic Facts** |
| Efficiently recall **all addition and subtraction facts within 20** and extend these facts to **multiples of 10 and 100**    Instantly recall **multiples of 100 facts that add to 1,000*,*** *e.g. 100 +900, 500 + 500, 300 + 700.*  Instantly recall **multiples of 10 to 200 (number bonds to twenty)** e.g**.** 1*20 + 80, 40 + 160, 200 – 70 = 130* | Efficiently recall **all addition and subtraction facts within 20** and extend these facts to **multiples of 10 (within 200)**    *e.g. 12 + 6 = 18 so 120 + 60 = 180*  *60 + 120 = 180*  *180 – 60 =120*  *180 – 120 = 60* | | |
| Begin to recall quickly **a single digit** number **added or subtracted** to/from a 2 digit number without bridging a decade.  *e.g. single digit*  *20 + 7 30 + 9 22 + 7 47 – 5 63-1* | Begin to recall quickly a **single digit** number or **multiple of hundred** **added to or subtracted** from any 3-digit number.  *e.g. 120 + 7 130 + 9 122 + 7 647 – 5*  *e.g. 100 + 319 516 + 200 487 – 100*  *674 – 300 + 356 = 656* | | Begin to recall quickly **a multiple of ten** **added to or subtracted** to/from a multiple of ten without bridging a century.  *e.g. multiple of ten*  *120 + 30 250 + 40 690 - 50*   1. *+ = 180 + 460 = 490* |
| Recall all **the doubles and corresponding halves** multiples of 10 (within 200) e.g. 90 180, ½ of 160 is 80  multiples of 100 (answer within 2,000 ) 600 1200  multiples of 1,000(answer within 20,000) ½ of 8,000 is 4,000 | Recall all the **doubles and corresponding halves** for:   * + multiples of 10 (answer within 400) e.g. 190 380, half of 240 is 120   + multiples of hundred (answer within 4,000) e.g. 1,400 2,800, half of 2,200 is 1,100   + multiples of thousand (answer within 40,000) e.g. 12,000 24,000, half of 36,000 is 18,000 | | |
| Instantly **recall all multiplication facts up to 10 x10** and **some corresponding division facts.** | | | Instantly **recall all multiplication and division facts up to the 10 times** tables (10 x10) including **square numbers.** |
| Recall **multiplication facts with tens, hundreds and thousands**.  *e.g. 10 x 10 =100 100 x 10=1,000 100 x 100 =10, 000* | | | Recall some **common multiples** beyond ten times table e.g. x11, x12, x15, x20…..  x25, x 50, x 75, x125, x200  x75, x150, x300 |
| **Recall the divisibility rule for 2, 5 and 10**  *e.g.*  *All numbers in the two times tables are always even.*  *The pattern in the ones repeats for the 5 and 10 times tables -0 and 5* | | | Efficiently recall the **divisibility rules for 2, 3, 5, 9 and 10.** *e.g. 474 is divisible by 3 because 4+7+4=15 and 15 is divisible by 3.*  *171 is divisible by 9 because 1+7+1=9 which is divisible by 9* |

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| **Second** | **Second**  **Points to consider – Part 2** |  |

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| **THE NEXT DOMAIN NEEDS TO BE ORGANISED IN A DIFFERENT WAY BECAUSE THE INTRODUCTION, DEVELOPMENT AND PERFECTION OF THE STRATEGIES INCLUDED WILL NEED AT LEAST TWO/THREE YEARS FOR MOST SECOND LEVEL PUPILS TO FULLY MASTER.** It is advised that the strategies in the ‘**Choosing Appropriate Mental and Written Strategies for Addition and Subtraction Problems’** domain are built up in a **linear progression**.  Once the child has proved competent in using a particular strategy, they may then move on to learning a new strategy. To be completely proficient with a strategy means that the child has moved from understanding how the strategy works whilst using concrete materials to then being just as competent when visualising the materials or using pictorial clues. They then must make the important conceptual leap to being able to successfully answer problems given in the abstract form. This will involve using the strategies learned but applying these to numbers larger than they could possibly image in their heads.   |  |  |  | | --- | --- | --- | | **Choosing Appropriate Mental and Written Strategies for Addition and Subtraction Problems’** | | | | \* | \*\* | \*\*\* | | New strategies introduced by using   * **concrete** materials * **visualising** screeningmaterials or using pictorial clues * **abstract** problems – *e.g. 862 + 25*   The strategies will then be practiced and refined gradually until children slowly build up a wide range of useful approaches to solving problems.  **PLEASE LOOK CAREFULLY AT THIS DOMAIN IN FIRST LEVEL!** A child will be unable to proceed successfully if First level learning intentions are not fully understood and deeply embedded. | Pupils will need to show they **can successfully apply their knowledge/ strategies** to solve problems in **familiar and unfamiliar** situations.  FORMAL ALGORITHMS ARE INTRODUCED AT THIS STAGE – see ‘Points to Consider – Part 1 and examples in ‘Suggested Written Recording’  A **daily mix of calculations** in the form of equations and word problems should be given to the children and ample time should be ring-fenced to allow **rich discussion** about the most **efficient strategies** to use.  It is also very important that the type of calculations selected by the teacher provide **plenty of opportunity** to **practice the range of strategies** that have been taught.  **Children should choose the strategy** themselves; teachers should not give a set of problems and tell the children which strategy would be the most efficient! | **Constant revision and practice** will ensure that the knowledge and strategies are deeply embedded and fully understood. This rich number sense will help to ensure that children can make informed decisions and solve problems efficiently.  Only then should the children move onto learning the more sophisticated strategies listed in the \*\*\* section. These will be introduced at the end of Second Level and developed over Third level.  Calculations involving decimals and fractions are introduced at this stage. Decipipes and dienes are excellent tools to support pupils with understanding what tenths and hundredths look like.    Children are beginning to use multiplication to aid their addition and subtraction calculations (‘distributive law’)  *e.g. 21 + 42 + 14 are all multiples of 7 and so this can be changed to (3 x 7) + (6 x 7) + ( 2 x 7) = 11 x 7 = 77.* | |

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| ***\****  Second  ***Progress will be evident when pupils can:*** | ***\*\****  Second  ***Progress will be evident***  ***when pupils can:*** | ***\*\*\****  ***Progress will be evident when pupils can:*** | |
| ***Choosing Appropriate Mental and Written Strategies for Addition and Subtraction Problems*** | ***Choosing Appropriate Mental and Written Strategies for Addition and Subtraction Problems*** | | |
| *Solve* ***addition and subtraction problems*** *by using a* ***jump strategy which bridges to ten/hundred (tidy numbers)***  *e.g. 74 people on a train and 48 people get on at the next stop. How many people are now on the train?* | **EFFICIENTLY SOLVE PROBLEMS**  **Choosing effective strategies** is a skill that children will develop gradually.  **Regular practice (daily)** with a wide range of mental calculations will help support their ability to employ **efficient strategies** and make informed decisions that they can **confidently discuss** with others.  Children need to be provided with a **wide mix of problems** that should be presented as both **equations and word problems**.  **USE**  **FORMAL ALGORITHMS**  Pupils should be taught how to use the **standard written form** to solve addition and subtraction calculations.  They should always mentally **estimate** the answer before using the written method.  (See ‘Points to Consider – part 2’) | | *Use* ***multiplication to solve addition and subtraction*** *problems where* ***common factors*** *can be found.*  *e.g.*  *36 + 45 = (4 x 9) + (5 x9) = 9 x 9 = 81*  *29 + 30 + 28 + 33 + 32 + 27 +31 + 30 = 8 x 30*  *= (8 x 3)x 10*  *= 24 x10 = 240*  *63 – 27 = ( 7 x 9) – (3 x 9) = 4 x 9 = 36* |
| *Solve* ***addition and subtraction problems*** *by using a* ***jump strategy across the decade.***  *e.g. 93 -26 =*    *(Start at the right handside of an empty number line for a subtraction)* |
| ***The following learning intentions will be covered in a separate Fractions, Decimals and Percentages Progression.*** *Use of concrete materials such as decipipes will be explored in greater detail.*  ***However it is important to note that fractions must be understood before decimals and percentages are introduced.***   * *Understand how to* ***add and subtract fractions*** *with equal denominators* * Understand how to **add or subtract fractions** with **different denominators** (the use of equivalence is required to rewrite both fractions with a common denominator). |
| *Solve problems that involve calculating:*  ***How many tens make one hundred?*** *e.g.*  *Mrs MacDonald took her class to the Science Centre. She has £347 in her purse to pay for the admission. It costs £10 per person. There are 30 children in the class and five adults. Does she have enough money?*  ***How many hundreds make one thousand?*** *e.g.*  *The Bank of Scotland has run out of £1,000 notes. Jenny needs to withdraw £2875. How many £100 pound notes does Jenny receive?* |
| ***\****  Second  ***Progress will be evident when pupils can:*** | ***\*\****  Second  ***Progress will be evident***  ***when pupils can:*** | ***\*\*\****  ***Progress will be evident when pupils can:*** | |
| ***Choosing Appropriate Mental and Written Strategies for Addition and Subtraction Problems*** | ***Choosing Appropriate Mental and Written Strategies for Addition and Subtraction Problems*** | | |
| *Use the* ***commutative*** *property to add numbers by* ***making decade numbers up to 100*** *e.g.*   * *16 + 8 + 4 = 20 + 8* * *16 + 9 + 4 + 8 + 1 = 20 + 10 + 8 = 38* * *24+7+6 would be 24+6+7 = 30 + 7* * *14 + 16 + 45 = 30 + 45* * *60+20+40 would be 60+40+20 = 100 + 20* * *34 + 27 + 66 + 55 + 73 = 200 + 55 = 255* | **EFFICIENTLY SOLVE PROBLEMS**  **Choosing effective strategies** is a skill that children will develop gradually.  **Regular practice (daily)** with a wide range of mental calculations will help support their ability to employ **efficient strategies** and make informed decisions that they can **confidently discuss** with others.  Children need to be provided with a **wide mix of problems** that should be presented as both **equations and word problems**.  **USE**  **FORMAL ALGORITHMS**  Pupils should be taught how to use the **standard written form** to solve addition and subtraction calculations.  They should always mentally **estimate** the answer before using the written method.  (See ‘Points to Consider – part 2’) | | ***Can add or subtract two decimal numbers to one place*** *and explain what has happened to the decimal point (i.e. when the combined answer is a whole number and there are no parts of a whole in the answer!)*  *e.g. 1.5 + 3.5 = 5*    *2.7 + 3.3 = 6*    *7.4 + 2.6 = 10*  *7.5 – 3.5 = 4*  *9.4 – 6.4 = 3* |
| *Solve* ***subtraction problems by using a place value strategy (split strategy)*** |
| *Use a* ***split strategy*** *to* ***add and subtract decimals to one decimal place, using standard place value partitions.***  *Add 2 decimal numbers to one place by splitting the whole numbers and tenths,*  *e.g. 3.5 + 4.8 =*  *3 + 4 = 7*  *5 tenths + 8 tenths = 13 tenths 1 one and 3*  *tenths, so 7 + 1 + 0.3 = 8.3*  *9.7 – 5.3 = 9 – 5 = 4*  *7 tenths – 3 tenths = 4 tenths*  *4 + 0.4 = 4.4* |
| ***\****  Second  ***Progress will be evident when pupils can:*** | ***\*\****  Second  ***Progress will be evident***  ***when pupils can:*** | ***\*\*\****  ***Progress will be evident when pupils can:*** | |
| ***Choosing Appropriate Mental and Written Strategies for Addition and Subtraction Problems*** | ***Choosing Appropriate Mental and Written Strategies for Addition and Subtraction Problems*** | | |
| *Solve* ***addition problems by using a place value strategy (split strategy).***  *Partition the numbers in ones, tens and hundreds columns and then add / subtract them together and then recombine the columns to get the answer.*  *e.g... 25 + 67 Find 456 + 238* | **EFFICIENTLY SOLVE PROBLEMS**  **Choosing effective strategies** is a skill that children will develop gradually.  **Regular practice (daily)** with a wide range of mental calculations will help support their ability to employ **efficient strategies** and make informed decisions that they can **confidently discuss** with others.  Children need to be provided with a **wide mix of problems** that should be presented as both **equations and word problems**.  **USE**  **FORMAL ALGORITHMS**  Pupils should be taught how to use the **standard written form** to solve addition and subtraction calculations.  They should always mentally **estimate** the answer before using the written method.  (See ‘Points to Consider – part 2’) | | *Use a* ***split strategy*** *to* ***add and subtract decimals to one decimal place using non-standard place value partitions.***  *e.g. 4.3 – 1.7  4.3 converts to 3 + 13 tenths, so*  *3 + 13 tenths – 1 – 7 tenths*  *2 + 13 tenths – 7 tenths*  *2 + 6 tenths = 2.6*  *4.3 – 1 = 3.3 2 + 13 tenths*  *13 tenths – 7 tenths = 6 tenths so*  *2 ones + 6 tenths 2.6*  *N.B. In subtraction examples, the digit in the tenths column being subtracted needs to be greater than the digit in the tenths column from which it is being subtracted.*  *e.g. 1.9 + 2.5  1.9 + 2 3.9  3 and 9 tenths 9 tenths add 5 tenths  14 tenths  1 one and 4 tenths  1.4 so 3 + 1.4 = 4.4* |
| *Can* ***add and subtract decimal numbers*** *by using a* ***rounding and compensating method (tidy numbers)***  *e.g. 5.37 – 3.8 3.8 + 0.2 = 4 5.37 – 4*  *1.37 + 0.2 1.57*  *6.5 + 2.9 6.5 + 3 9.5 – 0.1 9.4* |
| *Use* ***non-standard place value splits*** *to mentally calculate. e.g.*  *39 – 17 as 19 – 17 + 20*  *98 – 27 as 28– 27 + 70 = 71* |
| Second  ***Progress will be evident when pupils can:*** | ***\*\****  Second  ***Progress will be evident***  ***when pupils can:*** | | ***\*\*\****  ***Progress will be evident when pupils can:*** |
| ***Choosing Appropriate Mental and Written Strategies for Addition and Subtraction Problems*** | ***Choosing Appropriate Mental and Written Strategies for Addition and Subtraction Problems*** | | |
| *Solve addition and subtraction problems using a* ***Rounding and******Compensation strategy:***  *When one number is* ***close to a multiple of ten****.*   * *What is 39 + 66? Round 39 up to 40 and then add 66 = 106*   *Then subtract 1 to make 105*   * *What is 51 – 35? Round 51 down to 50 and then subtract 35 = 15. Then add one more to make 16.*   *When one number is* ***close to a multiple of ten or a hundred****,*   * *What is £99 + £56? Round £99 up to £100 and then + £56 = £156. Then subtract £1 to make £155.* * *What is £568 - £99? Round £99 up to £100.*   *Then subtract £100 from £568 to make £468. Then add £1 to*  *make £469.*  *Similar sums include 101+ 34 67 + 101*  *101 – 53 202 – 34*  *Use numbers a small distance away from the century.*  *When one number is* ***close to any multiple of ten****.*   * *What is £39 + £516?*   *Round £39 to £40 and then add £516 to give £556*  *Then subtract £1 to make £555,*  *The answer is £555*   * *What is £768 - £59?*   *Round £59 to £60. Then subtract £60 from £768 to make £708.*  *Then add £1 to make £709.*  *The answer is £709*   * *Similar sums can include 31 + 689 51 + 734*   *723 – 91 453 – 31*  *Use numbers a small distance away from the century.* | **EFFICIENTLY SOLVE PROBLEMS**  **Choosing effective strategies** is a skill that children will develop gradually.  **Regular practice (daily)** with a wide range of mental calculations will help support their ability to employ **efficient strategies** and make informed decisions that they can **confidently discuss** with others.  Children need to be provided with a **wide mix of problems** that should be presented as both **equations and word problems**.  **USE**  **FORMAL ALGORITHMS**  Pupils should be taught how to use the **standard written form** to solve addition and subtraction calculations.  They should always mentally **estimate** the answer before using the written method.  (See ‘Points to Consider – part 2’) | | *Use the ‘****inverse rule’ to add and subtract decimals to one decimal place.***  *e.g.*  *0.6 + = 1.7 so reverse it*  *1.7 – 0.6 =*  *What do I need to add to 0.6 to make 1.7?*  *e.g.*  *9.4 – = 2.7*    *What do I need to add to 2.7 to make 9.4?*  *9.4 – 2.7 =* |
| ***\****  Second  ***Progress will be evident when pupils can:*** | ***\*\****  Second  ***Progress will be evident***  ***when pupils can:*** | | ***\*\*\****  ***Progress will be evident when pupils can:*** |
| ***Choosing Appropriate Mental and Written Strategies for Addition and Subtraction Problems*** | ***Choosing Appropriate Mental and Written Strategies for Addition and Subtraction Problems*** | | |
| *Solve instantly by understanding the* ***‘Inverse Rule’*** *i.e****.*** *use addition to solve a subtraction problem by ‘turning the sum around’,*  *e.g. 356 + ? = 723 becomes 723 – 356 = 367* | **EFFICIENTLY SOLVE PROBLEMS**  **Choosing effective strategies** is a skill that children will develop gradually.  **Regular practice (daily)** with a wide range of mental calculations will help support their ability to employ **efficient strategies** and make informed decisions that they can **confidently discuss** with others.  Children need to be provided with a **wide mix of problems** that should be presented as both **equations and word problems**.  **USE**  **FORMAL ALGORITHMS**  Pupils should be taught how to use the **standard written form** to solve addition and subtraction calculations.  They should always mentally **estimate** the answer before using the written method.  (See ‘Points to Consider – part 2’) | | *Use a range of mental and written strategies to solve multi-step problems, that involve a combination of addition, subtraction, multiplication and division with whole numbers.*  *e.g. mental and formal algorithms can be used for:*   * *Addition and subtraction for any whole number calculation and decimals.* * *Mental and semi-formal calculations for multiplication and division.*   *Mental methods should* ***always*** *be used in preference to formal algorithms. If a pupil cannot use mental strategies to solve a problem, they should not be asked to record solutions using formal algorithms as this will simply take them through a process rather than truly demonstrate their understanding of the given task.* |
| *Solve addition and subtraction problems by using the ‘Same Difference’ Strategy*  ***(Transformation)***  ***Add -******Take some from one number to give to the other****, e.g.*   * *18 + 17 becomes 20 + 15 [by adding 2 to 18 and then subtracting 2 from 17].* * *68 + 37 becomes 70 + 35*   *698 + 37 becomes 700 + 35*  *367 + 78 becomes 370 + 75 = 445*  ***Subtract – change the numbers by adding or subtracting the same amount*** *e.g.*   * *22 – 17 becomes 20 – 15 = 5*   *72 – 27 becomes 75 – 30 = 35*  *507 – 296 becomes 511 - 300 = 211*  *Start to use arrow notation to record thinking. ‘Instead of 53 take 19, I did 54 take 20’*    *53 – 19 = 54 – 20 = 34*  *Pupils should explore the effect of carrying out operations on an existing equation, e.*g. if they know (and write down) 20+15=35 then what is the effect of (say) doubling both sides? What happens if we add 5 to one side but not the other? What happens if we carry out different operations to both sides of the equation? |
| ***\****  Second  ***Progress will be evident when pupils can:*** | ***\*\****  Second  ***Progress will be evident***  ***when pupils can:*** | | ***\*\*\****  ***Progress will be evident when pupils can:*** |
| ***Choosing Appropriate Mental and Written Strategies for Addition and Subtraction Problems*** | ***Choosing Appropriate Mental and Written Strategies for Addition and Subtraction Problems*** | | |
| ***Use a known fact to work out an unknown fact*** *e.g.*  ***Number bonds to 10:***   * *40 + 70 40 + 60 = 100 so 40 + 70 is ten more = 110.* * ***Near doubles:***   *e.g. 31 + 31 is double 3 tens add 2*  *69 + 69 is double 7 tens take 2 away*  ***Doubles, up to 40:***   * *139 + 139 is double 14 tens – 2 [ 280 -2]* * *142 + 144 is double 14 tens add 6 [ 280 + 6]* | **EFFICIENTLY SOLVE PROBLEMS**  **Choosing effective strategies** is a skill that children will develop gradually.  **Regular practice (daily)** with a wide range of mental calculations will help support their ability to employ **efficient strategies** and make informed decisions that they can **confidently discuss** with others.  Children need to be provided with a **wide mix of problems** that should be presented as both **equations and word problems**.  **USE**  **FORMAL ALGORITHMS**  Pupils should be taught how to use the **standard written form** to solve addition and subtraction calculations.  They should always mentally **estimate** the answer before using the written method.  (See ‘Points to Consider – part 2’) | | *Can express their understanding of a particular calculation using stories, symbols pictures and real life situations.*  *e.g. use a think board to record their understanding of a multiplication sum and give valuable insight into the connections they have made between concrete objects, pictures and diagrams and words and symbols*      *See this think board in more detail at* [*NZMaths Book5*](http://nzmaths.co.nz/sites/default/files/Numeracy/numPDFs/NumBk5.pdf) |
| *Write number sentences using the terms ‘change’, ‘combine’ and ‘compare situations’, using diagrams and addition and subtraction number sentences. e.g.* |
| ***\****  Second  ***Progress will be evident when pupils can:*** | ***\*\****  Second  ***Progress will be evident***  ***when pupils can:*** | | ***\*\*\****  ***Progress will be evident when pupils can:*** |
| ***Choosing Appropriate Mental and Written Strategies for Addition and Subtraction Problems*** | ***Choosing Appropriate Mental and Written Strategies for Addition and Subtraction Problems*** | | |
| ***Write number stories*** *to match a given number sentence.*  *e.g. write a story to accompany :*  *24 – 13 =*  *76 – = 35*     * *97 = 125* | **EFFICIENTLY SOLVE PROBLEMS**  **Choosing effective strategies** is a skill that children will develop gradually.  **Regular practice (daily)** with a wide range of mental calculations will help support their ability to employ **efficient strategies** and make informed decisions that they can **confidently discuss** with others.  Children need to be provided with a **wide mix of problems** that should be presented as both **equations and word problems**.  **USE FORMAL ALGORITHMS** | | ***Write their own stories*** *to accompany a given number sentence or one of their own, including multi- step problems.*  *Make connections between maths in school and everyday experiences.*  *e.g.*  *John has hired me to count his money. I counted £1500 before stopping for coffee. After coffee I counted £5 more. John offered me £100 for the job or 10% of the money I had counted. Which choice will give me more money for my work?* |
| *Investigate* ***negative numbers*** *in real life contexts and explore the associated vocabulary.*  *e.g. Temperature – below freezing*  *Bank balances, debt – overdraft, bank loan*  *Height – above/below sea level*  *Sport – in golf, explore the idea of ‘above’ or ‘below’ par* | *Understand that subtraction can produce negative numbers; recognise the location of negative numbers in relation to zero and locate them on a number line.*  *e.g. explain this in the context of real life contexts such as temperature (below freezing) and money (debt).* | | *Solve a subtraction sum when* ***subtracting a positive integer from a smaller positive integer and adding/ subtracting negative integers from a negative integer.***  *e.g. +5– +8 = –3*  -4 *–*  +8= *–12* |

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| **Second** | **Second**  **Points to consider – Part 3** |  |

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| **THE NEXT DOMAIN ‘Strategies to Mentally solve Multiplication and Division Problems’ IS ORGANISED WHERE PROGRESSION IS SHOWN IN A HORIZONTAL FORMAT AGAIN.**  **You’ll notice \* and \*\* are always merged and \*\*\* is where the children are refining their ability to choose the most efficient strategy for a given calculation as well as being introduced to more sophisticated strategies, which will be developed further in third level. There is no linear progression unless indicated by the inclusion of arrows to show how a particular strategy might progress. The strategies introduced in \*\*\* will not necessarily be a more sophisticated strategy of the ones in the same row. THERE WILL NOT ALWAYS BE A PROGRESSION FROM (\* and \*\*) to \*\*\* in the same row!**   |  |  |  |  | | --- | --- | --- | --- | | **Strategies to Mentally solve Multiplication and Division Problems** | | | | | \* | \*\* | \*\*\* | | | **These strategies are built on from FIRST level strategies and knowledge in the same domain. Please assess that children are competent at First level before introducing the more sophisticated strategies in \* and \*\* of second level.**  New strategies should be introduced by using:   * **concrete** materials * **visualising** screeningmaterials or using pictorial clues * **abstract** problems – e.g. 436 x 8   The strategies will then be practiced and refined gradually until children slowly build up a wide range of useful approaches to solving multiplication and division problems. | | Children should be presented  with **daily** **opportunities** to solve a **mix of calculations** in the form of equations and  word problems where **children** **choose the strategy from \* and \*\*** and discuss confidently the most efficient method  chosen. | **Constant revision and practice** will ensure that the strategies are deeply embedded and fully understood. This rich number sense will help to ensure that children can make informed decisions and solve problems efficiently.  Only then should the children move onto learning the more sophisticated strategies listed in the \*\*\* section. These will be introduced at the end of Second Level and developed over Third level. | |

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| **\***  Second  **Progress will be evident when pupils can:** | **\*\***  Second  **Progress will be evident when pupils can:** | | **\*\*\***  **Progress will be evident when pupils can:** | | |
| **Strategies to Mentally solve Multiplication and Division Problems** | | | | **Strategies to Mentally solve Multiplication and Division Problems** | |
| Work out the **six, seven and eight times tables from their knowledge of the five times** tables, using the **distributive property** **of multiplication,** *e.g. 7 x 6 = 5 x 6 + 2 x6*    *Multiplying by 6 is same as x 5 add one more set, 8 x 6 = (8 x 5) + (8 x 1)*  *Multiplying by 7 is same as x 5 add 2 more sets, 9 x 7 = (9 x 5) + (9 x 2)*  *Multiplying by 8 is same as x 5 and add three more sets, 6 x 8 = (6 x 5) + (6 x 3)* | | | | Children should be presented  with **daily** **opportunities** to solve a **mix of calculations** in the form of equations and  word problems where **children** **choose the strategy from \* and \*\*** and discuss confidently the most efficient method  chosen. | Use **place value to multiply** the tens column and the ones column separately.  *e.g. 14 x 3 =*  *e.g. 19 x 3 = (10 x 3) + (9x 3)*  *= 30 + 27*  *= 57*    *e.g. 3 x 18 =*    *e.g. 268 x 8 = (200 x 8) +*  *(60 x 8) + (8 x 8) =*  *= 1,600 + 480 + 64*  *= 2,144* |
| Understand that multiplication is **commutative** and use this to solve a problem by **changing the order of the factors.** | | | |
| Using a known fact to derive a new fact, e.g. **use their ten times facts to work out the 9 times table**  8 x 9 is the same as 9 x 8. This is just 10 x 8 – 1 x 8 = 80 – 8 = 72  46 x 9 is the same as 9 x 46. So 10 x 46 – 1 x 46 = 460 – 46 = 414  68 x 9 is the same as 9 x 68. So 10 x 68 – 1 x 68 = 680 – 68 = 612 | | | |
| **\***  Second  **Progress will be evident when pupils can:** | **\*\***  Second  **Progress will be evident when pupils can:** | | | **\*\*\***  **Progress will be evident when pupils can:** | |
| **Strategies to Mentally solve Multiplication and Division Problems** | | | | **Strategies to Mentally solve Multiplication and Division Problems** | |
| **Use a known fact** to calculate a new multiplication fact.   * Make the links between the 2 times tables and the 3 times table and then the 6 and 9 times tables.      * Make the links between the 2 times table and the 4 times table and the 8 times table   i.e. the 4 times table is double the 2 times table and the 8 times table is double the 4 times table.    2 x 3 = Double 3 is 6, (double)  4 x 3 = Double 6 is 12, (double, double)  8 x 3 = double 12 is 24 (double, double, double)  10 x 3 is 30, half of 30 is 15, so 5 x 6 = 30 | | | | Children should be presented  with **daily** **opportunities** to solve a **mix of calculations** in the form of equations and  word problems where **children** **choose the strategy from \* and \*\*** and discuss confidently the most efficient method  chosen. | *Solve a* **multiplication by rounding and compensating (i.e. ‘tidy’ numbers)**  e.g. 6 x 99 6 x100 – 6 x 1  600 – 6 = 594  8 x 52  8 x 50 + 8 x 2  400 + 16  416  7 x 248  7 x 250 – 7 x 2  175 – 14 = 161 |
| Confidently describe and show using materials how the rules for **multiplying and dividing by X10, x100 and x1000** work and be able to solve problems involving 2 and 3-digit numbers.  *e.g.*  *10 x 1,678  16,780*    *100 x 1678 10 x 10 x 1,678*  *16,780 x 10  167.800*    *30 x 43 (30 x 40)+ (30 x 3)* |
| **\***  Second  **Progress will be evident when pupils can:** | **\*\***  Second  **Progress will be evident when pupils can:** | | | **\*\*\***  **Progress will be evident when pupils can:** | |
| **Strategies to Mentally solve Multiplication and Division Problems** | | | | **Strategies to Mentally solve Multiplication and Division Problems** | |
| Describe the rule for **multiplication by 10 as ‘digits move one place to the left’.**  *6 x 10 = 60 4 x 10 = 40 24 x 10 = 240 352 x 10 = 3,520*  Describe the rule for **division by 10 as ‘digits move one place to the right’.**  *50 ÷ 10 = 5 490 ÷ 10 = 49 600 ÷ 10 = 60*  Describe the rule for **multiplication by100 as ‘digits move two places to the left’**.  *8 x 100 = 800 2 x 10 0= 200 300 x 100 = 30,000*  Describe the rule for **division by 100** **as ‘digits move two places to the right’.**  *500 ÷ 100 = 5 4,900 ÷ 100 = 49 6,000 ÷ 100 = 60*    Describe the rule for **multiplication by 1,000 as ‘digits move three places to the left'**  *24 x 1,000 = 24,000 352 x 1,000 = 352,000 300 x 1,000 = 300,000*    Describe the rule for **multiplication by a multiple of 10**, | | | | Children should be presented  with **daily** **opportunities** to solve a **mix of calculations** in the form of equations and  word problems where **children** **choose the strategy from \* and \*\*** and discuss confidently the most efficient method  chosen. | Begin to solve **multiplication** problems by **halving and doubling** e.g. 3 x 18 =    Begin to solve **multiplication** problems by **trebling and thirding** e.g. 27 x 3 =  **Understand that trebling one side and thirding the other makes no difference to the product:** |
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| **Strategies to Mentally solve Multiplication and Division Problems** | | | | **Strategies to Mentally solve Multiplication and Division Problems** | |
| Solve **multiplication** problems by using a **rounding and compensation method (tidy numbers)**  *e.g. 5 x 19 5 x 20 and then subtract 5  100 – 5 = 95*  *5 x 21 5 x 20 and then add 5  100 + 5 = 105* | | | | Children should be presented  with **daily** **opportunities** to solve a **mix of calculations** in the form of equations and  word problems where **children** **choose the strategy from \* and \*\*** and discuss confidently the most efficient method  chosen. | Begin to solve **multiplication** or **division** problems involving a 3 - digit number by a 1-digit number by a **short written algorithm** – *see ‘Suggested Written Recording’* |
| Solve **division** problems by using **standard place value**.  e.g. 92 ÷ 4 = (80 ÷4) + (12 ÷ 4)  = 20 + 3 = 23  186 ÷ 3 = (180 ÷ 3) + (6 ÷ 3)  = 60 + 2 = 62 |
| Solve **division** problems using **known addition, subtraction and multiplication facts within the 2, 3, 4, 5 and 10 times table.** E.g.    How many threes are there in 15?  15 ÷ 3 = 5  5 threes makes 15  How many equal sets of 3 makes 15  15 – 3 – 3 – 3 – 3 – 3 = 0  3 + 3 + 3 + 3 + 3 = 15 | | | |
| Begin to solve **division** problems by using a **rounding and compensation method (tidy numbers)**  e.g. 248 ÷ 7  How many 7s are there in 280?  7 x 40 = 280  280 – 248 = 42  42 ÷7 = 6 so 40 sevens subtract 7 sevens equals 33 sevens. |
| **\***  Second  **Progress will be evident when pupils can:** | **\*\***  Second  **Progress will be evident when pupils can:** | | | **\*\*\***  **Progress will be evident when pupils can:** | |
| **Strategies to Mentally solve Multiplication and Division Problems** | | | | **Strategies to Mentally solve Multiplication and Division Problems** | |
| Solve **division** problems by using a **multiplication strategy** andby using the **inverse rule.** | | | | Children should be presented  with **daily** **opportunities** to solve a **mix of calculations** in the form of equations and  word problems where **children** **choose the strategy from \* and \*\*** and discuss confidently the most efficient method  chosen. | Begin to **split a number** to reveal its **factors** to help solve a **multiplication and division** problem *e.g.*  4 x 32 = 2 x 2 x 32 = 2 x 64 = 128  8 x 57 = 2 x 2 x 2 x 57 = 2 x 2 x 114 = 2 x 228 = 456  76 ÷ 4 = 76 ÷ 2 ÷ 2 =38 ÷ 2 =19  168 ÷ 8 = 168 ÷ 2 ÷ 2 ÷ 2 = 84 ÷ 2 ÷ 2 = 42 ÷ 2 = 21 |
| **Represent multiplication/ division stories** using a variety of ways, including story, pictorial, concrete and abstract.  *e.g.*  *Tommy arranged his 15 football trophies evenly on three shelves. How many trophies were on each shelf?*  *Fiona distributed 650 flyers for her new restaurant evenly amongst 13 streets. To how many houses did she deliver the pamphlets in each street?* | | | |
| Solve a **division** problem by **using multiplication** e.g.  72 ÷ 8 = how many 8s are there in 72? |
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| **Strategies to Mentally solve Multiplication and Division Problems** | | | | **Strategies to Mentally solve Multiplication and Division Problems** | |
| Use **division for sharing or grouping** a collection.  **Remainders** can be left or shared out depending on the context of the story e.g.  *There were 33 people at the family reunion dinner. The restaurant only had tables that would sit four people. How many tables did the family need to book?*  *Anya has bought 57 eggs from the farmer but they are all in one basket. She wants to pack them safely into egg boxes of 6 to stop them from breaking on her journey home. How many boxes will she need?* | | | | Children should be presented  with **daily** **opportunities** to solve a **mix of calculations** in the form of equations and  word problems where **children** **choose the strategy from \* and \*\*** and discuss confidently the most efficient method  chosen. | Solve a **division** problem that involves **remainders** and is beginning to express the remainder as a **whole number**, f**raction** or **decimal** depending on the context. E.g.  426 ÷ 8 = 426 ÷ 2 ÷ 2 ÷ 2  213 ÷ 2 ÷ 2  106 ½÷ 2 53 ¼  53 r2  53. 25    Begin to reason which answer would be most appropriate for the set word problem. |
| Find solutions to **multi-step problems** involving mixed operations and make up their own multi-step word problems.  e.g. 5 x40 + 7 = 207  12 x 3 + 128 = | | | | Solve problems using a **combination of the four operations**, including using the **order of operations**, which has been exemplified in ‘Suggested Written Recording’ |
| **\***  Second  **Progress will be evident when pupils can:** | **\*\***  Second  **Progress will be evident when pupils can:** | | | **\*\*\***  **Progress will be evident when pupils can:** | |
| **Patterns and Relationships** | | | | **Patterns and Relationships** | |
| Identify a simple number pattern involving one operation (increasing/ decreasing) and complete a table of values and describe the pattern in words.      The pattern 3,6,9,12,15,18,21,and 24 is increasing by 3 | | | | Explain the relationship between multiplication  facts by placing this information in a table and defining the rule (generalisation).  e.g. the 6 times table is double the 3 times table    The 4 times table is half of the 8 times table | |
| Determine the rule (known as ‘generalisation’) that describes the pattern from a table of results; use this rule to calculate the corresponding value for a larger number e.g. | | | | Can **observe a geometric pattern or a number**  **pattern** and create the following ways to record  this pattern:   * builds a simple geometric pattern using materials; * completes a table of values ; * calculates the value of a missing number in a table of values and explains how it was determined; * records a description of a number pattern using words; and, * determines a rule, in words, to describe the pattern presented in a table and uses this to calculate the corresponding value for a larger number. | |
| Solve simple combination problems *e.g. record all the possible digit combinations for 4-digit numbers and order from smallest to largest:*  1, 2, 3, 4 = 1234, 1243, 1324, 1342, 1423, 1432, 2134, 2143, 2314, 2341, 2413, 2431, 3124, 3142, 3214, 3241, 3412, 3421, 4123, 4132, 4213, 4231, 4312, 4321.*)* | | Describe the pattern of combinations formed when using 2, 3, 4 numbers and make a generalization,  *e.g. in using 3 colours there will be 6 combinations RBG, RGB, BGR, BRG, GBR, GRB (1x2x3)*  e.g. we have 4 objects: A, B, C and D. How many possible combinations are there when arranging them on a shelf? e.g. ABCD, ABDC, DACB etc. | | | |
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| **Patterns and Relationships** | | | | **Patterns and Relationships** | |
| Observe and describe the patterns in the multiplication tables up to 10 x 10.  e.g. repeating final digit patterns:  **8**, 1**6**, 2**4**, 3**2**, 4**0**, 4**8 or**  9, 18, 27, 36, 45 – the ones column decreases by one each time because you add ten and take 1**.** | | | | Use the ‘divisibility’ rule to determine if a number  is a multiple ofa particular times table e.g.…  Know that 273 is a multiple of 3 because the digits  add up to 12, which is divisible by 3.  273 2 + 7 + 3 = 12 and 12 is divisible by 3  Know that 162 is in the nine times table because  the digits add up to 9,which is divisible by 9. | |
| Find square numbers using concrete materials and diagrams  e.g. | | | |  | |
| Begin to identify ‘**multiples**’, ‘**products**’ and ‘**factors**’, e.g.  The multiples of 3 are 3, 6, 9, 12…  12 is a multiple of 4; 12 is the product of 3 x 4; 3 and 4 are factors of 12. | | | | Identify ‘**prime**’ numbers and show that they have **exactly two factors** *e.g. 7*    *13 has 2 factors (1 and 13) and therefore is a prime. 21 has more than two factors (1, 3, 7, 21) and therefore is a composite number.* | |