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| Northern Alliance  Numeracy and Mathematics Learning Progressions |
| Early - Fourth Level  December 2019 |

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Document History

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# Process, aims and intended outcomes

**The Northern Alliance Numeracy and Mathematics Progression** has been developed through a robust approach that moderated the content, progression and approaches identified in the following learning progressions:

* Aberdeen City Numeracy and Mathematics Broad General Education Progression (July 2017 v2)
* Aberdeenshire Progression Framework – Numeracy and Mathematics (Revised and Updated September 2017)
* Highland Numeracy Progression (2017 Update)

This learning progression’sambition is to ensure that all young people develop the numeracy and mathematics skills they need to achieve success in life, learning and work. It aims to:

* support and enhance planning and assessment, based on skills, knowledge and understanding
* provide staff with a structured progression for learning and teaching
* enable the sharing of standards within schools, clusters and across, and between, authorities
* enable the development of skills for learning, life and work
* facilitate the process of monitoring learners’ progress and achievement.

Desired outcomes:

* Improved attainment and confidence in numeracy and mathematics across all stages.
* Shared understanding amongst staff of how young people progress in numeracy and of effective learning and teaching strategies in numeracy and mathematics.

All recommended approaches are designed to develop understanding and progression for learners.

*The Northern Alliance Numeracy and Mathematics Learning Progression*aims to translate latest research into a clear and accessible developmental framework and is extensively based on proven approaches and strategies.  This is a constantly evolving picture as new science on the brain and learning gives us important insights into numeracy learning.

Resources such as Education Scotland Experiences & Outcomes and Benchmarks, Maths Recovery techniques and New Zealand research programmes have been central to the development and update of the framework as has the sharing of good practice and ideas from practitioners across the Northern Alliance.

**Numeracy and Mathematics**

***Numeracy***

The definition of Numeracy as defined in Curriculum for Excellence is:

***Competence with numbers and using graphical skills in relation to basic number and number processes, estimation and rounding, aspects of fractions, percentages and decimal fractions, money, time, measure and aspects of information handling.***

Being numerate helps us to function responsibly in everyday life and contribute effectively to society. It increases our opportunities within the world of work and establishes foundations which can be built upon through lifelong learning. Numeracy is not only a subset of mathematics; it is also a life skill which permeates and supports all areas of learning, allowing young people access to the wider curriculum.

***We are numerate if we have developed the confidence and competence in using number which will allow individuals to solve problems, analyse information and make informed decisions based on calculations.***

(Curriculum for Excellence: Numeracy across Learning, Scottish Government 2009)

Numeracy is a fundamental life skill. Being numerate involves developing a confidence and competence in calculating, problem solving, accessing and interpreting information, weighing up different options and hence making informed responsible lifestyle choices. It gives increased opportunities within the world of work and provides individuals with the knowledge, concepts and skills required for lifelong learning.

***Mathematics***

Mathematics is a creative subject. Having good mathematical skills allows us to spot patterns, use knowledge and skills in new contexts, ask good questions, make connections, solve problems, analyse and interpret information and make sense of the world around us.

***Mathematics equips us with many of the skills required for life, learning and work. Understanding the part that mathematics plays in almost all aspects of life is crucial. This reinforces the need for mathematics to play an integral part in lifelong learning and be appreciated for the richness it brings.***

Mathematics: Principles and Practice

Furthermore, the Mathematics Principles and Practice paper outlines the importance of Mathematics:

***Mathematics is important in our everyday life, allowing us to make sense of the world around us and to manage our lives. Using mathematics enables us to model real-life situations and make connections and informed predictions. It equips us with the skills we need to interpret and analyse information, simplify and solve problems, assess risk and make informed decisions.***

Mathematics Principles and practice

The experiences and outcomes and progressions detailed in this framework promote and support effective learning and teaching methodologies which will stimulate the interest of children and young people and promote creativity and ingenuity.

A rich and supportive learning environment will support a skilful mix of a variety of approaches, including:

* planned active learning which provides opportunities to observe, explore, investigate, experiment, play, discuss and reflect modelling and scaffolding the development of mathematical thinking skills;
* learning collaboratively and independently;
* opportunities for discussion, communication and explanation of thinking;
* developing mental agility;
* building on the principles of Assessment is for Learning, ensuring that young people understand the purpose and relevance of what they are learning;
* developing problem-solving capabilities and critical thinking skills;
* frequently asking children to explain their thinking;
* use of relevant contexts and experiences, familiar to children and young people;
* using technology in appropriate and effective ways;
* making frequent links across the curriculum, so that concepts and skills are developed further by being applied in different, relevant contexts;
* promoting an interest and enthusiasm for numeracy.

# Numeracy and mathematical skills

Numeracy and mathematical skills are embedded in the Experiences and Outcomes and cannot be taught in isolation. These skills can be developed through careful planning of learning activities, questions and a range of assessments. These should encourage learners to think about the concepts, going beyond the recall of knowledge and encouraging them to explain their thinking. As learners progress through Curriculum for Excellence levels, they should demonstrate increasing sophistication and independence in their ability to demonstrate, link, transfer and apply the following skills in a range of increasingly more challenging contexts: [[1]](#footnote-1)



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| **Numeracy and mathematical skill** | **Key features of the skill** | **Additional guidance** |
| **Interpret questions** | * *selects the relevant information* * *interprets data* * *highlights key words or phrases* * *makes notes* * *draws diagrams* * *chooses appropriate operations.* | *Learners need to:*   * interpret questions successfully in order to work out solutions; * select relevant information and be able to identify redundant or missing information in a question; * interpret data and understand information presented to work out the solution; * be supported to develop their skills of interpreting questions by highlighting key words or phrases, making notes or drawing diagrams; and * make important decisions about which operations to choose when solving a word problem. |
| **Select and communicate processes and solutions** | * *explains choice of process* * *shares thinking* * *verbalises or demonstrates thought processes.* | *Learners need to:*   * be able to explain why they have chosen a particular process as it demonstrates  their understanding of the task, question or assessment; * have frequent opportunities to discuss their thinking with their peers and teachers; * select from a range of processes and increasingly choose processes which are most efficient; * discuss their solutions to verbalise their thought process, either through explaining their thinking or demonstrating it pictorially; and * become more confident in their abilities to select from a growing repertoire of strategies, articulate their chosen approaches with increasing clarity and make greater use of specialised vocabulary. |
| **Justify choice of strategy used** | * *shows and talks though  their thinking* * *explains their strategy* * *justifies choice of strategy compared to other approaches.* | *Learners need to:*   * show and talk through their thinking to better understand and explain their own strategies; * regularly work in pairs and groups to learn with and from each other to refine their strategies; and * justify their choice of strategy, identifying the most efficient strategies for different types of task. |
| **Link mathematical concepts** | * *understands and applies links between mathematical concepts* * *transfers learning in one area to another* * *uses connections to solve problems.* | *Learners need to:*   * be able to link mathematical concepts through inverse operations and equivalences; and * transfer and apply their knowledge and skills within numeracy and mathematics and across the curriculum to solve a range of problems. |

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| ***Numeracy and mathematical skill*** | ***Key features of the skill*** | ***Additional guidance*** |
| **Use mathematical vocabulary and notation** | * *uses correct mathematical vocabulary* | *Learners need to:*   * apply the correct mathematical vocabulary, notation and appropriate units in a range of contexts. |
| **Mental agility** | * *knowledge of number facts* * *manipulates numbers.* | *Learners need to:*   * develop fluency in mental processes through a sound knowledge of key number facts; and * use strategies to manipulate an appropriate range of numbers and apply these to solve open-ended problems. |
| **Reason algebraically** | * *finds the unknown quantity* * *understands and uses the commutative, associative and distributive laws.* | *Learners need to:*   * understand that numbers can be replaced by pictures or symbols and use this to solve problems; and * apply commutative, associative and distributive laws to work with expressions and equations. |
| **Determine the reasonableness of a solution** | * *routinely uses estimation and rounding skills* * *selects the most appropriate degree of accuracy.* | *Learners need to:*   * use estimation and rounding to estimate and check the reasonableness of a solution; * consider the context of the question when determining the reasonableness of the solution; and * select the appropriate degree of accuracy for the given task. |

**Knowledge and Strategy**

The learning progressions are structured by differentiating between **Knowledge** and **Strategy**

Machine generated alternative text:
Strategy 
Knowledge 

Learning is a cycle, where knowledge provides the foundation for developing strategies, and use of strategies develops new knowledge.

* ***Strategy***describes the mental processes children use to estimate and solve problems.
* ***Knowledge*** describes what we want children to be able to recall without having to think about it. This is important because using knowledge can decrease the load on the working memory and enable students to solve more complex number problems.

It is important for students to develop new items of knowledge and more advanced strategies for solving number problems at the same time.

Both strategy and knowledge have been identified in the progressions, although knowledge and strategy will often be connected and interlinked in learning and teaching. In the learning progressions many of the statements relating to **strategies are coloured blue** and many of those that are **knowledge are coloured green.**

Machine generated alternative text:
strategy 
Addition and subtraction 
Multiplication and division 
Fractions: decimals and percentages 
Addition/subtraction and 
multiplication/dlvision should be taught 
simu taneously to reinforce understand ng 
ot inverse properties 
Knowledge 
Number Sequences and Order 
Numeral Identification 
Grouping and Place Value 
Basic Facts 
Written Recording 

# Stages of Early Arithmetical Learning (SEAL) and New Zealand Numeracy Framework

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| Research shows that there are significant differences in the numerical knowledge of children when they begin school.  These differences in number knowledge increase as children progress through schooling, with a clear tendency for low attainers in the early years to continue to be low attainers through their primary years and develop negative attitudes towards mathematics.  Therefore, there is a need to give every child a thorough understanding and success in early number work.  Image result for new zealand numeracy stages of developmentThe Stages of Early Arithmetical Learning (SEAL) is a model that can be used to understand the development of children’s numerical knowledge and clearly links research to classroom pedagogy. SEAL forms the basis for the New Zealand Numeracy Framework which has been adopted as part of this Northern Alliance Numeracy and Mathematics Learning Progressions document.  *[Further details, and support materials (including video clips) will be available on Bennachie Campus’s website when the learning progressions are complete (June ’19). These materials will support teachers and practitioners to become confident in the use of the terminology used, the knowledge progression.]*  The following table summarises the framework and uses colour to make it easier to identify the various stages in the learning progressions i.e. at the end of a section in the learning progression a table indicates the knowledge that has been covered, using the numbers and colours from the framework, and the strategies that students are likely to use/develop. |

# Developmental Stages of Numerical Learning

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|  | **Developmental Stage** | | **Description** | **Example** |
| Early | Stage 0 | **Emergent** | *Pupils are unable to consistently count a given number of objects because they lack the knowledge of counting sequences and/or the ability to match things one-to-one.* | Could not collect 7 counters.  Counted 1, 2, 4, 5, 10 |
| Stage 1 | **One-to-One Counting** | *Pupils can count up to ten but cannot solve simple problems that involve joining and separating sets like 4 + 3.* | Collected 4 counters and collected another 3 counters but then did not know what to do. ‘I have 4 and 3’. Or said - it makes 10 |
| Stage 2 | **Counting from One using Materials** | *When solving joining or separating of sets problems, pupils first rely heavily on counting physical materials, like their fingers. They count all the objects in both sets to find the answer.* ***(They start their count at one).*** | Used my fingers to calculate 8 + 5 =  1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 |
| Stage 3 | **Counting from One by Imaging** | *When solving joining or separating of sets problems, they can move away from using materials and are able to image visual patterns of the objects in their minds and count them. They count all the objects in both sets to find the answer.* ***(They start their count at one).*** | I pictured the 8 and 5 counters in my head and counted: 8 + 5 = 1, 2, 3, 4, 5, 6, 7, 8,  9, 10, 11, 12, 13 |
| First | Stage 4 | **Advanced Counting (Counting on/back)** | *Pupils can solve number problems by counting on, or back. They keep track of the count using materials (e.g. fingers) or by imaging (in their heads). They understand that the end number in a counting sequence measures the whole set and can relate addition and subtraction of objects to the forward and backward number sequence by ones and tens etc.*  *Pupils at this stage use a skip-counting strategy to solve multiplication problem.* | I thought 9 and then counted on:  9 + 4 = 9, 10,11, 12, 13 or  32 + 21 = 32, 42, 52, 53  7 x 3 = I counted in 3s like this: 3, 6, 9, 12 but I didn’t know the next numbers so I had to count like this:13, 14, **15,** 16, 17, **18,**19, 20, **21** |
| Stage 5 | **Early Additive** | *Pupils at this stage have begun to recognise that numbers can be split into parts and recombined in different ways. This is called part-whole thinking.*  *Pupils use a limited range of mental strategies to estimate answers and solve addition and subtraction problems. Strategies used at this stage are most often based on a group of five or ten or use a known fact, such as a double.* | 48 + 7 as (48 + 2) + 5  26 – 9 = (26 – 10) + 1 = 17  8 + 9 = (8 + 8) + 1 |
| Second | Stage 6 | **Advanced Additive**  **(Part Whole)** | *Pupils are familiar with a range of part-whole strategies and are learning to choose appropriately between these. They have well developed strategies for solving addition and subtraction problems. They see numbers as whole units but also understand that they can be ‘nested’ within these units.*  *Pupils are able to solve multiplication answers from known facts. These pupils are also able to solve problems using a combination of multiplication and addition- based strategies.* | 367 + 260 as  (300 + 200) + (60 + 60) + 7  135 – 68 = 135 – 70 + 2  604 – 598 as 598 + ? = 604  6 x 3 = (5 x 3 ) + 3 = 15 + 3 = 18 |
| Stage 7 | **Advanced Multiplicative (Part Whole)** | *Pupils at this stage choose appropriately from a range of part-whole strategies to solve and estimate problems with whole numbers and decimals to one place. They are able to choose a multiplicative strategy to solve an addition problem where appropriate.*  *Pupils are learning to manipulate factors mentally to solve multiplication and division problems. They move from partitioning additively to using a halving and doubling strategy. A key strategy of this stage is reversibility, solving division problems using multiplication.* | 6.5 + 7.7 = 6.5 + 8 = 14.5 – 0.3 = 14.2  55 + 44 + 33 =  (5 x 11)+ (4 x 11) + (3 x 11) = 12 x 11  Understand that 5 x 12 can be partitioned into (5 x 10) + ( 5 x 2)  Begins to understand how 5 x 12 is the same as 10 x 6 |
| Second/Third | Stage 8 | **Advanced Proportional** | *Pupils at this stage are able to choose appropriately from a range of part-whole strategies to solve problems with whole numbers, integers, and decimals. These students are extending their ability to add and subtract factors by learning to operate on fractions with unlike denominators. They are learning to combine ratios and proportions. Pupils at this stage use a range of multiplicative strategies to solve problems with whole numbers and learn to solve multiplication problems involving fractions and decimals.*  *Strategies developed at this stage include partitioning of fractions and conversions between fractions and decimals. Pupils are also learning to solve simple division problems with decimals. Students at this stage are able to use basic multiplication and division facts and apply their knowledge of factors to solve a range of problems that include fractions and ratios. At stage 8 students are learning to use proportional thinking strategies to solve problems involving percentages, ratios and rates.* | 1/3 + 1/4 = 7/12 (using equivalent fractions)  1.8 + 2.5 = 2 + 2.5 - 0.2 = 4.3(compensation)  Apples and oranges are packed into mixed bags, the bag of 25 has a ratio of 2:3, the bag of 35 has a ratio of 2:5, so the combined bag has a ratio of 1:2  1.5 x 4.5 = 3 x 2.25 = 6.75 (doubling and halving)  75% of 120 is 50%+25% of 120  36 :48 is 3:4 1:4 is 1/5 |

**Learning progressions and Benchmarks – Number, money and measurement**

**Early Level**

*Estimation and rounding & Number and number processes – Early Level*

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **1 of 8** | ***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 0-01a 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*** | | |
| **Progression through Early Level** | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| ***It’s essential to avoid introducing counting until learners can demonstrate the following:***   * **I can demonstrate an understanding of:**   ***the same as, as many as, greater than, more, larger, bigger, less, least, fewer, fewest, smaller, smallest, greatest, most, bigger, largest, one/two more, one/two less, equal to, compare, order, size, before, after, next, between, above, below***   * **I can show more, or less, than a given number of objects (without counting)** | |  |  |
| Image result for 6 counters  e.g. show me more than…. | |  |  |
| * **I can sort the objects using familiar or given criteria** | |  |  |
| e.g. colour, size etc. | |  |  |
| * **I recognise the number 0 and know that it represents none of a quantity.** | | * **I can explain that zero means there is none of the quantity and is represented by 0.** | ***Explains that zero means there is none of a particular quantity and is represented by the numeral 0.*** |
| * **I can say the number word sequences forwards in the range 0-10.** | | * **I can say the number word sequences forwards in the range 0-30, from any given number.** | ***Recalls the number sequence forwards within the range 0 - 30, from any given number.*** |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **2 of 8** | ***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 0-01a 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*** | | |
| **Progression through Early Level** | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can say the number word sequences backwards from 10-0** | | * **I can say the number word sequences backwards from 20-0** | ***Recalls the number sequence backwards from 20.*** |
| * **I can recognise all the numbers from 0-10.** | | * **I can recognise number names and numerals to 20.** | ***Identifies and recognises numbers from 0 to 20.*** |
| e.g. find number within a group and name numbers in their environment e.g.... bus, house, class names. | | e.g. find numbers within a group and in a variety of contexts, including on classroom charts, computer keyboard etc. |
| * **I can find numbers on a number line up to 10.** | | * **I can find numbers on a number line to 20.** |
| * **I can represent some numbers to 10 (including zero)** | | * **I can represent all numbers to 20 (including zero)** |
| e.g. using symbols and objects, including fingers and by making marks/drawings. Distinguishing numerals from other written symbols. | | e.g. using numerals, words, symbols, pictures and objects (including fingers). |
| * **I can order numerals to 5, and then 10.** | | * **I can order and sequence numerals forwards and backwards to 20.** | ***Orders all numbers forwards and backwards within the range 0 - 20.*** |
| *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.* | | * **I can place 3 non-consecutive numbers to 20 in order.**   **19**  **12**  **15** |
| * **I can identify the number before, and number after, any number up to 10.** | | * **I can identify the number before and number after any number up to 20.** | ***Identifies the number before, the number after and missing numbers in a sequence within 20.*** |
| * **I can identify missing number on a number line to 10.** | | * **I can identify missing numbers to 20 on a number line.** |
| e*.g. If one piece of the train puzzle was missing, would they know which number was missing?* (Practical materials used where possible) ***C:\Users\ht-ibell\Pictures\Numeracy\train.jpg*** | | * **I can find a number between two 2 digit numbers within 20.** |
| e.g.... 5, 6, \*, or 8, 9, \*, (on a numeral track).    e.g.... 16, \*, \*, 19, 20 (on a numeral track).    e.g.... *Give me a number between 11 and 15? Can you think of another?* |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **3 of 8** | ***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 0-01a 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*** | | |
| **Progression through Early Level** | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can count when asked, ‘How many?’** | | * **I can sort and create groups of objects by number.** | ***Uses one-to-one correspondence to count a given number of objects to 20.*** |
| e.g. Count out a requested number of items.  ‘Please find 4 acorns in the woods and place them on the green plate.’ | | e.g. 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).* |
| * **I can use concrete materials to count a set of objects.** | | * **I can count the objects to decide which has the most or least.** |
| 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. | | e.g. Match objects in a collection to see which group has the most or the fewest. |
| * **I can match the counting words with objects by touching each in turn (one-to-one correspondence).** | | * **I can use 1:1 correspondence to count to 20.** |
|  | | As pupils progress they should be given opportunities to demonstrate an understanding that ten ones can be bundled up and become one ten. 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. |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **4 of 8** | ***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 0-01a 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*** | | |
| **Progression through Early Level** | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can subitise (recognise number quantities at a glance) using regular (e.g. dice, Numicon) and irregular dot patterns, arrays, five frames, ten frames to 6.** | | * **I can subitise (recognise number quantities at a glance) using regular (e.g. dice, Numicon) and irregular dot patterns, arrays, five frames, ten frames to 10.** | ***Identifies ‘How many?’ in regular dot patterns, for example, arrays, five frames, ten frames, dice and irregular dot patterns, without having to count (subitising).*** |
| e.g. 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.** | | e.g. Explain flashed domino patterns up to 6 and explain what they see and describe it in another way. |
|  | | * **I can recognise an amount is the same regardless of form. e.g. 5 on a dice, 5 in a row. (conservation of number)** | ***Groups items recognising that the appearance of the group has no effect on the overall total (conservation of number).*** |
| * **I understand that the count does not alter when objects are re-arranged.** |
| * **I am beginning to use and recognise ordinal numbers in real life context. e.g. first, second, third, before, after, between** | | * **I can describe a position using ordinal numbers in real life contexts. e.g *first, second, third… tenth, last, second last before, after.*** | ***Uses ordinal numbers in real life contexts, for example, ‘I am third in the line’.*** |
| ***Uses the language of before, after and in-between.*** |
| * **I have explored addition and subtraction through rhymes and games to 5** | | * **I can count on and back in ones to solve addition and subtraction.** | ***Counts on and back in ones to add and subtract.*** |
| e.g. Use stories e.g. The Hungry Caterpillar’ | | e.g. ‘Here are five pencils. I add one more - how many have I now?’.  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. |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **5 of 8** | ***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 0-01a 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*** | | |
| **Progression through Early Level** | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can solve addition and subtraction problems using a count all strategy and materials.** | | * **I can combine two collections of objects to make a total.** | ***Counts on and back in ones to add and subtract (Cont…)*** |
| Image result for tower of bricksThe learner 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? | | The learner can 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.*  ( Concrete/Materials Stage) |
| 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’?* | | * **I can combine two collections when one of the sets is hidden.** |
| The learner can count items from two collections with one of the collections screened (hidden) e.g.  (Imaging phase) |
| * **I can combine two sets when both collections are screened.** |
| * **I can take objects away from a set and find the new total.** |
| e.g. Separate and take part of a group of objects away within 10, to model subtraction and use appropriate vocabulary i.e. ‘Take away’. |
| * **I can compare groups of objects to find the difference between 2 numbers** |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **6 of 8** | ***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 0-01a 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*** | | |
| **Progression through Early Level** | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
|  | | * **I can double numbers to the total of 10 mentally.** | ***Doubles numbers to a total of 10 mentally.*** |
|  | | Use finger patterns to show patterns of 0-10, doubles and halves  *e.g.1+1, 2+2, 3+3, 4+4, 5+* |
| * **I know that the last number I count tells me the total of the set.** | |  | ***When counting objects, understands that the number name of the last object counted is the name given to the total number of objects in the group.*** |
|  | | * **I can demonstrate all possible partitions of numbers to 10. e.g. 4+0, 3+1, 2+2, 1+1+2** | ***Partitions quantities to 10 into two or more parts and recognises that this does not affect the total.*** |
|  | | Make finger patterns up to 10 in different ways without looking at their fingers. *e.g. make different combinations of ten.* |
|  | | 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 |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **7 of 8** | ***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 0-01a 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*** | | |
| **Progression through Early Level** | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
|  | | * **I have learned the basic facts for addition and subtraction and can link these (to 10)** | ***Adds and subtracts mentally to 10*** |
| Learners recall addition facts to ten,  e.g. 2+1, 5+3, 7+2, 3-2, 4-1 …etc.  Learners recall subtraction facts to ten,  e.g. 3-2, 4-, 7-4…etc |
| * **I can use a range of strategies to add and subtract mental facts to 10.** |
| Learners can link ‘number families’ when explaining mental strategies for addition and subtraction to 10.  E.g. 3+5=8 5+3=8 8-5=3 8-3=5 |
| * **I can use appropriate mathematical symbols + - =** | ***Uses appropriately the mathematical symbols +, − and =.*** |
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| * **I can solve simple missing number equations.**   **e.g. 3 + \_ = 10** | ***Solves simple missing number problems.*** |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **8 of 8** | ***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 0-01a 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*** | | |
| **Progression through Early Level** | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can estimate, without counting and with some accuracy, up to 5.** | | * **I can estimate, without counting and with some accuracy, to 20.** | ***Recognises the number of objects in a group, without counting (subitising) and uses this information to estimate the number of objects in other groups.*** |
| * **I can describe groups of objects by saying which is bigger, smaller or if they are the same.** | | * **I can count the objects in a group and use this information to estimate the amount of objects in the larger group.** |
|  | | * **I know and can show understanding of what the terms estimate and estimating means.** |
| * **I can check estimate by counting.** | | * **I can check estimate by counting.** | ***Checks estimates by counting.*** |
|  | | * **I can recognise number of objects without counting (up to 20).** | ***Demonstrates skills of estimation in the contexts of number and measure using relevant vocabulary, including less than, longer than, more than and the same.*** |
| * **I can estimate an object’s length using non-standard units with some accuracy.** |
| * **I can estimate an object’s capacity using non-standard units with some accuracy.** |
| * **I can estimate an object’s weight using non-standard units with some accuracy.** |
| * **I can estimate in the contexts of number and measure using relevant vocabulary, for example, ‘less than’, ‘longer than’.** |

### Strategies and Knowledge

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| **Estimation and Rounding and**  **Number and number processes**  **– Early Level**  1 of 2 | | ***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*** | |
| **Strategies** | | | **Knowledge** |
| 1 | Count and form a set of items up to 10 | | **Number Word Sequences** |
| 1 | Join and split objects into groups | | Count forwards to 10 |
| 2 | Solve adding problems to ten by counting all the objects | | Count backwards from 10 |
| 2 | Solve subtracting problems to ten by counting all the objects | | Count forwards to 20 |
| 3 | Solve simple adding problems by counting all the items when screened | | Count backwards from 20 |
| 3 | Solve simple subtracting problems by counting all the items when screened | | Say the number after a number up to 20 |
|  |  | | Say the number before a number up to 20 |
|  |  | | Count forwards to 30 |
|  |  | | Say the number after a number up to 30 |
|  |  | | Say the number before a number up to 30 |
|  |  | | **Numeral Identification** |
|  |  | | Read numbers to 10 |
|  |  | | Sequence numbers up to 10 |
|  |  | | Identify and represent numbers to 10 using numerals, words, symbols and objects |
|  |  | | Recognise numbers to 10 (find number within a group) |
|  |  | | Identify missing numbers in sequences up to 10 |
|  |  | | Use some ordinal names |
|  |  | | Read numbers to 20 |
|  |  | | Sequence numerals up to 20 |
|  |  | | Identify and represent numbers to 20, using numerals, words, symbols, pictures and objects |
|  |  | | Recognise numbers from 0 -20 (find numbers within a group) |
|  |  | | Identify missing numbers in sequences up to 20 |
|  |  | | Find a number between two 2 digit numbers within 20 |
|  |  | | Read and use ordinal names to “tenth” |

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| **Estimation and Rounding and**  **Number and number processes**  **– Early Level**  2 of 2 | | ***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*** | |
|  |  | | **Grouping and place value** |
|  |  | | Recognise small collections (subitising) |
|  |  | | Recognise domino patterns up to 6 |
|  |  | | Recognise five-wise patterns to 10 |
|  |  | | Recognise pair-wise patterns to 10 |
|  |  | | Make finger patterns up to 5 in different ways by looking at fingers |
|  |  | | Use finger patterns to show patterns of 0 – 10 and doubles |
|  |  | | Use finger patterns to show different ways to make numbers up to 10 without looking |
|  |  | | Count and copy a temporal sequence of claps or beats up to 10 |
|  |  | | Use 5 as an anchor in forming numbers from 6 to 10 with materials |
|  |  | | Recognise smaller collections within a collection |
|  |  | | Estimate the number of objects in a group up to 20 and count to check |
|  |  | | Compare two groups of objects and decide which has most of fewest |
|  |  | | Recognise that ten ones can be bundled up and become one ten |
|  |  | | **Basic Facts** |
|  |  | | Recall doubles to 10 |
|  |  | | Recall halves to 10 |
|  |  | | Recall adding facts to 5 |
|  |  | | Recall subtracting facts to 5 |
|  |  | | Recall adding facts to 10 |
|  |  | | Recall subtracting facts to 10 |

*Estimation and rounding & Number and number processes - First Level*

**First Level**

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  1 of 4 | | ***I can share ideas with others to develop ways of estimating the answer to a calculation or problem, work out the actual answer, 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*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I know the forward number sequence to 100.** | * **I know the forward number sequence to 1000.** | |  | ***Reads, writes, orders and recites whole numbers to 1000, starting from any number in the sequence.*** |
| e.g. 21 21 22 23 24 …  68 69 70 71 72…. |  |
| * **I know the backward number sequence from 100 to 0.** | * **I know the backward number sequence from 1000 to 0.** | |  |
| e.g. 91 90 89 88….. |  |
| * **I can read and write numbers to 100 in numerals.** * **I can make and draw collections of a given size to 100s using tens and ones.** * **I can convert these into words and symbols.** | * **I can read and write numbers to 1000 in numerals.** * **I can make and draw 3-digit numbers in non-standard form.** * **I can convert hundreds into tens and hundreds and tens into ones and vice versa.** | |  |
| e.g. Using materials such as bundles of sticks. | e.g. 330= 2 hundreds and 13 tens or 33 tens or 330 ones. | |  |
| * **I can order consecutive numbers within 100.** | * **I can order non-consecutive numbers within 100 (smallest to biggest and biggest to smallest).** | | * **I can order consecutive numbers within 1000 (smallest to biggest and biggest to smallest).** * **I can order non-consecutive numbers within 1000 (smallest to biggest and biggest to smallest).** |
|  | e.g ....put these numbers in order from smallest to largest – 34, 56, 18, 22, 98 | |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  2 of 4 | | ***I can share ideas with others to develop ways of estimating the answer to a calculation or problem, work out the actual answer, 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*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I know how to construct 2 digit numbers and can put them in order.** |  | | * **I know how to construct 3 digit numbers and can put them in order.** | ***Reads, writes, orders and recites whole numbers to 1000, starting from any number in the sequence (…cont)*** |
| e.g. if given 53 58 55 57 56 54  -> 53 54 55 56 57  If given 23 14 78 39 62 28  ->14 23 28 39 62 78 |  | | e.g. if given 345 341 340 342 348  -> 340 341 342 345 348  if given 258 203 265 214 299  -> 203 214 258 265 299  if given 678 843 235 586 834  -> 235 586 678 834 843 |
| * **I can use < and > to compare two numbers within 100.** |  | | * **I can use < and > to compare two numbers within 1000.** |
| * **I can find missing numbers on a number line or square up to 100.** |  | | * **I can find missing numbers in part of a number line or square up to 1000.** |
| e.g.100, \*\*, 98, 97, 96, \*\*, \*\*, 93, \*\*, 91  45, 46, \*\*, \*\*, 49, \*\*, \*\*, 52, 53 |  | | e.g. 345, 346, \*\*\*, 348, \*\*\*, \*\*\*, 351  501, \*\*\*, \*\*\*, 498, 497, \*\*\*, 495 |
| * **I can say the number before and after a given number in the range 0-100 i.e. count on and back.** | * **I can say the number before and after a given number in the range 0-1000 i.e. count on and back (on and off the decade).** | | * **I can say the number 1, 10 and 100 before and after a given number in the range of 0-1000 (on and off the decade/hundred).** |
| e.g. **28** 27 is before, 29 is after    **87** 86 is before, 88 is after  **90** 89 is before and 90 is after | e.g. **456** 455 is before, 457 is after  **700**  699 is before, 701 is after  **799** 798 is before , 80 is after | | e.g. **599** 598 is 1 before, 589 is 10 before, 499 is one before    **891** 892 is 1 after, 901 is 10 after, 991 is 100 after |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  3 of 4 | | ***I can share ideas with others to develop ways of estimating the answer to a calculation or problem, work out the actual answer, 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*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can say the next 2, 3, 4 numbers in a number word sequence in the range of at least 0-100** | * **I can say the number word before and/or after in a multiple sequence number sequence in 2s, 5s and 3s.** | | * **I can say the next number word before or after in a multiple number sequence in 2s 5s 3s and 4s** | ***Reads, writes, orders and recites whole numbers to 1000, starting from any number in the sequence (…cont)*** |
| e.g. say the next three numbers after 34 or before 65. | e.g. 13, 16, 19, \*\*, \*\*, 45, 50, 55 | | e.g. 126, 130, 134, \*\* |
| * I can count the number of jumps forward and backwards from a to b on a number track. Should not cross decades | * I can count the number of jumps forwards and backwards from a to b (on a number track showing 2s, 10s, 5s or 3s) | | * **I can count the number of jumps forwards and backwards from a to b (on a number track showing 2s, 10s, 5s, 3s or 4s)** |
| e.g. How many jumps from 22 to 25 or 95 to 92 | Examples should cross decades.  e.g. How many jumps from 28 to 36 in 2s? | | e.g How many jumps from 36 to 60 in 4s? |
|  | * **I understand zero as a placeholder in whole numbers to at least 100.** | | * **I understand zero as a placeholder in whole numbers to at least 1000.** | ***Demonstrates understanding of zero as a placeholder in whole numbers to 1000.*** |
|  | e.g.... know that the value of the digits in 20 are worth 2 tens or twenty and zero ones.  and | | Arrow cards, numeral cards and digit cards are very useful materials. |
| * **I can use place value materials to show that I understand the value of the digits in two digit numbers.** | * **I can use place value materials to show that I understand the value of the digits in three digit numbers~~.~~** | | * **I can partition of a three digit number into hundreds, tens and ones, identifying the value of each digit.** | ***Identifies the value of each digit in a whole number with three digits, for example, 867 = 800 + 60 + 7.*** |
|  | |  |
| * I can describe the value of each digit in a numeral to at least 100. |  | | * I can use place value to partition numbers up to 100 e.g. 27=20+7 |
| * I can use place value to partition numbers up to 20 e.g. 17=10+7 |  | | * I can describe the value of each digit in a numeral up to 1000. |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  4 of 4 | | ***I can share ideas with others to develop ways of estimating the answer to a calculation or problem, work out the actual answer, 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*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can count in tens forwards and backwards within 100 (multiples of 10).** | * **I can count in fives forwards and backwards within 100.** | | * **I can count in 100s up to 1000 from any number** | ***Counts forwards and backwards in 2s, 5s, 10s and 100s.*** |
|  |  | | e.g. 135, 235, 335… |
| * **I can count in twos forwards and backwards within 100.** | * **I can count in tens forwards and backwards within 100 from any number** | | * **I can count in tens forwards and backwards within 1000 from any number** |
| May track the counts using materials (fingers) or by imaging. | e.g. 34, 44, 54, 64… | | e.g. 345, 355, 365... |
|  | * **I can count in 100s up to at least 1000 (multiples of 100).** | | * **I can count forwards and backwards in jumps using at least 2s, 5s, 10s and 100s** |
| * **I can round numbers to the nearest ten using number lines.** | * **I can round whole numbers to the nearest 10 using number lines or squares.** | | * **I can round whole numbers to nearest ten and hundreds** | ***Rounds whole numbers to the nearest 10 and 100 and uses this routinely  to estimate and check the reasonableness of a solution.*** |
|  |  | | e.g. 345 to 350 or 300  875 to 880 or 900 |
|  | * **I can show my understanding of the rule for rounding involving half way between, for example 5 and above is rounded up, below 5 is rounded down.** | | * **I can use rounding skills to estimate.** |
| * **I can use rounding skills to check answers.** | * **I can use rounding skills to check answers.** | | * **I can use rounding skills to check answers.** |
| * **I can estimate quantities up to 20.** | * **I can estimate quantities up to 50.** | | * **I can estimate quantities up to 100.** | ***Uses strategies to estimate an answer to a calculation or problem, for example, doubling and rounding.*** |
| * **I can estimate the position of any number up to 20 on a number line/square** | * **I can estimate the position of any number up to 50 on a number line/square.** | | * **I can estimate the position of any number up to 100 on a number line/square.** |
| * **I can compare an estimation with the answer to a calculation and decide if the answer is reasonable.** |  | |  |

### Strategies and Knowledge

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| **Estimation and Rounding and**  **Number and number processes**  1 of 3 **– First Level** | | ***I can share ideas with others to develop ways of estimating the answer to a calculation or problem, work out the actual answer, 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*** | |
| **Strategies** | | | **Knowledge** |
|  |  | | **Number word sequences** |
|  |  | | Counts forwards from any number up to 100 |
|  |  | | Counts backwards from any number up to 100 |
|  |  | | Says decade number word sequences forwards and backwards to 100 |
|  |  | | Says forward/backward number words sequences in 2s and 5s to 100 |
|  |  | | Say the number after and before a number 1-100 |
|  |  | | Count forwards 1s, 10s and 100s up to 1000. |
|  |  | | Count backwards in 1s, 10s and 100s up to 1000. |
|  |  | | Count forwards in multiples of 2s, 10s, 5s, 3s and 4s up to 100. |
|  |  | | Count backwards in multiples of 2s, 10s, 5s, 3s and 4s up to 100. |
|  |  | | Say the number word before and after a number in the range 0 – 1000 in 1s, 10s and 100s. |
|  |  | | Say the next multiple before and after a number multiple sequence for 2s, 5s, 3s and 4s |
|  |  | | Count the number of jumps from a to b in multiples of 2, 10, 5, 3 and 4. |
|  |  | | **Numeral identification** |
|  |  | | Read and use ordinal numbers to one twenty |
|  |  | | Read, write and use ordinal number names up to one hundredth |
|  |  | | Recognise, read and write any number up to 100 |
|  |  | | Recognise, read and write any number up to 1000 |
|  |  | | Sequence numerals up to 100 |
|  |  | | Sequence numerals up to 1000 |
|  |  | | Sequence decade numerals up to 100 |
|  |  | | Sequence multiples of 10 and 100 in range of 0 – 1000 |
|  |  | | Sequence multiples of 2, 10, 5, 3 and 4 up to 100 |

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| **Estimation and Rounding and**  **Number and number processes**  **– First Level**  2 of 3 | | ***I can share ideas with others to develop ways of estimating the answer to a calculation or problem, work out the actual answer, 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*** | |
| **Strategies** | | | **Knowledge** |
|  |  | | **Numeral identification (Cont..)** |
|  |  | | Identify missing 2 digit numbers visually within 100 and place on a number line |
|  |  | | Identify missing 3 digit numbers visually within 1000 and place on a number line |
|  |  | | Identify missing 3 digit numbers visually within 1000 in multiples of 10 |
|  |  | | Find a number between two 2 digit numbers within 100 |
|  |  | | Find a number between two 3 or 4 digit numbers within 1000 |
|  |  | | Find a number exactly halfway between 2 given numbers within 1000 |
|  |  | | Order 2 digit numbers within 100 in ascending or descending order |
|  |  | | Order 3 digit numbers within 1000 in ascending or descending order |
|  |  | | **Grouping and place value** |
|  |  | | Recognise five-wise and pair-wise pattern ten frames |
|  |  | | Use 10 as an anchor to form numbers 11 – 20 |
|  |  | | Use decades as an anchor to from numbers within 100 |
|  |  | | Describe the number of tens in decades |
|  |  | | Describe the numbers of twos up to 20 and fives up to 50 |
|  |  | | Identify, say and represent 2 digit numbers up to 100, showing understanding of the role of zero |
|  |  | | Identify, say and represent 2 and 3 digit numbers up to 1000, showing understanding of the role of zero |
|  |  | | Record all the possible digit combinations for 2 digit numbers and order by size |
|  |  | | Record all the possible digit combinations for 2 and 3 digit numbers and order by size |
|  |  | | Make and draw collections of a given size to 100 using tens and ones |

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| **Estimation and Rounding and**  **Number and number processes**  **– First Level**  3 of 3 | | ***I can share ideas with others to develop ways of estimating the answer to a calculation or problem, work out the actual answer, 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*** | |
| **Strategies** | | | **Knowledge** |
|  |  | | **Grouping and place value (Cont…)** |
|  |  | | Make and draw 2 and 3 digit numbers in standard and non-standard form |
|  |  | | Increase and decrease numbers by tens on the decade |
|  |  | | Increase and decrease numbers by tens off the decade |
|  |  | | Increase and decrease numbers by tens and ones |
|  |  | | Increase and decrease by hundreds on the century |
|  |  | | Increase and decrease by tens and hundreds off the century and off the decade |
|  |  | | Estimate first, then count large collections in 10s, 20s, 25s and 100s |
|  |  | | **Rounding and estimating** |
|  |  | | Rounds numbers to the nearest 10 using materials |
|  |  | | Round numbers to the nearest 10 when estimating |
|  |  | | Round 3 digit numbers to the nearest 10 or 100 when estimating |

**Second Level**

## Estimation and Rounding & Number and Number Processes – Second Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **1 of 9** | | ***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***  ***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*** | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can say, read, order, write the forward and backward number sequence up 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  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  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* | * **I can say, read, order, write the forward and backward number sequence up 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, 30,00*   Say the number word just before and after a 4, 5 and 6 digit number in the range of 0-100,000.  Place whole numbers up to 100,000 on a scaled number line, using varied intervals: | | * **I can say, read, order, write the forward and backward number sequence up to 1 000 000.**   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*  Confidently say the number word just before and after a 4, 5 and 6 digit number in the range of 0-1,000,000.  Place whole numbers up to 1,000,000 on a scaled number line, using varied intervals: | ***Reads, writes and orders whole numbers to 1 000 000, starting from any number in the sequence.*** |
| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **2 of 9** | | ***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***  ***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*** | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| e.g. place whole numbers up to 10,000 on a scaled number line, using varied intervals:     * I can identify and represent whole numbers up to ten thousand and beyond using numerals, words and number lines.        * **I can place non-consecutive numbers in order of size up to 10 000.** | * Identify and represent whole numbers up to hundred thousand using numerals, words and number lines.      * I can place non-consecutive numbers in order of size up to 100 000. | | * I can confidently identify and represent whole numbers to a million and beyond using numerals, words and number lines. * **I can place non-consecutive numbers in order of size up to 1 000 000.** | ***Reads, writes and orders whole numbers to 1 000 000, starting from any number in the sequence (cont…)*** |
| * **I can partition whole numbers up to 10 000 into tens of thousands, thousands, hundreds, tens and ones.**   Recognise exact partitions of 1,000 and record in standard/expanded notation (standard and non-standard place value). | * I can partition whole numbers up to 100 000 into hundreds of thousands, tens of thousands, thousands, hundreds, tens and ones.   Recognise exact partitions of 10,000 and record in expanded notation (standard and non- standard place value). | | * **I can partition whole numbers up to 1 000 000 into millions, hundreds of thousands, tens of thousands, thousands, hundreds, tens and ones.**   Recognise exact partitions of a million and record in expanded notation (standard and non-standard place value). | ***Partitions a wide range of whole numbers*** |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **3 of 9** | | ***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***  ***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*** | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
|  |  | |  | ***Partitions a wide range of whole numbers (cont…)*** |
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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **4 of 9** | | ***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***  ***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*** | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| 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 | ***Partitions a wide range of whole numbers (cont…)***  ***Explains the link between a digit, its place and its value for whole numbers  to 1 000 000.*** |
| * **I can explain the link between a digit, its place and its value for numbers up to 10 000.**   *e.g. 7,896 is bigger* *than 7,096 because there is an 8 in* *the hundreds place rather than a 0.* | * **I can explain the link between a digit, its place and its value for numbers up to 100 000.**   e.g. 25,296 is bigger than 24,987 because there is a 5 in the thousands place rather than a 4. | | * **I can explain the link between a digit, its place and its value for numbers up to 1 000 000.**   e.g. 765,296 is bigger than 754,998 because there is a 6 in the ten thousands place rather than a 5. |
| * **I can round numbers up 10 000 to the nearest 10, 100, and 1000.**   Round whole numbers to the nearest 10, 100 or 1,000.  *e.g. 4,790 to 5,000*  *28,399 to 28,000* | * **I can round numbers up to 100 000 to 10, 100. 1000 and 10 000**   Confidently round whole numbers to nearest 10, 100, 1,000 or 10,000.  *e.g. 35, 785 rounds to*  *35,790 (nearest 10)*  *35,800 (nearest 100)*  *36,000 (nearest 1,000)*  *40, 000 (nearest 10, 000)* | | * **I can round numbers up to 1 000 000 up to 10, 100. 1000, 10 000 and 100 000**   Confidently round whole numbers to nearest 10, 100, 1,000 or 10,000.  *e.g. 635, 785 rounds to*  *635,790 (nearest 10)*  *635,800 (nearest 100)*  *636,000 (nearest 1,000)*  *640, 000 (nearest 10, 000)*  *600, 000 (nearest 100, 000)* | ***Rounds whole numbers to the nearest 1000, 10 000 and 100 000.*** |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **5 of 9** | | ***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***  ***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*** | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can say, read, write, order and sequence numbers up to 1 decimal place.**   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…  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 | * **I can say, read, write, order and sequence numbers up to 2 decimal places.**   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…*  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*  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* | | * **I can say, read, write, order and sequence numbers up to 3 decimal 0places.**   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…*  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*  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* | ***Partitions decimal fractions to three decimal places, for example, 3∙6 = 3 ones and 6 tenths = 36 tenths***  ***Explains the link between a digit, its place and its value for numbers to three decimal places.*** |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **6 of 9** | | ***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***  ***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*** | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| Identify and represent decimal numbers up to one decimal place using numerals, words and pictures, understanding the value of each digit e.g.  Sequence decimal numbers to one decimal place.    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 to 0.9 | Identify and represent decimal numbers up to two decimal place using numerals, words and pictures, understanding the value of each digit e.g.    Sequence decimal numbers to two decimal place e.g.  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 ]* | | 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*  e.g. Sequence decimal numbers to three decimal place e.g.    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* | ***Explains the link between a digit, its place and its value for numbers to three decimal places (cont…)*** |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **7 of 9** | | ***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***  ***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*** | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I recognise that the place to the right of the decimal point represents tenths.**   e.g. 3.8 is ‘three ones and 8 tenths’ and is read as ‘three point eight’. | * **I recognise the two places to the right of the decimal point represent tenths and hundredths.**   *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’* | | * **I recognise the three places to the right of the decimal point represent tenths, hundredths and thousandths.**   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’. | ***Explains the link between a digit, its place and its value for numbers to three decimal places (cont…)*** |
| * **I know that 10 tenths make a whole.**   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* | * **I know that 100 hundredths make a whole and 10 hundredths make a tenth**.   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 10 hundredths make 1 tenth* | | |
| * **I can use place value to partition a wide range numbers including numbers to 1 decimal place.** * **I can recognise where decimal fractions are used in everyday life and can convert simple amounts of money and measurement accurately** | * **I can understand 0 as a place holder in decimal fractions.** * **I can use place value to partition a wide range numbers including numbers to 2 decimal places.** * **I can recognise where decimal fractions are used in everyday life and can convert amounts of money and measurement accurately.** | | * **I can partition decimal fractions up to 3 decimal places.** * **I can explain how zero is used as a place holder for whole numbers and decimals.** * I can recognise where decimal fractions are used in everyday life and can convert complex amounts of money and measurement accurately. |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **8 of 9** | | ***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***  ***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*** | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can explain the link between a digit, its place and its value for numbers up to 1 decimal place.**   Locate decimal numbers to 1 place on a scaled number line, using tenths. | * **I can explain the link between a digit, its place and its value for numbers up to 2 decimal places.** | | * **I can explain the link between a digit, its place and its value for numbers up to 3 decimal places** | ***Explains the link between a digit, its place and its value for numbers to three decimal places (cont…)*** |
| Locate decimal numbers to 2 places on a scaled number line, using hundredths. | | |
|  | * **I can round decimal fractions (1 decimal place) to the nearest whole number.**   Round numbers having one decimal place to the nearest whole number.  *e.g.... round 3.6 to 4 17.2 to 17*   * **I can show my understanding of the rule for rounding involving half way between, i.e. 0·5 and above is rounded up, below 0·5 is rounded down.** | | * **I can round numbers to 2 decimal places**   Round numbers having up to two decimal places to the nearest whole number or tenth.  *e.g.*  *5.47 rounded to nearest tenth is 5.5*  *and 5 to the nearest whole*  *6.79 rounded to nearest tenth is 6.8*  *And 7 to the nearest whole - 7* | ***Rounds decimal fractions to the nearest whole number, to one decimal place  and two decimal places.*** |
| *See Fractions, Decimal Fractions and Percentages.* | | | |
| * **I understand how rounded numbers can be used to estimate.** * **I can use rounding skills to estimate.** * **I can use rounding skills to check answers.** * **I can use knowledge of estimation and rounding within a range of problem solving contexts including money or measure.** | | | | ***Applies knowledge of rounding to give an estimate to a calculation appropriate  to the context.*** |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **9 of 9** | | ***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***  ***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*** | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
|  |  | | * **I can talk about contexts in which negative numbers can be used in real life contexts.**   e.g. Temperature, depth, golf parking levels, overdrafts, goal difference | ***Identifies familiar contexts in which negative numbers are used.*** |
|  |  | | * **I can order negative numbers and locate them on a number line.** | ***Orders numbers less than zero and locates them on a number line.*** |

### Strategies and Knowledge

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| **Estimation and Rounding and**  **Number and number processes**  **– Second Level**  1 of 3 | | ***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***  ***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*** | |
|  | **Strategies** | | **Knowledge** |
|  |  | | **Number word sequences** |
|  |  | | Count forwards and backwards in steps of 1000, 500,100,50,20,10 and 1 from different start points to 10 000 |
|  |  | | Count forwards and backwards in steps of 10 000, 5000, 1000, 500,100,50,20,10 and 1 from different start points to 100 000 |
|  |  | | Count forwards and backwards in steps of 100 000, 50 000, 10 000, 5000, 1000, 500, 100, 50, 20 and 10 from different start points to a million |
|  |  | | Say the number word after or before for numbers up to 10 000 |
|  |  | | Say the number word after or before for numbers up to 100 000 |
|  |  | | Say the number word after or before for numbers up to 1 000 000 |
|  |  | | Count forwards and backwards in decimal amounts to 1 decimal place |
|  |  | | Count forwards and backwards in decimal amounts to 2 decimal places |
|  |  | | Count forwards and backwards in decimal amounts to 3 decimal places |
|  |  | | Say the number one tenth before and after decimal amounts to one decimal place |
|  |  | | Say the number one hundredth before and after decimal amounts to two decimal places |
|  |  | | Say the number one thousandth before and after decimal amounts to two decimal places |
|  |  | | **Numeral identification** |
|  |  | | Read, write and say ordinal numbers beyond 100 |
|  |  | | Read, write, identify and represent any whole number up to 10 000 |
|  |  | | Read, write, identify and represent any whole number up to 100 000 |
|  |  | | Read, write, identify and represent any whole number up to a million |
|  |  | | Sequence and order numerals up to 10 000 |
|  |  | | Sequence and order numerals up to 100 000 |
|  |  | | Read, write and say decimal numbers to one decimal place |
|  |  | | Read, write and say decimal numbers to two decimal places |
|  |  | | Read, write and say decimal numbers to three decimal places |
|  |  | | Identify and represent decimal numbers to one decimal places using numerals, words and pictures |

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| **Estimation and Rounding and**  **Number and number processes**  **– Second Level**  2 of 3 | | ***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***  ***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*** | |
|  | **Strategies** | | **Knowledge** |
|  |  | | **Numerical identification (cont…)** |
|  |  | | Identify and represent decimal numbers to two decimal places using numerals, words and pictures |
|  |  | | Identify and represent decimal numbers to three decimal places using numerals, words and pictures |
|  |  | | Read, write and say decimal numbers to three decimal places |
|  |  | | Identify and represent decimal numbers to one decimal places using numerals, words and pictures |
|  |  | | Identify and represent decimal numbers to two decimal places using numerals, words and pictures |
|  |  | | Identify and represent decimal numbers to three decimal places using numerals, words and pictures |
|  |  | | Sequence and order decimal numbers to one decimal place |
|  |  | | Sequence and order decimal numbers to two decimal places |
|  |  | | Sequence and order decimal numbers to three decimal places |
|  |  | | Locate decimal numbers to 1 decimal place on a scaled number line, using tenths |
|  |  | | Locate decimal numbers to 2 decimal places on a scaled number line, using hundredths |
|  |  | | **Grouping and place value** |
|  |  | | Recognise exact partitions of 1000 |
|  |  | | Recognise exact partitions of 10 000 |
|  |  | | Recognise exact partitions of one million |
|  |  | | Convert hundreds and thousands into groups of 10, 100 and 1000 |
|  |  | | Convert thousands and ten thousands up to 100 000 into groups of 10, 100 and 1000 |
|  |  | | Convert numbers up to one million into groups of 10, 100 and 1000 |
|  |  | | Show groupings of 2, 3, 4, 5 and 10 within numbers to 100 and show any remainders |
|  |  | | Show groupings of all numbers to 10 within numbers to 100 and show any remainders |
|  |  | | Recognise places to the right of the decimal place as tenths |
|  |  | | Recognise places to the right of the decimal place as tenths and hundredths |
|  |  | | Recognise places to the right of the decimal place as tenths, hundredths and thousandths |
|  |  | | Explain how many tenths are in the whole number for numbers to 1 decimal place |
|  |  | | Explain how many tenths and hundredths are in the whole number for numbers to 2 decimal places |

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| **Estimation and Rounding and**  **Number and number processes**  **– Second Level**  3 of 3 | | ***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***  ***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*** | |
|  | **Strategies** | | **Knowledge** |
|  |  | | **Rounding and estimating** |
|  |  | | Round whole numbers to the nearest ten or hundred |
|  |  | | Round whole numbers to the nearest ten, hundred or one thousand |
|  |  | | Round numbers to one decimal place to the nearest whole number |
|  |  | | Round numbers to two decimal places to the nearest whole number |
|  |  | | Round numbers to two decimal places to the nearest whole number or tenth |
|  |  | | Identify the number halfway between two given numbers up to 10 000 |
|  |  | | Identify the number halfway between two given numbers up to 100 000 |
|  |  | | Identify the number halfway between two given numbers up to 1 000 000 |

**Third/Fourth Level**

## Estimation and rounding & Number and number processes – Third/Fourth Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | ***I can round a number using an appropriate degree of accuracy, having taken into account the context of the problem. MNU 3-01a*** | | |
| **Progression through Third Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can round decimal fractions to 3 decimal places** | * **I can use my knowledge of estimation to calculate an approximate solution to a problem** * **I can use my knowledge of estimation to simplify a calculation and explain my choice of strategy** | | * **I can use my estimate to check the validity of my final answer** * **I can apply my knowledge of rounding to help solve problems** | ***Rounds decimal fractions to three decimal places.***  ***Uses rounding to routinely estimate the answers to calculations.*** |
| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | ***Having investigated the practical impact of inaccuracy and error, I can use my knowledge of tolerance when choosing the required degree of accuracy to make real-life calculations.***  ***MNU 4-01a*** | | |
| **Progression through Fourth Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can round whole numbers to a specified number of significant figures** * **I can round correctly depending on the context of a question e.g. how many taxis do I need to order for 13 people?** | * **I can round any number greater than 1 to a specified number of significant figures e.g. round 12.68 to 3 sf** * **I can work to an appropriate degree of accuracy throughout a calculation** | | * **I can round any number to a specified number of significant figures e.g. round 0.09376 to 2 sf** * **I understand and can demonstrate the effect of premature rounding on the final answer to a calculation** * **I can work to an appropriate degree of accuracy throughout a calculation, rounding my final answer correctly** * **I understand and can interpret the notation for tolerance e.g. means strictly between 29 and 39** * **I can apply my understanding of tolerance to solve problems in context e.g. How could you use spacing blocks (25 mm by 25 mm) to ensure the regulation below is met?** | ***Rounds decimal fractions to three decimal places.***  ***Uses rounding to routinely estimate the answers to calculations.***  ***Demonstrates the impact of inaccuracy and error, for example, the impact of rounding an answer before the final step in a multi-step calculation.***  ***Uses a given tolerance to decide if there is an allowable amount of variation of a specified quantity, for example, dimensions of a machine part, 235 mm ± 1 mm.*** |

**First Level**

## Number Processes (Calculations) – First Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  1 of 9 | | ***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*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can use mathematical language to discuss addition and subtraction, for example, add, plus, makes, minus, take away, more than, less than and difference between.** | | | | ***Uses correct mathematical vocabulary when discussing the four operations including, subtract, add, sum of, total, multiply, product, divide and shared equally.*** |
| * **I can use mathematical language to discuss multiplication and division, for example, total, shared equally.** | * **I can use mathematical language to discuss multiplication and division, for example, multiply, divide.** | | * **I can use mathematical language to discuss multiplication and division, for example, multiply, divide, product and shared.** |
| * **I use the commutative property to add to 20 by counting from the biggest number** | * **I use the commutative property to add to 100 by counting from the biggest number** | | * **I use the commutative property to aid my mental agility when solving problems** | ***Demonstrates understanding of the commutative law, for example,***  ***6 + 3 = 3 + 6*** |
| e.g. 2+11=11+2 | e.g. 2+39 = 39+2 | | *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 | | ? | | |
| * **I understand that the order in which I add numbers does not matter, for example I understand that 2 + 6 is the same as 6 + 2.** | * **I can use the commutative law to solve problems involving multiplication** | |
| * **I can use my understanding of the commutative law to solve addition problems more efficiently, for example to count on from the bigger number.**   *e.g. ‘Use colour cubes to make the following*   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |   3 + 4 = 7 or 4 + 3 = 7 | e.g. 2x4 = 4x2. | |
| * **I understand that 3 x 5 is the same as 5 x 3 and can show this by moving arrays, for example** | |
| ****  ****  ****  ****  ****  ****  ****  **** | | * **I can use the commutative law to solve problems involving multiplication**   e.g. 6x5 = 5x6 |
|  | * **I can use known multiplication facts to help me solve others by ‘switching’, for example if I know 8 x 3 is 24 therefore I know 3 x 8 is 24.** |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  2 of 9 | | ***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*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can describe how I solve a variety of addition and subtraction tasks to 20 using my knowledge of inverse operations** | * **I can describe how I solve a variety of addition and subtraction tasks to 100 using my knowledge of inverse operations** | | * **I understand the relationship between adding and subtracting and can use this to check written calculations.** | ***Applies knowledge of inverse operations (addition and subtraction).*** |
| e.g. 12+3=15, 3+12=15, 15-3=12, 15-12=3 | e.g. 100-55=45 45+55=100 | |  |
|  | * **I can understand that an addition calculation can be used to check a subtraction calculation**   **(Practical materials)** | |  |
|  | *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* | | *?* | | | |  |
| * **I understand the relationship between adding and subtracting, for example within ‘number families’.** * 5 plus facts * 10 plus facts * Counting on and back * Bridging * Using doubles – near doubles * Jumping and splitting |  | |  |
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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  3 of 9 | | ***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*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can count back from the larger number to subtract within 20.** | * **I can use an empty number line or my own jottings to show the jumps I make when solving problems.** | | * **I can use an empty number line or my own jottings to show the jumps I make when solving problems.** | ***Solves addition and subtraction problems with three digit whole numbers.*** |
| e.g. 19-3 – start at largest number (19) and track number of counts: 19 – 18(1), 17(2), 16(3)  Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones.  13 – 4  Use counters and move them away from the group as you take them away counting backwards as you go. | Start at the bigger number and count back the smaller number showing the jumps on the number line.    This can progress all the way to counting back using two 2 digit numbers. | | * **I can use the associative property to make addition easier** |
| e.g. 8+5+132 = 132+8=140+5 |
| * **I have a range of mental methods to solve addition and subtraction problems and can justify my choices.** |
| * **I can use the associative property to make addition easier** | | * **I can use strategies, including counting in chunks on an empty number line, to add and subtract within 1000.**   **Jump through the next decade** addition and subtraction sums. (**Split** second number into smaller parts to jump to/back to nearest decade and beyond).  e.g. 15 + … = 47,  15 + 5 = 20 + 20 = 40 + 7 = 47  *(Can now jump through more than one decade)*  *These could be recorded on an empty number line.* |
| e.g. 8+5+32 = 32+8=40+5 | |
| * I can use doubles, and halves to add and subtract numbers to 20 | |
| *e.g. on a Rekenrek or tens frame spot that 11 is made from double 5 add 1.*  Image result for rekenrek image  Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.  Image result for bead string | |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  4 of 9 | | ***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*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can use the associative property to make addition easier** | * **I can use strategies, including counting in chunks on an empty number line, to add and subtract within 100.** | | * **I have learned the basic facts for addition and subtraction and number families to 100.** | ***Solves addition and subtraction problems with three digit whole numbers (…cont)*** |
| e.g. 3+5+7 = 7+3=10+5 |
| * **I have learned the basic facts for addition and subtraction and number families to 20** | * **I can use my knowledge of doubles and near doubles to help me add up to 2 digits.** | | * **I can partition two digit and three digit numbers to mentally add the ones then the tens, with carrying.** |
| * **I can show, or tell, my calculation strategy in a variety of ways.** | e.g 25 + 26 = 25 + 25 + 1 | | 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, 234+20 = 254 + 8* |
| *e.g. use a think board to show the story, materials, picture, diagram and the number sentence for the sum.* | * **I can use empty number lines or my own jottings to solve missing number problems within 100.**   46 + \_\_ = 79  Image result for number line adding on | |
| * **I can partition single digit numbers to help me bridge 10 when adding or subtracting within 20**   e.g. 8 + 7 = 8 + 2 + 5, and show this on an empty number line.  +2 +5   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  |  | | 8 10 15 | | | | | | | | | | |  | | * **I can partition three digit and two digit numbers to mentally subtract the ones then the tens, with carrying.**   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 |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  5 of 9 | | ***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*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can (through support and discussion) begin to identify part-part-whole in a single step word problem** * **Through support and discussion, I can begin to write single step word problems as number sentences.**   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 =* | * **I can add and subtract 10s to any whole number up to 100** | | **I can add and subtract 10s and 100s to any whole number up to 1000.** | ***Adds and subtracts multiples of 10 or 100 to or from any whole number to 1000.***  ***Solves two step problems.*** |
| e.g. 20+30 30+40 30-10 60-30 60-50 80-50   * 1. 30 = 2 tens and 3 tens = 5 tens =50 | |  |
| * **I can (through support and discussion) identify part-part-whole in a single step word problem** * **Through support and discussion, I can write single step word problems as number sentences.** | | * **I can apply my understanding of part-part-whole to a two-step word problem** * **I can write two-step word problems as number sentences.** |
| * **I can recognise equal-sized groups found in everyday situations.**   *e.g. Look for equal-sized groups such as stacks of class chairs.* | * **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)* | | * **I can use jumps, repeated addition, grouping and sharing to solve multiplication and division problems** | ***Applies strategies to determine multiplication facts, for example, repeated addition, grouping, arrays and multiplication facts. (Cont…)*** |
| * **I can build, describe and count arrays of numbers**   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:* |
| * **I can make equal groups using practical materials and use this to calculate the total amount.**   Using practical materials, arrays or pictorial representations |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  6 of 9 | | ***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*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I know that when we are multiplying we are making groups of a given amount e.g. 3 x 2 means 3 groups of 2.** | * **I can apply a range of strategies to determine multiplication facts, for example counting in jumps (skip counting), doubling, halving, repeated, repeated addition and arrays~~.~~** | | e.g. Record an **array as a multiplication sentence** and work out how many there are in total.    ***8 + 8 + 8 = 24***  e.g. 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.* | ***Applies strategies to determine multiplication facts, for example, repeated addition, grouping, arrays and multiplication facts.(…cont)*** |
| 3 sets of 2 make 6 | 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*  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.*    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? | |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  7 of 9 | | ***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*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can recall doubles of numbers up to double 10.** | * **I can recall the facts of the 2, 4 and 8 times tables (using doubling)** * **I can recall the facts of the 5 and 10 times tables** | | * **I can recall the facts of the 3, 6 and 12 times tables (using doubling).** * **I can recall the facts of 9 times table.** * **I can recall the facts of the 7 and 11 times tables.** | ***Applies strategies to determine multiplication facts, for example, repeated subtraction, equal groups, sharing equally, arrays and multiplication facts. (…cont)*** |
| Focus on the fact that there are only 45 facts to learn (up to 10 x 10), and only 21 once you know the 1, 2 and 3 times tables.  This is an alternative way of demonstrating the 45 facts | | |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  8 of 9 | | ***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*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| **The concept of division should be covered alongside multiplication – not as a separate unit** | | | | ***Applies strategies to determine division facts, for example, repeated subtraction, equal groups, sharing equally, arrays and multiplication facts. (cont…)*** |
| * **I can share through practical examples**   e.g. Sharing toys etc. Organise equal groups. | * **I can apply a range of strategies to determine division facts, for example repeated subtraction, grouping, arrays and multiplication facts** | | |
| 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.* |
| * **I can take a larger group of items and share it into equal groups**   e.g. “I have 15 cubes. How many groups of 5 can I make?”  Image result for  toy maths cubes | Use a number line to show jumps in groups. The number of jumps equals the number of groups.    Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group.    Draw an array and use lines to split the array into groups to make multiplication and division sentences. | | 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 |
| Children use pictures or shapes to share quantities.  e.g. *Share 8 star biscuits shared amongst 4 children.* |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  9 of 9 | | ***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*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
|  | * **I can demonstrate an understanding that some collections of objects can be shared evenly and some collections have objects left over.** | | | ***Applies strategies to determine division facts, for example, repeated subtraction, equal groups, sharing equally, arrays and multiplication facts. (…cont)*** |
|  | e.g. One apple would be left over if seven apples were shared between two people*.* | | e.g. Twenty eight pencils were shared between 3 groups of children. Each group received 9 pencils and one was left over. |
|  | * **I can use the commutative law to solve problems involving multiplication** | | * **I can use known multiplication facts to help me solve others by ‘switching’, for example if I know 8 x 3 is 24 therefore I know 3 x 8 is 24.** | ***Applies knowledge of inverse operations (multiplication and division).*** |
| E.g. understand that 3 x 5 is the same as 5 x 3 and can show this by moving arrays  ** **  ** **     ****  **** | |  |
| * **I can describe how I solve a variety of multiplication and division tasks using my knowledge of inverse operations and to check my answers**   e.g. 2x5=10, 5x2=10, 10÷5=2, 10÷2=5 | | * **I can describe how I solve a variety of multiplication and division tasks using my knowledge of inverse operations and to check my answers**   e.g. 6x7=42, 7x6=42, 42÷6=7, 42÷7=6 |
|  | * **I can multiply a single digit number by 10.**   e.g. 8 x 10   * **I can divide a two digit multiple of 10 by a single digit**   e.g. 80 ÷ 10. | | * **I can multiply a single digit number by 100.**  e.g. 4 x 100 * **I can divide a three digit multiple of 100 by 100,**  e.g. 600 ÷ 100. * **I can divide a three digit multiple of 100 by 10**  e.g. 400 ÷ 10. * **I can divide a three digit multiple of 10 by 10** e.g 560 ÷ 10. | ***Multiplies and divides whole numbers by 10 and 100 (whole number answers only).*** |
| * I can interpret and solve a range of one step word problems when I am told the operation being used. * I can interpret a range of simple verbal word problems, with one step, using addition and subtraction. | * I can carry out subtraction calculation to check my addition calculation. * I am beginning to interpret a range of word problems, with more than one step, using addition and subtraction. | | * **I can interpret and solve a range of word problems with more than one step, and applies the correct operations to complete the calculation.** * **I can interpret a range of word problems, with more than one step, using addition and subtraction.** | ***Solves two step problems.***  ***Uses multiplication and division facts to solve problems within the number range 0 to 1000.*** |

### Strategies and Knowledge

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| **Calculations**  **– First Level** | | ***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*** | |
| **Strategies** | | | **Knowledge** |
| 3 | Solve simple multiplication and division problems by counting all the items | | Instantly recall “five and” facts within 10 |
| 3 | Find halves and quarters of shapes or sets to 20 by counting all the items | | Instantly recall addition facts to 10 |
| 4 | Solve adding problems by counting on from the bigger number | | Recall subtraction facts to 10 |
| 4 | Solve subtracting problems by counting back from the biggest number | | Explain that when you add or subtract zero, the number doesn’t change |
| 4 | Solve missing addend problems by counting on from the bigger number | | Recall doubles to 20 |
| 4 | Solving missing subtrahend problems by counting down to the number remaining | | Recall halves to 20 |
| 4 | Solve adding and subtracting problems by counting in tens | | Recall “ten and” facts for teen numbers |
| 4 | Solve multiplication problems by skip-counting in two, fives and tens | | Recall “five and” facts within 14 |
| 4 | Solve division problems by grouping collections in equal sets or sharing into equal groups | | Recall addition facts to 20 |
| 5 | Solve simple problems mentally by using Basic Facts I know: Doubles/Five-based facts/Making tens | | Recall subtraction facts within 10 |
| 5 | Solve 2 and 3 digit number problems using partitioning through tidy numbers (Split second umber into parts to jump to/back nearest decade) | | Recall subtraction facts from 20 |
| 5 | Solve 2 and 3 digit number problems by partitioning tens and ones | | Recall multiples of 10 that add to 100 |
| 5 | Solve addition problems using the commutative property | | Instantly add/subtract 10 to any 2 digit number |
| 5 | Solve problems using my understanding that addition and subtraction are inversely related (e.g. solve subtraction problems by adding up) | | Recall multiplication for facts for x2, x5 and x10 |
| 5 | Find the difference between quantities by adding or subtracting | | Recall division facts for x2, x5 and x10 |
| 5 | Record arrays as multiplication sentences and work out the total | | **Written recording** |
| 5 | Use repeated addition or subtraction to work out an unknown fact from an known fact (e.g. I know 6 x 5 = 30, so 5 x5 must be 25) | | Use a number sentence including the symbols + and – to record addition and subtraction problems |
| 5 | Use repeated addition or subtraction to solve division problems | | Use a number sentence including the symbols x and ÷ to record multiplication and division problems |
| 5 | Form factors when knowing the Basic Facts | | Explain the term “is equal to” and understand both sides of a number sentence need to balance |
|  |  | | Use the symbols ‹ and › to show the relationship between numbers |

**Second Level**

## Number and Number Processes (Calculations) – Second Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **Addition and Subtraction Strategies (1 - 4 of 13 )** | ***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*** | |
| ***Please Note: Addition and subtraction should always be taught simultaneously.*** | | |
| **Addition and Subtraction strategies:** | | |
| 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? | | *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)* |
| *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 63 – 27 = ( 7 x 9) – (3 x 9) = 4 x 9 = 36  *29 + 30 + 28 + 33 + 32 + 27 +31 + 30 = 8 x 30*  *= (8 x 3)x 10*  *= 24 x10 = 240* | | 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 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? |
| *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* | | *Solve* ***subtraction problems by using a place value strategy (split strategy)*** |
| ***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* | |
| *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* | | *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* |
| Use **non-standard place value splits** to mentally calculate. e.g.  39 – 17 as 19 – 17 + 20  98 – 27 as 28– 27 + 70 = 71 | |
| *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* | |
| *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.* |
| *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* | |
| *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* | | *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.* |
| *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 =* | |
| *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* | |
| *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?  *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 |
| ***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]* | |
| ***Write number stories*** *to match a given number sentence.*  *e.g. write a story to accompany :*  *24 – 13 =*  *76 – = 35*     * *97 = 125* | |
| ***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?* | |
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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **5 of 13** | | ***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*** | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can use known facts to work out unknown facts – e.g. Number bonds to 10 applied to bigger numbers, doubles and near doubles** * **I can use jump strategies to add and subtract whole numbers from 0 to 10 000.** * **I can use split strategies to add whole numbers from 0 to 10 000.** * **I can use rounding and compensation strategies to add and subtract whole numbers from 0 to 10 000.** * **I can use diagrams, jottings and models to represent and share my mental strategies to add and subtract with whole numbers from 0 to 10 000.** (Number Talk type approach) * **I can choose from a range of strategies to answer a question or solve a problem.** | * **I can use known facts to work out unknown facts** * **I can use jump strategies to add and subtract whole numbers from 0 to 100 000.** * **I can use split strategies to add whole numbers from 0 to 100 000.** * **I can use rounding and compensation strategies to add and subtract whole numbers from 0 to 100 000** * **I can use diagrams, jottings and models to represent and share my mental strategies to add and subtract with whole numbers from 0 to 100 000.** (Number Talk type approach) * **I can choose an appropriate strategy to answer a question or solve a problem.** | | * **I know a range of addition and subtraction strategies and can use them flexibly with whole numbers from 0 to 1 000 000** * **I can use diagrams, jottings and models to represent and share my mental strategies to add and subtract with whole numbers from 0 to 1 000 000.** (Number Talk type approach) * **I can choose the most efficient strategy to answer a question or solve a problem.** * **I can interpret and solve multi-step word problems.** * **I can write multi-step word problems as number sentences.** | ***Adds and subtracts whole numbers***  ***within the number range 0 to 1 000 000.*** |
| ***Children should not be exposed to standard written algorithms until they can use part-whole mental strategies to solve number problems. If they are exposed to working forms too early, this restricts ability and motivation to use mental strategies and can inhibit their development of number sense.***  **i.e. Mental methods should always be used in preference to formal algorithms.** | | | |
| * **I can use the expanded method of addition and subtraction, supported by concrete materials, with whole numbers from 0 to 1000.** * **I can use formal written algorithms for addition and subtraction with whole numbers from 0 to 1000** | * **I can use the expanded method of addition and subtraction, supported by concrete materials, with whole numbers from 0 to 10 000.** * **I can use formal written algorithms for addition and subtraction with whole numbers from 0 to 10 000** | | * **I can use the expanded method of addition and subtraction with whole numbers from 0 to 1 000 000.** * **I can use formal written algorithms for addition and subtraction with whole numbers from 0 to 1 000 000.** |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **6 of 13** | | | ***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*** | | | |
| **Progression through Second Level** | | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** | |
| * **I can add and subtract multiples of 10, 100 and 1000 to numbers up to 10 000.** | * **I can add and subtract multiples of 10, 100 and 1000 to numbers up to 100 000.** | | * **I can add and subtract multiples of 10, 100 and 1000 to numbers up to 100 000.** | | ***Adds and subtracts multiples of 10, 100 and 1000 to and from whole numbers.*** | |
| * **I can add or subtract two decimal numbers to one place where the combined answer makes a whole***(and explain what has happened to the decimal point)*   *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*   * ***I can add 2 decimal numbers to one place by splitting the whole numbers and tenths***   *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* | * **I 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*   * ***I can 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 =* | | * **I can use formal written algorithms for addition and subtraction with decimal fractions to two decimal places from 0 to 1 000 000.** | | ***Adds and subtracts decimal fractions to two decimal places, within the number range 0 to 1 000 000.*** | |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **7 of 13** | | | ***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*** | | | |
| **Progression through Second Level** | | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** | |
|  | * **I can add and subtract multiples of 10, 100 and 1000 to and from decimal fractions to one decimal place.** | | * **I can add and subtracts multiples of 10, 100 and 1000 to and from decimal fractions to two decimal places. e.g. 2.53+10=12.53, 2.53+100=102.53, 2.53+1000=1002.53.** * **I have a range of mental strategies that I can use to solve problems with numbers up to 3 decimal places.** | | ***Adds and subtracts multiples of 10, 100 and 1000 to and from decimal fractions to two decimal places.*** | |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **Multiplication and division Strategies (8-11 of 13 )** | ***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*** | |
| ***Please Note: Multiplication and division should always be taught simultaneously.*** | | |
| Multiplication and division strategies: | | |
| 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 x 6*  Using the distributive property of multiplication, *e.g. 7 x 6 = 5 x 6 + 2 x 6*    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) | | 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 | | *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 |
| **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 | | 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)* |
| Bein 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:** |
| 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* | | 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 |
| 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. |
| 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 | | Solve **division** problems by using a **multiplication strategy** andby using the **inverse rule.** |
| 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 |
| Solve a **division** problem by **using multiplication** e.g.  72 ÷ 8 = how many 8s are there in 72? |
| **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?* | | 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?* |
| 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 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. |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **12 of 13** | | ***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*** | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| ***Please Note: Multiplication and division should always be taught simultaneously.*** | | | |  |
| * **I can construct the 6, 7 then 8 times tables using arrays, repeated addition, build on knowledge of 5 times table.** * **I understand that multiplication is commutative and I can solve a problem by changing the order of the factors. e.g. 5x8=40 8x5=40** * **I know that division is the inverse operation of multiplication and can use my table facts to solve division problems within the tables.** | * **Through discussion and sharing, I can identify an appropriate strategy to construct any times table fact and use it to solve multiplication and division problems**. | | * **Through discussion and sharing, I can identify the most efficient strategy to construct any times table fact and use it to solve multiplication and division problems** | ***Uses multiplication and division facts to the 10th multiplication table***.  *(Please note that rapid recall of table facts is not required until the end of 3rd level.)* |
| * **I can multiply a two digit number by a single digit number, both mentally and using the grid method**. e.g. 35 x 7 See the source image | * **I can use the grid method to multiply 2 digit whole numbers by 2 digit whole numbers** e.g. 72 x 38 See the source image | | * See the source image**I can use a range of methods, including grid and other written methods, to multiply numbers of more than 2 digits by 2 digits** e.g. 815 x 34 | ***Multiplies whole numbers by two digit numbers.*** |
|  | * **I can use a range of strategies to multiply numbers with up to 1 decimal place by a single digit.** | | * **I can use a range of strategies including written methods to multiply numbers with two decimal places by a single digit** | ***Multiplies decimal fractions to two decimal places by a single digit.*** |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **13 of 13** | | ***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*** | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can use table facts to mentally divide a two digit number by a single digit number including remainder**. E.g. 47/5 =5r2 * **I can use mental strategies to divide a multiple of ten by a single digit using table facts,** for example 360÷3 | * **I can divide whole numbers by 10 and 100 where the answer is a decimal of no more than 2 decimal place.** e.g. 233/100 = 2.33 * **I can use a variety of written methods to divide a three digit whole number by a single digit with remainders**. | | * **I can divide a two digit whole number by a single digit, where answers include a decimal fraction,** for example 78 ÷ 4 = 19·5. * **I can divide a decimal fraction with up to 2 decimal places by a single digit where the answer has no more than 2 decimal places** e.g. 5.25/5 = 1.05 | ***Divides whole numbers and decimal fractions to two decimal places, by a single digit, including answers expressed as decimal fractions, for example, 43 ÷ 5 = 8∙6.*** |
| * **I can use mental strategies to multiply a single digit number by a multiple of ten,** for example 3 x 50. * **I can divide whole numbers by 10 using concrete materials where the answer has one decimal place** e.g. 23/10 = 2.3 * **I can multiply and divide whole numbers by multiples of 10.** | * **I can use mental strategies to multiply 2 digit multiples of ten by multiples of ten,** for example 50 × 30. * **I can use mental strategies to divide up to three digit numbers by multiples of ten**, for example 360 ÷ 30. * **I can multiply and divide whole numbers by multiples of 10 and 100** | | * **I can multiply and divide whole numbers by multiples of 10, 100 and 1000.** * **I can divide multiples of 10 by 100 and 1000 recognising the role of zero as a place holder.** | ***Multiplies and divides whole numbers by multiples of 10, 100 and 1000.*** |
| * **I can multiply decimal fractions to 1 decimal place by 10 using concrete materials.** | * **I can multiply decimal fractions to 2 decimal places by 10 and 100.** | | * **I can multiply decimal fractions to 2 decimal places by 10, 100 and 1000.** * **I can divide whole numbers and decimal fractions by 10, 100 and 1000 where the answer has no more than 2 decimal places.** e.g. 25/100 – 0.25 or 3.7/10=0.37 | ***Multiplies and divides decimal fractions to two decimal places by 10, 100 and 1000.*** |
|  | * **I understand the distributive law and can split numbers to solve multiplication calculations.**   e.g. 5 x 15 = (5x10)+(5x5) | | * **I know the rules for calculating multi step problems:**   + **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.** | ***Applies the correct order of operations in number calculations when solving multi-step problems.*** |

### Strategies and Knowledge

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| **Number processes (Calculations)**  **– Second Level**  1 of 2 | | ***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*** | |
|  | **Strategies** | | **Knowledge** |
| 6 | Use jump strategies which bridge tens/ hundreds | | **Basic facts** |
| 6 | Use jump strategies across decades | | Instantly recall all addition and subtraction facts within 20 |
| 6 | Use rounding and compensation to solve problems | | Instantly recall all multiples of 100 that add to one thousand |
| 6 | Use place value partitioning to solve problems | | Instantly recall multiples of 10 to 200 |
| 6 | Use commutative properties to solve addition problems | | Instantly recall all addition and subtraction facts within 20 and extend these facts to multiples of 10 within 200 |
| 6 | Use equal adjustments to solve problems | | Recall quickly a single digit number added/subtracted to/from a 2 digit number without bridging a decade |
| 6 | Use reversibility to solve problems e.g. subtract by adding | | Recall quickly a single digit number or multiple of a hundred added/subtracted to/from a 3 digit number |
| 6 | Use the standard written form for addition | | Recall a multiple of ten added or subtracted to/from a multiple of ten without bridging a century |
| 6 | Use the standard written form for subtraction | | Recall doubles and halves for multiples of ten, hundred and thousand |
| 6 | Use the most efficient strategy and justify my choice | | Instantly recall all multiplication facts up to 10 x 10 |
| 6 | Work out the 6, 7 and 8 times tables using my knowledge of the 5 times tables | | Instantly recall all multiplication and division facts up to 10 times tables, including square numbers |
| 6 | Use commutative properties – change the order of factors to solve a problem | | Recall multiplication facts with tens, hundreds and thousands |
| 6 | Use known facts to derive new facts | | Recall some common multiples beyond ten times table |
| 6 | Use reversibility to solve division problems by multiplying | | Recall divisibility rules for 2, 5 and 10 |
| 6 | Use division for sharing or grouping collections and leave or share out remainders depending on the problem context | | Recall divisibility rules for 2, 3, 5, 9 and 10 |

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| **Number processes (Calculations)**  **– Second Level**  2 of 2 | | ***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*** | |
|  | **Strategies** | | **Knowledge** |
| 7 | Use a range of strategies to solve problems and choose the most efficient, justifying my choice | | **Written recording** |
| 7 | Use multiplication to solve addition and subtraction problems | | Record calculations using a range of symbols and numbers |
| 7 | Use the standard written form for addition and subtraction | | Use empty number lines to record calculations |
| 7 | Add or subtract two decimal numbers to one place where the combined answer makes a whole | | Use arrow notation to record calculations |
| 7 | Add or subtract two decimal numbers to one place using place value partitioning | | Understand that the equals sign can be used in the middle of a number sentence and that both sides must balance |
| 7 | Use rounding and compensating to solve problems with decimals | | Use formal algorithms for addition and subtraction |
| 7 | Use reversibility to solve add/subtract decimals to one decimal place | | Use semi-formal written strategies for multiplication and division |
| 7 | Use place value to multiply the tens and ones separately | | Understand the order of operations when solving and recording written problems |
| 7 | Use rounding and compensation to solve multiplication and division problems | |  |
| 7 | Confidently describe and show how the rules for multiplying by tens, hundreds and thousands work, and use this to solve problems | |  |
| 7 | Solve multiplication problems by using proportional adjustments e.g. doubling/halving | |  |
| 7 | Use written forms to solve multiplication/division problems | |  |
| 7 | Solve division problems using standard place value | |  |
| 7 | Split the factors to solve multiplication and division problems | |  |
| 7 | Use reversibility to solve division problems by multiplying | |  |
| 7 | Interpret division remainders in meaningful contexts | |  |
| 7 | Solve problems using a combination of the four operations, using the order of operations exemplified | |  |

**Third/Fourth Level**

## Number and number processes (Calculations) – Third/Fourth Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **1 of 2** | | ***I can use a variety of methods to solve number problems in familiar contexts, clearly communicating my processes and solutions. MNU 3-03a***  ***I can continue to recall number facts quickly and use them accurately when making calculations. MNU 3-03b***  ***I can use my understanding of numbers less than zero to solve simple problems in context. MNU 3-04a*** | | |
| **Progression through Third Level**  **ADDITION AND SUBTRACTION** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can solve – without using a calculator - addition and subtraction problems involving whole numbers** * **I can add to and subtract from any given integer** | * **I can solve – without a calculator – addition and subtraction problems involving quantities with at most 3 decimal places** * **I can add and subtract negative integers from any given integer** | | * **I can solve any addition and subtraction problems, making use of a calculator where appropriate** * **I can solve any addition and subtraction problem which involves integers** | ***Recalls quickly multiplication and division facts to the 10th multiplication table.***  ***Uses multiplication and division facts to the 12th multiplication table.***  ***Solves addition and subtraction problems working with whole numbers and decimal fractions to three decimal places.***  ***Solves addition and subtraction problems working with integers.*** |
| **Strategies for addition and subtraction developed from Early Level to Level 2 can be employed to deepen understanding:**   * **Use of empty number lines to position numbers** * **Empty number lines for addition and subtraction (including ‘counting on’)**   **Also, when developing addition and subtraction with integers the following can pave the way for deeper understanding of multiplication and division:**  **1. Using the ‘additive inverse’ as a means of performing the operation of subtraction**  **2. Addition of ‘zero pairs’ to enable the completion of the operation ‘subtracting a negative’**    1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  Take away the 4 red counters  Introduce 4 zero pairs  **3. For a combination of addition and subtraction involving 3 or more numbers:**    1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  **It is important that learners understand the concept of zero pairs before making use of them. Whilst there are various contexts that can be employed to convince learners that , it is important for them to be aware that this calculation is a specific example of a more general *axiom* of arithmetic.** | | | | |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **1 of 1** | | ***I can use a variety of methods to solve number problems in familiar contexts, clearly communicating my processes and solutions. MNU 3-03a***  ***I can continue to recall number facts quickly and use them accurately when making calculations. MNU 3-03b***  ***I can use my understanding of numbers less than zero to solve simple problems in context. MNU 3-04a*** | | |
| **Progression through Third Level**  **MULTIPLICATION AND DIVISION** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can rapidly recall key multiplication and division facts up to the 10 times table** * **I can use a range of strategies to multiply by a whole number and divide by a single digit number** * **I can use repeated addition to multiply a positive integer by a negative integer and vice-versa** | * **I can rapidly recall key multiplication and division facts up to the 12 times table** * **I can use a range of strategies to solve problems which involve multiplying or dividing by a single digit whole number, without using a calculator** * **I can multiply and divide integers by a negative integer** | | * **I can use a range of strategies to solve multiplication and division problems involving whole numbers and decimal fractions (see MNU3-07)** * **I can solve problems involving the multiplication and/or division of integers** | ***Recalls quickly multiplication and division facts to the 10th multiplication table.***  ***Uses multiplication and division facts to the 12th multiplication table.***  ***Solves multiplication and division problems working with whole numbers and decimal fractions to three decimal places.***  ***Solves multiplication and division problems working with integers.*** |
| **Repeated addition may be used to introduce multiplication involving a negative integer. For example, consider the pattern below:**  **Subtract**  **and then add**  **in 2 zero pairs**  **Subtract**  1  1  **Subtract**  1  1  1  1  1  1  **Subtract**  1  1  **Subtract**  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  **Similar patterns could be explored leading to:**  **Using the results above (and the concept of division) we can then conclude e.g. :**   * **because** * **because or by ‘quotative’ division ( form 4 groups of and consider repeated subtraction)** * **because or by ‘partitive’ division (share into 2 equal groups)** | | | | |

**Second Level**

## Multiples, factors and primes – Second Level

*No experiences and outcomes for Early and First Levels.*

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | ***Having explored the patterns and relationships in multiplication and division, I can investigate and identify the multiples and factors of numbers. MTH 2-05a*** | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can skip count forwards and backwards to identify multiples.** * **I can describe what multiples are and how to generate a sequence of multiples** * **I can describe what a factor of a number is.** * **I can find some of the factors of a given whole number**. | * **I can use known relationships between multiplication and division to find multiples and factor pairs for a given whole number.** * **I can use repeated addition, subtraction, doubles and other part-whole strategies to identify multiples, outwith tables.** | | * I can use ‘divisibility rules’ to determine if a number is a multiple of 3, 4, 6, 8, 9 e.g. 273 -> 2 + 7 + 3 = 12 and 12 is divisible by 3 so 273 is in the 3 times table. * I can quickly find the factor pairs for any whole number up to 100 * I can find factors of numbers larger than 100 e.g. 120, 500, 1000 * I can apply my knowledge and understanding of multiples and factors to solve related problems in number, money and measurement. | ***Identifies multiples and factors of whole numbers and applies knowledge and understanding of these when solving relevant problems in number, money and measurement.*** |

**Third Level**

## Multiples, factors and primes – Third Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | **I have investigated strategies for identifying common multiples and common factors, explaining my ideas to others, and can apply my understanding to solve related problems. MTH 3-05a**  **I can apply my understanding of factors to investigate and identify when a number is prime.**  **MTH 3-05b** | | |
| **Progression through Third Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can find a common multiple for a set of 2 or 3 numbers * I can use a suitable strategy to find the common factors for a set of 2 or 3 numbers and explain my answers | * **I can identify common multiples and common factors from any set of whole numbers and explain my strategy** * **I can find the lowest common multiple of a set of numbers and explain my strategy** * **I can identify prime numbers up to 100 and explain my strategy** | | * **I can apply my knowledge of common multiples and lowest common multiples to solve problems in a variety of contexts** * **I can apply my knowledge about finding the highest common factor to solve problems in a variety of contexts** * **I can use the commutative property to correctly multiply 3 or more whole numbers together e.g.** * **I can use multiplication facts to express a given number as a product of prime factors, including the use of simple powers e.g.** | ***Identifies common multiples, including the lowest common multiple for whole numbers and can explain method used.***  ***Identifies common factors, including the highest common factor for whole numbers and can explain method used.***  ***Identifies prime numbers to 100 and can explain method used.***  ***Solves problems using multiples and factors.***  ***Writes a given number as a product of its prime factors.*** |

**Third Level**

## Powers and roots – Third Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | **Having explored the notation and vocabulary associated with whole number powers and the advantages of writing numbers in this form, I can evaluate powers of whole numbers mentally or using technology**. MTH 3-06a | | |
| **Progression through Third Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I understand and can use the words ‘base’ and ‘index/power’** * **I can use correct notation to distinguish between a repeated addition and a repeated multiplication e.g.**     **(and vice versa)** | * **I can use the terms ‘squared’ and ‘cubed’ and relate these to the area of a square and the volume of a cube respectively** * I can, without a calculator, find – up to 3 - powers of the numbers 1 to 10 * I can, without a calculator, find the squares of the first twenty-five natural numbers | | * **I can rapidly recall the squares of the first twenty-five natural numbers** * **I can rapidly recall the cubes of the first ten natural numbers** * **I can use a range of strategies to calculate powers of whole numbers without a calculator e.g.** * I can express numbers as a whole number to a power, e.g. 32 = 25, 125 = 53. | Explains the notation and uses associated vocabulary appropriately, for example, index, exponent and power.  ***Evaluates whole number powers, for example, 24 = 16***  ***Expresses whole numbers as powers, for example, 27 = 33*** |

**Fourth Level**

## Powers and roots – Fourth Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | I have developed my understanding of the relationship between powers and roots and can carry out calculations mentally or using technology to evaluate whole number powers and roots, of any appropriate number.  MTH 4-06a  Within real-life contexts, I can use scientific notation to express large or small numbers in a more efficient way and can understand and work with numbers written in this form.  MTH 4-06b | | |
| **Progression through Fourth Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can apply my understanding of multiplication to square a negative integer * I can use my knowledge of squares and cubes to find a square or cube root with a whole number answer. * I can write numbers greater than 10 in the form . | * I can show my understanding of square roots e.g. if then * I can write numbers between 0 and 1 in the form . * I can, without a calculator, find the *n*th root of a whole number in straightforward situations e.g. | | * I can calculate powers of whole numbers. * I can use my knowledge of powers to write whole numbers as a whole number to a power, e.g. 32 = 25, 125 = 53. * I can state that the *n*th root of a number is the *inverse* of raising a number to the *n*th power, e.g. is the *inverse* of . * I can find the *n*th root of a whole number, rounding to an appropriate degree of accuracy * I can express any number in the form . | Shows understanding that square roots of whole numbers can have positive and negative values, for example, .  ***Uses knowledge of the inverse relationship between powers and roots to evaluate whole number roots of any appropriate number, .***  Uses knowledge of mathematical notation to express numbers in scientific notation. |

**Early Level**

## Fractions, decimal fractions and percentages – Early Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | ***I can share out a group of items by making smaller groups and can split a whole object into smaller parts. MNU 0-07a*** | | |
| **Progression through Early Level** | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I understand and can use the word whole. * I can split a whole object into halves. * I can share out a group of items, dealing them out one at a time using concrete materials. e.g. sharing fruit, beads, toys | | * I can recognise halves and know that they are an object split into two parts of the same size. * I can split a whole object into halves and quarters and use the associated vocabulary. * I can demonstrate an understanding of the term ½ . * I can share out a group of items equally and find out how many are in the smaller groups. | ***Splits a whole into smaller parts and explains that equal parts are the same size.***  ***Uses appropriate vocabulary to describe halves.***  ***Shares out a group of items equally into smaller groups.*** |

### Strategies and Knowledge

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| **Fractions, decimal fractions and percentages – Early Level** | | ***I can share out a group of items by making smaller groups and can split a whole object into smaller parts. MNU 0-07a*** | |
| **Strategies** | | | **Knowledge** |
| 1 | Join and split objects into groups | | Recall halves to 10 |
| 4 | Find halves and quarters of shapes or sets to 20 by counting all the items | |  |
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*Fractions, decimal fractions and decimals – First Level*

**First Level**

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **1 of 2** | | ***Through exploring how groups of items can be shared equally, I can find a fraction of an amount by applying my knowledge of division. MNU 1-07b***  ***Through taking part in practical activities including use of pictorial representations, I can demonstrate my understanding of simple fractions which are equivalent. MTH 1-07c*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| NB Variation is essential in this area. It’s important that learners encounter working with fractions in various forms i.e. not always a fraction of a shape, but also a fraction of an amount e.g. using the Singapore bar model.  e.g. what is ½ of 16?   |  |  | | --- | --- | | 16 | | |  |  | | | | |  |
| * I can split a whole object into halves and quarters and use the associated vocabulary * I can illustrate fractions using materials and pictures and discuss them (and next column)not just shape related. | * I can split a whole object into halves, quarters and eighths and use the associated vocabulary | | * I can split a whole object up into any reasonable fraction and use the associated vocabulary * I understand that a fraction is an equal part of a whole. | ***Explains what a fraction is using concrete materials, pictorial representations and appropriate mathematical vocabulary.*** |
| * I am beginning to use the correct fraction notation for halves and quarters | * I can read and write fractions using fraction notation for halves and quarters | | * I can read and write fractions using fraction notation e.g. one eighth is ⅛ | ***Uses the correct notation for common fractions to tenths, for example, ,  and .*** |
|  | * I am beginning to compare the size of fractions using pictorial representations and other models (halves and quarters). * I can place simple fractions, in order, on a number line – halves and quarters | | * I can place simple fractions, in order, on a number line (same denominator) | ***Compares the size of fractions and places simple fractions in order on a number line.*** |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **2 of 2** | | ***Through exploring how groups of items can be shared equally, I can find a fraction of an amount by applying my knowledge of division. MNU 1-07b***  ***Through taking part in practical activities including use of pictorial representations, I can demonstrate my understanding of simple fractions which are equivalent. MTH 1-07c*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
|  | * **I can recognise the equivalence of simple fractions using practical resources**   e.g. ½ and 5/10 | | * **I can use pictorial representations and other models e.g. fraction walls to demonstrate understanding of simple equivalent fractions e.g. ½ = 2/4 = 3/6** | Uses pictorial representations and other models to demonstrate understanding of simple equivalent fractions, for example,. |
| * **I am aware that any sized group of items can be shared equally.** | * **I can share a group of items into half or quarter** | | * **I can use multiplication and division facts to find half and quarter of a whole number**   e.g. ½ of 20=10 | ***Uses known multiplication and division facts and other strategies to find unit fractions of whole numbers, for example,*** ***or*** ***.*** |
| * I am beginning to understand that the denominator tells how many equal parts the whole has been divided into and the numerator tells how many of the equal parts are used, for halves and quarters | * I understand that the denominator tells how many equal parts the whole has been divided into and the numerator tells how many of the equal parts are used for halves and quarters | | * I can explain the role of the denominator and the numerator. * I can compare the size of fractions   e.g. the greater the number of portions, the smaller the size of each equal share ½,1/3, ¼, 1/5, 1/6, 1/7, 1/8, 1/9, 1/10 | ***Explains the role of the numerator and denominator.***  ***Demonstrates understanding that the greater the number of equal parts, the smaller the size of each share.*** |

### Strategies and Knowledge

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| **Fractions, decimal fractions and percentages – First Level** | | ***Having explored fractions by taking part in practical activities, I can show my understanding of***   * ***how a single item can be shared equally*** * ***the notation and vocabulary associated with fractions*** * ***where simple fractions lie on the number line* MNU 1-07a**   ***Through exploring how groups of items can be shared equally, I can find a fraction of an amount by applying my knowledge of division. MNU 1-07b***  ***Through taking part in practical activities including use of pictorial representations, I can demonstrate my understanding of simple fractions which are equivalent. MTH 1-07c*** | |
| **Strategies** | | | **Knowledge** |
| 5 | Find a fraction of a number by trial and improvement using addition facts | | Symbols for most common fractions – halves, quarters, thirds, tenths, fifths |
| 5 | Find fractions of lengths and shapes, including fractions greater than 1 | | Able to order fractions with the same denominators |
| 5 | Put fractions in order from smallest to biggest or vice versa | |  |
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**Second Level**

## Fractions, decimal fractions and decimals – Second Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **2 of 2** | | I have investigated the everyday contexts in which simple fractions, percentages or decimal fractions are used and can carry out the necessary calculations to solve related problems. MNU 2-07a  I can show the equivalent forms of simple fractions, decimal fractions and percentages and can choose my preferred form when solving a problem, explaining my choice of method. MNU 2-07b  I have investigated how a set of equivalent fractions can be created, understanding the meaning of simplest form, and can apply my knowledge to compare and order the most commonly used fractions. MTH 2-07c | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| Please note: Variation is important when exploring fractions – avoid always using shapes and vary the size of the whole. The bar model approach is very useful. Learners must understand part-whole prior to working with fractions at this level. | | | |  |
| I can use fraction walls or concrete materials to find equivalent fractions  I understand simple equivalences in fractions. | I can use known multiplication and division facts to find equivalent fractions.  I can create simple equivalent fractions and use this to put a set of fractions in order – denominators to 10 | | I can create equivalent fractions and use this to put a set of fractions in order  e.g. twentieths, fiftieths, etc (looking towards percentages) | Creates equivalent fractions and uses this knowledge to put a set of most commonly  used fractions in order. |
| I can use concrete materials/fraction wall to find the simplest form of a fraction. | I can use known table facts to simplify fractions using division. | | I can reduce fractions to the simplest form and know that my answer should always be written in the simplest form. | Expresses fractions in their simplest form. |
| I can find the fraction of an amount by using concrete materials, arrays, pictures or informal jottings  e.g. 2/3 𝑜𝑓 15.  I can mentally find basic percentages of whole numbers – 25%, 50%. | I can use my table facts to find the fraction of an amount. | | I can find the fraction of an amount up to 3 digit number by using multiplication and division to solve problems  e.g. 2/3 𝑜𝑓 360 | Calculates simple fractions of a quantity and uses this knowledge to solve problems, for example, find  of 60. |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **2 of 2** | | I have investigated the everyday contexts in which simple fractions, percentages or decimal fractions are used and can carry out the necessary calculations to solve related problems. MNU 2-07a  I can show the equivalent forms of simple fractions, decimal fractions and percentages and can choose my preferred form when solving a problem, explaining my choice of method. MNU 2-07b  I have investigated how a set of equivalent fractions can be created, understanding the meaning of simplest form, and can apply my knowledge to compare and order the most commonly used fractions. MTH 2-07c | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I know that 25% is a quarter, 50% is half  e.g. 50% off sale, and 100% is whole. | I understand that a percentage is a fraction with a denominator of 100.  I can use my knowledge of fractions to find percentages of a quantity (100%, 75%, 50%, 25%, 10% and 1%). | | I can calculate simple percentages of a quantity with or without a calculator and solve problems in every day contexts.  I can find percentages of a quantity (66∙6%, 33∙3%, 20%, 15% and 5%). | C***alculates simple percentages of a quantity, and uses this knowledge to solve problems in everyday contexts, for example, calculates the sale price of an item with a discount of 15%.*** |
|  | I can use my knowledge of equivalent forms of common fractions, decimal fractions and percentages e.g. three quarters = 0.75 = 75%, to solve problems | | | Uses knowledge of equivalent forms of common fractions, decimal fractions and percentages e.g. three quarters = 0.75 = 75%, to solve problems |

### Strategies and Knowledge

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| **Fractions, decimal fractions and percentages – Second Level** | | I have investigated the everyday contexts in which simple fractions, percentages or decimal fractions are used and can carry out the necessary calculations to solve related problems.  MNU 2-07a  I can show the equivalent forms of simple fractions, decimal fractions and percentages and can choose my preferred form when solving a problem, explaining my choice of method. MNU 2-07b  **I have investigated how a set of equivalent fractions can be created, understanding the meaning of simplest form, and can apply my knowledge to compare and order the most commonly used fractions. MTH 2-07c** | |
| **Strategies** | | | **Knowledge** |
| 6 | Find fractions of whole numbers | |  |
| 6 | Solve simple equivalent ratio and rate problems | |  |
| 6 | Compare fraction sizes with whole numbers | |  |
| 7 | Identify equivalent fractions | |  |
| 7 | Convert fractions to decimals and decimals to fractions | |  |
| 7 | Order and sequence fractions and decimals | |  |
| 7 | Add and subtract fractions and decimals using equivalence | |  |
| 7 | Work out percentages of amounts | |  |
| 7 | Compare ratios and proportions | |  |

**Third Level**

## Fractions, decimal fractions and decimals – Third Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **1 of 2** | | I can solve problems by carrying out calculations with a wide range of fractions, decimal fractions and percentages, using my answers to make comparisons and informed choices for real-life situations. MNU 3-07a  By applying my knowledge of equivalent fractions and common multiples, I can add and subtract commonly used fractions. MTH 3-07b  Having used practical, pictorial and written methods to develop my understanding, I can convert between whole or mixed numbers and fractions. MTH 3-07c  I can show how quantities that are related can be increased or decreased proportionally and apply this to solve problems in everyday contexts. MNU 3-08a | | |
| **Progression through Third Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can use strategies, including concrete materials and visual representations, to add and subtract simple fractions having different denominators * I can use strategies, including concrete materials and visual representations, to change mixed numbers into improper fractions and vice versa * I can convert any given percentage into a decimal fraction and vice versa * **I can convert a given percentage into an equivalent fraction in its simplest form** | * **I can use different strategies to add and subtract proper fractions, expressing my answer as a mixed number where appropriate** * **I can change mixed numbers into improper fractions and vice versa and explain my choice of strategy** * **I can convert a given percentage into an equivalent fraction in its simplest form** * **I can, without a calculator, convert between fractions (whose denominators are, or may be simplified to, factors of 100) decimal fractions and percentages** * **I can, without a calculator, use division to convert unit fractions (having denominators 3, 6, 7, 8, 9, and 12) to decimal fractions and percentages** | | * **I can add and subtract mixed numbers without a calculator** * **I can solve problems involving the addition and subtraction of mixed numbers in various contexts** * **I can, without a calculator, convert between fractions (whose denominators are, or may be simplified to, factors of 1000) decimal fractions and percentages** * **I can, without a calculator, use division to convert fractions having denominators 3, 6, 7, 8, 9 and 12 to decimal fractions (at most 3 dp) or percentages** * **I can, with a calculator, convert between fractions, decimal fractions and percentages rounding to at most 3 dp when appropriate** * **I can use a range of strategies to order a set which may contain proper and improper fractions, decimal fractions and percentages**   **e.g. arrange the following numbers from largest to smallest:** | Converts fractions, decimal fractions or percentages into equivalent fractions, decimal fractions or percentages.  Converts between whole or mixed numbers, improper fractions and decimal fractions.  Adds and subtracts whole numbers and fractions, including when changing a denominator |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **2 of 2** | | I can solve problems by carrying out calculations with a wide range of fractions, decimal fractions and percentages, using my answers to make comparisons and informed choices for real-life situations. MNU 3-07a  By applying my knowledge of equivalent fractions and common multiples, I can add and subtract commonly used fractions. MTH 3-07b  Having used practical, pictorial and written methods to develop my understanding, I can convert between whole or mixed numbers and fractions. MTH 3-07c  I can show how quantities that are related can be increased or decreased proportionally and apply this to solve problems in everyday contexts. MNU 3-08a | | |
| **Progression through Third Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I can, without a calculator, use multiplication and division facts to find a fraction of a quantity  I can, without a calculator, find 10% (and multiples of) of a quantity   * I can, without a calculator, find 1% (and multiples of) of a quantity * I can, given a percentage (multiples of 10%) of a quantity calculate the original whole   I can use concrete materials and/or visual representations to:   * interpret a ratio involving two quantities * demonstrate equivalent ratios * find one of the parts given the whole | I can, without a calculator, use an appropriate strategy to find more complex percentages of a quantity  e.g. 18% of £350  I can mentally work out a fraction of a quantity where the denominator is 10 or less e.g. of 56   * I can, given a fraction of an amount, use a suitable strategy to calculate the original whole e.g. * I can choose from a range of strategies to correctly determine an unknown quantity in a ratio problem | | * I can, without a calculator, find fractions of a quantity   e.g.   * I can find a fraction of a quantity, rounding my answer appropriately depending on the context * I can, without a calculator, use an efficient strategy to calculate a percentage of a quantity   e.g. 37.5% of £440   * I can use a calculator to find any percentage of a quantity, rounding my answer appropriately depending on the context * I can use the unitary method to solve problems where related quantities are increased or decreased proportionally | Uses knowledge of fractions, decimal fractions and percentages to carry out calculations with and without a calculator.  Solves problems in which related quantities are increased or decreased proportionally.  Expresses quantities as a ratio and where appropriate simplifies, for example, ‘if there are 6 teachers and 60 children in a school find the ratio of the number of teachers to the total amount of teachers and children’. |

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| **Some possible CVA approaches:**  **Example 1 Example 2 (Cuisenaire Rods – Fraction Addition)**  **Shaznee and Ryan share £120 in the ratio 3 : 5. Andy fills his car with petrol.**  **How much does Shaznee receive? He is charged £8.26 VAT (Value Added Tax).**  **This represents 20% of the total cost.**  **Find the total cost.**    **Other questions that might be asked:**   * **What fraction of the total does Ryan receive? Example 3** * **Express Shaznee’s amount as a fraction of Ryan’s Find .** * **Express Ryan’s amount as a fraction of Shaznee’s (Assigning a value of to the red rod)**   **Amount.**  **Example 4 (Double number line – direct proportion)**  **To make 3 biscuits, 13. 5g of butter are needed.**  **How much butter is needed to make 4 biscuits?**  **Possible points to consider:**   * **division using number line** * **opportunity to consolidate** * **lead on to a more general multiplicative model (Level 4)**   **Multiplicative model - links to other organisers:**   * ***Money* - Currency conversions (MNU 3-09a/b)** * ***Time* – Given speed and time, calculate distance** * ***Measurement* – Converting units, maps, scales** * ***Expressions & Equations* - Formulae** |

**Fourth Level**

## Fractions, decimal fractions and decimals – Fourth Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | I can choose the most appropriate form of fractions, decimal fractions and percentages to use when making calculations mentally, in written form or using technology, then use my solutions to make comparisons, decisions and choices.  MNU 4-07a  I can solve problems involving fractions and mixed numbers in context, using addition, subtraction or multiplication.  MTH 4-07b  Using proportion, I can calculate the change in one quantity caused by a change in a related quantity and solve real-life problems.  MNU 4-08a | | |
| **Progression through Fourth Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can use visual representations or other strategies to solve addition and subtraction problems involving mixed numbers * I can apply my knowledge of place value, fractions and decimal fractions to find the multiplier in a percentage increase/decrease problem | * I can use visual representations or other strategies to solve multiplication problems involving fractions and mixed numbers * I can use a multiplicative strategy to efficiently calculate a percentage increase or decrease * I can create and use a simple multiplicative model to represent quantities which are in direct proportion * I can explain why as one quantity increases another quantity may decrease proportionally and vice-versa * I can decide when quantities are inversely proportional to one another and explain the method used to calculate a change in one quantity given a change in the other | | * I can recognise when quantities are in direct or indirect proportion and apply a range of strategies to solve problems involving such quantities * I can, with or without a calculator, choose the most efficient strategy to carry out a wide range of calculations involving fractions, decimal fractions and percentages * I can use my solutions to help me make comparisons, decisions and choices within a given context | Chooses the most efficient form of fractions, decimal fractions or percentages when making calculations.  Uses calculations to support comparisons, decisions and choices.  Calculates the percentage increase or decrease of a value.  Applies addition, subtraction and multiplication skills to solve problems involving fractions and mixed numbers.  Uses knowledge of proportion to solve problems in real-life which involve changes in related quantities. |

**Early Level**

## Money – Early Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | **I am developing my awareness of how money is used and can recognise and use a range of coins.**  **MNU 0-09a** | | |
| **Progression through Early Level** | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I am developing an awareness of how money is used in real life. * I understand that coins have different values. * I can recognise the value of some coins. * During role play activities, I can develop my understanding of money. | | * I am developing an awareness that coins/money can be exchanged for goods and services. * I can identify all the coins up to £2. * I can make amounts to 10p using concrete materials or pictures. * I can select 1p, 2p, 5p, 10p, coins to pay the exact value for items to 10p. * I can use addition and subtraction skills to pay the exact value for items to 10p. | ***Identifies all coins to £2.***  ***Applies addition and subtraction skills and uses 1p, 2p, 5p and 10p coins to pay the exact value for items to 10p.*** |

**First Level**

*Money – First Level*

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | ***I can use money to pay for items and can work out how much change I should receive. MNU 1-09a***  ***I have investigated how different combinations of coins and notes can be used to pay for goods or be given in change. MNU 1-09b*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can identify and name all coins and notes to £5. * I can explore different ways of making the same total up to 20p | * I can identify and name all coins and notes to £10. * I can explore different ways of making the same total up to £1 | | * I can identify and name coins and notes to £20. * I can explore different ways of making the same total up to £10. | ***Identifies and uses all coins and notes to £20 and explores different ways of making the same total.***  ***Uses a variety of coin and note combinations, to pay for items and give change within £10.*** |
| * I can read and write monetary values in pence. | * I can read and write monetary values using the appropriate symbols e.g. £ or p | | * I can read and write monetary values using correct notation including the decimal point e.g. 149p = £1.49 | ***Records amounts accurately in different ways using the correct notation,  for example, 149p = £1·49 and 7p = £0·07.*** |
| * I can use mental strategies to calculate the total spent in a real life/shopping situation up to 20p * I can work out change from 20p | * I can use mental strategies to calculate the total spent in a real life/shopping situation up to £1. * I can work out change from £1 | | * I can use mental strategies to calculate the total spent in a real life/shopping situation up to £10. * I can work out (mentally) change from £10. | ***Applies mental agility number skills to calculate the total spent in a shopping situation and is able to calculate change.*** |
|  |  | | * I can demonstrate an awareness of how goods can be paid for using cards and digital technology. | ***Demonstrates awareness of how goods can be paid for using cards and digital technology.*** |

**Second Level**

## Money – Second Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | I can manage money, compare costs from different retailers, and determine what I can afford to buy.  MNU 2-09a  I understand the costs, benefits and risks of using bank cards to purchase goods or obtain cash and realise that budgeting is important. MNU 2-09b  I can use the terms profit and loss in buying and selling activities and can make simple calculations for this. MNU 2-09c | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I can read and write monetary values using the correct notation.  I can add and subtract monetary values with a decimal point.  I can work out the cost of an item or selection of items.  I am able to apply strategies I can use for whole numbers to monetary amounts. | I have further developed the range of written and mental calculation strategies to +,-, x and ÷ with money.  I can work out how much money I will have left over after paying for an item or selection of items. | | I can solve real life problems involving money  I choose the best method of written and mental calculation strategies to add, subtract, multiply and divide with money and use technology when appropriate. | Carries out money calculations involving the four operations. |
| I can identify the difference between a need and a want.  I can find the cost of items from a range of sources.  I can plan purchases within a given budget. | I can find the cost of the same or similar items/services from a range of retailers to find the best value.  I can plan purchases, making appropriate decisions within given budgeting constraints. | | I can find the cost of items from a range of sources/retailers to find the best value including calculating discounts, delivery charges etc.  I can compare the price of goods against my given budget and determine if I can afford to buy them. | Compares costs and determines affordability within a given budget. |
| I understand the terms profit and loss. | I can talk about profit and loss in buying and selling activities. | | I can talk about profit and loss in buying and selling activities and make calculations for this. | Calculates profit and loss accurately, for example, when working with a budget for an enterprise activity. |
| I know why we have banks and what their role is.  I understand that it’s important to keep our money safe. | I can investigate and discuss payment methods other than cash. | | I understand the use of bank cards and digital technologies.  I understand the difference between a credit card and a debit card.  I can investigate debt and how this can mount up when using cards.  I am aware that electronic payments can involve a risk e.g. fraudulent practices | Demonstrates understanding of the benefits and risks of using bank cards and digital technologies. |

**Third Level**

## Money – Third Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | When considering how to spend my money, I can source, compare and contrast different contracts and services, discuss their advantages and disadvantages, and explain which offer best value to me.  MNU 3-09a  I can budget effectively, making use of technology and other methods, to manage money and plan for future expenses. MNU 3-09b | | |
| **Progression through Third Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I can use the internet and other sources to research goods and services, compare them and discuss their advantages and disadvantages  I can:   * source different suppliers for buying the same goods * calculate costs when buying more than one item * calculate the change given from a certain amount * calculate any savings made.   I know the meaning of financial terms, including:  debit/credit, APR, p.a., direct debit/standing order and interest rate. | * **I can consider how to spend my money to get the cheapest price and calculate the saving made.** * **I can convert from £s to a foreign currency** | | * **I can:** * **source, compare, and contrast different prices, deals, contracts and services** * **discuss their advantages and disadvantages** * **explain which offer best value to me.** * **I can compare deals and calculate the total cost, e.g. buy-1-get-1-free, 2-for-1, multipack buys, and decide which offers best value.** * **Using my understanding of financial terms and vocabulary I can choose the best financial product for me.** * **I can convert between different currencies, having investigated the current exchange rate.** | Demonstrates understanding of best value in relation to contracts and services when comparing products.  Chooses the best value for their personal situation and justifies choices.  Budgets effectively, using digital technology where appropriate, showing development of financial capability.  Demonstrates knowledge of financial terms, for example, debit/credit, APR, pa, direct debit/standing order and interest rate.  Converts between different currencies. |

**Fourth Level**

## Money – Fourth Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | I can discuss and illustrate the facts I need to consider when determining what I can afford, in order to manage credit and debt and lead a responsible lifestyle.  MNU 4-09a  I can source information on earnings and deductions and use it when making calculations to determine net income.  MNU 4-09b  I can research, compare and contrast a range of personal finance products and, after making calculations, explain my preferred choices.  MNU 4-09c | | |
| **Progression through Fourth Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I understand the meaning of credit and debit in the context of money.  I can explain the different methods I can earn money from an employer e.g. commission, bonuses, overtime.  • I can explain the different deductions to my earnings that can be taken by my employer or the government e.g. national insurance, pensions. | * **I can apply the understanding of debit and credit in relation to earning, spending and deductions.** * **I can calculate net pay when I know total earning and all deductions.** * **I can compare a range of financial products looking at benefits or penalties e.g. repayment term, interest rates, monthly payments, charges, early repayment costs.** * **I can calculate any cost incurred when buying currency e.g. commission, changing exchange rates or charges.** | | * **I can look at debits, credits, expenses and earnings to manage income effectively and explain decisions on spending and how much to save.** * **I can communicate why I have chosen a certain financial product or why I have made a certain financial decision.** * **I can determine the best value and search for the best deal when converting currencies.** | Applies understanding of credit and debit in relation to earnings and deductions.  ***Uses budgeting skills to manage income effectively and justifies spending and saving choices.***  ***Calculates net income by selecting appropriate information.***  Compares a range of personal finance products.  Communicates the impact of financial decisions.  Applies knowledge of currency conversion to determine best value. |

*Time – Early Level*

**Early Level**

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | **I am aware of how routines and events in my world link with times and seasons, and have explored ways to record and display these using clocks, calendars and other methods. MNU 0-10a** | | |
| **Progression through Early Level** | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can discuss my daily routine. * I can follow simple routines. * I can identify what things I do during the day and what things I do at night. * I know that day follows night and night follows day. * I know that there are names for the days of the week and am beginning to use them. * I can describe the seasons and the special events associated with them. * I know that events have a duration but cannot yet use a timer. * I can discuss ways of measuring and recording time for example - clocks, timers, sand timers, watches etc. * I know that clocks, watches and digital displays can tell you the time. * I can use basic visual timetables. * I have seen both analogue clock faces and digital displays and can recognise they both tell the time. * When discussing time, I can use the terms before and after appropriately. | | * I can link daily routines and personal events to time sequences. * I can name and sequence the days of the week and use language such as before, after, yesterday, tomorrow. * I can talk about the features of each season and special events associated with them, for example Christmas, Easter * I can name the months of the year. * I can interpret basic visual timetables. * I can explore different types of calendars and understand what information they have and why they are helpful. * I can read analogue o’clock times (12 hour). * I can read digital o’clock times (12 hour). * I can represent o’clock on a digital display or clock face. * I know that an analogue clock has an hour hand and a minute hand. * I can use time language for example - before, after, o’clock, hour hand and minute hand. | ***Links daily routines and personal events to time sequences.***  ***Names the days of the week in sequence, knows the months of the year and talks about features of the four seasons in relevant contexts.***  ***Recognises, talks about and where appropriate, engages with everyday devices used to measure or display time, including clocks, calendars, sand timers and visual timetables.***  ***Reads analogue and digital o’clock times (12 hour only) and represents this on a digital display or clock face.***  ***Uses appropriate language when discussing time, including before, after, o’clock, hour hand and minute hand.*** |

*Time – First Level*

**First Level**

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **1 of 2** | | ***I can tell the time using 12 hour clocks, realising there is a link with 24 hour notation, explain how it impacts on my daily routine and ensure that I am organised and ready for events throughout my day.***  ***MNU 1-10a***  ***I have begun to develop a sense of how long tasks take by measuring the time taken to complete a range of activities using a variety of timers. MNU 1-10c*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can record the time (o’clock and half past) from analogue and digital clocks | * I can record the time (o’clock, half past, quarter past, quarter to) from analogue and digital clocks * I understand that am is before midday and pm is after midday. | | * I can record the time using both am and pm * I can identify 24 hour notation from analogue and digital clocks in real life   situations  e.g. computer display | ***Tells the time using half past, quarter past and quarter to using analogue and digital 12 hour clocks.***  ***Records 12 hour times using am and pm and is able to identify 24 hour notation,  for example, on a mobile phone or computer.*** |
| * I can understand that the date can be written in a variety of ways   e.g. can read it from the board. | * I can record the date in a variety of ways in words and numbers within my daily routine | | * I can change dates between the full format and the short format e.g 7th April 2015 -> 07.04.15 or 7/4/15 | ***Records the date in a variety of ways, using words and numbers.*** |
| * I can read and change classroom visual calendar/timetables | * I can read and change classroom visual calendar/timetables | | * I can use and interpret a variety of calendars * I can use a calendar/timetable to plan events when relevant * I can place events into a weekly timetable/diary. * I can read a timetable in 12 hour notation. * I can add important events to a calendar, for example, birthdays. * I can use timetables in 12 hour notation to plan key events. | ***Uses and interprets a variety of calendars and 12 hour timetables to plan key events.*** |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **2 of 2** | | ***I can tell the time using 12 hour clocks, realising there is a link with 24 hour notation, explain how it impacts on my daily routine and ensure that I am organised and ready for events throughout my day.***  ***MNU 1-10a***  ***I have begun to develop a sense of how long tasks take by measuring the time taken to complete a range of activities using a variety of timers. MNU 1-10c*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
|  | * I know that 1 minute is 60 seconds. * I know that 1 hour is 60 minutes. * I am learning ways of remembering how many days are in each month. | | * I know that 1 day is 24 hours. * I know how many days are in each month. * I know that there is 52 weeks in a year. * I know that there is 365 days in a year. * I know that there is 366 days in a leap year | ***Knows the number of seconds in a minute, minutes in an hour, hours in a day,  days in each month, weeks and days in a year.*** |
|  | * I can sequence the seasons of the year. * I know the months of the year. | | * I can sequence the months of the year and relate them to the appropriate season * I know the ordinal number of the months, for example January is the first month | ***Orders the months of the year and relates these to the appropriate seasons*** |
| * I can compare how long things take, for example break and lunch, and say which takes longer. | * I can use and select a variety of timers for specific purposes. | | * I have an understanding of how long a second, minute and hour is and what can be done in this time. * I am beginning to understand that real life tasks/events may take seconds, minutes or hours. | ***Selects and uses appropriate timers for specific purposes.*** |

**Second Level**

## Time – Second Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **1 of 2** | | I can use and interpret electronic and paper-based timetables and schedules to plan events and activities, and make time calculations as part of my planning. MNU 2-10a  I can carry out practical tasks and investigations involving timed events and can explain which unit of time would be most appropriate to use. MNU 2-10b | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
|  |  | | I can read and convert between 12 and 24 hour notation. | ***Reads and records time in both 12 hour and 24 hour notation and converts between the two.*** |
|  | I know that a decade is 10 years.    I know that a century is 100 years.  I know that a millennium is 1000 years. | | I know the relationship between commonly used units of time and can convert between them  e.g. 1 ½ hours into minutes. | ***Knows the relationships between commonly used units of time and carries out simple conversion calculations, for example, changes 1 hours into minutes.*** |
| I can plan a journey given a simple timetable presented in 12 hour notation.  I can use a calendar to calculate the number of days between events within the month. | I can read timetables using 12 and 24 hour time using a real-life context e.g. to plan a journey.  I can use a calendars to calculate the number of days between events over a few weeks bridging over the months. | | I can apply my knowledge of 12 and 24 hour notation to plan activities using more than one timetable  e.g. bus and ferry, train and cinema  I can investigate how long a journey will take using online route planners. | ***Uses and interprets a range of electronic and paper-based timetables and calendars to plan events or activities and solve real life problems.*** |
|  | If I know the start time and duration of an event in 12hr notation (e.g. journey, movie) I can calculate when it ends, bridging across the hour. | | I can calculate durations of events bridging across several hours in 12 and 24 hour notation | ***Calculates durations of activities and events including situations bridging across several hours and parts of hours using both 12 hour clock and 24 hour notation.*** |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **2 of 2** | | I can use and interpret electronic and paper-based timetables and schedules to plan events and activities, and make time calculations as part of my planning. MNU 2-10a  I can carry out practical tasks and investigations involving timed events and can explain which unit of time would be most appropriate to use. MNU 2-10b | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
|  | I can estimate the time taken for a journey based on criteria given  e.g. walking a known journey, cycling the same distance. | | I understand what is meant by miles per hour (mph) and kilometres per hour (km/h) and solve simple problems using this.  I can estimate the time taken for a journey, given the speed and distance, for easy values  e.g. If a car travels 100km at 50kph how long does the journey take? | ***Estimates the duration of a journey based on knowledge of the link between speed, distance and time.*** |
| I can time practical activities and justify my choice of unit and timing device. | | | | ***Chooses the most appropriate timing device in practical situations and records  using relevant units, including hundredths of a second.*** |
|  |  | | I can record time using relevant units including a hundredth of a second. |
| I can select the most appropriate unit of time for a given task and justify my choice. | | | | ***Selects the most appropriate unit of time for a given task and justifies choice.*** |

**Third Level**

## Time – Third Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | Using simple time periods, I can work out how long a journey will take, the speed travelled at or distance covered, using my knowledge of the link between time, speed and distance. MNU 3-10a | | |
| **Progression through Third Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I know and can explain the relationship between distance speed and time** * **I can identify different units used for speed and explain their meaning** * **I can choose correct units for distance and time and identify the correct corresponding unit for speed** | * **I can convert between hours, minutes and seconds** * **I can calculate the duration of activities/events including bridging across several hours and days** * **I can use the formulas connecting distance, speed and time to an unknown quantity given the other two** * **I can record my answers to calculations using correct units** | | * **I can calculate the duration of activities/events including bridging across hours, parts of hours and days** * **For a given problem I can:** * **choose the appropriate formula** * **use the formula correctly** * **calculate the answer accurately** * **record the answer using correct units** * **I can make use of appropriate technology to calculate** * **When planning a journey I can:** * **choose an appropriate mode of transport** * **calculate departure/arrival times** * **calculate if the journey is possible within safe speed restrictions** | Applies knowledge of the relationship between speed, distance and time to find each of the three variables.  Calculates time durations across hours and days. |

**Fourth Level**

## Time – Fourth Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | I can research, compare and contrast aspects of time and time management as they impact on me.  MNU 4-10a  I can use the link between time, speed and distance to carry out related calculations.  MNU 4-10b | | |
| **Progression through Fourth Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can calculate duration of activities/events including bridging across hours including across midnight, parts of hours and days.** * **I can calculate time intervals across different time zones e.g. given the departure time of an 11 hour flight from the UK and calculating local time of arrival.** | * **I can manage my time effectively to make plans e.g. journey plans including several modes of transport, planning an event timetable, estimating the time of a task or job.** * **I can use my knowledge of units of time to convert between hours and decimal fractions of hours into hours and minutes and vice versa.** | | * **I can solve speed distance time calculations which involve fractions of an hour, giving an accurate answer in the correct format with the correct units.** * **I can calculate the number of days between two dates remembering to include the starting date e.g. am event beginning on the 8th of June ending on 19th of June lasts for 12 days.** * **I can calculate duration of activities/events across hours, days and months.** | Demonstrates effective time management skills, for example, working with different time zones or making plans, including across midnight.  Carries out calculations involving speed, distance and time involving decimal fraction hours.  Calculates time durations across hours, days and months. |

**Early Level**

*Measurement – Early Level*

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | **I have experimented with everyday items as units of measure to investigate and compare sizes and amounts in my environment, sharing my findings with others MNU 0-11a** | | |
| **Progression through Early Level** | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can give examples of where I have used measurement used, for example in baking. * I can use the terms big/small, long/short, tall/short, heavy/light. | | * I can give examples of where I have used measurement of lengths, heights, mass and capacities in a variety of real-life situations. * I can use full/empty, long/short, wide/narrow, tall/short, heavy/light and holds more/holds less. * I can use non-standard units to measure the length, weight or capacity of familiar items to help me compare them. e.g hand, feet, cubes | ***Shares relevant experiences in which measurements of lengths, heights, mass and capacities are used, for example, in baking.***  ***Describes common objects using appropriate measurement language, including tall, heavy and empty.*** |
| * I can put objects in order of size. * I can compare two objects and identify which is, heavier/lighter, bigger/smaller, longer/shorter. * I can find an object that is 'longer', 'shorter', 'heavier', 'lighter', ‘holds more’, ‘holds less’. | | * I can put objects in order using length, height, mass or capacity. * I can put objects in order of length, weight or capacity by comparing them directly. | ***Compares and describes lengths, heights, mass and capacities using everyday language, including longer, shorter, taller, heavier, lighter, more and less.*** |
| * I can use parts of my body to measure objects. | | * I can estimate length, height, mass and capacity using non-standard units.   + Length of jotter in paper clips   + Height of desk in pencils. * I can measure the length, height, mass and capacity of familiar objects using non-standard units. * I can compare some differences in non-standard measurements.   e.g. the jotter measures 12 paperclips, but 15 cubes | ***Estimates, then measures, the length, height, mass and capacity of familiar objects using a range of appropriate non-standard units.*** |

## Measurement – First Level

**First Level**

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  1 of 2 | | ***I can estimate how long or heavy an object is, or what amount it holds, using everyday things as a guide, then measure or weigh it using appropriate instruments and units. MNU 1-11a***  ***I can estimate the area of a shape by counting squares or other methods. MNU 1-11b*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| **Learners should have mastered fractions work at the relevant level prior to undertaking measurement work. Measurement provides a useful context for the application of fraction knowledge. Measurement begins with non-standard units and progresses to standard units. Measurement begins with large items and then progresses to smaller items.** | | | |  |
| * I can estimate and measure length in metres. * I can estimate and measure length in half metres. * I can estimate and measure mass in kg. * I can estimate and measure mass in ½ kg * I can estimate and measure capacity in litres. * I can estimate and measure capacity in half litres. | * I can read scales identifying points between full units using my knowledge of fractions. * I can estimate and measure length in metres, half metres, ¼ and ¾ m eg. Corridor 12 ½ m, classroom 7 1/4m, dining room 14 3/4m. * I can estimate and measure the length of small items using uniform objects (i.e. unit cubes, unifix cubes, lego blocks, K’nex) (Towards standardisation) * I can estimate and measure mass in kg, 1/2kg, 1/4kg and 3/4kg * I can measure small items using uniform objects e.g. unit cubes, marbles? Unifix cubes * I can estimate and measure capacity in l, ½ l, ¼ kg and ¾ l * I can measure small items using uniform objects e.g. cups, egg cups, spoons, can * I can select and use appropriate devices to measure length, height, weight and capacity, reading scales accurately. e.g. When I measure, I take care to measure accurately (I try not to spill when measuring, start at ‘0’ when using a ruler). | | * I can use the most appropriate instrument for the task. * I can estimate and measure the length of small objects using cm. * I can estimate and measure the length of small objects in mm e.g. pencil case is 132mm. * I can estimate and measure distance in cm. e.g. length of dinner table is 176cm. * I can estimate and measure the mass of small objects using g. e.g. 1230g * I can estimate and measure the capacity of objects using ml. e.g. multiples of 10/100 * I use the correct language for naming and recording each unit as well as the correct conventions and symbols for writing them. * I can compare my initial estimate to my final answer. | ***Uses knowledge of everyday objects to provide reasonable estimates of length, height, mass and capacity.***  ***Makes accurate use of a range of instruments including rulers, metre sticks, digital scales and measuring jugs when measuring lengths, heights, mass and capacities using the most appropriate instrument for the task.***  ***Records measurements of length, height, mass and capacity to the nearest standard unit, for example, millimetres (mm), centimetres (cm), grams (g), kilograms (kg), millilitres (ml), litres (l).***  ***Compares measures with estimates.***  ***Reads a variety of scales on measuring devices including those with simple fractions, for example, ½ litre.*** |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  2 of 2 | | ***I can estimate how long or heavy an object is, or what amount it holds, using everyday things as a guide, then measure or weigh it using appropriate instruments and units. MNU 1-11a***  ***I can estimate the area of a shape by counting squares or other methods. MNU 1-11b*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
|  |  | | * I can convert between ml and l e.g. 1 300ml = 1l 300ml and vice-versa * I can convert between g and kg e.g. 1 230g = 1kg 230g and vice-versa * I can convert between cm and m e.g. 1m 76 = 176cm and vice-versa | ***Uses knowledge of relationships between units of measure to make simple conversions, for example, 1 m 58 cm = 158 cm.*** |
| * I have explored the concept of area using familiar items. E.g. how many of us could fit on the rug. How many sandwiches in packed-lunch box. * I can compare areas by putting one item onto another item. * I can use non-standard units of measurement to measure area.   e.g. 2D-shapes, carpet tiles, books, post-its. | * I can estimate the area of shapes, drawing around a template, counting squares or similar method. | | * I can use a grid to estimate the area of simple 2D shapes. * I can create shapes within a given area to the nearest half square using square tiles or grids. | ***Uses square grids to estimate then measure the areas of a variety of simple 2D shapes to the nearest half square.***  ***Creates shapes with a given area to the nearest half square using square tiles or grids.*** |
|  |  | | * I know that the area of a shape cannot change even when moved or reshaped. | ***Recognises that different shapes can have the same area (conservation of area).*** |

**Second Level**

## Measurement – Second Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **1 of 3** | | I can use my knowledge of the sizes of familiar objects or places to assist me when making an estimate of measure. MNU 2-11a  I can use the common units of measure, convert between related units of the metric system and carry out calculations when solving problems. MNU 2-11b | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I can estimate the size of familiar objects by comparing them to another object.  NOTE – volume means the space inside an object, capacity is measuring liquids. A container with a volume of 1000 cubic cm holds 1 litre. |  | |  | Uses the comparative size of familiar objects to make reasonable estimations  of length, mass, area and capacity. |
| I can justify my estimates by drawing on my experiences with the length, mass or capacity of everyday objects and explain why I am confident in my estimates. | | | |
| I can estimate and measure using whole and ½ unit measures,  e.g. 1kg, ½ kg, ½ l, ½ m | I can estimate and measure to the nearest 10g/ml, etc. | | I can estimate to the nearest appropriate unit and when I measure I take care to measure accurately. | Estimates to the nearest appropriate unit, then measures accurately: length, height and distance in millimetres (mm), centimetres (cm), metres (m) and kilometres (km); mass in grams (g) and kilograms (kg); and capacity in millilitres (ml) and litres (l). |
| I know that the perimeter is the distance around the outside of a shape.  I can calculate the perimeter of squares and rectangles represented on squared paper. | I can calculate the perimeter of squares and rectangles (mm & cm). | | I can calculate the perimeter of simple 2D shapes and simple composite shapes using m, cm and mm. | Calculates the perimeter of simple straight sided 2D shapes in millimetres (mm), centimetres (cm) and metres (m). |
| I can explain the method I used to find the perimeter, area or volume of a shape, and use the correct units. | | | |  |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **2 of 3** | | I can use my knowledge of the sizes of familiar objects or places to assist me when making an estimate of measure. MNU 2-11a  I can use the common units of measure, convert between related units of the metric system and carry out calculations when solving problems. MNU 2-11b | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I can use my knowledge of multiplication arrays to calculate the area of squares and rectangles represented on squared paper. | I can use my knowledge of tables facts to calculate the area of squares and rectangles in m squared, mm squared and cm2, given the lengths of the sides.  I can measure the sides of squares and rectangles accurately and use my measurements to calculate the area. | | I can use my knowledge of calculating area of rectangles and squares to work out the area of a right-angled triangle.  e.g. half the area of a rectangle/square (using mm2, cm2 and m2) | Calculates the area of squares, rectangles and right-angled triangles in square millimetres (mm2), square centimetres (cm2) and square metres (m2). |
| I can use cubes to measure containers. | I have explored how to calculate volume using practical materials  e.g. by making links between the volume of cubes and multiplication facts (noticing that a cuboid with volume of 120 cubes is 6 cubes x 5 cubes x 4 cubes). | | I can calculate the volume of cubes and cuboids using the formula 𝑉=𝑙 ×𝑏 ×ℎ and the correct units | Calculates the volume of cubes and cuboids in cubic centimetres (cm3) and cubic metres (m3). |
| I know the relationship between some of the standard units of measure  e.g. 10mm=1cm, 1000m = 1km, 1000g = 1kg, 100cm = 1m and can convert between them e.g. 1m34cm = 134cm | I know the relationship between some of the standard part units of measure e.g. half a metre = 50cm, half litre = 500ml etc | | I can convert between related units of the metric system using decimal notation and demonstrate how I do this.  I can record measurements in a variety of ways using decimal notation up to 3 places, for example 550cm = 5∙5m or 3∙009kg = 3kg 9g. | Converts between common units of measurement using decimal notation,  for example, 550 cm = 5·5 m; 3·009 kg = 3009 g. |
| I can choose the most appropriate measuring device to use when solving problems | | | | Chooses the most appropriate measuring device for a given task and carries out the required calculation, recording results in the correct unit. |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **3 of 3** | | I can use my knowledge of the sizes of familiar objects or places to assist me when making an estimate of measure. MNU 2-11a  I can use the common units of measure, convert between related units of the metric system and carry out calculations when solving problems. MNU 2-11b | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I know the standard units of measure.  I can read scales and measure to the nearest half unit, e.g. half metre, half litre  I know that the unit must not change during the measuring activity (i.e. if I am using pictures of feet they must all be the same size or I must use the same picture repeatedly).  I can choose an appropriate unit of measurement to compare items. (e.g. to measure a pencil I use fingers, not feet) | I can read scales to the nearest 10g or cm or ml. | | I can use the most appropriate standard units of measurement, read a variety of scales and record results independently using the correct unit.  I can read scales on measuring devices calculating unmarked intervals. | Reads a variety of scales accurately. |
| I can accurately draw a straight line of a given length, vertically and horizontally.  I can accurately draw squares given the length of the sides. | I can accurately draw squares and rectangles given the length of the sides. | | I can use my knowledge of factors and multiples to calculate the possible lengths of the sides of a rectangle or square, given the perimeter or area  I can accurately draw squares and rectangles with a given perimeter or area.  I am aware that millimetres are used in real life measure to ensure accuracy e.g. joiners | Draws squares and rectangles accurately with a given perimeter or area. |
| I can use practical materials to arrange a given number of items into different rectangles, including squares of the same area.  e.g. squares, geoboards (pin board with elastic bands), pegs on a peg board etc | I use a problem solving process to demonstrate an understanding of conservation of area, volume capacity and mass.  e.g. squish playdough, card boxes of same volume –different lengths, area | | | Demonstrates understanding of the conservation of measurement, for example,  draw three different rectangles each with an area of 24 cm2. |
|  |  | | I can use digital technology to convert between imperial and metric units. | Shows awareness of imperial units used in everyday life, for example, miles or stones. |
| I know and understand that in everyday life we use imperial units, for example miles or stones. | | | |

**Third Level**

## Measurement – Third Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | I can solve practical problems by applying my knowledge of measure, choosing the appropriate units and degree of accuracy for the task, and using a formula to calculate area or volume when required.  MNU 3-11a  Having investigated different routes to a solution, I can find the area of compound 2D shapes and the volume of compound 3D objects, applying my knowledge to solve practical problems. MTH 3-11b | | |
| **Progression through Third Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can choose the most appropriate unit of length to describe/measure a length or height of an object. * I can estimate the length or height of an object using the most appropriate unit of measure. * I can choose the most appropriate unit of length when calculating the perimeter of a 2D shape or object. * I can choose the most appropriate unit of area to describe the area of a 2D surface or 2D surface of an object. * I can choose a correct unit of area to estimate the area of a 2D shape * I can choose the most appropriate unit to measure the volume of chosen containers and 3D objects. | * **I can convert between units of length from km through to mm working to 3 decimal places.** * **I can calculate the perimeter of a 2D shape when more than one unit of length is used** * **I can convert between units of area, mm2 to cm2 and back, cm2 to m2 and back and working to 3 decimal places.** * **I can calculate the area of triangles using A= b x h where the measurement of height is at right angles to the measurement of the base.** * **I can convert between units of volume/capacity, cm3 to mland back, ml to l and back working to 3 decimal places and use the unit most appropriate for the problem I am working on.** | | * **I can convert units of length to help me solve problems, giving my answer with the most appropriate unit for the context of the problem.** * **I can convert units of length to help me solve problems involving calculating the area of 2D shapes where the units are inconsistent, giving my answer with the most appropriate unit of area.** * **I can calculate the area of compound shapes composed of squares, rectangles and triangles.** * **I can convert between units of volume, cm3 to m3 and back, and be able to talk about the size and practicality of mm3 and km3 working to 3 decimal places.** * **I can calculate the volume of compound 3D shapes made up from cubes and cuboids.** | Chooses appropriate units for length, area and volume when solving practical problems.  Converts between standard units to three decimal places and applies this when solving calculations of length, capacity, volume and area.  Calculates the area of a 2D shape where the units are inconsistent. |

**Fourth Level**

## Measurement – Fourth Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | I can apply my knowledge and understanding of measure to everyday problems and tasks and appreciate the practical importance of accuracy when making calculations.  MNU 4-11a  Through investigating real-life problems involving the surface area of simple 3D shapes, I can explore ways to make the most efficient use of materials and carry out the necessary calculations to solve related problems.  MTH 4-11b  I have explored with others the practicalities of the use of 3D objects in everyday life and can solve problems involving the volume of a prism, using a formula to make related calculations when required.  MTH 4-11b | | |
| **Progression through Fourth Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can calculate the area of kites using A= d1 x d2, area of parallelograms using A = b x h and trapeziums using A= (a + b)h. * I can calculate the volume of a cylinder using the formula V = πr2h. | * I can calculate the surface area of a cuboid. * I can calculate the surface area of an open or closed cylinder. * I can calculate the surface area of triangular prisms. * I can calculate the volume of a triangular prism. | | * I know that to keep the accuracy required in the answer I need to work to one more decimal place than required. * I understand that if I round any part of my calculation too soon I can affect the accuracy of my final answer. | Demonstrates understanding of the impact of truncation and premature rounding.  Calculates the area of kites, parallelograms and trapeziums.  Uses formulae and calculates the surface area of cylinders, cuboids and triangular prisms.  Calculates the volume of triangular prisms and cylinders using formulae. |

*Mathematics – its impact on the world, past, present and future – First Level*

**First Level**

*No experiences and outcomes for Early Level.*

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | ***I have discussed the important part that numbers play in the world and explored a variety of systems that have been used by civilisations throughout history to record numbers. MTH 1-12a*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can describe a variety of ways in which I have used number in real life. | * I can show an understanding of the ways in which numbers are used in real life. | | * I can investigate and share my understanding of the importance of numbers in learning, life and work.   e.g. ask a known adult how they use numbers in their life/work. | **Investigates and shares understanding of the importance of numbers in learning,  life and work.**  **Investigates and shares understanding of a variety of number systems used throughout history.** |
|  | * I can investigate and share my understanding of a variety of number systems that has been used by civilisations throughout history to record numbers,   e.g Early Humans, Egyptians, Roman Numerals, Vikings, Arabic | | |

**Second Level**

## Mathematics – its impact on the world, past, present and future – Second Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | I have worked with others to explore, and present our findings on, how mathematics impacts on the world and the important part it has played in advances and inventions. MTH 2-12a | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I have researched jobs/careers where mathematics plays an important part.** | * **I have researched jobs/careers where mathematics plays an important part, including STEM subjects and arts and business** | | * **I can research and present ways in which mathematics has played an important role in advancing our world of work,** for example in the construction industry **and ways in which numeracy and mathematics equips learners with skills for life and work.** | ***Researches and presents examples of the impact mathematics has in the world of life and work.*** |
| * **I have worked with others to research how mathematics has played a part in inventions,** for example the wheel, map of the world. | * **I have worked with others to research how mathematics has played a part in advances in society.** For example measuring time, code breaking. | | * **I can present my findings on the part mathematics has played in advances and inventions, using appropriate technology.** | ***Contributes to discussions and activities on the role of mathematics in the creation of important inventions, now and in the past.*** |

**Third Level**

## Mathematics – its impact on the world, past, present and future – Third Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | I have worked with others to research a famous mathematician and the work they are known for, or investigated a mathematical topic, and have prepared and delivered a short presentation. MTH 3-12a | | |
| **Progression through Third Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I have worked with others to research about the work of famous mathematicians, what work they are known for and why it is still relevant today.** | * **I have worked with others to research how mathematics has played a part in advances in society, the inventions we use and the technology maths is involved in.** | | * **I can present my findings on mathematical topic I have researched, use the mathematical notation correctly and explain why the maths is relevant in modern society and why it is used.** | Researches and communicates using appropriate mathematical vocabulary and notation, the work of a famous mathematician or a mathematical topic and explains the relevance and impact they have on society. |

**Fourth Level**

## Mathematics – its impact on the world, past, present and future – Fourth Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | I have discussed the importance of mathematics in the real world, investigated the mathematical skills required for different career paths and delivered, with others, a presentation on how mathematics can be applied in the workplace.  MTH 4-12a | | |
| **Progression through Fourth Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can discuss with others the importance of mathematics in everyday life and in the workplace.** * **I have worked with others to present about the role of mathematics in life and work.** | * **I have investigated how mathematics is used in modern places of work.** * **I have investigated how mathematics is used in science, technology, engineering and other subject areas.** | | * **I have investigated how mathematics is required for a range of careers, including those in STEM subjects.** | Contributes to discussions and presentations on the role of mathematics in everyday life and in the workplace.  Investigates the mathematical skills required for a range of careers, including those in STEM subjects. |

**Early Level**

*Patterns and relationships – Early Level*

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | ***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*** | | |
| **Progression through Early Level** | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can copy and continue simple non-numeric patterns.   e.g clapping, colour, shape, rhythmic clapping   * I can use simple language such as repeat, again, pattern etc. to describe these patterns * I can explore, identify and discuss patterns in the environment. E.g. a flowery pattern      * I can find missing numbers on a number line up to 10 | | * I can copy a repeated pattern using shapes and numbers. * I can continue a repeat pattern using shapes and numbers. * I can create increasingly complex repeated patterns (shape and objects). * I can copy a repeated pattern using numbers. * I can continue a repeat pattern using numbers. * I can copy, continue, create and recognise simple patterns involving number and describe them using appropriate vocabulary. * I can use language associated with patterns, for example next, before, after. * I can describe a simple repeating pattern.     Big, little, big, little   * I can find missing numbers on a number line ranging from 0-20. | **Copies, continues and creates simple patterns involving objects, shapes and numbers.**  **Explores, recognises and continues simple number patterns.**  **Finds missing numbers on a number line within the range 0 - 20.** |

*Patterns and relationships – First level*

**First Level**

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | ***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*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can continue a repeating pattern involving shapes, pictures symbols and movements, making use of a variety of media using a 3 step pattern e.g. red, yellow, blue, red, yellow, blue | * I can continue and create a repeating pattern involving shapes, pictures symbols and movements, making use of a variety of media using more than a 3 step pattern | | * I can continue and create a repeating pattern involving shapes, pictures symbols and movements, making use of a variety of media | **Continues and creates repeating patterns involving shapes, pictures, symbols.** |
| * I can describe patterns in numbers e.g. on a number line, hundred square, missing numbers | * I can describe patterns in numbers e.g.in the multiplication square (2,3,4,5 and 10 times tables), hundred square, missing numbers | | * I can describe patterns in numbers e.g.in the multiplication square, hundred square and missing numbers and explain the rule applied | **Describes patterns in number, for example, in the multiplication tables and hundred square.** |
| Image result for numicon odds and evensI can describe and continue number patterns, explain the rules e.g. using addition, subtraction, counting in jumps   * I can recognise and continue odd and even number sequences. | * I can describe and continue number patterns, explain the rules e.g. using addition, subtraction, doubling, halving, counting in jumps (skip counting) and using known multiples | | * I can describe, continue and create number patterns, explain the rules e.g. using addition, subtraction, doubling, halving, counting in jumps (skip counting) and using known multiples | **Describes, continues and creates number patterns using addition, subtraction, doubling, halving, counting in jumps (skip counting) and known multiples and is able to explain the rule applied.** |
| * I can count in 2s, 5s and 10s using a number square and counters to help me find patterns. | * I can count forwards and backwards in 2s, 5s and 10s to 100 * I can count f and b in 10s starting from any given number (bundles of straws)   E.g. start at 27 counting in 10s | | * I can count forwards and backwards in 2s, 5s and 10s to 1000 from any given whole number * I can recognise and continue number sequences up to 1000 (in 2s, 5s and 10s). * I can describe patterns in number using my knowledge of some multiplication tables. | **Counts forwards and backwards in 2s, 5s and 10s from any whole number up to 1000.** |

**Second Level**

## Patterns and relationships – Second Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **1 of 2** | | ***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*** | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can describe a simple sequence using words.** * **I can write the rule to a simple sequence.** * **I can find a missing number in a simple sequence.** * **I can use my times tables to generate number patterns.** | * **I can describe more complex sequences using words.** * **I can explain and write the rule to more complex sequence.** * **I can find a missing number in a complex sequence.**   I can observe and describe the patterns in the multiplication tables up to 10 x 10, 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**.**    * **I can find square numbers using visual materials** | | * **I can explain the rule for a variety of number sequences.** * **Explain the relationship between multiplication facts by placing this information in a table and defining the rule.**  |  | | --- | | e.g. the 6 times table is double the 3 times table    The 4 times table is half of the 8 times table |  * I have explored number sequences such as the Fibonacci sequence or triangular numbers and can explain the rule for these sequences. * I can use concrete materials or diagrams to explore triangular numbers | **Explains and uses a rule to extend well known number sequences including square numbers, triangular numbers and Fibonacci sequence.** |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **2 of 2** | | ***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*** | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
|  |  | | * I can apply my knowledge of multiples, factors, square numbers and triangular numbers to generate number patterns.   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. | Applies knowledge of multiples, square numbers and triangular numbers to generate number patterns. |

**Third Level**

## Patterns and relationships – Third Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | Having explored number sequences, I can establish the set of numbers generated by a given rule and determine a rule for a given sequence, expressing it using appropriate notation. MTH 3-13a | | |
| **Progression through Third Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I can use a rule and a counting system, e.g. n = 1, 2, 3, … to generate a number sequence. | I can extend a pattern that I am given and explain the calculation I am doing to get the next term in the sequence.  Having studied the way a number pattern extends, I can describe the common rule that connects the value of the number to its position in the sequence. | | * **I can express rules in algebraic notation from a problem or a statement.** | Generates number sequences from a given rule, for example, T = 4n + 6.  Extends a given pattern and describes the rule  Expresses sequence rules in algebraic notation, for example, the cost of hiring a car is £75 plus a charge of £0·05 per mile, ‘m’ driven, C = 0.05m + 75 |

**Fourth Level**

## Patterns and relationships – Fourth Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | Having explored how real-life situations can be modelled by number patterns, I can establish a number sequence to represent a physical or pictorial pattern, determine a general formula to describe the sequence, then use it to make evaluations and solve related problems.  MTH 4-13a  I have discussed ways to describe the slope of a line, can interpret the definition of gradient and can use it to make relevant calculations, interpreting my answer for the context of the problem.  MTH 4-13b  Having investigated the pattern of the coordinate points lying on a horizontal or vertical line, I can describe the pattern using a simple equation.  MTH 4-13c  I can use a given formula to generate points lying  on a straight line, plot them to create a graphical representation then use this to answer related questions.  MTH 4-13d | | |
| **Progression through Fourth Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I can determine the general formula for the nth term of a linear sequence from a table of values.  I can use the general formula for the nth term of a linear sequence to solve related problems. | Given a coordinate diagram with appropriate scales, I can calculate the gradient of straight lines drawn on the diagram.  Given the coordinates of points on a straight line, I can calculate the gradient of the line.  I can – given the equation of a line – plot points and draw the line | | * **I can draw conclusions about the gradient I have calculated, in a real life context.** * **I can state the gradient and equation of a horizontal line** * **I can state the equation of a vertical line and can explain why its gradient is undefined** | Determines a general formula for the nth term to describe a sequence and uses it to solve related problems, linear examples only.  Calculates the gradient of lines in a coordinate diagram.  Draws conclusions about the gradient of a line, for example, ‘does the ramp meet building regulations?’  Communicates the gradient of vertical and horizontal lines and states the equation  of these lines as x = a or y = b or equivalent.  Uses a given formula to plot a straight line onto a Cartesian diagram. |

*Expressions and equations – First Level*

**First Level**

*There are no experiences or outcomes at Early Level*

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | ***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*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can create a number statement using the phrases ‘greater than’, ‘less than’ and ‘equal to’ within numbers to 20. * I can make pictures or diagrams for ‘equals’ and ‘not equal to’. | * I can create a number statement using symbols for <, >, = within numbers to 100. * I can create a number statement using ‘equals’ and ‘not equal to’. | | * I can accurately uses the terms ‘equal to’, ‘not equal to’, ‘less than’, ‘greater than’, and the related symbols (=, ≠ , <, >) when comparing sets of quantities up to 1000. | **Understands and accurately uses the terms ‘equal to’, ‘not equal to’, ‘less than’, ‘greater than’, and the related symbols (=,≠ , <, >) when comparing quantities** |
| * I can demonstrate my understanding of the equal sign as a balance. e.g 4+5=9 | * I understand that the equal sign signifies balance in a number sentence e.g. 3+6=10-1 | | * I can apply understanding of the equals sign as a balance, and knowledge of number facts, to solve simple algebraic problems where a picture or symbol is used to represent a number, for example, × 6 = 30 or 120 ÷  = 40 | **Applies understanding of the equals sign as a balance, and knowledge of number facts,  to solve simple algebraic problems where a picture or symbol is used to represent a number, for example,** ◆ **+ 17 = 30 and** ◆ **× 6 = 30.** |
| * I can find the missing numbers in number sentences when symbols are used us ing numbers to 20. | * I can use a simple function machine for addition and subtraction operations, talking about the input and output. * I can find the missing numbers in number sentences when symbols are used using numbers to 100. | | * I can use a simple function machine for all numerical operations (+, −, ×, ÷), talking about the input and output. |

**Second Level**

## Expressions and equations – Second Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | 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 | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I understand that both sides of the equal must be balanced,  e.g. 4 + 2 = 9 – 3  I can solve simple inequalities.  I can solve missing number problems with the four operations, using inverses, e.g. 3 x ? = 27.  I can use function machines forward and reverse for at least one operation. | I know that a letter can represent a missing number  I can solve more complex missing number problems,  e.g. 16 + 4 =10 x ?  I can solve a simple algebraic equation. e.g. x + 4 = 10, b – 7 = 4 | | I can show and explain the steps taken to solve the equation,  e.g. a – 30 = 40, a = 40 + 30, a = 70 (important to ensure answer is in this form). | Solves simple algebraic equations with one variable, for example, a - 30 = 40 and 4b = 20. |

**Third Level**

## Expressions and equations – Third Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | I can collect like algebraic terms, simplify expressions and evaluate using substitution. MTH 3-14a  Having discussed ways to express problems or statements using mathematical language, I can construct, and use appropriate methods to solve, a range of simple equations. MTH 3-15a  I can create and evaluate a simple formula representing information contained in a diagram, problem or statement. MTH 3-15b | | |
| **Progression through Third Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can use the language associated with ‘like terms’ to describe when two or more terms are alike and what it means to collect them e.g. ‘simplify’, ‘shorten’, ‘tidy’. * I can substitute a variable with a numerical value to evaluate an expression using positive numbers. * I can use concrete materials to represent an equation and by balancing both sides I can find the value of the unknown. | * **I can collect like terms in an expression containing terms in one variable and numeric terms.** * **I can substitute for two variables with numerical values to evaluate an expression, following the order of operations correctly, using positive and negative numbers.** * **I can write down, using a balancing method, how to solve a linear equation and state the value of the unknown variable.** * **I can use the facts given in a word problem or statement to create a simple linear formula.** | | * **I can collect like terms in an expression containing more than one variable, including squared terms, and numeric terms.** * **I can evaluate a simple formula using my knowledge of substitution and the correct order of operations, e.g. Find C when m = 60 using C = 0.05m + 75.** * **I can solve linear equations displaying all working for my method and state the value of the unknown.** * **I can use the information displayed in a diagram, e.g. a poster or a straight line graph, to create a simple linear formula.** | Collects like terms, including squared terms, to simplify an algebraic expression.  Evaluates expressions involving two variables using both positive and negative numbers.  Solves linear equations, for example, ax ± b = c where a, b and c are integers.  Creates a simple linear formula representing information contained in a diagram, problem or statement.  Evaluates a simple formula, for example, C = 0.05m + 75. |

**Fourth Level**

*Expressions and equations – Fourth Level*

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | **Having explored the distributive law in practical contexts, I can simplify, multiply and evaluate simple algebraic terms involving a bracket.**  **MTH 4-14a**  **I can find the factors of algebraic terms, use my understanding to identify common factors and apply this to factorise expressions.**  **MTH 4-14b**  **Having discussed the benefits of using mathematics to model real-life situations, I can construct and solve inequalities and an extended range of equations.**  **MTH 4-15a** | | |
| **Progression through Fourth Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * **I can use the distributive law to multiply out a single bracket.** * **I can solve linear equations of the form , where *a*, *b* and *c* are integers.** * **I can solve linear inequalities on simple closed intervals.** * **I can use my knowledge of numerical factors and algebraic multiplication to find factors of algebraic terms, e.g. writing as a factor pair of and** | * **I can use my knowledge of expanding brackets to solve problems that also require simplification and/or substitution of values.** * **I can solve linear equations of the form , where *a*, *b*, *c* and *d* are integers.** * **I can solve linear inequalities giving my answer as or .** * **I can identify common factors and the highest common factor of two or more algebraic terms.** | | * **I can solve problems in context that require expanding brackets and simplifying.** * **I can solve an extended range of linear equations including brackets.** * **I can solve problems by expressing the given information appropriately as an equation, inequality or formula.** * **I can use my knowledge of algebraic factors to factorise expressions.** | Expands brackets using the distributive law and simplifies.  Solves an extended range of linear equations involving the distributive law, for example, ax ± b = cx ± d, where a, b, c and d are integers.  Solves linear inequalities, including on simple closed intervals.  Solves problems by expressing the given information appropriately as an equation, in-equation or formula.  Evaluates algebraic expressions involving a bracket.  ***Factorises expressions with a numeric common factor.*** |

**Learning progressions and Benchmarks – Shape, position and movement**

**Early Level**

*Properties of 2D shapes and 3D objects – Early Level*

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | ***I enjoy investigating objects and shapes and can sort, describe and be creative with them.***  ***MTH 0-16a*** | | |
| **Progression through Early Level** | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| This learning progression purposefully begins with 3D shapes and they are concrete objects that learners can hold and interact with. | | |  |
| * I can collect, handle and talk about a range of 3D objects. * I can recognise and name 3D objects in the world around me - cube, cuboid, cylinder, sphere and cone. * I can identify and match 3D objects within the local environment. * I can create or copy 3D structures using building blocks or everyday objects. * I can sort 3D objects that roll and objects that do not roll. * I can sort 3D objects that stack and objects that do not stack. * I can describe 3D objects using the terms flat and curved. | | * I can recognise and name 2D shapes - square, circle, rectangle and triangle. * I can identify and match 2D shapes within the local environment. * I can use the terms straight and round, to describe and sort 2D shapes * I can talk about the difference between 2D shapes and 3D objects using relevant vocabulary e.g. solid, flat | **Recognises, describes and sorts common 2D shapes and 3D objects according to various criteria, for example, straight, round, flat and curved.** |

*Properties of 2D shapes and 3D objects – First Level*

**First Level**

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | ***I have explored simple 3D objects and 2D shapes and can identify, name and describe their features using appropriate vocabulary. MTH 1-16a***  ***I can explore and discuss how and why different shapes fit together and create a tiling pattern with them. MTH 1-16b*** | | | |
| **Progression through First Level** | | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| This learning progression purposefully begins with 3D shapes and they are concrete objects that learners can hold and interact with. | | | | |  |
| * **I can identify and name everyday 3D objects in different orientations and sizes.** * **I can sort and classify everyday 3D objects.** * **I can describe 3D objects using faces, vertices ~~(corners)~~ and edges ~~sides~~.** * **I can identify simple 2D shapes within 3D objects.** * **I can identify and name common 2D shapes in different orientations and sizes.** * **I can sort and classify common 2D shapes.** * **I can describe 2D shapes using the terms corners and edges sides.** * **I can investigate 2D shapes that tile.** * **I can identify examples of tiling in the environment.** | * **I can recognise 3D objects from 2D drawings.** * **I can identify and name triangular prisms and square based pyramids, and describe their properties.** * **I can identify the composition of 3D objects using my knowledge of 2D shapes.** * **I can identify and name pentagons, hexagons and octagons, and describe their properties.** * **I can create a tiling pattern with one or two 2D shapes.** | | | * **I can describe 3D objects using the terms faces, edges, vertices and base.** * **I can describe 2D shapes using the terms side and vertices.** * **I can identify and name simple quadrilaterals, for example rhombus, kite and trapezium, and describe their properties.** * **I can identify right angles in well-known 2D shapes.** * **I can use a variety of 2D shapes to create a tiling pattern incorporating two different shapes.** * **I can describe why some shapes tile and some do not.** | **Names, identifies and classifies a range of simple 2D shapes and 3D objects  and recognises these shapes in different orientations and sizes.**  **Uses mathematical language to describe the properties of a range of common  2D shapes and 3D objects including side, face, edge, vertex, base and angle.**  **Identifies 2D shapes within 3D objects and recognises 3D objects from 2D drawings.**  **Identifies examples of tiling in the environment and applies knowledge of the features of 2D shapes to create tiling patterns incorporating two different shapes.** |
| When we talk about **3D shapes**, we talk about **faces, edges**and **vertices.**  The **faces** are the **flat parts of the shape**.  The **edges** are the **lines where two faces meet**.  The **vertices** are the **points where two or more edges meet.**  For example, this 3D shape has 6 faces, 12 edges and 8 vertices: https://www.theschoolrun.com/sites/theschoolrun.com/files/content-images/3d_shape.png | | | When we talk about **2D shapes**, we talk about **sides** and **angles**.  **The angles of a 2D shape are also sometimes referred to as 'vertices' (singular: vertex).**  For example: this 2D shape has four sides and four angles: https://www.theschoolrun.com/sites/theschoolrun.com/files/content-images/2d_shape.png | |  |

**Second Level**

## Properties of 2D shapes and 3D objects – Second Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **1 of 3** | | Having explored a range of 3D objects and 2D shapes, I can use mathematical language to describe their properties, and through investigation can discuss where and why particular shapes are used in the environment. MTH 2-16a  Through practical activities, I can show my understanding of the relationship between 3D objects and their nets. MTH 2-16b  I can draw 2D shapes and make representations of 3D objects using an appropriate range of methods and efficient use of resources. MTH 2-16c | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I can describe the features of a range of 2D shapes using language such as side, angle & diagonal  I can recognise and name triangles e.g. equilateral & right-angled.  I can describe cubes and cuboids using specific vocabulary- vertex, vertices, face, edge | I can recognise and name a range of 2D shapes including regular and irregular polygons using language such as side, angle & diagonal  I can recognise and name triangles *e.g. equilateral, right-angled, and scalene.*    I can describe pyramids, cones, cylinders using specific vocabulary- vertex, vertices, face, edge | | I can describe quadrilaterals e.g. rectangle, kite, trapezium, rhombus, parallelogram using language such as side, angle, parallel lines perpendicular lines & diagonals  I can classify 2D shapes and 3dD objects according to their properties  I can describe triangles based on the lengths of their sides  e.g. equilateral, isosceles, right-angled, scalene.  I can use my knowledge of angles to describe triangles  e.g. equilateral, isosceles, right-angled, scalene.  I can describe prisms and spheres using specific vocabulary- vertex, vertices, face, edge, circumference, radius, diameter.  I can describe 2D faces within the 3D objects | Describes 3D objects and 2D shapes using specific vocabulary including regular, irregular, diagonal, radius, diameter and circumference.  Identifies and describes 3D objects and 2D shapes within the environment and explains  why their properties match their function.    Applies this knowledge to demonstrate understanding of the relationship between 3D objects and their nets. |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **2 of 3** | | Having explored a range of 3D objects and 2D shapes, I can use mathematical language to describe their properties, and through investigation can discuss where and why particular shapes are used in the environment. MTH 2-16a  Through practical activities, I can show my understanding of the relationship between 3D objects and their nets. MTH 2-16b  I can draw 2D shapes and make representations of 3D objects using an appropriate range of methods and efficient use of resources. MTH 2-16c | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I can use the above knowledge of 2D shape and 3D objects to identify them within the environment  2D Properties – Road signs triangular signs give warnings, circular signs give speeds, rectangular signs are for information such as miles to next town.  3D Shape Function – Where have you seen a cube used? Rubix cubes, Sugar cubes | I can use the above knowledge of 2D shape and 3D objects to identify them within the environment  3D Object Properties – Why are storage boxes cuboids? Rigid. Easy to make nets.  Why are toilet rolls cylinders? To roll the paper on and off  Why is does ice cream come in cones and circular tub? Ice cream scoops are spherical.  Where have you seen a square based pyramids? Egyptian pyramids. Why did they build them as pyramids? | | I can use the above knowledge of 2D shape and 3D objects to identify them within the environment  Where have you seen a triangular prism? (e.g. Toblerone) |  |
| I can construct a cube or cuboid from its net.  I can identify a cube or cuboids from its net. | I can construct a range of objects from their nets.  e.g. pyramids, cones, cylinders  I can identify a range of objects from their nets.  e.g. pyramids, cones, cylinders | | I can construct a range of complex objects from their 3D nets. e.g. prisms  I can identify a range of complex objects from their 3D nets. e.g. prisms  Activity example – use straws to build skeletons |
| I am aware of what the radius and diameter are. | I can identify the parts of a circle including the terms radius, diameter and circumference. | | I know what the radius and diameter are and can use this knowledge to draw circles accurately.  I can use my knowledge of radius and diameter to work out what the missing one is. | Knows that the radius is half of the diameter |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **3 of 3** | | Having explored a range of 3D objects and 2D shapes, I can use mathematical language to describe their properties, and through investigation can discuss where and why particular shapes are used in the environment. MTH 2-16a  Through practical activities, I can show my understanding of the relationship between 3D objects and their nets. MTH 2-16b  I can draw 2D shapes and make representations of 3D objects using an appropriate range of methods and efficient use of resources. MTH 2-16c | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I can accurately draw a range of 2D shapes using a ruler  I can accurately draw a right angle triangle.  I can identify 3D objects from their drawings | I can use a ruler draw isosceles triangle and mark on equal sides  I can draw cubes, cuboids, square based pyramids, cones, cylinders. | | I can use different mathematical instruments to draw 2D shapes and 3D objects – e.g. protractor, ruler, compass  I understand that not all parts of a 3D object will be visible in a drawing.  Given the radius or diameter of a circle, I can use a compass to draw a circle  Given the length of the diagonals of a kite, I can draw a kite using a ruler (multiple answers)  I can use digital technologies to draw 2D shapes and 3D objects | Uses digital technologies and mathematical instruments to draw 2D shapes and make representations of 3D objects, understanding that not all parts of the 3D object can be seen. |

**Third Level**

## Properties of 2D shapes and 3D objects – Third Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | Having investigated a range of methods, I can accurately draw 2D shapes using appropriate mathematical instruments and methods. MTH 3-16a | | |
| **Progression through Third Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I can use a ruler and protractor to accurately draw rectangles and squares within ± 2 mm and ± 2°. | * **I can use a ruler and protractor to accurately draw a triangle when given the length of one side and two internal angles within ± 2 mm and ± 2°.** * **I can use a ruler and protractor to accurately draw a triangle when given the length of two sides and the interior angle within ± 2 mm and ± 2°.** | | * **I can use a ruler and compasses to accurately draw a triangle when given the lengths of all three sides within ± 2 mm.** * **I can use a ruler, compasses and protractor to accurately draw a regular polygon, when given the interior angle and the length of the sides, within ± 2 mm and ± 2°.** | Demonstrates a variety of methods to accurately draw 2D shapes, including triangles and regular polygons (given the interior angle), using mathematical instruments. |

**Fourth Level**

*Properties of 2D shapes and 3D objects – Fourth Level*

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | **I have explored the relationships that exist between the sides, or sides and angles, in right-angled triangles and can select and use an appropriate strategy to solve related problems, interpreting my answer for the context.**  **MTH 4-16a**  **Having investigated the relationships between the radius, diameter, circumference and area of a circle, I can apply my knowledge to solve related problems.**  **MTH 4-16b** | | |
| **Progression through Fourth Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| **• I can state Pythagoras’ Theorem and use it to calculate the length of the Hypotenuse in a right angled triangle.**  **• I can identify the hypotenuse, adjacent and opposite sides in relation to a given angle in a right-angled triangle.** | * **I can use Pythagoras’ Theorem to calculate the length of a shorter side in a right angled triangle.** * **I can calculate the length of a side in a right-angled triangle using trigonometry.** * **Given the radius or the diameter I can calculate the circumference of a circle using the correct formula.** * **Given the radius or the diameter I can calculate the circumference of a circle using the formula A= πr^2.** | | * **I can use Pythagoras’ Theorem to calculate the length of a missing side in a right angled triangle.** * **I can apply the use of Pythagoras’ Theorem to solve problems in new and unfamiliar contexts.** * **I can calculate the size of an angle in a right-angled triangle using trigonometry.** * **Given the area or circumference, I can calculate the diameter and radius using the relationships**  or or . | ***Calculates the length of any side of a right-angled triangle using the Theorem of Pythagoras.***  ***Calculates the size of an angle in a right-angled triangle using trigonometry.***  ***Calculates the length of a side in a right-angled triangle using trigonometry.***  ***Uses the formula C= πD or C=2πr to calculate the circumference of a circle.***  ***Uses the formula A= πr2 to calculate the area of a circle.***  ***Calculates diameter and radius of a circle when given the area or circumference.*** |

*Angle, symmetry and transformation – Early Level*

**Early Level**

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | ***In movement, games, and using technology I can use simple directions and describe positions.***  ***MTH 0-17a***  ***I have had fun creating a range of symmetrical pictures and patterns using a range of media.***  ***MTH 0-19a*** | | |
| **Progression through Early Level** | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * During real life situations I understand some positional language. | | * I can describe the position of an object by using positional words such as behind, in front of, above and below, left, right, forward and backwards. * I can program a sequence of directions into a programmable toy or similar technology. | **Understands and correctly uses the language of position and direction, including in front, behind, above, below, left, right, forwards and backwards, to solve simple problems in movement games.** |
| * I can explore symmetry. e.g. butterflies. | | * I can identify, describe and create a symmetry picture or pattern with one line of symmetry. | **Identifies, describes and creates symmetrical pictures with one line of symmetry.** |

*Angle, symmetry and transformation – First Level*

**First Level**

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | ***I can describe, follow and record routes and journeys using signs, words and angles associated with direction and turning. MTH 1-17***  ***I have developed an awareness of where grid reference systems are used in everyday contexts and can use them to locate and describe position. MTH 1-18a***  ***I have explored symmetry in my own and the wider environment and can create and recognise symmetrical pictures, patterns and shapes. MTH 1-19a*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can use technology and other methods to follow directions using words associated with directions and turning e.g. forwards, backwards, right and left | * I can use technology and other methods to follow directions using words associated with directions and turning e.g. full turn, half turn, quarter turn, clockwise, anticlockwise, right turn, left turn | | * I can use technology and other methods to follow directions using words associated with angles, directions and turning e.g. full turn, half turn, quarter turn, clockwise, anticlockwise, right turn, left turn, right angle, 90 degrees turn, 180 degrees turn, 270 degrees turn and 360 degrees turn * I can use technology and other methods to describe directions using words associated with angles, directions and turning (see above) | **Uses technology and other methods to describe, follow and record directions using words associated with angles, directions and turns including, full turn, half turn, quarter turn, clockwise, anticlockwise, right turn, left turn, right angle.**  **Knows that a right angle is 90°.**  **Knows and uses the compass points, North, South, East and West.**  **Uses informal methods to estimate, compare and describe the size of angles in relation  to a right angle.**  **Finds right angles in the environment and in well-known 2D shapes.**  **Identifies where and why grid references are used.**  **Describes, plots and uses accurate two figure grid references, demonstrating knowledge  of the horizontal and vertical location.**  **Identifies symmetry in patterns, pictures, nature and 2D shapes.**  **Creates symmetrical pictures and designs with more than one line of symmetry.** |
|  | * I know what a right angle looks like and can find them in the environment * I know and can use compass points e.g. North, South, East and West * I can identify where and why grid references are used * I can find objects on a grid and give its location. * I can plot objects onto a grid. | | * I know that a right angle is 90° and can identify them in 2D shapes * I can use my knowledge of right angles to estimate if an angle is bigger or smaller than 90° * I know and can use compass points e.g. North/South West * I can relate compass points to appropriate angles East = 90 degrees * I can identify where and why grid references are used * I can describe, plot and use accurate grid reverences |
| * I can identify symmetry in patterns, pictures, nature and 2D shapes * I can create symmetrical pictures patterns and shapes, with one line of symmetry | * I can identify symmetry in patterns, pictures, nature and 2D shapes * I can create symmetrical pictures patterns and shapes, with one line of symmetry | | * I can identify symmetry in patterns, pictures, nature and 2D shapes * I can create symmetrical pictures patterns and shapes, with more than one line of symmetry |

**Second Level**

## Angle, symmetry and transformation – Second Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **1 of 2** | | I have investigated angles in the environment, and can discuss, describe and classify angles using appropriate mathematical vocabulary. MTH 2-17a  I can accurately measure and draw angles using appropriate equipment, applying my skills to problems in context. MTH 2-17b  Through practical activities which include the use of technology, I have developed my understanding of the link between compass points and angles and can describe, follow and record directions, routes and journeys using appropriate vocabulary. MTH 2-17c  Having investigated where, why and how scale is used and expressed, I can apply my understanding to interpret simple models, maps and plans. MTH 2-17d  I can use my knowledge of the coordinate system to plot and describe the location of a point on a grid.  MTH 2-18a / MTH 3-18a  I can illustrate the lines of symmetry for a range of 2D shapes and apply my understanding to create and complete symmetrical pictures and patterns MTH 2-19a / MTH 3-19a | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I know a right angle is 90°, a straight line is 180° and a full turn is 360°.  I can identify right, straight and full turn angles in the environment and within shapes. | I know an acute angle is less than 90°.  I know an obtuse angle is more than 90° but less than 180°.  I know a reflex angle is more than 180°, but less than 360°.  I can identify right, acute, obtuse, straight and reflex angles in the environment and within shapes. | | I can describe and classify all angles I have seen in the environment/shapes using appropriate vocabulary. | Uses mathematical language including acute, obtuse, straight and reflex to describe and classify a range of angles identified within shapes in the environment. |
| I can draw right angles accurately.  I can use a protractor to check my right angles are correct. | I can estimate the size of an angle and check using a protractor.  I can use a protractor to draw acute, right, obtuse, reflex angles and full turns accurately.  I can use a protractor to measure and check my angles. | | I can measure angles to within +/-2 degrees with accuracy.  I can draw angles within +/-2 degrees with accuracy to produce shapes. | Measures and draws a range of angles to within . |
| Where appropriate use digital technology to support learning | | | |

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| **Experience and Outcome for Planning Teaching, Learning and Assessment**  **2 of 2** | | I have investigated angles in the environment, and can discuss, describe and classify angles using appropriate mathematical vocabulary. MTH 2-17a  I can accurately measure and draw angles using appropriate equipment, applying my skills to problems in context. MTH 2-17b  Through practical activities which include the use of technology, I have developed my understanding of the link between compass points and angles and can describe, follow and record directions, routes and journeys using appropriate vocabulary. MTH 2-17c  Having investigated where, why and how scale is used and expressed, I can apply my understanding to interpret simple models, maps and plans. MTH 2-17d  I can use my knowledge of the coordinate system to plot and describe the location of a point on a grid.  MTH 2-18a / MTH 3-18a  I can illustrate the lines of symmetry for a range of 2D shapes and apply my understanding to create and complete symmetrical pictures and patterns MTH 2-19a / MTH 3-19a | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
|  | I know that complimentary angles add up to 90 degrees and can calculate the missing angle. | | I know that supplementary angles add up to 180 degrees and can calculate the missing angle.  I can use my knowledge of complementary and supplementary angles to calculate missing angles. | Knows that complementary angles add up to 90° and supplementary angles add up to 180° and uses this knowledge to calculate missing angles. |
| I know the 4 point compass points and the connections with right angles.  I can use the 4 point compass points when giving directions. | I know 8 point compass and can use them to describe directions and journeys.  I can use my knowledge of complimentary angles to work out the relevant angles for NE, SE, NW, SW | | I know the link between the compass and angles. I can apply this to describe, follow and record directions, routes and journeys. | Uses knowledge of the link between the eight compass points and angles to describe,  follow and record directions. |
|  | I can apply a simple enlargement or reduction.  I understand that scaled objects, maps, plans keep the same shape and look. | | I can use and interpret simple scales on maps, plans or models. | Interprets maps, models or plans with simple scales, for example, 1 cm:2 km. |
| I can find objects on a coordinate grid given its coordinates. | I can use the notation of coordinate grids.  I can plot coordinates on a coordinate grid. | | I can describe, plot and record the location of a point on a grid using coordinate notation. | Describes, plots and records the location of a point, in the first quadrant, using coordinate notation. |
| Consider teaching this with 2D shape | | | | Identifies and illustrates line symmetry on a wide range of 2D shapes and applies this understanding to complete a range of symmetrical patterns, with and without the use  of digital technologies. |
| I can find and draw the lines of symmetry on simple pictures, patterns or objects.  I can complete simple pictures or patterns that have line symmetry. | I can identify and draw all lines of symmetry on a wide range of 2D shapes.  I can draw simple pictures or patterns with a line of symmetry. | | I can create symmetrical patterns with line symmetry, identifying where my line or lines of symmetry are with and without use of digital technology. |

**Third Level**

## Angle, symmetry and transformation – Third Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | I can name angles and find their sizes using my knowledge of the properties of a range of 2D shapes and the angle properties associated with intersecting and parallel lines. MTH 3-17a  Having investigated navigation in the world, I can apply my understanding of bearings and scale to interpret maps and plans and create accurate plans, and scale drawings of routes and journeys.  MTH 3-17b  I can apply my understanding of scale when enlarging or reducing pictures and shapes, using different methods, including technology. MTH 3-17c  I can use my knowledge of the coordinate system to plot and describe the location of a point on a grid. MTH 2-18a / MTH 3-18a  I can illustrate the lines of symmetry for a range of 2D shapes and apply my understanding to create and complete symmetrical pictures and patterns. MTH 2-19a / MTH 3-19a | | |
| **Progression through Third Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I can identify angles given certain criteria and name the angles using mathematical notation.  I can identify corresponding, alternate and vertically opposite angles and understand their properties.  I can give the 3 figure bearing for each of the 8 main compass points.  I can find and draw the lines of symmetry on pictures, patterns or objects.  I can draw a co-ordinate grid with x and y axes, 0 and a correct scale.  I can use and understand the terms enlargement and reduction in relation to scale. | * **I can use the properties of corresponding, alternate and vertically opposite angles to determine the size of missing angles.** * **I can state the sum of internal angles in triangle and quadrilateral.** * **I understand the properties of the different types of triangles: equilateral, isosceles, scalene and right-angled and how these properties relate to the internal angles.** * **I understand the properties of different quadrilaterals and how these properties relate to the internal angles.** * **I can identify and draw lines of symmetry: horizontal, vertical and diagonals** * **I can use the correct notation** * **I can plot points on a coordinate grid.** * **I can move shapes on a coordinate grid.** * **I can compare two corresponding measures to work out if there has been an enlargement or reduction in scale.** | | * **I can use the properties of triangles and quadrilaterals to calculate the size of missing angles.** * **I can describe a 3 figure bearing as a measure of turn clockwise from North.** * **I can draw any given 3 figure bearing and use it to describe a journey in a navigational context.** * **I can identify, complete and create symmetrical shapes and pictures and patterns with vertical, horizontal and diagonal lines of symmetry with and without digital technology.** * **I can use my knowledge of compass points and angles to describe, follow and record directions.** * **I can describe, plot and record the location of a point in the first quadrant on Cartesian grid using co-ordinate notation.** * **I can describe how to move from one point on a grid to another point.** * **I can use my knowledge of scale to reduce or enlarge on object.** | Names angles using mathematical notation, for example, <ABC  Identifies corresponding, alternate and vertically opposite angles and uses this knowledge to calculate missing angles.  Uses the angle properties of triangles and quadrilaterals to find missing angles.  Applies knowledge and understanding of scale to enlarge and reduce objects in size showing understanding of linear scale factor.  Uses bearings in a navigational context, including creating scale drawings.  Identifies all lines of symmetry in 2D shapes.  Creates symmetrical patterns and pictures. |

**Fourth Level**

## Angle, symmetry and transformation – Fourth Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | Having investigated the relationship between a radius and a tangent and explored the size of the angle in a semi-circle, I can use the facts I have established to solve related problems.  MTH 4-17a  I can apply my understanding of the properties of similar figures to solve problems involving length and area.  MTH 4-17b  I can plot and describe the position of a point on a 4-quadrant coordinate grid.  MTH 4-18a  I can apply my understanding of the 4-quadrant coordinate system to move, and describe the transformation of, a point or shape on a grid.  MTH 4-18b  Having investigated patterns in the environment, I can use appropriate mathematical vocabulary to discuss the rotational properties of shapes, pictures and patterns and can apply my understanding when completing or creating designs.  MTH 4-19a | | |
| **Progression through Fourth Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I can identify tangents to a circle.  I can identify the radius of a circle and how two radii and a chord make an isosceles triangle.  • I can identify the diameter and state that a triangle drawn with the diameter and touching the circumference is right-angled.  • I can describe the rotational properties of objects in the environment around us and in nature as well as mathematical shapes.  I can use and understand the terms enlargement and reduction in relation to scale.  I know to enlarge a measure I must multiply by a number greater than 1.  • I know to reduce a measure I must multiply by a number less than 1. | * **I can identify where a radius meets the tangent at the circumference and state that they are perpendicular** * **I can discuss the order of rotation using terms such as full-turn, half-turn and quarter-turn symmetry etc.** * **I can plot and read co-ordinates in a four-quadrant Cartesian gird.** * **I can reflect or translate an object on a four quadrant grid.** * **I can compare two corresponding measures to work out if there has been an enlargement or reduction in scale.** | | * **I can apply my knowledge of triangles, angles and circles, including semi-circles, to solve problems.** * **I can use my knowledge of rotational symmetry to complete designs to a specified order of rotation.** * **I can identify the transformation of an object or a shape which has been reflected or translated on a grid.** * **I can use two corresponding sides to work out the scale factor.** * **I can use the scale factor to work out the length of an enlarged or reduced measurement.** * **I can combine my knowledge of angles, scale and bearings to complete an accurate scale drawing of a shape or a navigational journey.** | Describes rotational properties of shapes, pictures and patterns, including the order of rotation.  Uses knowledge of rotational symmetry to complete designs.  Uses a four-quadrant Cartesian grid to read and plot coordinates.  Applies understanding of translation to reflect or translate an object on a four-quadrant grid.  Uses similarity to find unknown lengths of 2D shapes.  Applies knowledge of the relationship between the tangent and radius to calculate sizes of missing angles.  Applies knowledge of triangles, angles and circles, including semi-circles, to solve problems.  Identifies transformation by reflection or translation of a point or shape on a grid. |

**Learning progressions and Benchmarks – Information handling**

**Early Level**

*Data and analysis – Early Level*

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | ***I can collect objects and ask questions to gather information, organising and displaying my findings in different ways. MNU 0-20a***  ***I can match objects, and sort using my own and others’ criteria, sharing my ideas with others.***  ***MNU 0-20b***  ***I can use the signs and charts around me for information, helping me plan and make choices and decisions in my daily life. MNU 0-20c*** | | |
| **Progression through Early Level** | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can use real objects to display sets. * I can collect information about myself and about other pupils, for example hair colour, eye colour etc. * I can sort objects by colour, shape, size etc. into sets. * I can contribute, with support, a simple pictograph. * I can tell my teacher and peers what signs in my immediate environment mean. | | * I can collect information about myself and about other pupils then sort data. * I can make a simple tally as collections of objects. eg. Tally/tick marks * I can contribute to a simple pictogram, using digital technologies as appropriate. * I can use counting skills to ask and answer questions. * I can interpret simple charts and graphs and demonstrate how they support planning, choices and decision making in familiar situations by applying to real life contexts for example – Fri lunch orders, which day does the kitchen have to order in most pizza. What are the most common pets in our class? | ***Asks simple questions to collect data for a specific purpose.***  ***Collects and organises objects for a specific purpose.***  ***Applies counting skills to ask and answer questions and makes relevant choices and decisions based on the data.***  ***Contributes to concrete or pictorial displays where one object or drawing represents one data value, using digital technologies as appropriate.***  ***Uses knowledge of colour, shape, size and other properties to match and sort items in a variety of different ways.***  ***Interprets simple graphs, charts and signs and demonstrates how they support planning, choices and decision making.*** |

**First Level**

*Data analysis – First Level*

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | ***I have explored a variety of ways in which data is presented and can ask and answer questions about the information it contains MNU 1-20a I have used a range of ways to collect information and can sort it in a logical, organised and imaginative way using my own and others’ criteria. MNU 1-20b***  ***Using technology and other methods, I can display data simply, clearly and accurately by creating tables, charts and diagrams, using simple labelling and scale. MTH 1-21a*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I can conduct a survey, for example using a questionnaire with yes or no answers. * I can use tally marks to represent quantity and total them at the end. * I can complete a bar graph, table or diagram using information givenand a ~~s~~cale where one unit represents one data value * I can interpret information from bar graphs and diagrams. | * I can conduct a survey involving options or choices, and sort data, for a given purpose * I can display simple data using a variety of different methods, including the use of digital technologies e.g. block graphs, bar graphs and Venn diagrams * I can use an appropriate scale where one unit represents one, or two, data values. * I can include a suitable title. * I can interpret information from tables and charts. | | * I can independently collect, organise, display and interpret information using block graphs, bar graphs, tables, Carroll and Venn diagrams and charts, including the use of digital technologies. * I can use an appropriate scale where one unit represents more than one data value e.g. two, five or 10 data values. * I can include a suitable title and simple labelling of both axis. * I can use information from a variety of data sets (charts, diagrams, bar graphs and tables) to inform choices and decisions e.g. survey of items for a tuck shop to inform what the tuck shop will stock | ***Asks and answers questions to extract key information from a variety of data sets including charts, diagrams, bar graphs and tables.***  ***Selects and uses the most appropriate way to gather and sort data for a given purpose, for example, a survey, questionnaire or group tallies.***  **Uses a variety of different methods, including the use of digital technologies, to display data, for example, as block graphs, bar graphs, tables, Carroll diagrams and Venn diagrams.**  **Includes a suitable title, simple labelling on both axes and an appropriate scale where  one unit represents more than one data value in graphs.** |

**Second Level**

## Data and analysis – Second Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | Having discussed the variety of ways and range of media used to present data, I can interpret and draw conclusions from the information displayed, recognising that the presentation may be misleading. MNU 2-20a  I have carried out investigations and surveys, devising and using a variety of methods to gather information and have worked with others to collate, organise and communicate the results in an appropriate way. MNU 2-20b  I can display data in a clear way using a suitable scale, by choosing appropriately from an extended range of tables, charts, diagrams and graphs, making effective use of technology.  MTH 2-21a / MTH 3-21a | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I suggest which data to collect and who to ask to investigate a given question,e.g. What bake would sell the most at a home bake stall? | I can access a variety of methods to collect data depending on the given task,  e.g. internet research for statistics, online survey or class-based survey. | | I can independently choose which method to use to collect data depending on the given task. | Devises ways of collecting data in the most suitable way for the given task. |
| I can represent data with a block or bar graph with a given scale.  Where available, I can use digital technology to create pie charts. | I can represent data with a block or bar graph choosing an appropriate scale.  I can draw line graphs as well as using digital technologies to create one, using appropriate scale.  I can represent data on a spreadsheet. | | I can represent data by choosing from an extended range of tables, pie charts, diagrams, plots and graphs using digital technologies when appropriate. | Collects, organises and displays data accurately in a variety of ways including through the use of digital technologies, for example, creating surveys, tables,  bar graphs, line graphs, frequency tables, simple pie charts and spreadsheets.  Displays data appropriately making effective use of technology and chooses  a suitable scale when creating graphs. |
| * **I can use appropriate labels on my diagrams.** | | | |
| I can read information from a range of tables, charts, diagrams, plots and graphs (including 1 to many correspondence). | I can say if my data is accurate and use it to help me answer questions. | | I can analyse, interpret and draw conclusions from a variety of data and talk about my findings. | Analyses, interprets and draws conclusions from a variety of data. |
|  |  | | I can compare different displays of the same data. I can also explain why a presentation might be misleading. | Draws conclusions about the reliability of data taking into account, for example,  the author, the audience, the scale and sample size used. |
|  |  | | I can understand that data is presented in a variety of ways by the media and it is not always reliable. |

**Third Level**

## Data and analysis – Third Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | I can work collaboratively, making appropriate use of technology, to source information presented in a range of ways, interpret what it conveys and discuss whether I believe the information to be robust, vague or misleading. MNU 3-20a  When analysing information or collecting data of my own, I can use my understanding of how bias may arise and how sample size can affect precision, to ensure that the data allows for fair conclusions to be drawn.  MTH 3-20b  I can display data in a clear way using a suitable scale, by choosing appropriately from an extended range of tables, charts, diagrams and graphs, making effective use of technology MTH 2-21a / MTH 3-21a | | |
| **Progression through Third Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I can source information to collect using digital technology if needed.  I can collect the data we have sourced accurately and decide the best format to display the data making it easier to interpret.  I can display the data sourced in a variety of forms and interpret what the data is telling me. | * **I can answer questions about the data when represented in a suitable form.** * **I can describe trends in the data over time using appropriate language.** * **I can decide if the data is misleading or not, decide if the conclusions the data is presenting are unrealistic and begin to explore why this might be the case.** | | * **I can reflect on the process of data collection and say if there is any sample bias, e.g. too few people surveyed or sample chosen too varied.** * **I can explain how sample bias can affect data and choose a representative sample accordingly.** * **I can determine the reasons for displayed data being misleading.** | Sources information or collects data making use of digital technology where appropriate.  Interprets data sourced or given.  Describes trends in data using appropriate language, for example, increasing trend.  Determines if information is robust, vague or misleading by considering, for example, the validity of the source, scale used, sample size, method of presentation and appropriateness of how the sample was selected.  Collects data by choosing a representative sample to avoid bias.  Organises and displays data appropriately in a variety of forms, for example, compound bar and line graphs and pie charts, making effective use of technology as appropriate. |

**Fourth Level**

## Data and analysis – Fourth Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | I can evaluate and interpret raw and graphical data using a variety of methods, comment on relationships I observe within the data and communicate my findings to others.  MNU 4-20a  In order to compare numerical information in real-life contexts, I can find the mean, median, mode and range of sets of numbers, decide which type of average is most appropriate to use and discuss how using an alternative type of average could be misleading.  MNU 4-20b  I can select appropriately from a wide range of tables, charts, diagrams and graphs when displaying discrete, continuous or grouped data, clearly communicating the significant features of the data.  MTH 4-21a | | |
| **Progression through Fourth Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I can calculate the mean of a data set.  I can calculate the mode of a data set.  I can calculate the range of a data set.  I can interpret data presented in various forms of graphical representations.  I can choose the most appropriate form of statistical diagram to display the data. | * **I can calculate the median of an ordered data set with an even amount of data entries.** * **I can calculate the median of an ordered data set with an odd amount of data entries.** * **I can describe the data including trends, correlations and identify any relationships that may help make conclusions about the data.** * **I can justify why my choice of diagram is the most appropriate for the data set given.** | | **• I can decide which of the averages would best describe the data set and discuss why the others may be misleading.**  **• I can discuss how an average may be distorted by changes in the data set.**  **• I know the differences between discrete, continuous and grouped data and choose the most appropriate way to display the different types of data, using technology where necessary.** | Interprets raw and graphical data.  Uses statistical language, for example, correlations, to describe identified relationships.  Calculates the mean, median, mode and range of a data set.  Selects the most appropriate statistical diagram to display a given data set, for example, stem and leaf.  Justifies the most appropriate statistical diagram to display a given data set.  Uses different types of charts to display discrete, continuous and grouped data appropriately. |

*Ideas of chance and uncertainty – First Level*

**First Level**

*No experiences and outcomes at Early Level.*

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | ***I can use appropriate vocabulary to describe the likelihood of events occurring, using the knowledge and experiences of myself and others to guide me. MNU 1-22a*** | | |
| **Progression through First Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| * I am beginning to use words such as possible and impossible to describe the likelihood of events occurring in everyday situations | * I can use words such as certain/uncertain, likely/unlikely, possible/impossible to describe the likelihood of events occurring in everyday situations | | * I use vocabulary such as certain/uncertain, probable, likely/unlikely, possible/impossible, fair/unfair to describe the likelihood of events occurring in **everyday events** and can justify my choice. * I can interpret data gathered through **everyday experiences** to make reasonable predictions of the likelihood of an event occurring | ***Uses mathematical vocabulary appropriately to describe the likelihood of events occurring in everyday situations including, probable, likely/unlikely, certain/uncertain, possible/impossible, and fair/unfair.***  ***Interprets data gathered through everyday experiences to make reasonable predictions of the likelihood of an event occurring.*** |
| * I am beginning to use appropriate vocabulary when describing the likelihood of events occurring such as might happen, might not happen, likely/unlikely, certain. | * I can represent chance/likelihood of events on a number line.   impossible - unlikely - possible - likely - certain | | * I can use the terms certain/uncertain, probable, likely/unlikely, possible/impossible, fair/unfair to predict the outcome of a **scenario**, for example if you pick a counter from a bag of 10 blue counters what is the probability of it being red? |

**Second Level**

## Ideas of chance and uncertainty – Second Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | I can conduct simple experiments involving chance and communicate my predictions and findings using the vocabulary of probability. MNU 2-22a | | |
| **Progression through Second Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I understand that the probability of an event lies between impossible and certain.  I can arrange events in order to determine which is most or least likely to occur.  I can list all the possible outcomes of simple events using tree diagrams or organised lists. | I can identify 1 as certain and 0 as impossible on the number line.  I can place events on a number line (concrete materials) to demonstrate simple probabilities  e.g. probability of tossing a coin and it landing heads up is 0.5.  I understand that probability can be represented by a ratio; one in two, one in three, e.g. if I roll the dice what are the chances it will be a six? | | I can place events on a number line to demonstrate the probability of any event.  I can use the language of probability accurately to describe how likely it is that simple events will occur, for example equal chance fifty-fifty, one in two.  I can describe percentage chance, for example 100% chance, 0% chance, 50% chance.  I can describe the likelihood of simple events happening using fractions | ***Uses the language of probability accurately to describe the likelihood of simple events occurring, for example equal chance; fifty-fifty; one in two, two in three; percentage chance; and .*** |
|  | I can estimate probability by conducting experiments.  e.g. coin tosses, dice throws. | | I can plan and carry out simple experiments involving chance by repeating the procedure several times. | Plans and carries out simple experiments involving chance with repeated trials,  for example, ‘what is the probability of throwing a six if you throw a die fifty times?’. |
|  |  | | I can use data to predict the outcome of a simple experiment and explain the reasoning behind the prediction.  I understand that the more you carry out an experiment, the more confident you can become in predicting the result.  I am aware of how implications of chance are used in daily routines, decision making and the media. | Uses data to predict the outcome of a simple experiment. |

**Third Level**

## Ideas of chance and uncertainty – Third Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | ***I can find the probability of a simple event happening and explain why the consequences of the event, as well as its probability, should be considered when making choices. MNU 3-22a*** | | |
| **Progression through Third Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I use the vocabulary impossible, unlikely, evens, likely and certain and know how they relate to a probability scale of 0 (impossible) to 1 (certain).  I can place a value written as fraction or decimal fraction on the probability scale of 0 to 1 and describe how likely the outcome will be.  I can talk about an outcome and assign it a possible value from 0 to 1 given as a fraction or decimal fraction. | * I can discuss the frequency of an event, the randomness of an outcome and how this relates to the probability of the event/outcome occurring. E.g. the probability of rolling a 6 is but I could roll a dice six times and not get a 6 or get a 6 more than once. * I can calculate the probability of an event happening leaving the answer as a fraction, a simplified fraction or a decimal fraction. * I can use a given probability to calculate a value for a given outcome and discuss the appropriateness of the answer, e.g. the probability of having triplets is 0.03. How many sets of triplets would you expect to be born in a month where 80 woman give birth? | | * **I understand that the probability of an event happening and the probability of it not happening must add to 1.** * **I can identify all the possible outcomes of a mutually exclusive event, events that cannot happen at the same time, and calculate the probability of each, e.g. cut a deck of cards and get a black king or a diamond or an ace of spades.** * **I can make decisions on real-life situations based on the probability of the event happening and the possible consequences of my choice, e.g. deciding to ground airplanes and cancel flights after a forecast of a storm.** | Uses the probability scale of 0 to 1 showing probability as a fraction or decimal fraction.  Demonstrates understanding of the relationship between the frequency of an event happening and the probability of it happening.  Uses a given probability to calculate an expected outcome, for example, ‘the probability of rain in June is 0·25 so how many days do we expect it to rain?’  Calculates the probability of a simple event happening, for example, ‘what is the probability of throwing a prime number on a 12 sided die?’  Identifies all of the mutually exclusive outcomes of a single event and calculates the probability of each.  Investigates real-life situations which involve making decisions on the likelihood of events occurring and the consequences involved. |

**Fourth Level**

## Ideas of chance and uncertainty – Fourth Level

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| **Experience and Outcome for Planning Teaching, Learning and Assessment** | | ***By applying my understanding of probability, I can determine how many times I expect an event to occur, and use this information to make predictions, risk assessment, informed choices and decisions.***  ***MNU 4-22a*** | | |
| **Progression through Fourth Level** | | | | **Benchmarks to Support Teachers’ Professional Judgement of Achievement of a Level** |
| I calculate the probability of an event leaving the answer as a fraction, a simplified fraction or a decimal fraction and discuss the likelihood of the event occurring. | * I can determine the probability of two successive events and determine how that effects the likelihood of the event occurring again, e.g. Probability of choosing an Ace from 52 cards, drawing a red Ace, not returned to the pack, and then probability of choosing a red ace from the remaining 51 cards. 0.08 reduces to 0.02. | | * **I understand the randomness of events and that the calculated value does not guarantee occurrence.** * **I can use my calculated value to make predictions on likelihood of an event, make a decision based on likelihood and apply this to real life contexts, e.g. 0.65 chance of spending £30000 on advertising with improve profit by 6%. Is it worth investing?** | Calculates the probability and determines the expected occurrence of an event.  Applies knowledge and skills in calculating probability to make predictions. |

1. National Benchmarks - Numeracy and Mathematics – Education Scotland (June 2017) [↑](#footnote-ref-1)