



**Progression and Support Document  
Second Level – Pathway 3**



### **Rationale**

This series of Progression and Support documents, including Pathways and Bundling Advice provides a progression of skills through a level. Regular reinforcement of concepts and promotion of Numeracy Across Learning is encouraged. The Pathways are not intended to be prescriptive or restrictive. Practitioners should identify when opportunities occur within contexts across the curriculum and plan for this to demonstrate relevance. The overall aim is to provide a shared standard of expectations and to ensure progression and depth within planning.

The Progression and Support documents focus on the skills required to achieve concepts within an outcome and detail the mental agility strategies associated with the learning within each experience and outcome. Suggestions for formative assessment and summative assessment are provided and some possible resources are listed, but this list is by no means exhaustive.

It is hoped that these Progression and Support documents provide a clear framework and the necessary support so that practitioners can feel confident in planning engaging, well-paced and suitably challenging learning experiences, which involve a variety of methodologies. Ultimately our goal is to raise attainment for all our learners and these documents are just one part of that journey. All our learners should be given opportunities that will allow them to become confident and numerate, build their skills in a variety of contexts and allow them to reach their own targeted positive destinations.

Many of the documents consulted in the process of creating the Support and Progression documents can be found on the Education Scotland website. These include:

- Numeracy and Mathematics: Experiences and Outcomes
- Mathematics: Principles and Practice
- Numeracy Across Learning: Principles and Practice
- National Numeracy and Mathematics Progression Framework
- Numeracy and Mathematics Benchmarks
- CfE Statement for Practitioners

In addition to this, current planning documents that are being used across the authority, progression documents from other local authorities across Scotland and a variety of resources were consulted.

### **Bundling Advice**

There are many possible ways to bundle Numeracy and Mathematics Experiences and Outcomes depending on the skills that are being explored and the contexts for learning that are relevant to the children that the learning is being planned for.

The following is **one example** of how to bundle the Experiences and Outcomes according to the skills in this pathway. Choosing bundles of outcomes based on relevant contexts for learning is always the best practice and should be explored whenever possible. It can also be appropriate to bundle Numeracy and Mathematics across curricular areas if there is a clear opportunity to do so. There is exemplification of one of these bundles for further clarification and to demonstrate the learning opportunities that link these particular Experiences and Outcomes as a bundle in this instance.

These bundles can be approached in whichever order is most appropriate. Some of the Experiences and Outcomes have not been bundled as links between outcomes were too tenuous. Bundling without clear and strong links is not beneficial and it may be the case that some Experiences and Outcomes are better taught discretely.

There should be an element of number work/manipulating number every day, regardless of any other Numeracy and Mathematics learning that is planned for. This will provide regular opportunities to reinforce and challenge learning across the key numeracy outcomes which are indicated in **bold** below. At the beginning of a new pathway, the regular number work/manipulation of number will be based on reinforcement of the skills from the previous pathway. As the learning progresses, introduction of learning to develop the new skills within the current pathway should be introduced and progressed.

<b>Bundling of Experiences and Outcomes Second Level Pathway 2</b>	<b>Opportunities across the curriculum</b>
<b>Estimation and rounding</b> MNU 2-01a <b>Number and number processes</b> MNU 2-03a Money MNU 2-09a, MNU 2-09b & MNU 2-09c	
<b>Number and number processes</b> MNU 2-02a <b>Number and number processes</b> MNU 2-04a	
<b>Multiples, factors &amp; primes</b> MTH 2-05a Mathematics – its impact on the world, past, present & future MTH 2-12a <b>Patterns &amp; relationships</b> MTH 2-13a	
Number and number processes MTH 2-03c Expression and equations MTH 2-15a	
Properties of 2D shapes & 3D objects MTH 2-16a Properties of 2D shapes & 3D objects MTH 2-16b Angle, symmetry & transformation MTH 2-17a Angle, symmetry & transformation MTH 2-17b	
Angle, symmetry and transformation MTH 2-19a	
Measurement MNU 1-11a & MNU 2-11b (length, weight and volume & capacity) Time MNU 2-10c Properties of 2D shapes & and 3D objects MTH 2-16c Angle, symmetry and transformation MTH 2-17d	
Measurement MNU 2-11c	
<b>Number and number processes</b> MNU 2-03b <b>Fractions, decimal fractions and percentages</b> MNU 2-07a, MNU 2-07b & MTH 2-07c	
Time MNU 2-10a & MNU 2-10b	
Data & analysis MNU 2-20a, MNU 2-20b & MTH 2-21a	
Ideas of chance and uncertainty MNU 2-22a	

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As stated above, this is only one possible way to bundle the Experiences and Outcomes for this pathway. Different contexts for learning across the curriculum will raise opportunities to bundle in different ways. Consideration should be given to bundling in relevant contexts and to using opportunities across the curriculum to reinforce Numeracy and Mathematics skills.

### Bundling within Numeracy and Mathematics

The following explains why these experiences and outcomes bundle sensibly.

Bundle	Reasons bundle was chosen
<b>Number and number processes MNU 2-03b</b>  <b>Fractions, decimal fractions and percentages MNU 2-07a, MNU 2-07b &amp; MTH 2-07c</b>	<p>Understanding hundredths and their place in the number system is central to understanding and converting between decimal fractions, fractions and, especially, percentages. Therefore, it seems sensible to bundle these outcomes together.</p> <p>As stated previously, there are numerous ways to bundle the experiences and outcomes, this is only one way. If there is a particular context being explored in class, i.e. social studies, science etc., it may be sensible to bundle differently.</p>

### Bundling Across the Curriculum

The following is an example of bundling experiences and outcomes from across the curriculum, within a context.

Bundle and Context for Learning	Reasons bundle was chosen
<b>Context is class novel of 'Tribes' by Catherine MacPhail</b>  <p>As I listen or watch, I can identify and discuss the purpose, main ideas and supporting detail contained within the text, and use this information for different purposes. <b>LIT 2-04a</b></p> <p>I can show my understanding of what I listen to or watch by responding to literal, inferential, evaluative and other types of questions, and by asking different kinds of questions of my own. <b>LIT 2-07a</b></p> <p>I can select and use a range of strategies and resources before I read, and as I read, to make meaning clear and give reasons for my selection. <b>LIT 2-13a</b></p>	<p>Plan a trip to the Isle of Mull just as the Tribe do in the story. Use the transport timetables, café menus and activity pricelists to work to a budget and get the best value for money. This activity could incorporate <b>MNU 2-03a, MNU 2-07a/b, MNU 2-09a, MNU 2-10a/b/c</b> depending on the level of complexity of the offers available on the pricelists and the information provided on the timetables.</p> <p>Explore measure and scale by creating a scaled model of the old whisky factory and derelict shops. <b>MNU 2-11a/b, MTH 2-16a/b, MTH 2-17d</b>. Skills within <b>MNU 2-03a</b> may also be utilised.</p> <p>These are a few examples of how to plan for Numeracy and Mathematics across the curriculum by bundling relevant outcomes. As you can see, many of the discussion points would have taken place anyway. Considering the above experiences and outcomes together, extends the learning and utilises Numeracy and Mathematics in a meaningful way.</p>

## Second Level Progression and Support Pathway Three

Number and Number Processes  MNU 2-02a	Number and Number Processes  MNU 2-03a Add & Subtract	Ideas of chance and uncertainty  MNU 2-22a	Angle, symmetry and transformation  MTH 2-17a	Angle, symmetry and transformation  MTH 2-17b	Estimating and Rounding  MNU 2-01a	Number and Number Processes  MNU 2-03a Multiply & Divide	Time  MNU 2-10a	Properties of 2D shapes & 3D objects  MTH 2-16a
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Patterns & Relationships  MTH 2-13a	Expressions & Equations  MTH 2-15a	Numbers and Number Processes  MNU 2-04a	Angle, symmetry and transformation  MTH 2-19a	Mathematics – its impact on the world, past, present & future MTH 2-12a	Money  MNU 2-09c	Number and Number Processes  MNU 2-03b	Fractions, decimal fractions & percentages MNU 2-07a	Properties of 2D shapes & 3D objects  MTH 2-16b
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Measurement  MNU 2-11a MNU 2-11b Length	Data & Analysis  MNU 2-20b	Numbers and Number Processes  MTH 2-03c	Multiples, factors & primes  MTH 2-05a	Fractions, decimal fractions & percentages  MTH 2-07c	Money  MNU 2-09a	Measurement  MNU 2-11a MNU 2-11b Weight	Data & Analysis  MTH 2-21a	Data & Analysis  MNU 2-20a
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Angle, symmetry & transformation  MTH 2-17d	Measurement  MNU 2-11c	Time  MNU 2-10c	Time  MNU 2-10b	Measurement  MNU 2-11a MNU 2-11b Volume & Capacity	Money  MNU 2-09b	Properties of 2D shapes & 3D objects  MTH 2-16c	Fractions, decimal fractions & percentages  MNU 2-07b
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Please note that MTH 2-17c and MTH 2-18a are omitted from this Pathway.

The above is an overview of the Experiences and Outcomes contained in Second Level Pathway 3. It is best practice to bundle together Es & Os for teaching and learning. This can happen within the curricular area of Numeracy and Mathematics or Numeracy and Mathematics Es & Os can be bundled with other curricular Es & Os. Some Es & Os may be taught in isolation if bundling is not appropriate with the particular contexts for learning that are being explored as tenuously bundled Es & Os are not advised as relevance and depth of learning would be weak. **Advice on bundling is included within this document.**

## How to Use Progression and Support Documents to Support Planning

The following annotation explains how the Progression and Support Documents can be used to support planning.

The Experience and Outcome.

The benchmark(s) to be achieved by the **end** of the level.

Topic & CfE Outcome - Multiples, factors and primes			
Having explored the patterns and relationships in multiplication and division, I can investigate and identify the multiples and factors of numbers. MTH 2-05a			
<b>Benchmarks</b> - Identifies multiples and factors of whole numbers and applies knowledge and understanding of these when solving relevant problems in number, money and measurement.			
Mental Strategies	Skills	Possible Resources	Assessment
<b>Recall</b> Recite and recall all multiplication facts and corresponding division facts  Recognise the link between 2, 4 and 8 times tables  Recognise the link between 3, 6 and 9 times tables  Recognise the link between 2, 5 and 10 times tables	I can use the term 'multiple' correctly  <b>I can recognise number patterns involving multiples of the 2 – 10 times tables, e.g.</b> 2, 4, 6, 8... 5, 10, 15...  <ul style="list-style-type: none"> <li>I can recite my 2, 4 and 8 times-tables</li> <li>I can recall individual multiplication and division facts in my 2, 4 and 8 times-tables</li> <li>I can recite my 5 and 10 times-tables</li> <li>I can recall individual multiplication and division facts in my 5 and 10 times-table</li> <li>I can recite my 3, 6 and 9 times-tables</li> <li>I can recall individual multiplication and division facts in my 3, 6 and 9 times-tables</li> <li>I can recite the 7 times-table</li> <li>I can use the link between times-tables to help me recall my facts, e.g. doubling and halving</li> <li>I can find the lowest common multiple of up to 3 numbers</li> </ul>	HAM Teaching Cards MD 1.7a, MD 1.7b, MD 1.7c (Revision)  TJ Level C Ch 13 Ex 2 pg 152  TJ 2a Ch 17 Ex 1 pgs 168 – 169  <a href="http://www.mathsisfun.com/numbers/maths-trainer-multiply.html">http://www.mathsisfun.com/numbers/maths-trainer-multiply.html</a>  <a href="http://www.topmarks.co.uk/Flash.aspx?f=carrollv7">http://www.topmarks.co.uk/Flash.aspx?f=carrollv7</a>	<b>Write</b> HAM Question Bank MD 1.7a, MD 1.7b & MD 1.7c  <b>Do</b> Call out multiples of 2, 4 or 8 and, for each, ask children to write a times-tables fact with that answer on their mini-whiteboards. Discuss the different facts written for each number, e.g. 24 could be $3 \times 8$ , $6 \times 4$ , etc. Encourage children to explain how and why these facts are related, i.e. that multiplication is commutative.  <b>Do</b> One child sits on a chair and the others line up facing the child's on the chair. Call out a multiple, e.g. 24, the first to respond with a correct fact using the multiple wins the seat.

Mental strategies that are associated with the learning taking place in the Experience and Outcome.

This lists the skills that are to be achieved in this section of the Experience and Outcome. The **bold type** is the overall skills that should be developed and the bullet points are the skills broken down.

Some possible scheme based resources that could be used. This is not exhaustive. Best practice is to use a **Concrete – Pictorial – Abstract** approach that will involve a variety of resources and methodologies.

Suggested formative and summative assessments that could be used. Again, this is not exhaustive and assessment should take place when relevant and in the most appropriate style for the learner.

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### Topic & CfE Outcome - Estimating and Rounding

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**

### Benchmarks

- Rounds whole numbers to the nearest 1000, 10 000 and 100 000.
- Rounds decimal fractions to the nearest whole number, to one decimal place and two decimal places.
- Applies knowledge of rounding to give an estimate to a calculation appropriate to the context.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b> Practise rounding to 1000, 10 000 and 100 000 using real-life contexts</p> <p>Sums and differences of pairs of multiples of 10, 100 and 1000</p> <p>Numbers that can be added to any four digit number to make the next multiple of 1000, i.e. 4087 + ? = 5000</p> <p><b>Skills</b> (mentally, with jottings and materials if needed)</p> <p>Use rounding to estimate an answer to a calculation</p> <p>Partition – add or subtract a multiple of 10, 100 or 1000 and adjust e.g. 46 + 29 = 46 + 30 – 1 or 86 – 38 = 86 – 40 + 2</p>	<p><b>I can round decimal fractions to the nearest whole number, to one decimal place and two decimal places</b></p> <ul style="list-style-type: none"> <li>• I can round decimal fractions to the nearest whole number to one decimal place and two decimal places by looking at the digits and can explain the rule I have used. e.g. <ul style="list-style-type: none"> <li>▪ 23·6 rounds to 24 to a whole number</li> <li>▪ 176·27 rounds to 176·3 to one decimal place</li> <li>▪ 519·528 rounds to 519·53 to two decimal places</li> </ul> </li> <li>• I can explain the importance of looking at particular digits in a number when I am deciding how to round</li> <li>• I can give examples of numbers which are rounded to the nearest whole number, one decimal place and two decimal places</li> <li>• I have estimated, by rounding in different ways, and can compare this with the exact answer, discussing the accuracy of my estimate</li> <li>• I can give examples of when the accuracy of an answer is important in everyday contexts</li> </ul>	<p>HAM Teaching Cards WN 2.15a, WN 2.15b</p> <p>TJ Level D Ch 3 Ex 3 pgs 39 – 40</p> <p>TJ Level E Ch 2 Ex 3 pgs 30 – 31</p> <p>TJ 2a Ch 5 Ex 3 Ex 4 pgs 44 – 47</p> <p>TJ 2b Ch 1 Ex 3 pgs 7 – 8</p> <p>H7 Teacher's Notes pgs 31 – 34</p> <p>H7 Tbk pg 5</p>	<p><b>Write</b> HAM Question Bank WN 2.15a, WN 2.15b</p> <p><b>Write</b> TJ Assessment Pack MNU 2-01a</p> <p><b>Say and Do</b> Use whiteboards or Maths Journals for working and answers. Ask the children to round two given numbers the nearest tenth or whole number. The children then add or subtract the rounded numbers to achieve a rounded total then use a strategy of their choice to complete an accurate calculation using the original numbers. Children then compare the rounded estimate with the accurate calculation and explain the strategies used.</p>

**Topic & CfE Outcome - Number and Number Processes**

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**

**Benchmarks**

- Reads, writes and orders whole numbers to 1 000 000, starting from any number in the sequence.
- Explains the link between a digit, its place and its value for whole numbers to 1 000 000.
- Reads, writes and orders sets of decimal fractions to three decimal places.
- Explains the link between a digit, its place and its value for numbers to three decimal places.
- Partitions a wide range of whole numbers and decimal fractions to three decimal places, for example,  $3.6 = 3 \text{ ones and } 6 \text{ tenths} = 36 \text{ tenths}$ .

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b></p> <p>Count on or back in hundreds, tens, ones, tenths, hundredths and thousandths</p> <p>What must be added to a decimal with ones, tenths and hundredths to make the next whole number? e.g. <math>7.26 + ? = 8</math></p> <p>Repeat for units, tenths, hundredths and thousandths.</p> <p>Give alternative representations of a decimal to two places, e.g. <math>0.44</math>, <math>\frac{44}{100}</math>, 44 hundredths (Mixed numbers may also be explored if appropriate)</p> <p>Count on or back in tenths and hundredths</p> <p>Equivalent fractions, decimal fractions and percentages for hundredths, i.e. 35% is equivalent to <math>0.35</math> and <math>\frac{35}{100}</math></p>	<p><b>Introduce thousandths as decimal notation</b></p> <ul style="list-style-type: none"> <li>• <b>Order</b></li> <li>• <b>Read</b></li> <li>• <b>Write (digits and words)</b></li> <li>• <b>Place Value</b></li> <li>• <b>Partition</b></li> <li>• <b>I can round to two decimal places in a real life context</b></li> </ul> <p><b>I can use digits 0 – 9 in different combinations to show how numbers are constructed to 2 decimal places, using 0 as a place holder.</b></p> <p><b>I can identify, extend &amp; predict number sequences involving numbers to 2 decimal places.</b></p> <p><b>I can identify, extend and predict number sequences involving numbers to a million</b></p> <ul style="list-style-type: none"> <li>• I know that a decimal fraction is a representation of part of a whole number</li> <li>• I can identify and write thousandths as fractions</li> <li>• I can change any thousandths fraction to a decimal fraction</li> <li>• I can explain the importance of zero as a placeholder</li> <li>• I can identify the position of thousandths on a number line</li> <li>• I can change any mixed number with hundredths or thousandths to a decimal</li> <li>• I can talk about how decimal fractions are used in everyday life</li> </ul>	<p>HAM Teaching Cards FDP 2.9b, FDP 2.9c, FDP 2.10, FDP 2.11</p> <p>TJ Level E Ch 2 Ex 1 Qu 9 – 15 pg 27</p> <p>H7 Teacher's Notes pgs 78 – 83</p> <p>H7 Tbk pgs 28 – 30</p>	<p><b>Write</b></p> <p>HAM Question Bank FDP 2.9b, FDP 2.9c, FDP 2.10, FDP 2.11</p> <p><b>Write</b></p> <p>TJ Assessment Pack MNU 2-02a</p> <p><b>Say</b></p> <p>Call out a decimal. The child should respond with the matching number, i.e. <math>4.767 = 4</math> and <math>767</math> thousandths. Can be played as a team game two lines of children playing against each other. The first two in the line are given a number like above and the first to respond correctly gets a point for their team. This could also be played as a whiteboard 'Show Me' task.</p> <p><b>Do</b></p> <p>Children are given a number that is to be rounded to one decimal place. i.e. <math>4.36</math> is given and the children are expected to respond with <math>4.4</math>. This assessment technique could be used for rounding to two decimal places too.</p> <p><b>Do</b></p> <p>Ask children to write a true or false statement onto a whiteboard, e.g. two and seven hundredths is the same as <math>2.7</math>; three and seventeen hundredths can be written as <math>3.17</math>; the number <math>4.08</math> has 8 tenths. Children explain why they think each is true or false. If a statement is false, the child who wrote it should explain how the statement could be changed to make it true. They explain how to work it out if there are any mistakes.</p>



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**Topic & CfE Outcome - Numbers and Number Processes**

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**

**Benchmarks**

- Adds and subtracts multiples of 10, 100 and 1000 to and from whole numbers and decimal fractions to two decimal places.
- Adds and subtracts whole numbers and decimal fractions to two decimal places, within the number range 0 to 1 000 000.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b> Recall the sums and differences of pairs of multiples of 10, 100 and 1000</p> <p>Addition and subtraction facts for multiples of 10 to 1000, e.g. <math>650 + ? = 930</math></p> <p>Recall the addition doubles of numbers from 1 to 100, e.g. <math>37 + 37</math>, and the corresponding halves</p> <p>What must be added to any 3 digit number to make the next multiple of 100, e.g. <math>631 + ? = 700</math></p> <p><b>Skills</b> (mentally, with jottings and materials if needed)</p> <p>Add or subtract any pair of three digit numbers, including crossing the 10s and 100 boundary, e.g. <math>247 + 358</math> and <math>591 - 235</math></p> <p>Add near doubles of three digit numbers, i.e. <math>128 + 127</math></p> <p>Add or subtract a near multiple of 100 to any two or three digit number, e.g. <math>235 + 198 =</math> <math>235 + 200 - 2</math></p> <p>Add or subtract a near multiple of 10 with three digits to any two or three digit number, e.g. <math>351 + 229 =</math> <math>351 + 230 - 1</math></p>	<p><b>Add and Subtract</b></p> <p><b>I can add and subtract 3 digit numbers to/from 3 and 4 digit numbers mentally</b></p> <p><b>Without a calculator, I can add and subtract whole numbers to a total of 1 000 000 in written form</b></p> <ul style="list-style-type: none"> <li>• I can look at an addition or subtraction calculation and decide and explain which number to round up or down</li> <li>• I can complete the calculation using my rounded number</li> <li>• I can work out the difference between my rounded number and the original number</li> <li>• I can decide and explain whether to add or subtract this to get the answer to the original calculation</li> <li>• I can use counting on to find the difference between two numbers</li> <li>• I can count on to the next 10, 100 or 1000 and can use this to solve calculations</li> <li>• I can partition and count on or back using the different parts to find the answer</li> <li>• I can use an empty number line or jottings to help my thinking</li> <li>• I can create complements to 100 and 1000 as I know number pairs which total 10 and can multiply these by 10 or 100</li> <li>• I can use my number bonds to bridge to the next 10 or 100 and can work out how many more makes 100 or 1000</li> <li>• I can use my knowledge of numbers that add to 100 to explain how to carry out related subtractions (e.g. <math>63 + 27 = 100</math> so <math>100 - 27 = 73</math>)</li> <li>• I can use my knowledge of numbers that add to 1000 to explain how to carry out related subtractions e.g. <math>635 + 265 = 1000</math> so <math>1000 - 265 = 735</math></li> <li>• I know my doubles for totals up to 40</li> <li>• I can multiply and divide my numbers by 10, 100, 1000 and can use this to create new facts</li> <li>• I can use partitioning to help me double and halve numbers</li> <li>• I can use jottings to help me with my doubling and halving</li> <li>• I can use near doubles to help me solve addition calculations (e.g. <math>25 + 27</math> is double 25 add 2)</li> <li>• I can explain the features of the formal written method for addition and subtraction</li> <li>• I can explain my understanding of the steps and how I record them as I carry out a formal calculation</li> <li>• I understand that I have to go through the same steps no matter the size of the numbers and can accurately complete any calculation</li> <li>• I can interpret numbers in words as numbers in digits and set down a calculation with the digits in the correct column</li> <li>• I can use a range of checking strategies for my calculation</li> </ul>	<p><b>Add and Subtract</b> HAM Teaching Cards WN 2.14, WN 2.15a, WN 2.15b, WN 2.15c, WN 2.16, WN 2.17</p> <p>TJ Level E Ch 1 Ex 2 pgs 11 – 12</p> <p>H7 Teacher's Notes pgs 26 – 31</p> <p>H7 Tbk pgs 1 – 4</p>	<p><b>Write</b> HAM Question Bank WN 2.14, WN 2.15a, WN 2.15b, WN 2.15c, WN 2.16, WN 2.17</p> <p><b>Do</b> Write a calculation on the board involving a near multiple of 10, e.g. <math>87 - 39</math>. Children work out the answer and show it on a whiteboard.</p> <p><b>Write</b> Write a calculation on the board. The children work out the answer, drawing a number line on their whiteboard to show their working, counting on or back.</p> <p><b>Do</b> Children all write a 2 or 3 digit number on their whiteboard and write the complement to 100 and/or 1000 on the back. Ask children to volunteer to be the teacher and get them to come to the front of the class. Each child works out the complement to 100 or 1000 and shows it to the child at the front of the class to see if it matches with the answer the child has written on the opposite side of their board. If there are any mistakes, these can be used as positive learning opportunities.</p> <p><b>Do</b> Call out a number, e.g. 42, which children write in the middle of their whiteboard. They draw an arrow to the left and write half and do the same on the other side for double. Children hold up their whiteboards to show answers, e.g. <math>21 \leftarrow 42 \rightarrow 84</math>. Vary the complexity of the number used to include a range from 1 000 000 to thousandths</p> <p><b>Write</b> Write three vertical</p>

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<p>Add or subtract 2 or 3 digit multiples of 10 e.g. <math>140 - 20</math>, <math>120 + 150</math> and <math>470 - 280</math></p> <p>Find the difference between near multiples of 100 or 1000, with or without bridging, e.g. <math>597 - 302 =</math> <math>597 - 300 - 2</math></p> <p>Find the difference between near multiples of 100 and 1000, with bridging, e.g. <math>6070 - 4097 =</math> <math>6070 - 4000 - 100 + 3</math></p> <p><b>Partition:</b> add hundreds, tens and ones separately, then recombine</p> <p><b>Partition:</b> subtract hundreds, tens and then ones, e.g. subtracting 372 by subtracting 300 then 70 then 2</p> <p><b>Counting on and back</b> in multiples</p> <p>Subtract by <b>counting on</b> to the larger number</p> <p>Subtract by <b>counting back</b> from the larger number</p> <p><b>Partition:</b> add or subtract a multiple of 10 and adjust, e.g. <math>46 + 29 = 46 + 30 - 1</math> or <math>76 - 28 = 76 - 30 + 2</math></p> <p><b>Partition:</b> double and adjust, e.g. to calculate <math>76 + 78</math>, double 76 and add 2 or double 78 and subtract 2</p> <p>Use knowledge of place value to</p>			<p>subtractions on the board, including one with a deliberate mistake, such as: <math>121 - 64 = 57</math> <math>232 - 86 = 146</math> <math>352 - 168 = 186</math> Explain that two are right and one is wrong. Challenge children to find the wrong one.</p>
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<p><b>partition</b> numbers for addition and subtraction, i.e.  <math>244 + 127 =</math>  <math>200 + 100 + 40 + 20 + 7 + 4</math></p> <p><b>Chunking</b> - Add or subtract in chunks of <b>friendly numbers</b>, i.e.  <math>660 + 43 =</math>  <math>660 + 40 + 3</math>          An empty number line can be used to visualise this</p> <p><b>Rounding and adjusting</b> - in addition and subtraction round one of the numbers to the nearest 10 (can round to 100 too in some circumstances) then deal with the second number. Remember to adjust at the end, i.e.  <math>340 + 18 =</math>  <math>340 + 20 - 2</math></p> <p><b>Making Tens</b> -          Use knowledge of tens to help in calculations, i.e.  <math>189 + 245</math>, take 1 from 245 and add to 189 to <b>Make a Ten</b> makes,  <math>190 + 244 =</math>          434</p> <p>Use knowledge of place value and related calculations, e.g.  <math>130 + 150 = 280</math>          by using  <math>13 + 15 = 28</math></p>			
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## Numeracy and Mathematics Progression and Support - Second Level Pathway 3

### Topic & CfE Outcome - Numbers and Number Processes

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 continued**

### Benchmarks

- Uses multiplication and division facts to the 10th multiplication table.
- Multiplies and divides whole numbers by multiples of 10, 100 and 1000.
- Multiplies whole numbers by two digit numbers.
- Divides whole numbers and decimal fractions to two decimal places, by a single digit, including answers expressed as decimal fractions, for example,  $43 \div 5 = 8.6$ .

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b> Recite and recall all multiplication facts and corresponding division facts</p> <p><b>Skills</b> (mentally, with jottings or materials in needed)</p> <p>Multiply pairs of two digit and single digit numbers, i.e. <math>28 \times 3</math></p> <p>Divide a two digit number by a single digit number, i.e. <math>98 \div 7</math> (exploring partitioning method)</p> <p>Divide by 25 or 50 by repeated halving</p> <p>Multiply pairs of multiples of 10 and 100, i.e. <math>600 \times 20</math>, <math>300 \times 400</math></p> <p>Divide multiples of 100 by a multiple of 10 or 100 (whole number answers), i.e. <math>600 \div 20</math>, <math>800 \div 400</math></p> <p>Scale up or down using known facts, i.e. given that three oranges cost 24p, find the cost of four oranges</p>	<p><b>Multiply and Divide</b></p> <ul style="list-style-type: none"> <li>• I can multiply and divide up to 1 000 000 by a single digit in written form</li> <li>• I have explored multiplication of whole numbers by two digits using different methods, i.e. grid, array etc.</li> <li>• I can use notation of remainders correctly</li> </ul> <p><b>I have had opportunities to explore concrete materials and pictorial representations in relation to grouping and sharing, building the concepts of multiplying and dividing, i.e. arrays for multiplication</b></p> <p><b>I have investigated vocabulary in order to determine which processes are needed to solve problems</b></p> <ul style="list-style-type: none"> <li>• I understand that a number can be split in lots of different ways which help me to multiply (e.g. <math>32 \times 6 = (30 \times 6) + (2 \times 6)</math>)</li> <li>• I can use my knowledge of place value to partition a number</li> <li>• I can use my knowledge of multiplication facts and multiplying by multiples of 10 to fill in the grid and calculate an answer</li> <li>• I can use estimation to check whether my answer is sensible</li> <li>• I understand that division can be done by repeated subtraction</li> <li>• I can use my table facts to take away groups of a number to work out a division calculation knowing there may be some left over</li> <li>• I can use my table facts to take away blocks of 10 from a number including remainders</li> <li>• I know how to set out my working</li> <li>• I can look at a calculation and decide if I need to use a written calculation or if I can use table facts to solve it</li> <li>• I can use my table facts to take away groups of a multiple of 10 to work out a division calculation knowing there may be some left over</li> <li>• If I need a written calculation, I can write it in the appropriate layout</li> <li>• I understand that division can be thought of as sharing</li> <li>• I can use base ten material to model sharing of 2- and 3-digit numbers by 1-digit numbers</li> <li>• I know how to record the formal algorithm using base ten material</li> <li>• I can read a problem and work out what it means</li> <li>• I can identify the calculations required to solve the problem, knowing when more than one calculation is required</li> <li>• I can identify the most appropriate strategy for carrying out the calculation(s)</li> </ul>	<p><b>Multiply and Divide</b> HAM Teaching Cards WN 2.18a, WN 2.19a, WN 2.19b, WN 2.19c, WN 2.20a, WN 2.20b, WN 2.20c, WN 2.20d, WN 2.21</p> <p>TJ Level E Ch 1 Ex 5 Ex 6 Ex 7 Ex 8 pgs 15 – 20</p> <p>H7 Teacher's Notes pgs 41 – 43</p> <p>H7 Tbk pgs 11 – 12</p>	<p><b>Write</b> HAM Question Bank WN 2.18a, WN 2.19a, WN 2.19b, WN 2.19c, WN 2.20a, WN 2.20b, WN 2.20c, WN 2.20d, WN 2.21</p> <p><b>Write</b> TJ Assessment Pack MNU 2-03a</p> <p><b>Do</b> Write a calculation on the board involving a near multiple of 10, e.g. <math>29 \times 5</math>. Children work out the answer and show it with their number fan.</p> <p><b>Write and Do</b> On the board write several multiple choice answers, e.g. A less than 200, B 200–400, C 400–600, D more than 600. Write a calculation on the board. Ask children to estimate what the answer will be and to vote for one of the four options. Then they work with a partner to calculate the exact answer and see if their estimate was right.</p> <p><b>Say, Write and Do</b> Write up a calculation on the board and split the class into three teams. Give each team a different strategy to use to complete the calculation, i.e. grid method, partitioning and combining, formal algorithm, calculator etc. Discuss the similarities and differences between each method and which method is most efficient.</p> <p><b>Write</b> Roll a dice three times to create a 2 digit <math>\div</math> 1 digit calculation. Children use the chunking method to complete the calculation on their whiteboards.</p>

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	<ul style="list-style-type: none"> <li>• I can record and explain my thinking so that it makes sense to somebody else</li> <li>• I can explain my answer in relation to the original question and can check my solution makes sense</li> <li>• I know there may be more than one solution to a problem and can identify a range of possible solutions</li> </ul>		<p><b>Do</b></p> <p>Half of the children write a 3 digit number and the other half write a 1 digit number. Ask children to walk around the room until you call stop. If they have a 3 digit number, they find the closest 1 digit number to pair up with and vice versa. They work together to find the answer to their division using any method they wish, including concrete materials and pictorial representations.</p> <p><b>Do</b></p> <p>Give pairs of children a calculation. Ask one child to solve it mentally and the other to use a written method. They compare answers and decide which method they thought was more appropriate for the calculation. Have a vote to see if all the pairs agreed on the same strategy.</p>
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**Important Reminder**

\* Do not teach that when multiplying by 10 “add a zero to the end” as is stated in some textbooks as this shortcut does not develop conceptual understanding of what happens when a number is multiplied by 10. Teach that when a number is multiplied by 10, the number becomes ten times larger so each digit moves one column to the left with zero being inserted into the now vacant ones column as a place holder if needed.

\* Similarly, do not teach that when dividing by 10 “simply remove a zero” as stated in some textbooks as this shortcut does not develop conceptual understanding and can indeed cause greater confusion when the whole number being divided does not end in a zero or later in Second Level when decimals are being divided by 10. Teach that when a number is divided by 10, the number becomes ten times smaller so each digit moves one column to the right.

Apply similar methodology to teaching multiplication and division by 100 and 1000.

**Topic & CfE Outcome - Numbers and Number Processes**

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**

**Benchmarks**

- Uses multiplication and division facts to the 10th multiplication table.
- Multiplies and divides whole numbers by multiples of 10, 100 and 1000.
- Multiplies and divides decimal fractions to two decimal places by 10, 100 and 1000.
- Multiplies whole numbers by two digit numbers.
- Multiplies decimal fractions to two decimal places by a single digit.
- Divides whole numbers and decimal fractions to two decimal places, by a single digit, including answers expressed as decimal fractions, for example,  $43 \div 5 = 8.6$ .

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b> Addition and subtraction facts for multiples of 10 to 1000 and decimal numbers with one or two decimal places, i.e. <math>650 + ? = 930</math> <math>? - 1.25 = 3.75</math></p> <p><b>Skills</b> (mentally, with jottings and materials if needed)</p> <p>Find doubles of decimals each with ones and tenths, with bridging, i.e. double 1.6</p> <p>Add near doubles of decimals, i.e. <math>2.5 + 2.6</math></p> <p>Add or subtract a decimal with ones and tenths, that is nearly a whole number, i.e. <math>4.3 + 2.9</math></p> <p>Add or subtract pairs of decimals with ones, tenths or hundredths, e.g. <math>0.7 + 3.38</math></p> <p>Use knowledge of place value and related calculations, e.g. <math>680 + 430</math>, <math>6.8 + 4.3</math> and <math>0.68 + 0.43</math> can all be worked out using the related calculation <math>68 + 43</math></p> <p>Partition: add or subtract a whole number and adjust, e.g.</p>	<p><b>Hundredths – without a calculator</b></p> <p><b>I can add and subtract decimals with at most 2 decimal places in written form, i.e. <math>67.38 - 24.21 = 43.17</math></b></p> <p><b>I can add and subtract multiples of 10, 100 and 1000 to and from whole numbers and decimal fractions to 2 decimal places</b></p> <p><b>I can multiply and divide decimals with at most 2 decimal places, by a single digit, in written form, i.e. <math>76.35 \div 2 = 38.175</math></b></p> <p><b>I can multiply and divide whole numbers and decimal fractions to 2 decimal places by 10, 100 and 1000</b></p> <p><b>Add and Subtract</b></p> <ul style="list-style-type: none"> <li>• I can use what I know about adding and subtracting whole numbers to help me work with decimal fractions to two decimal places</li> <li>• I can partition decimals into wholes, tenths and hundredths to add or subtract mentally</li> <li>• I can use doubles and near doubles to help me add and subtract mentally</li> <li>• I can use an empty number line to show my thinking when adding or subtracting decimals</li> <li>• I can round and adjust to add or subtract decimals</li> <li>• I can work out complements to the next whole number or tenth to help me add and subtract decimals</li> <li>• I can use written calculations to help me add and subtract decimals</li> <li>• I can add and subtract multiples of 10, 100 and 1000 to and from whole numbers and decimal fractions to 2 decimal places</li> </ul> <p><b>Multiply and Divide</b></p> <ul style="list-style-type: none"> <li>• I can explain how to multiply and divide by 10, 100 and 1000</li> <li>• I can multiply any number by 1000 by moving the digits three places to the left</li> <li>• I can divide any multiple of 1000 by 1000 to give a whole number answer</li> <li>• I can divide any number by 1000 to give a whole number answer with a remainder or decimal fraction with up to 2 decimal places</li> <li>• Using my knowledge of table facts and multiplying by 10, I can create new facts (e.g. <math>3 \times 4 = 12</math> so <math>30 \times 4 = 120</math> so <math>300 \times 4 = 1200</math>, <math>1200 \div 40 = 30</math>)</li> <li>• Using my knowledge of table facts and multiplying by 100,</li> </ul>	<p><b>Add and Subtract</b> HAM Teaching Cards FDP 2.17b</p> <p>TJ Level D Ch 3 Ex 4 pgs 41 – 43</p> <p>TJ Level E Ch 2 Ex 4 Qu 1 – 5</p> <p>TJ 2a Ch 5 Ex 5 pgs 48 – 50</p> <p>H6 Teacher's Notes pgs 104 – 108</p> <p>H6 Tbk pgs 45 – 47</p> <p>H7 Teacher's Notes pgs 83 – 85</p> <p>H7 Tbk pgs 31 – 32</p> <p><b>Multiply and Divide</b> HAM Teaching Cards WN 2.7, WN 2.18b, FDP 2.18b, FDP 2.19b</p> <p>TJ Level D Ch 6 Ex 1 Ex 2 Ex 3 Ex 4 Ex 5 pgs 66 – 73</p> <p>TJ Level E Ch 2 Ex 5 Ex 6 Ex 7 Ex 8 Ex 9 pgs 35 – 40</p> <p>TJ 2a Ch 7 Ex 1 Ex 2 Ex 3 Ex 4 Ex 5 pgs 62 – 67</p>	<p><b>Write</b> HAM Question Bank WN 2.7, WN 2.28b, FDP 2.17b, FDP 2.18b, FDP 2.19b</p> <p><b>Write</b> TJ Level D Ch 3 Topic in a Nutshell pg 44 (miss out Q4)</p> <p><b>Write</b> TJ 2a Ch 5 The 3 R's pg 51 (miss out Q4 and 5)</p> <p><b>Do</b> Give children a start number, e.g. 1.45, and set the size of jumps they take, e.g. 0.12. They make a sequence by adding on repeatedly.</p> <p><b>Say and Do</b> Call out a decimal or use number cards/spinner to randomly create one. Children double the number and write their answer on their mini-whiteboards. Discuss their strategies for working it out.</p> <p><b>Write</b> TJ Level D Ch 6 Topic in a Nutshell pg 74</p> <p><b>Write</b> TJ 2a Ch 7 The 3 R's pg 68</p> <p><b>Do</b> Place a chair at the front. Children stand in a line and the first child sits in the chair. Ask a question involving multiplying multiples of 10, 100 or 1000 for the sitting person and the first standing person to answer. If the sitting person is first they stay in position and the other person goes to the end of the line. If the standing person is first, they take over in the hot seat. Continue,</p>

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<p><math>4 \cdot 3 + 2 \cdot 9</math>  <math>= 4 \cdot 3 + 3 - 0 \cdot 1</math></p> <p>Double decimals with ones and tenth and find the corresponding halves, i.e. double <math>7 \cdot 6</math>, half of <math>15 \cdot 2</math></p> <p>Multiply and divide two digit decimal fractions by a single digit, i.e. <math>0 \cdot 8 \times 7</math>, <math>4 \cdot 8 \div 6</math></p>	<p>I can create new facts (e.g. <math>3 \times 4 = 12</math> so <math>300 \times 4 = 1200</math>, <math>1200 \div 4 = 300</math>)</p> <ul style="list-style-type: none"> <li>Using my knowledge of table facts and multiplying by 1000, I can create new facts (e.g. <math>3 \times 4 = 12</math> so <math>3000 \times 4 = 12\ 000</math>, <math>12\ 000 \div 4 = 3000</math>)</li> <li>I can combine these skills to work out calculations with multiples of 10, 100 and 1000 (e.g. <math>3000 \times 40 = 120\ 000</math> or <math>300 \times 400 = 120\ 000</math>, <math>120\ 000 \div 400 = 300</math>)</li> <li>I can explain how to apply my whole-number strategies to decimal numbers, linking them to the value and position of each digit (e.g. <math>4 \times 6 = 24</math>, so <math>4 \times 0 \cdot 6 = 2 \cdot 4</math>)</li> <li>I can use doubling and halving skills to multiply decimals by a single digit</li> <li>I can partition and use the grid method to multiply decimals by a single digit</li> <li>I can use the expanded formal written method to multiply decimals by a single digit</li> <li>I can use the formal written method to multiply decimals by a single digit</li> <li>I can explain how to apply my whole-number strategies to decimal numbers linking them to the value and position of each digit</li> <li>I can use my halving skills to divide decimals</li> <li>I can divide using the chunking method</li> <li>I can divide using the expanded formal method</li> <li>I can divide using the formal method</li> <li>I can use multiplication to check my division calculations</li> <li>I know how and when to use a zero as a placeholder in calculations which go beyond tenths and hundredths</li> </ul>	<p>H6 Teacher's Notes pgs 108 – 109</p> <p>H6 Tbk pgs 48 – 49</p> <p>H7 Teacher's Notes pgs 85 – 91</p> <p>H7 Tbk pgs 33 – 39</p>	<p>seeing how long someone can stay in the hot seat.</p> <p><b>Do</b>            Draw a function machine on the board and set it to multiply by a given number. Write a decimal as an input number, and have children write the output.</p> <p><b>Do</b>            Challenge children to find a decimal which matches given criteria, e.g. has the digit 2 and has two decimal places; has an odd number of decimal places; has a group of recurring digits starting with 2; has only odd numbers, etc. Share their answers.</p>
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**Important Reminder**

\* Do not teach that when multiplying by 10 “add a zero to the end” as is stated in some textbooks as this shortcut does not develop conceptual understanding of what happens when a number is multiplied by 10. Teach that when a number is multiplied by 10, the number becomes ten times larger so each digit moves one column to the left with zero being inserted into the now vacant ones column as a place holder if needed.

\* Similarly, do not teach that when dividing by 10 “simply remove a zero” as stated in some textbooks as this shortcut does not develop conceptual understanding and can indeed cause greater confusion when the whole number being divided does not end in a zero or later in Second Level when decimals are being divided by 10. Teach that when a number is divided by 10, the number becomes ten times smaller so each digit moves one column to the right.

Apply similar methodology to teaching multiplication and division by 100 and 1000.

**Topic & CfE Outcome - Numbers and Number Processes**

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**

**Benchmarks**

- Applies the correct order of operations in number calculations when solving multi-step problems.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b> Identify when reordering is appropriate</p> <p>If appropriate, reorder in a sensible way, e.g. adding numbers that will give manageable numbers such as complements to ten etc.</p> <p><b>Skills</b> (mentally, with jottings and materials if needed)</p> <p>Apply rule of BODMAS in given calculations</p> <p>*Brackets</p> <p>*Orders</p> <p>*Division</p> <p>*Multiplication</p> <p>*Addition</p> <p>*Subtraction</p>	<p><b>I can use the order of operations to carry out calculations correctly</b></p> <p><b>I know that in an addition or multiplication calculation I can reorder the numbers</b></p> <p><b>I can look at a calculation and decide which numbers can be reordered</b></p> <p><b>I can use brackets to show how numbers have been grouped together to make a calculation easier</b></p> <p><b>I know that in some calculations the order cannot be changed</b></p> <p><b>I know what BODMAS, BIDMAS and PEDMAS means and can apply the order in calculations - BODMAS means - Brackets, Operations, Division, Multiplication, Addition, Subtraction</b></p> <ul style="list-style-type: none"> <li>• I can look at a calculation and decide which numbers I can reorder</li> <li>• I can use my knowledge of place value and friendly numbers to partition an addition calculation</li> <li>• I can explain why the order of the numbers in an addition calculation can be changed without changing the answer e.g. <math>128 + 256 = (100 + 200) + (28 + 56)</math></li> <li>• I can use my knowledge of tables and factors to partition a multiplication calculation</li> <li>• I can explain why the order of the numbers in an addition or multiplication calculation can be changed without changing the answer e.g. <math>24 \times 6 = (20 \times 6) + (4 \times 6)</math></li> <li>• I can use brackets to show which parts of a calculation I am going to do together</li> <li>• I have investigated how the order of operations can change the answer in a calculation</li> <li>• I know that I start by looking at multiplication and division before addition and subtraction</li> <li>• I can use this order to carry out calculations correctly</li> </ul>	<p>HAM Teaching Cards WN 2.10, WN 2.11, WN 2.12</p> <p>TJ 2b Ch 1 Ex 6 pg 11</p>	<p><b>Write</b> HAM Question Bank WN 2.10, WN 2.11, WN 2.12</p> <p><b>Write</b> TJ Assessment Pack MTH 2-03b/c</p> <p><b>Do</b> Write up an addition, e.g. <math>3 + 12 + 8 + 6 + 9 + 4</math>. Write four possible answers, e.g. 52, 40, 42, 39. Children work out which answer is correct. Discuss how they reordered the numbers to make the calculation more manageable.</p> <p><b>Write and Do</b> Roll a dice to give the different numbers in a calculation, addition or multiplication depending on your focus. Children complete the calculation using partitioning.</p> <p><b>Do</b> Give children a number and ask them to make as many different calculations as they can which give that answer. The calculations must use more than one operation and have brackets. You might give them a time limit to work within. Collate different examples on the board and discuss the range of answers.</p>



## Numeracy and Mathematics Progression and Support - Second Level Pathway 3

**Topic & CfE Outcome - Numbers and Number Processes**

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**

**Benchmarks**

- Identifies familiar contexts in which negative numbers are used.
- Orders numbers less than zero and locates them on a number line.

Mental Strategies	Skills	Possible Resources	Assessment
<b>Skills</b> (mentally, with jottings and materials if needed) Count on from a negative number  Count back to a negative number  Compare numbers using < and > signs, i.e. $-23 < 4$ , $-12 < -10$	<b>I can use an extended range of numbers including negative numbers</b>  <b>Introduction of negative numbers.</b> <ul style="list-style-type: none"> <li>• <b>Order – positive and negative</b></li> <li>• <b>Read</b></li> <li>• <b>Write</b></li> <li>• <b>Place Value</b></li> </ul> <ul style="list-style-type: none"> <li>• I can give examples of when and where negative numbers are used</li> <li>• I can create a number line which includes negative numbers and locate negative numbers on a number line</li> <li>• I can discuss how far away positive and negative numbers are from zero and recognise the patterns within this</li> <li>• I can compare and order positive and negative numbers</li> <li>• I can carry out simple addition and subtraction involving negative numbers by counting on and back</li> </ul>	HAM Teaching Cards WN 2.5b  TJ Level E Ch 5 Ex 1 pg 59 Ex 2 Qu 1 – 7 pgs 59 – 62  TJ 2b Ch 8 Ex 1 Ex 2 pgs 81 – 84  H7 Teacher's Notes pgs 125 – 129  H7 Tbk pgs 57 – 58  H7 Wbk pgs 13 – 14	<b>Write</b> HAM Question Bank WN 2.5b  <b>Write</b> TJ Assessment Pack MNU 2-04a  <b>Write</b> Provide the children with a blank number line and a set of numbers, both positive and negative. Ask the children to arrange the numbers correctly on the number line.  <b>Write</b> Give the children a set of cards that have both positive and negative numbers on them. Ask the children to order them by a given criteria.  <b>Do</b> Children research a world weather forecast and note down a specified number of temperatures that they have found. Children to explain how far one temperature is from another. Children can also compare temperatures using < and > signs.

**Topic & CfE Outcome - Multiples, factors and primes**

Having Explored the patterns and relationships in multiplication and division, I can investigate and identify the multiples and factors of numbers.

**MTH 2-05a**

**Benchmarks**

- Identifies multiples and factors of whole numbers and applies knowledge and understanding of these when solving relevant problems in number, money and measurement.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b> Recite and recall all multiplication facts and their corresponding division facts</p> <p>Factor pairs of a given number, i.e. 25 - 1, 25 5, 5</p> <p>Give multiples of a given number, i.e. Give the next 5 multiples of 3</p> <p>Prime Numbers up to 100</p>	<p><b>I can identify multiples of a given number</b></p> <p><b>I can identify factors of a given number and calculate which numbers are prime</b></p> <p><b>I can create a set of multiples and find common multiples between tables</b></p> <p><b>I can explain what a prime number is</b></p> <ul style="list-style-type: none"> <li>• I can explain what a factor is and can work out all the factor pairs of a number</li> <li>• I know that factor and multiple are inverses: 12 is a multiple of 3, 3 is a factor of 12</li> <li>• I know that a prime number only has factors of 1 and itself</li> <li>• I can use my knowledge of multiples and factors to work out all the prime numbers up to 100</li> <li>• If I am given a number, I can work out if it is prime or not</li> </ul>	<p>HAM Teaching Cards WN 2.9</p> <p>TJ Level E Ch 13 Ex 1 Ex 2 Ex 3 pgs 162 – 166</p> <p>TJ 2a Ch 17 Ex 3 pgs 170 – 171</p>	<p><b>Write</b> HAM Question Bank WN 2.9</p> <p><b>Write</b> TJ Level E Topic in a Nutshell pg 167</p> <p><b>Write</b> TJ 2a The 3R's pg 172</p> <p><b>Write</b> TJ Assessment Pack MTH 2-05a</p> <p><b>Do</b> Ask a child to select two cards from a set of 1 – 10 number cards. Once they pick two cards, ask them to multiply them together, i.e. 3 and 8. (24) Challenge children to find other factor pairs of 24, e.g. <math>4 \times 6</math>, <math>1 \times 24</math>. Repeat for different pairs of number cards.</p> <p><b>Do</b> List key words from the lesson on the board, such as 'factor', 'pair', 'prime', 'multiple' and 'square number'. In pairs, children write true or false statements using key words and numbers, e.g. 'The number 21 has exactly two factors and so is prime'. Invite other children to decide whether the statements are true or false. They discuss the false statements and say what could be changed to make them true.</p>

# Numeracy and Mathematics Progression and Support - Second Level Pathway 3

## Topic & CfE Outcome - Fractions, decimal fractions and percentages

I have investigated the everyday context in which simple fractions, percentages or decimal fractions are used and can carry out the necessary calculations to solve related problems **MNU 2-07a**

### Benchmarks

- Uses knowledge of equivalent forms of common fractions, decimal fractions and percentages, for example,  $\frac{3}{4} = 0.75 = 75\%$ , to solve problems.
- Calculates 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%.
- Calculates simple fractions of a quantity and uses this knowledge to solve problems, for example, find  $\frac{3}{5}$  of 60.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b></p> <p>Equivalent fractions, decimal fractions and percentages for hundredths, i.e. 35% is equivalent to <math>0.35</math> and <math>\frac{35}{100}</math></p> <p>More complex but frequently used equivalent fractions, decimal fractions and percentages, i.e. <math>33\frac{1}{3}\%</math> is equivalent to <math>\frac{1}{3}</math> or <math>0.33\ldots</math></p> <p><b>Skills</b></p> <p>(mentally, with jottings or materials if needed)</p> <p>Find multiples of 10% of whole numbers and quantities, e.g. 30% of 50ml, 40% of £30</p> <p>Calculate 1% by dividing by 100. Use this to find less common percentages, i.e. 17% of 30 - divide by 100 then multiply by 7</p> <p>Partition a fraction in to parts to work with, i.e. 15% is 10% and 5%</p> <p>Use knowledge of multiplication facts to simplify fractions</p>	<p><b>Fractions</b></p> <p><b>I have had opportunities to use materials and visual representations to support my learning</b></p> <p><b>I understand and can use and explain the terms numerator and denominator</b></p> <p><b>I understand the concept of equivalence</b></p> <p><b>I can demonstrate simplification of proper fractions</b></p> <p><b>Fractions and Percentages</b></p> <p><b>I can solve problems involving percentages in context</b></p> <p><b>I can explain the relationship/equivalence of common fractions, decimals and percentages</b></p> <ul style="list-style-type: none"> <li>• I can explain what percentage means</li> <li>• I can use my knowledge of equivalent fractions to work out common percentages</li> <li>• I can explain what a percentage is and how to calculate a percentage of an amount</li> <li>• I can work out 10% of an amount by dividing by 10</li> <li>• I can find percentages which are a multiple of 10</li> <li>• I can work out 1% of an amount using my understanding of place value to divide by 100</li> <li>• I can multiply 1% to find other percentages</li> <li>• I can break down a percentage into chunks, e.g. to calculate 14% of a quantity, find 10% then 4%</li> <li>• I can work out any percentage of an amount using my knowledge of equivalent fractions and chunking multiples of 10% and 1%</li> <li>• I can work out calculations and compare and interpret the results</li> <li>• I can explain what a percentage is and how to calculate a percentage of an amount</li> <li>• I know that to work out a percentage I need to know how many there are altogether and how many are in the e.g. There are 50 children in total and 30 have school lunches. What percentage have school lunches?</li> <li>• I can write this as a fraction: <math>\frac{30}{50}</math></li> <li>• I can change my fraction so it has a denominator of 100 using my knowledge of equal fractions: <math>\frac{30}{50} = \frac{60}{100}</math></li> <li>• I can write my fraction as a percentage: <math>\frac{60}{100} = 60\%</math></li> </ul>	<p>HAM Teaching Cards FDP 2.20a, FDP 2.20b, FDP 2.20c</p> <p>Fractions</p> <p>TJ Level E Ch 6 Ex 1 Ex 2 pgs 67 – 70</p> <p><a href="http://nrich.maths.org/1275">http://nrich.maths.org/1275</a></p> <p><a href="http://www.topmarks.co.uk/">http://www.topmarks.co.uk/</a> - search fractions</p> <p><b>Percentages</b></p> <p>TJ Level D Ch 13 Ex 2 Ex 3 pg 145 – 146</p> <p>TJ 2a Ch 12 pg 109</p> <p>TJ 2b Ch 12 Consolidation of Fractions, Decimals and Percentages pgs 119 – 120 Qu 1-15</p> <p>TJ 2b Ch 12 Ex 1 (miss out Q8) Ex 2 Ex 3 Q 1 – 7 pgs 121 – 124</p> <p>H7 Teacher's Notes pgs 100 – 111</p> <p>H7 Tbk pgs 46 – 51</p> <p><a href="http://nrich.maths.org/1249">http://nrich.maths.org/1249</a></p> <p><a href="http://www.topmarks.co.uk/">http://www.topmarks.co.uk/</a> - search percentages</p>	<p><b>Write</b></p> <p>HAM Question Bank FDP 2.20a, FDP 2.20b, FDP 2.20c</p> <p><b>Write</b></p> <p>TJ Level D Ch 13 Topic in a Nutshell</p> <p><b>Write</b></p> <p>TJ Assessment Pack MNU 2-07a</p> <p><b>Write</b></p> <p>TJ 2b Ch 12 The 3 R's pg 126 Qu 1 – 8</p> <p><b>Do</b></p> <p>Ask each pair to find a percentage of a given amount. One child works out 1% and the other multiplies it to find the percentage.</p> <p><b>Say</b></p> <p>Call out a fraction. The children reply with an equivalent percentage. For variation, call out a percentage and they reply with the fraction.</p> <p><b>Do</b></p> <p>Ask children to find 10%, 50%, 20%, 5% and 1% of an amount. Then they create as many different percentages as they can by adding the percentages they know, e.g. <math>16\% = 10\% + 5\% + 1\%</math>.</p>

**Renfrewshire Council**  
**Numeracy and Mathematics Progression and Support - Second Level Pathway 3**

**Topic & CfE Outcome - Fractions, decimal fractions and percentages**

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**

**Benchmarks**

- Uses knowledge of equivalent forms of common fractions, decimal fractions and percentages, for example,  $\frac{3}{4} = 0.75 = 75\%$ , to solve problems.
- Calculates simple fractions of a quantity and uses this knowledge to solve problems, for example, find  $\frac{3}{5}$  of 60.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b>                      Equivalent fractions, decimal fractions and percentages for hundredths, i.e. 35% is equivalent to <math>\frac{35}{100}</math> and 0.35</p> <p>More complex but frequently used equivalent fractions, decimal fractions and percentages, i.e. 33% is equivalent to <math>\frac{1}{3}</math> or 0.33...</p> <p><b>Skills</b>                      (mentally, with jottings or materials if needed)</p> <p>Find multiples of 10% of whole numbers and quantities, e.g. 30% of 50ml, 40% of £30</p> <p>Calculate 1% by dividing by 100. Use this to find less common percentages, i.e. 17% of 30 - divide by 100 then multiply by 7</p> <p>Partition a fraction in to parts to work with, i.e. 15% is 10% and 5%</p>	<p><b>I understand the equivalence of fractions to decimals and vice versa</b></p> <p><b>I understand the equivalence of decimals to percentages and vice versa</b></p> <p><b>I understand the equivalence of fractions to percentages and vice versa</b></p> <p><b>I can choose my preferred process to solve problems and explain my choice and the process carried out</b></p> <p><b>Decimals</b></p> <p><b>I can explain equivalence of fraction within context</b></p> <p><b>I understand simple equivalence of fractions to 2 decimal places using money</b></p> <p><b>I can problem solve in context</b></p> <ul style="list-style-type: none"> <li>• I can discuss the different skills I have built up for fractions, decimals and percentages</li> <li>• I can look at a calculation and work out what it is asking me to do</li> <li>• I can compare the different skills and strategies I know and can decide which are helpful to solve a problem</li> <li>• I can solve a problem and can discuss how I solved it</li> <li>• I can choose a different strategy and compare them to see which is more helpful</li> </ul>	<p>HAM Teaching Cards FDP 2.21</p> <p>TJ Level E Ch 6                      Ex 3                      Ex 4                      Ex 5                      Ex 6 pgs 71 – 76</p> <p>H6 Teacher's Notes pgs 112 – 119</p> <p>H6 Tbk pgs 52 – 54</p> <p>H7 Teacher's Notes pgs 60 – 62</p> <p>H7 Tbk pg 21</p> <p>H7 Wbk pg 5</p>	<p><b>Write</b>                      HAM Question Bank FDP 2.21</p> <p><b>Write</b>                      TJ Level E Ch 6 Topic in a Nutshell</p> <p><b>Write</b>                      TJ Assessment Pack MNU 2-07b</p> <p><b>Say</b>                      Model writing a calculation on the board, talking out loud as you solve it, describing each step and why you are making that decision. Ask children if they would have done anything differently. Once you have completed a few different examples using different strategies, ask children to come out and lead an example.</p>

**Topic & CfE Outcome - Fractions, decimal fractions and percentages**

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**

**Benchmarks**

- Creates equivalent fractions and uses this knowledge to put a set of most commonly used fractions in order.
- Expresses fractions in their simplest form.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b> Equivalent fractions, decimal fractions and percentages for hundredths, i.e. 35% is equivalent to 0.35 and <math>\frac{35}{100}</math></p> <p>More complex but frequently used equivalent fractions, decimal fractions and percentages, i.e. 33% is equivalent to <math>\frac{1}{3}</math> or 0.33...</p> <p>Use knowledge of factors to simplify</p>	<p><b>I can demonstrate the equivalence of fractions using concrete materials and pictorial representations that help me make sense of the problem, i.e. bar model etc.</b></p> <p><b>I can create equivalent fractions confidently and explain my methods</b></p> <p><b>I can simplify fractions confidently and explain my thinking</b></p> <p><b>I understand the concept of and can find a lowest common denominator</b></p> <p><b>I can use simplification to order common fractions</b></p> <p><b>I can convert a mixed fraction into an improper fraction</b></p> <p><b>I can convert an improper fraction into a mixed number</b></p> <ul style="list-style-type: none"> <li>• I can apply these processes and strategies in contexts that are relevant in real-life</li> </ul>	<p>H7 Teacher's Notes pgs 60 – 62</p> <p>H7 Tbk pgs 21</p> <p>H7 Teacher's Notes pgs 62 – 73</p> <p>H7 Tbk pgs 22 – 27</p> <p>Linked to work in MNU 2-07a &amp; MNU 2-07b</p>	<p><b>Write</b> TJ 2b Consolidation of Fractions pgs 119 Q 1 - 5</p> <p><b>Write</b> TJ Assessment Pack MTH 2-07c</p>

Numeracy and Mathematics Progression and Support - Second Level Pathway 3

Topic & CfE Outcome - Money			
I can manage money, compare costs from different retailers, and determine what I can afford to buy. <b>MNU 2-09a</b>			
Benchmarks			
<ul style="list-style-type: none"> <li>- Carries out money calculations involving the four operations.</li> <li>- Compares costs and determines affordability within a given budget.</li> </ul>			
Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b></p> <p>Rounding for estimating total costs</p> <p>Number bonds to 100</p> <p>Counting on in 10s</p> <p><b>Skills</b> (mentally, with jottings and materials if needed)</p> <p>Apply mental strategies and skills from <b>MNU 2-03a</b> in context of money</p>	<p><b>I have investigated more complex offers – most cost effective, i.e. is it cost effective to travel further to buy something in order to save money on a deal?</b></p> <p><b>I can work to a budget to buy certain items</b></p> <p><b>I understand the benefits of saving to make purchases more affordable</b></p> <p><b>I can apply my mental agility strategies and the formal written method as appropriate to help with money calculations</b></p>	<p>TJ 2a Ch 8 Ex 5 pgs 76 – 78</p> <p>TJ 2b Ch 7 Ex 3 pg 68</p> <p>TJ Profit and Loss (Finance unit) Available for free-download from TJ website</p> <p>Linked to work in MNU 2-09c</p>	<p><b>Write</b></p> <p>TJ Assessment Pack MNU 2-09a</p>

**Topic & CfE Outcome - Money**

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**

**Benchmarks**

- Demonstrates understanding of the benefits and risks of using bank cards and digital technologies.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b></p> <p>Rounding for estimating total costs</p> <p>Number bonds to 100</p> <p>Counting on in 10s</p> <p><b>Skills</b> (mentally, with jottings and materials if needed)</p> <p>Apply mental strategies and skills from <b>MNU 2-03a</b> in context of money</p>	<p><b>I have investigated interest rates of various bank/credit cards</b></p> <p><b>I know how to compare rates for buying goods and taking out cash</b></p> <p><b>I have investigated debt and how this can mount up - including payment methods</b></p> <ul style="list-style-type: none"> <li>• I can talk about the ways I can access money</li> <li>• I can talk about representations of money such as vouchers, credit cards, rail/pre-pay tickets</li> <li>• I can give examples of where people keep the money they have and how they access it</li> <li>• I can talk about how people earn or obtain money</li> <li>• I can talk about how to be safe with money</li> <li>• I understand why people have bank or building society accounts</li> <li>• I can talk about the purpose of a bank and its features</li> <li>• I have explored different bank accounts and their benefits</li> <li>• I can discuss the different ways in which people might keep a log of their spending</li> <li>• I can interpret, discuss and check a bank statement in different formats</li> <li>• I understand that different countries use different currencies</li> <li>• I have explored how different currencies relate to pounds and know that the rate of exchange changes over time</li> <li>• I can change an amount from pounds to another currency</li> <li>• I can change an amount in another currency to pounds</li> <li>• I can use my estimation skills to work out roughly what something will cost in pounds when the price is displayed in a different currency</li> </ul>	<p>HAM Teaching Cards MF 2.1, MF 2.7, MF 2.8</p> <p>TJ 2 b Ch 7 Ex 1 Ex 2 pgs 66 – 67</p> <p>TJ 2 b Ch 7 Ex 5 Ex 6 Ex 7 Ex 8 pgs 71 - 78</p> <p>TJ Level E Ch 4 Ex 2 pgs 53 – 56</p>	<p><b>Write</b></p> <p>HAM Question Bank MF 2.1, MF 2.7, MF 2.8</p> <p><b>Write</b></p> <p>TJ 2a The 3R's pgs 79 Q1 – 4</p> <p><b>Write</b></p> <p>TJ Assessment Pack MNU 2-09b</p> <p><b>Say</b></p> <p>One at a time, call out a representation of money and children put their hand up if they have ever used it, for example, gift card, coin, voucher. Include some which they will not have used, such as a credit card, and discuss who uses them and when.</p> <p><b>Do</b></p> <p>Tell children how much was in an account at the start of the month and then list the different things money was spent on and their cost. They work out how much was left at the end of the month. Discuss the different ways to do this (e.g. count back or subtract each amount individually or work out the total spent and take this away from the initial amount).</p>

**Topic & CfE Outcome - Money**

I can use the terms profit and loss in buying and selling activities and can make simple calculations for this. **MNU 2-09c**

**Benchmarks**

- Calculates profit and loss accurately, for example, when working with a budget for an enterprise activity.

Mental Strategies	Skills	Possible Resources	Assessment																
<p><b>Recall</b> Rounding for estimating total costs</p> <p>Number bonds to 100</p> <p>Counting on in 10s</p> <p><b>Skills</b> (mentally, with jottings and materials if needed)</p> <p>Apply mental strategies and skills from <b>MNU 2-03a</b> in context of money</p>	<p><b>I can use processes already learned to calculate simple profit and loss</b></p> <p><b>I can explain the terms profit and loss</b></p> <p><b>I can describe making money using the term 'profit' and losing money using the term 'loss'</b></p> <p><b>I can calculate profit and loss in a context</b></p> <ul style="list-style-type: none"> <li>• I have talked about and understand the purpose of my project</li> <li>• I understand what profit and loss are, the implications of these and how I would calculate them</li> <li>• I can talk about the financial transactions that will be involved in my project and possible funding sources</li> <li>• I can work out the start-up and running costs of my project</li> <li>• I can create a plan with supporting calculations and can use this to decide whether to go ahead with the project</li> <li>• I can plan and present a pitch for funding for my project</li> <li>• I have explored the types of records I could keep to help me keep track of my project</li> <li>• I can maintain and monitor appropriate records to keep track of the financial status of my project</li> <li>• I can calculate the ongoing profit or loss of my project</li> <li>• I can make any changes necessary to ensure the project's success</li> <li>• I can present my accounts to a stakeholder</li> <li>• I can evaluate my project and make suggestions for future enterprise based on my experiences</li> </ul>	<p>HAM Teaching Cards MF 2.9, MF 2.10</p> <p>TJ 2b Ch 7 Ex 4 pg 69 – 70</p> <p>TJ Credit and debit cards (Finance unit) Available for free-download from TJ website</p>	<p><b>Write</b> HAM Question Bank MF 2.9, MF 2.10</p> <p><b>Write</b> TJ 2a Revisit – Review – Revise Q1 – 4 Pg 79</p> <p><b>Write</b> TJ Assessment Pack MNU 2-09c</p> <p><b>Write</b> TJ 2b Ch 7 The 3R's pg 80 Q15 - 18</p> <p><b>Make and Do</b> Revise the idea of profit and loss. Establish that profit is any money left over when the initial costs have been taken away from the money made during the sale, and that loss is when you didn't make enough money to cover your costs. Ask children to think about how much they will sell the cakes for in order to make a profit. You want to make a profit so you want to put a good price on them. But you also want to sell as many cakes as possible so can't make them too expensive. Discuss the amount of profit to aim for. Establish that if you charge twice as much as the cake cost to make, you will make 100% profit. Work out various percentages on the board, for example, for a large cup cake:</p> <table border="1"> <thead> <tr> <th>Cost</th><th>Add</th><th>Total</th><th>Profit</th></tr> </thead> <tbody> <tr> <td>40p</td><td>100%</td><td>80p</td><td>40p</td></tr> <tr> <td>40p</td><td>10%</td><td>44p</td><td>4p</td></tr> <tr> <td>40p</td><td>50%</td><td>60p</td><td>20p</td></tr> </tbody> </table> <p>Ask children to decide how much of a percentage they want to add to the cost of making the cake. Next, ask them to work in pairs to make up a price list. This also could be used in a presentation to the head teacher about a potential enterprise initiative.</p>	Cost	Add	Total	Profit	40p	100%	80p	40p	40p	10%	44p	4p	40p	50%	60p	20p
Cost	Add	Total	Profit																
40p	100%	80p	40p																
40p	10%	44p	4p																
40p	50%	60p	20p																



## Numeracy and Mathematics Progression and Support - Second Level Pathway 3

**Topic & CfE Outcome - Time**

I can use and interpret electronic and paper-based timetables and schedules to plan events and activities and to make time calculations as part of my planning. **MNU 2-10a**

**Benchmarks**

- Reads and records time in both 12 hour and 24 hour notation and converts between the two.
- Knows the relationships between commonly used units of time and carries out simple conversion calculations, for example, changes  $1\frac{3}{4}$  hours into minutes.
- Uses and interprets a range of electronic and paper-based timetables and calendars to plan events or activities and solve real life problems.
- 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.

Mental Strategies	Skills	Possible Resources	Assessment
<b>Recall</b> 1 hour = 60mins $\frac{3}{4}$ an hour = 45mins $\frac{1}{2}$ an hour = 30mins $\frac{1}{4}$ an hour = 15mins  12 o'clock after am is noon  12 o'clock after pm is midnight  <b>Skills</b> (mentally, with jottings and materials if needed)  Counting on and back in fives  <b>Partition:</b> count on or back in minutes and hours, bridging through 60 (analogue and digital times)  When calculating durations count on to the next hour, find the hours and add on the remaining minutes, e.g. from 10.25am to 12.10pm 10.25am → 11.00am 35mins 11.00am → 12.10pm 1hr 10m Duration is 1hr 45mins	<b>I can calculate duration in hours and minutes</b>  <b>I can calculate duration in seconds</b>  <b>I can use 24 hour times and relate it to 12 hour times</b>  <b>I can use time tables set out in both 12 and 24 hour clock times</b>  <ul style="list-style-type: none"> <li>• I can give examples of how people record times or dates that are important to them</li> <li>• I can interpret timetables, diaries and calendars and can ask and answer questions about the information they show</li> <li>• I can devise timetables, diaries and calendars to show my decisions and plans</li> <li>• I can plan for an event considering the time calculations and practicalities involved</li> </ul>	HAM Teaching Cards T 2.6  TJ Level E Ch 3 Ex 1 Ex 2 Ex 3 pgs 43 – 45  TJ 2a Ch 4 Ex 4 pg 33  TJ 2b Ch 3 Ex 1 Ex 2 pgs 21 – 24  H7 Teacher's Notes pgs 190 – 198  H7 Tbk pgs 87 – 91	<b>Write</b> HAM Question Bank T 2.6  Write TJ Level E Ch 3 Topic in a Nutshell  <b>Write</b> TJ Assessment Pack MNU 2-10a  <b>Do</b> Discuss a possible event in the school calendar, such as a, school trip, etc. Talk about why planning time is important for the context, for example, buses have to be booked, each class must have a chance to do different activities, etc. Talk about how to plan this and to find out times which are important. Children then work in pairs or small groups to create a timetable for the event. Where possible, encourage them to find out and use real-life facts and information, for example, using an online route planner to work out travel times, opening times, etc. They present their timetable to the class, giving reasons for their decisions, for example, We want the bus to leave for the museum at 8:30 am because it opens at 9 am and it will take half an hour to travel there.

## Numeracy and Mathematics Progression and Support - Second Level Pathway 3

**Topic & CfE Outcome - Time**

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****Benchmarks**

- Chooses the most appropriate timing device in practical situations and records using relevant units, including hundredths of a second.
- Selects the most appropriate unit of time for a given task and justifies choice.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b> 1 minute = 60 seconds</p> <p><b>Skills</b> (mentally, with jottings and materials if needed)</p> <p>Counting on and back in fives</p> <p><b>Partition:</b> count on or back in minutes and hours, bridging through 60 (analogue and digital times)</p>	<p><b>I can time various events</b></p> <p><b>I can make conversions between seconds, minutes and hours</b></p> <p><b>I can decide on the appropriate measurement for timing and event</b></p> <ul style="list-style-type: none"> <li>* I know that there are 60 seconds in a minute</li> <li>* I know that there are 100 milliseconds in a second</li> <li>* I can select appropriate devices to use to time events, i.e. stopwatch, use timer on phone/tablet device, sand timer</li> </ul>	<p>TJ Level E Ch 3 Ex 3 pgs 46 – 47</p>	<p><b>Write</b> TJ Assessment Pack MNU 2-10b</p> <p><b>Say</b> Give children a list of events and ask them what unit of measurement they feel appropriate to time them in, i.e. 100m sprint, marathon race. Ask the children to give reasons for their answers</p>

## Numeracy and Mathematics Progression and Support - Second Level Pathway 3

**Topic & CfE Outcome - Time**

Using simple time periods, I can give a good estimate of how long a journey should take, based on my knowledge of the link between time, speed and distance. **MNU 2-10c**

**Benchmarks**

- Estimates the duration of a journey based on knowledge of the link between speed, distance and time.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b> 1 minute = 60 seconds</p> <p>Know that speed = distance ÷ time</p> <p><b>Skills</b> (mentally, with jottings and materials if needed)</p> <p>Counting on and back in fives</p> <p><b>Partition:</b> count on or back in minutes and hours, bridging through 60 (analogue and digital times)</p>	<p><b>I have discussed experiences of different speeds and have a sense of what different speeds feel like</b></p> <p><b>I have undertaken practical investigation involving speed</b></p> <p><b>I know that speed is the distance travelled in a given time</b></p> <p><b>I can complete simple calculations using speed distance and time</b></p> <p><b>I can apply my knowledge of speed, distance and time to complete investigations and calculations</b></p> <ul style="list-style-type: none"> <li>• I am developing a sense of a broader range of time units and how they are used and I can select the most appropriate to solve a problem</li> <li>• I can devise and carry out practical experiments to solve problems involving time</li> <li>• I can use my knowledge of timetables, schedules and calendars to help me solve problems</li> <li>• I have explored the questions I need to ask in order to make decisions about journey times and modes of transport</li> <li>• I can look at a problem and decide how my knowledge of time can help me solve it</li> <li>• I can choose appropriate calculation skills to solve a problem</li> </ul>	<p>HAM Teaching Cards T 2.8, T 2.7</p> <p>TJ 2b Ch 9 Ex 1 Ex 2 Ex 3 pgs 87 – 92 Ex 4 pgs 92 – 93</p>	<p><b>Write</b> HAM Question Bank T 2.7 and T2.7</p> <p><b>Write</b> TJ Assessment Pack MNU 2-10c</p> <p><b>Do</b> Set questions giving different time periods and the distances travelled and ask children to calculate the speed by working out the distance travelled in an hour. I travelled 2 miles in 10 minutes. I travelled 200 miles in 2 hours. I travelled 270 miles in 9 hours. Children work individually or with a partner, write their responses on a whiteboard and then show them. Discuss how they worked it out. Ask children to come up with similar questions which could be worked out mentally using table facts.</p> <p><b>Do</b> Ask children to consider a trip or journey they would like to make, for example to the seaside, London, mainland Europe or a theme park. List their suggestions on the board. Choose one and discuss the questions that they might need to ask and find answers to in order to make decisions about the journey times and method of transport. Consider a trip to Belgium. What methods of transport could you use? They could drive and take a ferry or a train, or they could catch a bus to the airport and then fly. Discuss issues that might lead them to choose one method rather than another (e.g. cost, journey time, environmental issues).</p>

## Numeracy and Mathematics Progression and Support - Second Level Pathway 3

### Topic & CfE Outcome - Measurement

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 and

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

#### Benchmarks

- Uses the comparative size of familiar objects to make reasonable estimations of length, mass, area and capacity.
- 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).
- Converts between common units of measurement using decimal notation, for example, 550cm = 5.5m; 3.009kg = 3009g.
- Chooses the most appropriate measuring device for a given task and carries out the required calculation, recording results in the correct unit.
- Reads a variety of scales accurately.
- Shows awareness of imperial units used in everyday life, for example, miles or stones.

Mental Strategies	Skills	Possible Resources	Assessment
<b>Recall</b> 1 metre = 100cm $\frac{1}{2}$ metre = 50cm $\frac{1}{4}$ metre = 25cm $\frac{1}{10}$ metre = 10cm  10 millimetres = 1 cm  1 Kilometre = 1000 metres  <b>Skills</b> (mentally, with jottings and materials if needed)  When reading scales, work out the value of increments of the scale by reading two main points then count the number of intervals. Divide the amount between two main points by the number of intervals  Doubling and halving for estimating sizes  Rounding to the nearest 10 and 100  Multiplying and dividing by 100 and 1000 (Whole number answers only)	<b>I can use the length of a ruler or metre stick to estimate the lengths of items to the nearest cm</b>  <b>I can measure in mm, cm and m with increasing accuracy</b>  <b>I can read scales in a variety of graduations/intervals with increasing accuracy</b>  <b>Length</b> <ul style="list-style-type: none"> <li>• I can use kilometre, metre, centimetre and millimetre in calculations</li> </ul> <b>I can demonstrate a sense of imperial measurement and give examples, e.g. inches, feet, yards etc.</b>  <b>I can give examples of imperial units of length, when they are used and show that I have sense of their size</b>	<b>Length</b> TJ Level E Ch 10 Ex 1 pgs 118 – 120  TJ 2b Ch 13 Consolidation of Measurement (Length) pg 127  H6 Teacher's Notes pgs 154 – 157  H6 Tbk pgs 73 – 74  H7 Teacher's Notes pgs 148 – 149  H7 Tbk pg 68	<b>Do</b> Write one or more measurements or measurement words on the board. Children work in pairs or small groups and make up a word problem using the given words or measurements. Go around the groups and take examples for the others to solve.  <b>Do</b> On the board write a measurement or a word relating to measurement. Children work in small groups and make up as many questions as they can with this as the answer. For example, for 10 cm, they could write a simple question such as 'What is double 5 cm?' or they might write 'What is the length of a side of a square that has a perimeter of 40 cm?' or 'What is one tenth of a metre?' 'How else can you write 0.1 m?' Share their different types of questions.

**Topic & CfE Outcome - Measurement**

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** and

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 continued**

**Benchmarks**

- Uses the comparative size of familiar objects to make reasonable estimations of length, mass, area and capacity.
- 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).
- Converts between common units of measurement using decimal notation, for example, 550cm = 5.5m; 3.009kg = 3009g.
- Chooses the most appropriate measuring device for a given task and carries out the required calculation, recording results in the correct unit.
- Reads a variety of scales accurately.
- Shows awareness of imperial units used in everyday life, for example, miles or stones.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b></p> <p>1 kg = 1000g</p> <p><math>\frac{1}{2}</math> kg = 500g</p> <p><math>\frac{1}{4}</math> kg = 250g</p> <p><math>\frac{1}{10}</math> kg = 100g</p> <p><b>Skills</b> (mentally, with jottings and materials if needed)</p> <p>When reading scales, work out the value of increments of the scale by reading two main points then count the number of intervals. Divide the amount between two main points by the number of intervals</p> <p>Multiplying and dividing by 100 and 1000</p>	<p><b>I can demonstrate that I have a sense of weight of items, i.e. a bag of sugar and can use this to estimate the weight of other items to the nearest hundredth of a kg (10g)</b></p> <p><b>I can measure in g, and kg with increasing accuracy</b></p> <p><b>I can read scales in a variety of graduations/intervals with increasing accuracy</b></p> <p><b>Weight</b></p> <ul style="list-style-type: none"> <li>• I can use kilograms and grams in calculations</li> <li>• I have investigated the relationship between kilograms and grams</li> </ul> <p><b>I can demonstrate a sense of imperial measurement and give examples, e.g. stone, pound, ounce etc.</b></p> <p><b>I can give examples of imperial units of weight, when they are used and show that I have sense of their size</b></p>	<p><b>Weight</b></p> <p>TJ 2b Ch 13</p> <p>Consolidation of Measurement (Weight) pg 130</p> <p>H7 Teacher's Notes pgs 155 – 156</p> <p>H7 Tbk pgs 72 – 74</p>	<p><b>Do</b></p> <p>Write one or more measurements or measurement words on the board. Children work in pairs or small groups and make up a word problem using the given words or measurements. Go around the groups and take examples for the others to solve.</p> <p><b>Do</b></p> <p>On the board write a measurement or a word relating to measurement. Children work in small groups and make up as many questions as they can with this as the answer. For example, for 10g, they could write a simple question such as 'What is double 5g?' or they might write 'What is one tenth of a 100g?' 'How else can you write 0.1g?' Share their different types of questions.</p>

**Topic & CfE Outcome - Measurement**

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 and**

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 continued**

**Benchmarks**

- Uses the comparative size of familiar objects to make reasonable estimations of length, mass, area and capacity.
- 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).
- Converts between common units of measurement using decimal notation, for example, 550cm = 5.5m; 3.009kg = 3009g.
- Chooses the most appropriate measuring device for a given task and carries out the required calculation, recording results in the correct unit.
- Reads a variety of scales accurately.
- Shows awareness of imperial units used in everyday life, for example, miles or stones.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b></p> <p>1 l = 1000ml</p> <p><math>\frac{1}{2}</math> l = 500ml</p> <p><math>\frac{1}{4}</math> l = 250ml</p> <p><math>\frac{1}{10}</math> l = 100ml</p> <p><b>Skills</b> (mentally, with jottings and materials if needed)</p> <p>When reading scales, work out the value of increments of the scale by reading two main points then count the number of intervals. Divide the amount between two main points by the number of intervals</p> <p>Multiplying and dividing by 100 and 1000</p>	<p><b>I can demonstrate that I have a sense of certain volumes, i.e. litre of water and can use this to estimate capacity and volume to the hundredth of a litre (10ml)</b></p> <p><b>I can measure in ml and l, with increasing accuracy</b></p> <p><b>I can read scales in a variety of graduations/intervals with increasing accuracy</b></p> <p><b>Volume</b></p> <p><b>I can use litres and millilitres in calculations</b></p> <p><b>I have investigated the relationship between litres and millilitres</b></p> <ul style="list-style-type: none"> <li>• I can interpret a word or practical problem and decide which types of measure to use</li> <li>• I can solve a variety of word and practical problems working out the steps involved and estimating and measuring where appropriate</li> <li>• I can decide appropriate units to use in solving my problem and make any necessary conversions</li> <li>• I can decide how accurate I need to be</li> <li>• I can apply my calculation skills to help me solve the problem</li> <li>• I can record and explain my thinking so that it makes sense to somebody else</li> <li>• I can check that my solution addresses the original problem</li> <li>• I have reflected on my and others' ways of working and solutions and can talk about how I would approach similar problems in future</li> </ul>	<p><b>Volume</b></p> <p>HAM Teaching Cards M 2.6</p> <p>TJ Level D Ch 17 Ex 1 Ex 2 pgs 180 – 183</p> <p>TJ 2a Ch 13c Ex 4 pgs 137 – 139</p> <p>TJ 2b Ch 13 Consolidation of Measurement (Volume) pg 129 Qu 15 – 18</p> <p>TJ Level E Ch 16 Ex 3 pgs 189 – 191</p> <p>H7 Teacher's Notes pgs 172 – 173</p>	<p><b>Write</b></p> <p>HAM Question Bank M 2.6</p> <p><b>Write</b></p> <p>TJ Assessment Pack MNU 2-11a</p> <p><b>Write</b></p> <p>TJ Assessment Pack MNU 2-11b</p> <p><b>Do</b></p> <p>Write one or more measurements or measurement words on the board. Children work in pairs or small groups and make up a word problem using the given words or measurements. Go around the groups and take examples for the others to solve.</p> <p><b>Do</b></p> <p>On the board write a measurement or a word relating to measurement. Children work in small groups and make up as many questions as they can with this as the answer. For example, for 500ml, they could write a simple question such as 'What is half of a litre?'</p>

## Numeracy and Mathematics Progression and Support - Second Level Pathway 3

### Topic & CfE Outcome - Measurement

I can explain how different methods can be used to find the perimeter and area of a simple 2D shape or volume of a simple 3D object.

#### MNU 2-11c

#### Benchmarks

- Calculates the perimeter of simple straight sided 2D shapes in millimetres (mm), centimetres (cm) and metres (m).
- Calculates the area of squares, rectangles and right-angled triangles in square millimetres (mm<sup>2</sup>), square centimetres (cm<sup>2</sup>) and square metres (m<sup>2</sup>).
- Calculates the volume of cubes and cuboids in cubic centimetres (cm<sup>3</sup>) and cubic metres (m<sup>3</sup>).
- Demonstrates understanding of the conservation of measurement, for example, draw three different rectangles each with an area of 24 cm<sup>2</sup>.
- Draws squares and rectangles accurately with a given perimeter or area.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b></p> <p><math>A = l \times b</math></p> <p><math>A \text{ of } \Delta = (l \times b) \div 2</math></p> <p><math>V = l \times b \times h</math></p> <p>Recite and recall all multiplication and division facts</p> <p>When given a total, give possible factor pairs that would make the amount, e.g. <math>24 = 12 \times 2</math> or <math>6 \times 4</math> or <math>24 \times 1</math> and relate this to area</p> <p>Addition of several numbers and reordering numbers to make addition easier</p>	<p><b>Area</b></p> <ul style="list-style-type: none"> <li>• I can use the formula <math>l \times b</math> to calculate area of rectangles and squares</li> <li>• Calculate the area of composite shapes</li> <li>• Calculate area of right-angled triangles by halving area of square or rectangle</li> </ul> <p>• I have explored how to work out the area of a triangle using my knowledge of areas of squares and rectangles</p> <p>• I can create a compound shape using squares, rectangles and triangles</p> <p>• I can look at a compound shape and can split it into squares, rectangles and triangles</p> <p>• I can work out the area of squares, rectangles and triangles within a compound shape and can combine them to find the total area</p> <p><b>Perimeter</b></p> <ul style="list-style-type: none"> <li>• I can calculate the perimeter of shapes by adding lengths of sides using appropriate measurements</li> </ul> <p>• If I know the perimeter of a shape, with some further information I can calculate the lengths of the sides, i.e. a square with a perimeter of 16cm...4cm per side.</p> <p><b>Volume</b></p> <ul style="list-style-type: none"> <li>• Use cubed unit of measurement</li> <li>• I can calculate the volume of cubes and cuboids and investigate formula <math>l \times b \times h</math></li> </ul> <p>• I can talk about what volume and surface area are and the units we measure them in</p>	<p><b>Area</b></p> <p>HAM Teaching Cards M 2.4c</p> <p>TJ Level D Ch 14 Ex 5 Ex 6 Ex 7 pgs 156 – 162</p> <p>TJ Level E Ch 10 Ex 3 Ex 4 Ex 5 Ex 6 pgs 123 – 130</p> <p>TJ 2a Ch 13b Ex 3 pgs 127 – 128</p> <p>TJ 2b Ch 13 Consolidation of Measurement (Area) pg 128</p> <p>H7 Teacher's Notes pgs 160 – 167</p> <p>H7 Tbk pgs 75 – 77</p> <p><b>Perimeter</b></p> <p>TJ Level D Ch 14 Ex 4 pgs 154 – 155</p> <p>TJ Level E Ch 10 Ex 2 pgs 121 – 122</p> <p>TJ 2a Ch 13a Ex 4 Qu 5 – 10 pg 120</p> <p>H7 Teacher's Notes pgs 152 – 153</p> <p>H7 Tbk pg 71</p> <p><b>Volume</b></p> <p>HAM Teaching Cards M 2.4d</p> <p>TJ Level D Ch 17 Ex 4 pg 184</p>	<p><b>Write</b></p> <p>HAM Question Bank M 2.4c, MC 2.4d</p> <p><b>Write</b></p> <p>TJ Level D Ch 14 Topic in a Nutshell</p> <p><b>Write</b></p> <p>TJ Level E Ch 16 Topic in a Nutshell</p> <p><b>Write</b></p> <p>TJ 2a Ch 13 The 3 R's pg 129</p> <p><b>Write</b></p> <p>TJ Assessment Pack MNU 2-11c</p> <p><b>Do</b></p> <p>Call out or write up the length/base and height of a right-angled triangle. Children write the area on their whiteboard and hold this up to show you.</p> <p><b>Do</b></p> <p>Children work in pairs. Draw a triangle on the board and give measurements for the appropriate sides (i.e. for a right-angled triangle write measurements for the sides forming the right angle). One child works out the area of a rectangle with those dimensions and writes it on their whiteboard. The other child halves it and writes the answer on their whiteboard. Repeat for different triangles with children swapping roles.</p> <p><b>Make</b></p> <p>Children are given connecting cubes to use and a cubic volume. They work to create a cube or cuboid with the specified volume. Is there more than one solution?</p>

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	<ul style="list-style-type: none"> <li>• I can make two or more different solid shapes with the same volume using centimetre cubes</li> <li>• I can make a solid and tell you its volume</li> <li>• I can find the volume of a cube or cuboid by using my knowledge of arrays and multiplication facts</li> <li>• I can find the surface area of a simple 3D object using my measurement and calculation skills</li> </ul>	<p>TJ Level E Ch 16 pgs Ex 1 Ex 2 183 – 188</p> <p>TJ 2a Ch 13c Ex 4 pgs 137 – 139</p> <p>TJ 2b Ch 13 Consolidation of Measurement (Volume) Qu 19 –20 pg 129</p> <p>H7 Teacher's Notes pgs 170 – 172</p> <p>H7 Tbk pgs 79 – 80</p>	<p><b>Say and Do</b></p> <p>Roll a dice three times to give the dimensions of a cuboid in cm – children work out the volume in cubic centimetres. They write their responses on their whiteboards and they all show at the same time. Discuss how they worked it out and if they reordered the numbers to make them any easier. Repeat for different numbers.</p>
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## Numeracy and Mathematics Progression and Support - Second Level Pathway 3

**Topic & CfE Outcome - Mathematics – its impact on the world, past, present and future**

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**

**Benchmarks**

- Researches and presents examples of the impact mathematics has in the world of life and work.
- Contributes to discussions and activities on the role of mathematics in the creation of important inventions, now and in the past.

Mental Strategies	Skills	Possible Resources	Assessment
<b>Skills</b> (with jottings and materials if needed)  Apply mental strategies and skills from <b>MNU 2-03a</b> and <b>MNU 2-05a</b>	<p><b>I know that mathematics underpins scientific and technological progress</b></p> <p><b>I am developing an understanding about the needs of people and the important role mathematics plays in our everyday lives</b></p> <p><b>I know that statistics play an important role in changing minds and behaviour, i.e. Richard Doll's pioneering work connecting smoking with lung cancer</b></p> <p><b>I have studied some famous mathematicians</b></p> <p><b>Number Systems</b></p> <ul style="list-style-type: none"> <li>• <b>Pascal's Triangle</b></li> </ul> <ul style="list-style-type: none"> <li>• I can generate Pascal's triangle</li> <li>• I have investigated the patterns within Pascal's triangle</li> <li>• I have created patterns that are similar to Pascal's triangle</li> <li>• I can give examples of where statistics are used in everyday life, e.g. adverts, news items</li> </ul>	HAM Teaching Cards AT 2.7c	<p><b>Write</b>            HAM Question Bank AT 2.7c</p> <p><b>Write</b>            TJ Assessment Pack            MTH 2-12a</p> <p><b>Make</b>            Ask children to work in pairs to plan a short explanation showing others how to create Pascal's triangle and explaining what is special about the numbers it contains. Encourage them to describe patterns within the triangle and explain how to generate each new row.</p>

## Numeracy and Mathematics Progression and Support - Second Level Pathway 3

**Topic & CfE Outcome - Patterns and relationships**

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**

**Benchmarks**

- Explains and uses a rule to extend well known number sequences including square numbers, triangular numbers and Fibonacci sequence.
- Applies knowledge of multiples, square numbers and triangular numbers to generate number patterns.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b> Recall multiplication facts to 10 x 10 and the corresponding division facts</p> <p>Recall doubles of numbers 1 to 100 e.g. double 67, and corresponding halves e.g. half of 134</p> <p>Recall doubles of multiples of 10 and 100 and corresponding halves e.g. double 240, double 700 and half of 80, half of 600</p> <p>Double any 2 digit number, e.g. double 39</p> <p><b>Skill</b> (mentally, with jottings and materials if needed)</p> <p>Add or subtract any pair of two digit numbers, including crossing the 10s and 100 boundary, e.g. <math>87 + 18</math> and <math>82 - 35</math></p> <p>Add or subtract 2 or 3 digit multiples of 10 e.g. <math>130 + 20</math>, <math>120 - 30</math> and <math>470 - 280</math></p> <p>Double any multiple of 10 or 100, e.g. double 230 and double 700</p> <p>Halve any even number to 200</p>	<p><b>I can work with sequences and patterns involving square, cubed and triangular numbers</b></p> <ul style="list-style-type: none"> <li>• I can create different representations of square numbers</li> <li>• I can talk about how this pattern can be continued and can create the next few terms</li> <li>• Using my known number facts, I can work out the pattern and can describe how the pattern is formed</li> <li>• I can create a square number by multiplying a number by itself</li> <li>• I can use squared notation</li> <li>• I am beginning to recognise square numbers up to 100</li> <li>• I can create different representations of triangle and cube numbers</li> <li>• I can describe how the patterns are formed and, using my known number facts, I can work them out</li> <li>• I can talk about how to continue these patterns and can create the next few terms</li> <li>• I can create a cube number by multiplying a number by itself and by itself again</li> <li>• I can use cubed notation</li> <li>• I am beginning to recognise cube and triangular numbers</li> <li>• I can talk about the different types of patterns I know</li> <li>• I can use the differences to work out if a pattern has steps of the same size or different sizes</li> <li>• I can continue a sequence by looking at the previous terms and working out the rule</li> <li>• I can work out missing numbers in a sequence by working out the rule of the pattern</li> </ul>	<p>HAM Teaching Cards AT 2.7a, AT 2.7b, AT 2.10</p> <p>TJ Level D Ch 15 Ex 1 Q9 – 14 pg 169 – 170</p> <p>TJ Level E Ch 11 Ex 1 Ex 2 Ex 3 pgs 132 – 138</p> <p>TJ 2a Ch 15 Ex 3 pg 158</p> <p>H6 Teacher's Notes pg 127</p> <p>H6 Tbk pgs 57 – 58</p> <p>H7 Teacher's Notes pgs 116 – 119</p> <p>H7 Tbk pgs 52 – 53</p>	<p><b>Write</b> HAM Question Bank AT 2.7a, AT 2.7b, AT 2.10</p> <p><b>Write</b> TJ Assessment Pack MTH 2-13a</p> <p><b>Write</b> TJ Level E Ch 11 Topic in a Nutshell pg 144 Q1 – 6</p> <p><b>Do</b> Randomly hand out cards with the numbers of a pattern or sequence and ask children to line up in order. Other children write the pattern or sequence on their whiteboards and check if they were correct. To make this more challenging you could include a blank card which will be a missing number in the sequence. Children would have to work out where the missing number would be in the sequence and what the number should be.</p> <p><b>Do</b> Set a pattern. Children stand in a group and pass a ball or bean bag as they say the next number in the sequence. This can be done in any size of group from a pair standing across from each other up to the whole class in a circle.</p> <p><b>Do</b> Randomly write all over the board expressions related to cube numbers such as: <math>2 \times 2 \times 2</math>, 3 cubed, 8, 2 cubed, 2 to the power 3, 43, 27, <math>3 \times 3 \times 3</math>, 64, 33, etc. Ask children to come to the front and draw lines to connect related expressions and to rewrite the numbers to form a sequence of cube numbers in order.</p>

**Topic & CfE Outcome - Expressions and equations**

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**

**Benchmarks**

- Solves simple algebraic equations with one variable, for example,  $a - 30 = 40$  and  $4b = 20$ .

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b> Know what greater than, less than, equal to and not equal to means and be able to give examples, i.e. 36 is greater than 15. Tell me a number that is less than 21.</p> <p><b>Skills</b> (mentally, with jottings and materials if needed)</p> <p>Add or subtract a pair (or more) of numbers to demonstrate knowledge of equality, i.e. <math>23 + 3 = 18 + 8</math></p> <p>Find the value of a missing number by applying <b>inverse operations</b> -  <math>\Delta + 24 = 38</math>  <math>38 - 24 = 14</math>  <math>\Delta = 14</math></p> <p>Find the value of a missing number by applying <b>balancing</b> -  <math>\Delta + 24 = 38</math>  <math>\Delta + 24 - 24 = 38 - 24</math>  <math>\Delta = 14</math></p>	<p><b>I can calculate the value of a letter in an equation using more complex addition, subtraction, multiplication and division facts, i.e. <math>2x - 4 = 14</math></b></p> <p><b>I can create and solve simple equations</b></p> <p><b>I can solve word problems by creating and solving equations</b></p> <p><b>I can explain the strategies used to solve an equation</b></p> <ul style="list-style-type: none"> <li>• I understand that letters can be used to represent unknown numbers</li> <li>• I can work out how many of a letter there are and can write it using the appropriate form (e.g. <math>t + t + t = 3t</math>)</li> <li>• I can gather together terms letter and work out how many there are altogether using my number bonds (e.g. <math>2t + 4t - t = 5t</math>)</li> <li>• I have explored how to create an equation from a function machine</li> <li>• I can express an equation as a function machine</li> <li>• I can explain how each part of the equation relates to each part of the function machine</li> <li>• I can use inverse operations to work backwards through a function machine to work out the unknown value of the letter</li> <li>• I can check that my answer is sensible by using it as the input of the function machine</li> <li>• I can solve simple equations using my known number facts</li> <li>• I can draw or make a model of a balance to represent a simple equation</li> <li>• I know I have to find what balances the unknown number</li> <li>• I know I have to do the same thing to both sides to keep the equation balanced</li> <li>• I can work out what information I know and what I need to work out</li> <li>• I can use a letter to represent an unknown number</li> <li>• I can work out what operations are needed to solve a word problem</li> <li>• I can write an equation to represent the problem and solve it</li> <li>• I can look at what the answer means in terms of the word problem</li> <li>• I understand that finding the value of an unknown number will balance both sides of an equation</li> <li>• I understand that the balance remains when the same thing is done to both sides of the equation.</li> <li>• I can write an equation to represent a word problem and solve it</li> </ul>	<p>HAM Teaching Cards AT 2.9, AT 2.11, AT 2.12, AT 2.13</p> <p>TJ Level D Ch 7 pgs 75 – 84</p> <p>TJ level E Ch 8 Ex 1 pgs 92 – 93</p> <p>TJ 2a Ch 10 Ex 3 pgs 94 – 95</p> <p>TJ2b Ch 11 Consolidation of Algebra pg 108 Ex 1 Ex 2 Ex 3 pgs 109 – 113</p> <p>H7 Teacher's Notes pgs 118 – 122</p> <p>H7 Tbk pgs 54 – 56</p> <p><a href="http://www.mathsisfun.com/algebra/introduction.html">http://www.mathsisfun.com/algebra/introduction.html</a></p>	<p><b>Write</b> HAM Question Bank AT 2.9, AT 2.11, AT 2.12, AT 2.13</p> <p><b>Write</b> TJ Level D Ch 7 Topic in a Nutshell pgs 85 - 86 Q4 – 9</p> <p><b>Write</b> TJ 2a Ch 10 The 3 R's pg 96 Q4 – 6</p> <p><b>Write</b> TJ 2b Ch 11 The 3R's pg 118 Q1 – 4</p> <p><b>Write</b> TJ Assessment Pack MTH 2-15a</p> <p><b>Do</b> Write an equation on the board and have children work individually or in a pair to draw a function machine to solve it. Draw the function machine on the board and then work through it together to work out the value of the unknown letter.</p> <p><b>Do</b> Write an equation on the board. Children work in pairs. One child solves it by balancing and the other uses a function machine. Compare both methods. Which do they prefer?</p> <p><b>Make</b> Tell children the value of an unknown number, e.g. <math>t = 3</math>. They try to create an equation with this value, e.g. <math>5t + 2 = 17</math> To extend the challenge you could ask the children to make up a matching word problem to place it in context.</p>

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**Topic & CfE Outcome - Properties of 2D shapes and 3D objects**

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**

**Benchmarks**

- Describes 3D objects and 2D shapes using specific vocabulary including regular, irregular, diagonal, radius, diameter and circumference. Applies this knowledge to demonstrate understanding of the relationship between 3D objects and their nets.
- Identifies and describes 3D objects and 2D shapes within the environment and explains why their properties match their function.
- Knows that the radius is half of the diameter.

Mental Strategies	Skills	Possible Resources	Assessment
	<p><b>2D Shape</b></p> <ul style="list-style-type: none"> <li>• I can identify and name right angled, equilateral, isosceles and scalene triangles</li> <li>• I can use rigidity of triangles in model making</li> <li>• I can use vocabulary of circles; radius, diameter and circumference</li> <li>• I can define and classify quadrilaterals and discuss the properties of quadrilaterals</li> </ul> <p><b>3D Objects</b></p> <ul style="list-style-type: none"> <li>• I have investigated more complex 3D shapes and can discuss the names of the shapes and their properties</li> </ul>	<p><b>2D Shape</b></p> <p>TJ Level D Ch10 Ex 1 Ex 2 Qu 1 – 4 Ex 3 Pgs 118 – 121</p> <p>TJ 2a Ch 9 pgs 82 – 84</p> <p>TJ 2b Ch 10 Consolidation of 2D work pg 96 Ex 1, Ex 2, Ex 3, Ex 4 Ex 5, Ex 6 pgs 97 – 105 (Select aspects to focus on)</p> <p>H7 Teacher's Notes pgs 218 – 224</p> <p>H7 Tbk pgs 101 – 105</p> <p><b>3D Objects</b></p> <p>TJ Level D Ch 16 pgs 172 – 178</p> <p>TJ 2b Ch 16 Consolidation of 3-Dimensions pg 146</p> <p>H7 Teacher's Notes pgs 214 – 216</p> <p>H7 Tbk pgs 99 – 100</p>	<p><b>Write</b></p> <p>TJ Assessment Pack MTH 2-16a</p> <p><b>Write</b></p> <p>TJ Level D Ch 16 Topic in a Nutshell pg 179</p> <p><b>Make</b></p> <p>Provide children with art straws and ask them to make specified shapes using the straws. Children have to present their shape to others in their group, explaining the properties that their shape has. This could be completed for 2D shapes or 3D objects.</p> <p><b>Make</b></p> <p>Children to create a poster that explains the properties of different triangle types.</p>

## Numeracy and Mathematics Progression and Support - Second Level Pathway 3

**Topic & CfE Outcome - Properties of 2D shapes and 3D objects**Through practical activities, I can show my understanding of the relationship between 3D objects and their nets. **MTH 2-16b****Benchmarks**

- Describes 3D objects and 2D shapes using specific vocabulary including regular, irregular, diagonal, radius, diameter and circumference. Applies this knowledge to demonstrate understanding of the relationship between 3D objects and their nets.
- Identifies and describes 3D objects and 2D shapes within the environment and explains why their properties match their function.
- Knows that the radius is half of the diameter.

Mental Strategies	Skills	Possible Resources	Assessment
	<p><b>I can create nets of a:</b></p> <ul style="list-style-type: none"> <li>• Cube</li> <li>• Cuboid</li> <li>• Triangular prism</li> <li>• Triangular pyramid</li> <li>• Square based pyramid</li> </ul> <p>• I can look at a 3D object and visualise the net that it is made from – pentagonal prism, pentagonal pyramid, hexagonal prism, hexagonal pyramid, octahedron</p> <p>• From my visualisation, I can draw a net to create a simple 3D object</p> <p>• I can make a hollow 'skeleton' shape to match a given 3D object</p> <p>• I can take apart a hollow 3D object to create its net</p>	<p>HAM Teaching Cards SPM 2.1</p> <p>TJ 2b Ch 16 Ex 1 Ex 2 Ex 3 Ex 4 pgs 147 – 153</p> <p>H6 Teacher's Notes pgs 227 – 231</p> <p>H6 Tbk pgs 104 – 106</p> <p>Linked to work in MTH 2-16a</p> <p><a href="http://nrich.maths.org/1148">http://nrich.maths.org/1148</a></p>	<p><b>Write</b> HAM Question Bank SPM 2.1</p> <p><b>Write</b> TJ 2b Ch 16 The 3 R's pgs 154 – 155</p> <p><b>Write</b> TJ Assessment Pack MTH 2-16b</p> <p><b>Do</b> Draw part of a net on the board and ask children what you could add to complete it and what shape it would make. For example, if you draw three rectangles it could be completed in several different ways to create a cuboid, a triangular prism, etc.</p> <p><b>Say and Do</b> Start to draw a net on the board. As you do so, children quietly discuss with a partner what 3D object they think this is the net of and whether or not you have introduced a mistake. After a few minutes, stop and take children's suggestions. For example, is this the net of a cuboid? What needs to be corrected or added?</p>

Numeracy and Mathematics Progression and Support - Second Level Pathway 3

**Topic & CfE Outcome - Properties of 2D shapes and 3D objects**

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**

**Benchmarks**

- 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.

Mental Strategies	Skills	Possible Resources	Assessment
	<p>I can use set of compasses to draw triangles</p> <p>I can use rulers and set squares to draw squares and rectangles</p> <p>I can use rulers and a set of compasses or computer packages to represent 3D objects</p>	<p>TJ Level C Ch 14 Ex 2 pgs 157 – 158</p> <p>TJ Level D Ch 10 Ex 5 pgs 124 – 125</p> <p>TJ Level E Ch 14 Ex2 pgs 172 – 173</p> <p>TJ 2b Ch 5 Ex 1 Ex 2 Ex 3 pgs 42 – 47</p>	<p><u>Write</u></p> <p>TJ Assessment Pack MTH 2-16c</p>

## Numeracy and Mathematics Progression and Support - Second Level Pathway 3

**Topic & CfE Outcome - Angle, symmetry and transformation**

I have investigated angles in the environment, and can discuss, describe and classify angles using appropriate mathematical vocabulary.

**MTH 2-17a****Benchmarks**

- Uses mathematical language including acute, obtuse, straight and reflex to describe and classify a range of angles identified within shapes in the environment.

Mental Strategies	Skills	Possible Resources	Assessment
<b>Recall</b> Acute $1^\circ - 89^\circ$  Right $90^\circ$  Obtuse $91^\circ - 179^\circ$  Right $180^\circ$  Reflex $181^\circ - 259^\circ$  Full Turn $360^\circ$  <b>Skills</b> (mentally, with jottings and materials if needed)  Use addition and subtraction facts to calculate missing angles	<b>I can identify a right angle and know it is equal to <math>90^\circ</math></b>  <b>I can identify a straight angle and know it is equal to <math>180^\circ</math></b>  <b>I can identify an acute angle as being smaller than a right angle</b>  <b>I can identify an obtuse angle as being larger than a right angle but smaller than a straight angle</b>  <b>I can identify a reflex angle as being larger than an obtuse angle but less than <math>360^\circ</math></b>  <b>Investigate the above angles in the environment</b>  <b>I can confidently discuss that complementary angles add to <math>90^\circ</math> and supplementary angles add to <math>180^\circ</math></b>  <b>I know that vertically opposite angles are equal</b> <ul style="list-style-type: none"> <li>• I can compare the size of an angle with a right angle or straight line</li> <li>• I can use the words acute, obtuse, reflex and right angle to describe the angle between a pair of lines I have drawn</li> <li>• I can use the words acute, obtuse, reflex and right angle to describe the angles of a 2D shape I have made or I am given</li> </ul>	HAM Teaching Cards SPM 2.5a   TJ Level D Ch 8 Ex 5 Ex 6 Ex 7 pgs 93 – 97  TJ Level E Ch 12 Ex 1 pg 146  TJ 2b Ch 5 Ex 4 pg 48  H7 Teacher's Notes pgs 203 – 204  H7 Tbk pgs 93	<b>Write</b> HAM Question Bank SPM 2.5a  <b>Write</b> TJ Level D Ch 8 Topic in a Nutshell pgs 103 – 105 Q3-8  <b>Write</b> TJ Level 2a Ch 6 The 3R's pgs 60 - 61 Q3-5  <b>Write</b> TJ Level 2b Ch 5 The 3R's pgs 49 - 50 Q1, 2, 4, 5, 6 and 7  <b>Write</b> TJ Assessment Pack MTH 2-17a  <b>Do</b> Ask children to write a shape challenge, for example, 'Draw a shape with a right angle' or 'Draw a shape with an obtuse angle and two acute angles'. Collect their ideas. Read out one challenge – the class try to draw it and decide whether or not that challenge can be met. Take suggestions from the class and aim to reach consensus.  <b>Do</b> Call out a type of angle choosing from acute, right, obtuse, straight line and reflex. Each child draws an example of the specified angle on their whiteboard and marks the angle.

**Topic & CfE Outcome - Angle, symmetry and transformation**

I can accurately measure and draw angles using appropriate equipment, applying my skills to problems in context. **MTH 2-17b**

**Benchmarks**

- Measures and draws a range of angles to within  $\pm 2^\circ$
- Knows that complementary angles add up to  $90^\circ$  and supplementary angles add up to  $180^\circ$  and uses this knowledge to calculate missing angles.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Skills</b> (mentally, with jottings and materials if needed)</p> <p>Add any pair of numbers, including crossing the 10s and 100 boundary, e.g. <math>57 + 48</math></p> <p>Add 2 or 3 digit multiples of 10, e.g. <math>70 + 110</math></p>	<p><b>I can name angles using three letters</b></p> <p><b>I can measure angles to <math>360^\circ</math> accurately within 2 degrees</b></p> <p><b>I can draw angles to <math>360^\circ</math> accurately within 2 degrees</b></p> <ul style="list-style-type: none"> <li>• I can use a protractor to draw angles of a given size up to <math>180^\circ</math></li> <li>• I can use a protractor to draw angles of a given size up to <math>360^\circ</math></li> <li>• I can use my knowledge of right angles to check whether my drawn angle looks right</li> <li>• using my knowledge of angles I can calculate the size of a missing angle</li> </ul>	<p>HAM Teaching Cards SPM 2.5c</p> <p>TJ Level D Ch 8 Ex 2 Ex 3 Ex 4 pgs 88 – 93</p> <p>TJ Level E Ch 12 Ex 2 Ex 3 pgs 147 – 150</p> <p>TJ 2a Ch 6 Ex 2 Ex 3 Ex 4 pgs 53 – 57</p> <p>TJ 2b Ch 5 Consolidation of Angles pg 41 Qu1 -7 Ex 4 pg 48</p> <p>H7 Teacher's Notes pgs 200 – 203</p> <p>H7 Tbk pg 92</p>	<p><b>Write</b> HAM Question Bank SPM 2.5c</p> <p><b>Write</b> TJ Level D Ch 8 Topic in a Nutshell Qu 1 - 8</p> <p><b>Write</b> TJ Assessment Pack MTH 2-17b</p> <p><b>Do</b> Children work in pairs. The first child says a size of angle for the other child to draw. They draw the angle and pass it back to their partner who measures it to check. They repeat, swapping roles. You may want to specify the numbers of degrees they can use (e.g. less than <math>180^\circ</math>, multiples of <math>10^\circ</math>, etc.) or you may want them to choose any size of angle to challenge each other.</p>



Numeracy and Mathematics Progression and Support - Second Level Pathway 3

**Topic & CfE Outcome - Angle, symmetry and transformation**

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**

**Benchmarks**

- Interprets maps, models or plans with simple scales, for example, 1cm:2km.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b></p> <p>Recite and recall all multiplication and division facts</p>	<p><b>I have investigated where scale is used in real life, i.e. ordnance survey maps, architects drawings</b></p> <p><b>I can calculate actual measurements using scale</b></p> <p><b>I can convert more complex scales, e.g. in map work</b></p> <ul style="list-style-type: none"> <li>• I have explored why scale is used and who might use it</li> <li>• I can use my sense of scale when representing objects in my drawings and model making</li> <li>• I have interpreted drawings, plans and maps which use different scales</li> <li>• I can create a drawing, plan or map which uses a scale I have been given</li> <li>• I can choose an appropriate scale and use it when creating a drawing, plan or map</li> <li>• I can use scale to create models, maps and plans</li> </ul>	<p>HAM Teaching Cards M 2.5</p> <p>TJ Level E Ch 17 Ex 1 Ex 2 Ex 3 pgs 194 – 201</p> <p>TJ 2a Ch 6 Ex 2 pgs 55 – 56</p> <p>TJ 2b Ch 6 Ex 1 Ex 2 Ex 3 pgs 52 – 59</p> <p>H7 Teacher's Notes pgs 150 – 152</p> <p>H7 Tbk pgs 69 – 70</p>	<p><b>Write</b></p> <p>HAM Question Bank M 2.5</p> <p><b>Write</b></p> <p>TJ Assessment Pack MTH 2-17d</p> <p><b>Do</b></p> <p>Specify a scale, for example, 1:5. Children draw any rectangle on cm squared paper (using whole centimetre dimensions) and label the length and width in cm. Children swap their rectangle with a partner and they scale up each other's rectangle on plain paper, using the specified scale.</p> <p><b>Do</b></p> <p>Each child writes a problem involving scale on a piece of paper. For example, 'A road on a map is 7 cm long. The scale is 1:5000. How long is the road?' Take a question at random and read it out. Ask children to suggest how to solve the problem and answer the question.</p>

**Topic & CfE Outcome - Angle, symmetry and transformation**

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**

**Benchmarks**

- 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.

Mental Strategies	Skills	Possible Resources	Assessment
	<p><b>I can identify whether or not a shape has symmetry.</b></p> <p><b>I can create or complete more complex symmetrical patterns on squared paper including more complex patterns and designs, e.g. half squares, triangles etc.</b></p> <ul style="list-style-type: none"> <li>I have explored dividing up triangles and quadrilaterals and other polygons and can discuss the results</li> </ul>	<p>TJ Level D Ch 2 Ex 1 Ex 2 pgs 26 – 31</p> <p>TJ 2a Ch 2 Ex 2 Q2(i) – (k), 5 – 8</p> <p>TJ 2b Ch 2 Consolidation of Symmetry pg 14 Ex 1 pgs 15 – 18</p> <p><a href="http://www.topmarks.co.uk">www.topmarks.co.uk</a> and search line symmetry</p>	<p><b>Write</b> TJ Level D Ch 2 Topic in a Nutshell Qu 4 – 5</p> <p><b>Write</b> TJ Assessment Pack MTH 2-19a</p> <p><b>Write</b> TJ 2b Ch 2 The 3 R's pg 19</p> <p><b>Make</b> Provide children with small different coloured squares and ask them to create a symmetrical pattern. Change an aspect of the pattern by moving a square or squares and ask the child to fix the design to make it symmetrical.</p>

## Numeracy and Mathematics Progression and Support - Second Level Pathway 3

**Topic & CfE Outcome - Data and analysis**

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**

**Benchmarks**

- Analyses, interprets and draws conclusions from a variety of data.
- Draws conclusions about the reliability of data taking into account, for example, the author, the audience, the scale and sample size used.

Mental Strategies	Skills	Possible Resources	Assessment
<b>Recall</b> mean/ average  median - middle value of a list of ordered values  mode - most common value in a data set  <b>Skills</b> (mentally, with jottings and materials if needed)  Skip counting for the scale of an axis  Adding values and dividing by the number of values to find the average/mean  Put numbers in order to identify the median  Put numbers in order to identify the mode	<b>Interpret</b>  <b>I can take information from a table, graph, pie chart, spreadsheet or database</b>  <b>I can communicate my findings</b>  <b>I understand the meaning of average, mean, mode and frequency table</b>  <b>I can talk about why average values can be useful in different scenarios</b> <ul style="list-style-type: none"> <li>• I can talk about the key features of a pie chart and discuss information which is presented in this way</li> <li>• I can make visual comparisons of information presented in a pie chart</li> <li>• I can make a link between fractions and percentages and the information in a pie chart</li> <li>• I can create my own pie chart electronically</li> <li>• I have explored why I might want to work out an average</li> <li>• I can work out the mean, the mode and the median of a given set of numerical data</li> <li>• I can work out the range of a given set of numerical data</li> <li>• I can talk about why average values can be useful in different scenarios</li> </ul>	HAM Teaching Cards IH 2.7, IH 2.10  TJ Level D Ch 5 Ex 1 Ex 2 Ex 3 Ex 4 pgs 52 – 62  TJ Level E Ch 9 Ex 1 pgs 104 – 107  TJ 2a Ch 18 Ex 2 pgs 178 – 179  TJ 2b Ch 17 Consolidation of Statistics pgs 156 – 159 Omit Qu 4, 7 & 10  H6 Teacher's Notes pgs 258 – 262  H6 Tbk pgs 115 - 118  H7 Teacher's Notes pgs 231 – 234, 236 – 239  H7 Tbk pgs 109 – 110, 112 – 114  SHM 6 Tbk pgs 113 – 116, 118	<b>Write</b> HAM Question Bank IH 2.7, IH 2.10  <b>Write</b> TJ Level D Ch5 Topic in a Nutshell  <b>Write</b> TJ Assessment Pack MNU 2-20a  <b>Say</b> Write a colour key for a pie chart on the board and write a percentage next to all but one. Ask children to work out what percentage would complete the pie chart to give 100%. For example, If red is 50%, blue is 20% and green is 15%, what percentage is yellow?  <b>Say and Do</b> Tell children you are going to read out some statements. In pairs they should discuss whether or not each statement describes a possible use for a pie chart, and show if they agree by putting thumbs up or down. You could use a pie chart to: <ul style="list-style-type: none"> <li>• show the change in temperature from month to month</li> <li>• compare the number of votes for different parties in an election</li> <li>• show how a child spent their time during a day (e.g. sleeping, eating, watching TV, at school)</li> </ul>

## Numeracy and Mathematics Progression and Support - Second Level Pathway 3

**Topic & CfE Outcome - Data and analysis**

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**

**Benchmarks**

- Devises ways of collecting data in the most suitable way for the given task.
- 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.

Mental Strategies	Skills	Possible Resources	Assessment
	<p><b>I can use a database to gather, filter and sort information</b></p> <p><b>I can use spreadsheets to gather, filter and sort information</b></p> <p><b>I can explore and design questionnaires to help answer questions and solve problems</b></p> <ul style="list-style-type: none"> <li>• I can create spreadsheets, deciding what cells of information are required</li> <li>• I can show understanding of the need to be systematic when gathering information in order that the spreadsheet is complete</li> <li>• I can filter and sort the information held in a spreadsheet to find information</li> <li>• I can show that consideration has been given to who and how many people are needed for questioning in order to obtain answers needed</li> <li>• Having started a survey; decide whether there is a need to refine the questionnaire in order to obtain the best results</li> <li>• I can conduct a survey, collate results, make sense of the information gathered and decide what to do next</li> </ul>	<p>TJ 2b Ch 17 Consolidation of Statistics Qu 4 pg 157</p> <p>H7 Teacher's Notes pgs 230 – 231, 240 – 241</p> <p>H7 Tbk pgs 108, 115 – 116</p>	<p><u><b>Write</b></u></p> <p>TJ Assessment Pack MNU 2-20b</p>

**Topic & CfE Outcome - Data and analysis**

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**

**Benchmarks**

- Displays data appropriately making effective use of technology and chooses a suitable scale when creating graphs.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Skills</b> (mentally, with jottings and materials if needed)</p> <p>Skip counting for intervals on a scale</p>	<p><b>Display</b></p> <p><b>I can create a bar graph or line graph with the following:</b></p> <ul style="list-style-type: none"> <li>• Title</li> <li>• x and y axes labelled</li> <li>• Constant on x axis</li> <li>• Variable with appropriate scale on y axis</li> <li>• Equal spacing between bars</li> </ul> <p><b>When provided with a template I can display data as a pie chart</b></p> <ul style="list-style-type: none"> <li>• I can talk about how line graphs are useful in recording measurements over time</li> <li>• I can discuss the features of a line graph and find out information from it</li> <li>• I understand and can talk about the difference between discrete and continuous data</li> <li>• When making a line graph, I can choose an appropriate scale for both axes and plot measurements</li> <li>• I have explored how joining the points of measurement allows me to talk about what might be happening between them</li> </ul>	<p>HAM Teaching Cards IH 2.8, IH 2.11</p> <p>TJ Level E Ch 9 Ex 3 pgs 111 – 112</p> <p>TJ 2a Ch 18 Ex 3 Qu 7 – 10 pg 182</p> <p>TJ 2b Ch 17 Consolidation of Statistics Qu 7 &amp; 10 pgs 158 &amp; 159</p> <p>H7 Teacher's Notes pgs 235 – 236</p> <p>H7 Tbk pg 111</p> <p>Linked to MNU 2-20a &amp; MNU 2-20b</p>	<p><b>Write</b> HAM Question Bank IH 2.8, IH 2.11</p> <p><b>Write</b> TJ Assessment Pack MTH 2-21a</p> <p><b>Make</b> Create a table of data which could be represented in a line graph (e.g. changes in height of a plant or person, temperature over hours, etc.). Children work in small groups to plot this info on a blank line graph template, then join the points using straight lines to create a line graph. The context of the data should be relevant to the children, i.e. savings, school dinner uptake over a week etc.</p> <p><b>Make and Do</b> Give small groups of children a copy of a line graph template. Explain that you are going to tell a story and they have to represent what is happening in their line graph. Choose any context where things will change over time (e.g. a boy growing a plant, a snowman being built then melting, someone losing weight in a diet club, a footballer practising and getting better at scoring goals, etc.). They draw the graph to show the trends within the story and label the axes, including scales, appropriately. As an extra challenge you could ask groups to write a short story which other groups could turn into a graph.</p>

**Topic & CfE Outcome - Ideas of chance and uncertainty**

I can conduct simple experiments involving chance and communicate my predictions and findings using the vocabulary of probability.

**MNU 2-22a**

**Benchmarks**

- 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  $\frac{1}{6}$
- 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?'
- Uses data to predict the outcome of a simple experiment.

Mental Strategies	Skills	Possible Resources	Assessment
<p><b>Recall</b> Recall and practise times tables</p> <p>Recall types of numbers: even, odd, factors, multiples and squares</p> <p><b>Skills</b> (mentally, with jottings and materials if needed)</p> <p>Relate probabilities to fractions e.g. if the probability is 1 in 4 then it can also be written as <math>\frac{1}{4}</math></p>	<p><b>I can talk about how likely or unlikely it is that an event will happen</b></p> <p><b>I know that probability is a measure of likelihood</b></p> <ul style="list-style-type: none"> <li>• I can investigate when an outcome would have a good chance, poor chance or even chance of happening</li> <li>• I can place the likelihood of an event on a probability scale numbered 0–1</li> <li>• I have explored how to systematically create a list of all possible combinations and outcomes</li> <li>• I can represent the likelihood of a particular outcome numerically</li> <li>• I can discuss why this may be useful in everyday situations</li> </ul>	<p>HAM Teaching Cards IH 2.9</p> <p>TJ 2b Ch 18 Ex 2 pg 161 – 162</p> <p>H7 Teacher's Notes pgs 245 – 249</p> <p>H7 Tbk pgs 118 – 120</p>	<p><b>Write</b> HAM Question Bank IH 2.9</p> <p><b>Write</b> TJ 2b Ch18 The 3 R's pg 163</p> <p><b>Write</b> TJ Assessment Pack MNU 2-22a</p> <p><b>Say and Do</b> Draw a simple labelled probability scale on the board. Point to a place on the scale and children work in pairs and think of an event which would sit roughly around that position. Pairs share their suggestions with each other. Take some suggestions and add them to the line. Repeat for different positions.</p> <p><b>Do</b> Show children that you are putting 10 cubes into a bag: 1 is blue, 5 are green, 2 are yellow and 2 are pink. Ask children to write on their whiteboard the chance of randomly picking happening the following:</p> <ul style="list-style-type: none"> <li>• a blue cube</li> <li>• a green cube</li> <li>• a pink or yellow cube</li> <li>• a cube that is not pink.</li> </ul> <p>If they can, they write the probability as a fraction and a percentage. Discuss any differences in how children have written their answers.</p>

### Strategies

By the **END** of Second Level, Learners should understand when to use and be able to apply the following strategies. Knowledge of, understanding and application of these strategies should be built **across** the level.

- \* Emphasise the importance of using mental maths skills and recall in a variety of contexts, e.g. Money
- \* Explore and use correctly a variety of mathematical language related to addition, subtraction, multiplication and division

### Addition and Subtraction

- \* Emphasise the use of estimation and rounding in calculations
- \* Count on or back in hundreds, tens and ones. Progress to tenths then hundredths
- \* Subtract by counting up from the smaller to the larger number
- \* Reordering –  $25+3+15+8 = 25+15+8+3$
- \* Partitioning strategies:
  - $47+58$  - add tens and ones separately then recombine. Progress to hundreds
  - $91-35$  - subtract tens then ones. Progress to hundreds (Subtract in Chunks)
  - $56+29$  - add or subtract a multiple of 10 and adjust (Making Tens)
  - $38+37$  - double and adjust
- \*  $4.3+2.9 = 4.3+3 - 0.1$  – add or subtract a whole number and adjust
- How long from 3.45pm to 4.20pm? Count on and back in minutes and hours, bridging through 60 (analogue and digital times, progressing to 12 hour and 24 hour clock)
- Use knowledge of place value and related calculations, e.g.  $140+150=290$  using  $14+15=29$ . Progressing to decimals –  $6.3+4.8$  using  $63+48$ ,  $0.68+0.43$  using  $68+43$

Multiplication and Division

- \* Emphasise the use of estimation and rounding in calculations
- \* **32 x 5, 14 x 20** - Form an equivalent calculation, e.g. to multiply by 5 – multiply by 10 then halve, to multiply by 20 – double then multiply by 10 or multiply by 10 then double.
- \* **32 x 50, 48 x 25**, e.g. to multiply by 50 – multiply by 100 then halve. To multiply by 25 – multiply by 100, then halve and halve again
- \* **When dividing by 50**, form an equivalent calculation e.g. divide by 100 then double. To divide by 25 – divide by 100 then multiply by 4
- \* **4.3 x 10, 673 ÷ 100** – use understanding that when a number is multiplied or divided by 10 or 100, its digits move one or two places to the left or the right relative to the decimal point, and zero is used as a place holder
- \* **When calculating with multiples of 10**, use knowledge of multiplication and division facts and understanding of place value e.g. 60 x 30
- \* **Partitioning method for division** -  $98 \div 7 = (70 + 28) \div 7 = 10 + 4 = 14$
- \* Use knowledge of equivalence between fractions and percentages, e.g. to find 50% ( $\frac{1}{2}$ ), 25% ( $\frac{1}{4}$ ), 10% ( $\frac{1}{10}$ )
- \* **Scale up or down using multiplication and division** – e.g. if three oranges cost 24p: one orange costs  $24 \div 3 = 8$ p then four oranges cost  $8 \times 4 = 32$ p