



Education
Scotland
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Benchmarks

Numeracy and Mathematics

June 2017

Education Scotland's [Curriculum for Excellence \(CfE\) Statement for Practitioners](#) (Aug 2016) stated that the two key resources which support practitioners to plan learning, teaching and assessment are:

- **Experiences and Outcomes**
- **Benchmarks**

Benchmarks have been developed to provide clarity on the national standards expected within each curriculum area at each level. They set out clear lines of progression in literacy and English and numeracy and mathematics, and across all other curriculum areas from Early to Fourth Levels (First to Fourth Levels in Modern Languages). Their purpose is to make clear what learners need to know and be able to do to progress through the levels, and to support consistency in teachers' and other practitioners' professional judgements.

Skills development is integrated into the Benchmarks to support greater shared understanding. An understanding of skills and how well they are developing will enable learners to make links between their current learning and their future career options and employment.

Benchmarks draw together and streamline a wide range of previous assessment guidance (including significant aspects of learning, progression frameworks and annotated exemplars) into one key resource to support teachers' and other practitioners' professional judgement of children's and young people's progress across all curriculum areas.

Benchmarks have been designed to support professional dialogue as part of the moderation process to assess where children and young people are in their learning. They will help to support holistic assessment approaches across learning. They should not be ticked off individually for assessment purposes.

Benchmarks for literacy and numeracy should be used to support teachers' professional judgement of achievement of a level. In other curriculum areas, Benchmarks support teachers and other practitioners to understand standards and identify children's and young people's next steps in learning. Evidence of progress and achievement will come from a variety of sources including:

- observing day-to-day learning within the classroom, playroom or working area;
- observation and feedback from learning activities that takes place in other environments, for example, outdoors, on work placements;
- coursework, including tests;
- learning conversations;
- planned periodic holistic assessment; and
- information from standardised assessment.

Benchmarks in curriculum areas

Benchmarks in each curriculum area are designed to be concise and accessible, with sufficient detail to communicate clearly the standards expected for each curriculum level.

Teachers and other practitioners can draw upon the Benchmarks to assess the knowledge, understanding, and skills for learning, life and work which children are developing in each curriculum area.

In secondary schools, Benchmarks can support subject specialist teachers in making robust assessments of learners' progress and the standards they achieve. They will help teachers ensure that learners make appropriate choices and are presented at an appropriate level for National Qualifications in the senior phase. This can help avoid excessive workload for teachers and unnecessary assessments for learners. For example, learners should have achieved relevant Fourth level Experiences and Outcomes before embarking on the National 5 qualifications. Schools should take careful account of this when options for S4 are being agreed. Benchmarks should be used to help with these important considerations.

Literacy and numeracy

In literacy and numeracy, Benchmarks support teachers' professional judgement of achievement of a level. Teachers' professional judgements will be collected and published at national, local and school levels. It is important that these judgements are robust and reliable. This can only be achieved through effective moderation of planning learning, teaching and assessment.

Achievement of a level is based on teacher professional judgement, well informed by a wide range of evidence. Benchmarks should be used to review the range of evidence gathered to determine if the expected standard has been achieved and the learner has:

- achieved a **breadth** of learning across the knowledge, understanding and skills as set out in the Experiences and Outcomes for the level;
- responded consistently well to the level of **challenge** set out in the Experiences and Outcomes for the level and has moved forward to learning at the next level in some aspects; and
- demonstrated **application** of what they have learned in new and unfamiliar situations.

It is not necessary for learners to demonstrate mastery of every individual aspect of learning within Benchmarks at a particular level before moving on to the next level. However, it is important that there are no major gaps in children's and young people's learning when looking across the major organisers in each curriculum area.

Planning learning, teaching and assessment using the Benchmarks

In addition to the [Curriculum for Excellence \(CfE\) Statement for Practitioners](#) from HM Chief Inspector of Education, August 2016, on the purpose and use of Benchmarks, teachers and other practitioners should note the following advice.

KEY MESSAGES – WHAT TO DO	KEY MESSAGES – WHAT TO AVOID
<ul style="list-style-type: none"> Use literacy and numeracy Benchmarks to help monitor progress towards achievement of a level, and to support overall professional judgement of when a learner has achieved a level. 	<ul style="list-style-type: none"> Avoid undue focus on individual Benchmarks which may result in over-assessing or recording of learners' progress.
<ul style="list-style-type: none"> Become familiar with other curriculum area Benchmarks over time. 	<ul style="list-style-type: none"> Avoid the requirement to spend time collating excessive evidence to assess learners' achievement.
<ul style="list-style-type: none"> Use Benchmarks to help assess whether learners are making suitable progress towards the national standards expected and use the evidence to plan their next, challenging steps in learning. 	<ul style="list-style-type: none"> There is no need to provide curriculum level judgements in all curriculum areas – stick to literacy and numeracy.
<ul style="list-style-type: none"> Discuss Benchmarks within and across schools to achieve a shared understanding of the national standards expected across curriculum areas. 	<ul style="list-style-type: none"> Do not create excessive or elaborate approaches to monitoring and tracking.
	<ul style="list-style-type: none"> Do not assess Benchmarks individually. Plan periodic, holistic assessment of children's and young people's learning.
	<ul style="list-style-type: none"> Do not tick off individual Benchmarks.

Numeracy and Mathematical skills

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

- interpret questions;
- select and communicate processes and solutions;
- justify choice of strategy used;
- link mathematical concepts;
- use mathematical vocabulary and notation;
- use mental agility;
- reason algebraically; and
- determine the reasonableness of a solution.

The table below provides a brief outline of the key features of each skill.

Numeracy and mathematical skill	Key features of the skill	Additional guidance
Interpret questions	<ul style="list-style-type: none"> • selects the relevant information • interprets data • highlights key words or phrases • makes notes • draws diagrams • chooses appropriate operations. 	<p><i>Learners need to:</i></p> <ul style="list-style-type: none"> • interpret questions successfully in order to work out solutions; • select relevant information and be able to identify redundant or missing information in a question; • interpret data and understand information presented to work out the solution; • be supported to develop their skills of interpreting questions by highlighting key words or phrases, making notes or drawing diagrams; and • make important decisions about which operations to choose when solving a word problem.

<p>Select and communicate processes and solutions</p>	<ul style="list-style-type: none"> explains choice of process shares thinking verbalises or demonstrates thought processes. 	<p><i>Learners need to:</i></p> <ul style="list-style-type: none"> be able to explain why they have chosen a particular process as it demonstrates their understanding of the task, question or assessment; have frequent opportunities to discuss their thinking with their peers and teachers; select from a range of processes and increasingly choose processes which are most efficient; discuss their solutions to verbalise their thought process, either through explaining their thinking or demonstrating it pictorially; and become more confident in their abilities to select from a growing repertoire of strategies, articulate their chosen approaches with increasing clarity and make greater use of specialised vocabulary.
<p>Justify choice of strategy used</p>	<ul style="list-style-type: none"> shows and talks through their thinking explains their strategy justifies choice of strategy compared to other approaches. 	<p><i>Learners need to:</i></p> <ul style="list-style-type: none"> show and talk through their thinking to better understand and explain their own strategies; regularly work in pairs and groups to learn with and from each other to refine their strategies; and justify their choice of strategy, identifying the most efficient strategies for different types of task.
<p>Link mathematical concepts</p>	<ul style="list-style-type: none"> understands and applies links between mathematical concepts transfers learning in one area to another uses connections to solve problems. 	<p><i>Learners need to:</i></p> <ul style="list-style-type: none"> be able to link mathematical concepts through inverse operations and equivalences; and transfer and apply their knowledge and skills within numeracy and mathematics and across the curriculum to solve a range of problems.
<p>Use mathematical vocabulary and notation</p>	<ul style="list-style-type: none"> uses correct mathematical vocabulary 	<p><i>Learners need to:</i></p> <ul style="list-style-type: none"> apply the correct mathematical vocabulary, notation and appropriate units in a range of contexts.

Mental agility	<ul style="list-style-type: none"> • knowledge of number facts • manipulates numbers. 	<p><i>Learners need to:</i></p> <ul style="list-style-type: none"> • develop fluency in mental processes through a sound knowledge of key number facts; and • use strategies to manipulate an appropriate range of numbers and apply these to solve open-ended problems.
Reason algebraically	<ul style="list-style-type: none"> • finds the unknown quantity • understands and uses the commutative, associative and distributive laws. 	<p><i>Learners need to:</i></p> <ul style="list-style-type: none"> • understand that numbers can be replaced by pictures or symbols and use this to solve problems; and • apply commutative, associative and distributive laws to work with expressions and equations.
Determine the reasonableness of a solution	<ul style="list-style-type: none"> • routinely uses estimation and rounding skills • selects the most appropriate degree of accuracy. 	<p><i>Learners need to:</i></p> <ul style="list-style-type: none"> • use estimation and rounding to estimate and check the reasonableness of a solution; • consider the context of the question when determining the reasonableness of the solution; and • select the appropriate degree of accuracy for the given task.

Early Level Numeracy and Mathematics

	Curriculum organisers	Experiences and Outcomes for planning learning, teaching and assessment	Benchmarks to support practitioners' professional judgement of achievement of a level
Number, money and measure	Estimation and rounding	<p><i>I am developing a sense of size and amount by observing, exploring, using and communicating with others about things in the world around me.</i></p> <p style="text-align: right;"><i>MNU 0-01a</i></p>	<ul style="list-style-type: none"> • <i>Recognises the number of objects in a group, without counting (subitising) and uses this information to estimate the number of objects in other groups.</i> • <i>Checks estimates by counting.</i> • <i>Demonstrates skills of estimation in the contexts of number and measure using relevant vocabulary, including less than, longer than, more than and the same.</i>
	Number and number processes	<p><i>I have explored numbers, understanding that they represent quantities, and I can use them to count, create sequences and describe order.</i></p> <p style="text-align: right;"><i>MNU 0-02a</i></p> <p><i>I use practical materials and can 'count on and back' to help me understand addition and subtraction, recording my ideas and solutions in different ways.</i></p> <p style="text-align: right;"><i>MNU 0-03a</i></p>	<ul style="list-style-type: none"> • <i>Explains that zero means there is none of a particular quantity and is represented by the numeral 0.</i> • <i>Recalls the number sequence forwards within the range 0 - 30, from any given number.</i> • <i>Recalls the number sequence backwards from 20.</i> • <i>Identifies and recognises numbers from 0 to 20.</i> • <i>Orders all numbers forwards and backwards within the range 0 - 20.</i> • <i>Identifies the number before, the number after and missing numbers in a sequence within 20.</i> • <i>Uses one-to-one correspondence to count a given number of objects to 20.</i> • <i>Identifies 'how many?' in regular dot patterns, for example, arrays, five frames, ten frames, dice and irregular dot patterns, without having to count (subitising).</i> • <i>Groups items recognising that the appearance of the group has no effect on the overall total (conservation of number).</i> • <i>Uses ordinal numbers in real life contexts, for example, 'I am third in the line'.</i> • <i>Uses the language of before, after and in-between.</i> • <i>Counts on and back in ones to add and subtract.</i> • <i>Doubles numbers to a total of 10 mentally.</i> • <i>When counting objects, understands that the number name of the last object counted is the name given to the total number of objects in the group.</i>

The statements in ***bold and italics*** in both the Experiences and Outcomes and the Benchmarks are the responsibility of all and as such, evidence from across the curriculum should be considered when making judgements about achieving a level.

		<ul style="list-style-type: none"> • Partitions quantities to 10 into two or more parts and recognises that this does not affect the total. • Adds and subtracts mentally to 10. • Uses appropriately the mathematical symbols +, - and =. • Solves simple missing number problems.
Multiples, factors and primes	There are no Experiences and Outcomes at early level.	There are no Experiences and Outcomes at early level.
Powers and roots	There are no Experiences and Outcomes at early level.	There are no Experiences and Outcomes at early level.
Fractions, decimal fractions and percentages	<p><i>I can share out a group of items by making smaller groups and can split a whole object into smaller parts.</i></p> <p><i>MNU 0-07a</i></p>	<ul style="list-style-type: none"> • <i>Splits a whole into smaller parts and explains that equal parts are the same size.</i> • <i>Uses appropriate vocabulary to describe halves.</i> • <i>Shares out a group of items equally into smaller groups.</i>
Money	<p><i>I am developing my awareness of how money is used and can recognise and use a range of coins.</i></p> <p><i>MNU 0-09a</i></p>	<ul style="list-style-type: none"> • <i>Identifies all coins to £2.</i> • <i>Applies addition and subtraction skills and uses 1p, 2p, 5p and 10p coins to pay the exact value for items to 10p.</i>
Time	<p><i>I am aware of how routines and events in my world link with times and seasons, and have explored ways to record and display these using clocks, calendars and other methods.</i></p> <p><i>MNU 0-10a</i></p>	<ul style="list-style-type: none"> • <i>Links daily routines and personal events to time sequences.</i> • <i>Names the days of the week in sequence, knows the months of the year and talks about features of the four seasons in relevant contexts.</i> • <i>Recognises, talks about and where appropriate, engages with everyday devices used to measure or display time, including clocks, calendars, sand timers and visual timetables.</i> • <i>Reads analogue and digital o'clock times (12 hour only) and represents this on a digital display or clock face.</i>

The statements in **bold and italics** in both the Experiences and Outcomes and the Benchmarks are the responsibility of all and as such, evidence from across the curriculum should be considered when making judgements about achieving a level.

			<ul style="list-style-type: none"> • <i>Uses appropriate language when discussing time, including before, after, o'clock, hour hand and minute hand.</i>
	Measurement	<p><i>I have experimented with everyday items as units of measure to investigate and compare sizes and amounts in my environment, sharing my findings with others.</i></p> <p><i>MNU 0-11a</i></p>	<ul style="list-style-type: none"> • <i>Shares relevant experiences in which measurements of lengths, heights, mass and capacities are used, for example, in baking.</i> • <i>Describes common objects using appropriate measurement language, including tall, heavy and empty.</i> • <i>Compares and describes lengths, heights, mass and capacities using everyday language, including longer, shorter, taller, heavier, lighter, more and less.</i> • <i>Estimates, then measures, the length, height, mass and capacity of familiar objects using a range of appropriate non-standard units.</i>
	Mathematics – its impact on the world, past, present and future	There are no Experiences and Outcomes at early level.	There are no Experiences and Outcomes at early level.
	Patterns and relationships	<p>I have spotted and explored patterns in my own and the wider environment and can copy and continue these and create my own patterns.</p> <p><i>MTH 0-13a</i></p>	<ul style="list-style-type: none"> • Copies, continues and creates simple patterns involving objects, shapes and numbers. • Explores, recognises and continues simple number patterns. • Finds missing numbers on a number line within the range 0 - 20.
	Expressions and equations	There are no Experiences and Outcomes at early level.	There are no Experiences and Outcomes at early level.

Shape, position and movement	Properties of 2D shapes and 3D objects	<p>I enjoy investigating objects and shapes and can sort, describe and be creative with them.</p> <p>MTH 0-16a</p>	<ul style="list-style-type: none"> Recognises, describes and sorts common 2D shapes and 3D objects according to various criteria, for example, straight, round, flat and curved.
	Angle, symmetry and transformation	<p>In movement, games, and using technology I can use simple directions and describe positions.</p> <p>MTH 0-17a</p> <p>I have had fun creating a range of symmetrical pictures and patterns using a range of media.</p> <p>MTH 0-19a</p>	<ul style="list-style-type: none"> Understands and correctly uses the language of position and direction, including in front, behind, above, below, left, right, forwards and backwards, to solve simple problems in movement games. Identifies, describes and creates symmetrical pictures with one line of symmetry.
Information handling	Data and analysis	<p><i>I can collect objects and ask questions to gather information, organising and displaying my findings in different ways.</i></p> <p>MNU 0-20a</p> <p><i>I can match objects, and sort using my own and others' criteria, sharing my ideas with others.</i></p> <p>MNU 0-20b</p>	<ul style="list-style-type: none"> Asks simple questions to collect data for a specific purpose. Collects and organises objects for a specific purpose. Applies counting skills to ask and answer questions and makes relevant choices and decisions based on the data. Contributes to concrete or pictorial displays where one object or drawing represents one data value, using digital technologies as appropriate. Uses knowledge of colour, shape, size and other properties to match and sort items in a variety of different ways. Interprets simple graphs, charts and signs and demonstrates how they support planning, choices and decision making.

		<p><i>I can use the signs and charts around me for information, helping me plan and make choices and decisions in my daily life.</i></p> <p><i>MNU 0-20c</i></p>	
	<p>Ideas of chance and uncertainty</p>	<p>There are no Experiences and Outcomes at early level.</p>	<p>There are no Experiences and Outcomes at early level.</p>

First Level Numeracy and Mathematics

	Curriculum organisers	Experiences and Outcomes for planning learning, teaching and assessment	Benchmarks to support practitioners' professional judgement of achievement of a level
Number, money and measure	Estimation and rounding	<p><i>I can share ideas with others to develop ways of estimating the answer to a calculation or problem, work out the actual answer, then check my solution by comparing it with the estimate.</i></p> <p style="text-align: right;"><i>MNU 1-01a</i></p>	<ul style="list-style-type: none"> • <i>Uses strategies to estimate an answer to a calculation or problem, for example, doubling and rounding.</i> • <i>Rounds whole numbers to the nearest 10 and 100 and uses this routinely to estimate and check the reasonableness of a solution.</i>
	Number and number processes	<p><i>I have investigated how whole numbers are constructed, can understand the importance of zero within the system and can use my knowledge to explain the link between a digit, its place and its value.</i></p> <p style="text-align: right;"><i>MNU 1-02a</i></p>	<ul style="list-style-type: none"> • <i>Reads, writes, orders and recites whole numbers to 1000, starting from any number in the sequence.</i> • <i>Demonstrates understanding of zero as a placeholder in whole numbers to 1000.</i> • <i>Uses correct mathematical vocabulary when discussing the four operations including, subtract, add, sum of, total, multiply, product, divide and shared equally.</i> • <i>Identifies the value of each digit in a whole number with three digits, for example, $867 = 800 + 60 + 7$.</i> • <i>Counts forwards and backwards in 2s, 5s, 10s and 100s.</i> • <i>Demonstrates understanding of the commutative law, for example, $6 + 3 = 3 + 6$ or $2 \times 4 = 4 \times 2$.</i> • <i>Applies strategies to determine multiplication facts, for example, repeated addition, grouping, arrays and multiplication facts.</i> • <i>Solves addition and subtraction problems with three digit whole numbers.</i> • <i>Adds and subtracts multiples of 10 or 100 to or from any whole number to 1000.</i> • <i>Applies strategies to determine division facts, for example, repeated subtraction, equal groups, sharing equally, arrays and multiplication facts.</i>

The statements in ***bold and italics*** in both the Experiences and Outcomes and the Benchmarks are the responsibility of all and as such, evidence from across the curriculum should be considered when making judgements about achieving a level.

	<p><i>I can use addition, subtraction, multiplication and division when solving problems, making best use of the mental strategies and written skills I have developed.</i></p> <p><i>MNU 1-03a</i></p>	<ul style="list-style-type: none"> • <i>Uses multiplication and division facts to solve problems within the number range 0 to 1000.</i> • <i>Multiplies and divides whole numbers by 10 and 100 (whole number answers only).</i> • <i>Applies knowledge of inverse operations (addition and subtraction; multiplication and division).</i> • <i>Solves two step problems.</i>
<p>Multiples, factors and primes</p>	<p>There are no Experiences and Outcomes at first level.</p>	<p>There are no Experiences and Outcomes at first level.</p>
<p>Powers and roots</p>	<p>There are no Experiences and Outcomes at first level.</p>	<p>There are no Experiences and Outcomes at first level.</p>
<p>Fractions, decimal fractions and percentages</p>	<p><i>Having explored fractions by taking part in practical activities, I can show my understanding of:</i></p> <ul style="list-style-type: none"> • <i>how a single item can be shared equally;</i> • <i>the notation and vocabulary associated with fractions; and</i> • <i>where simple fractions lie on the number line.</i> <p><i>MNU 1-07a</i></p>	<ul style="list-style-type: none"> • <i>Explains what a fraction is using concrete materials, pictorial representations and appropriate mathematical vocabulary.</i> • <i>Demonstrates understanding that the greater the number of equal parts, the smaller the size of each share.</i> • <i>Uses the correct notation for common fractions to tenths, for example, $\frac{1}{2}$, $\frac{2}{3}$ and $\frac{5}{8}$.</i> • <i>Compares the size of fractions and places simple fractions in order on a number line.</i> • <i>Uses pictorial representations and other models to demonstrate understanding of simple equivalent fractions, for example, $\frac{1}{2} = \frac{2}{4} = \frac{3}{6}$.</i> • <i>Explains the role of the numerator and denominator.</i> • <i>Uses known multiplication and division facts and other strategies to find unit fractions of whole numbers, for example, $\frac{1}{2}$ or $\frac{1}{4}$.</i>

		<p><i>Through exploring how groups of items can be shared equally, I can find a fraction of an amount by applying my knowledge of division.</i> <i>MNU 1-07b</i></p> <p>Through taking part in practical activities including use of pictorial representations, I can demonstrate my understanding of simple fractions which are equivalent. <i>MTH 1-07c</i></p>	
	<p>Money</p>	<p><i>I can use money to pay for items and can work out how much change I should receive.</i> <i>MNU 1-09a</i></p> <p><i>I have investigated how different combinations of coins and notes can be used to pay for goods or be given in change.</i> <i>MNU 1-09b</i></p>	<ul style="list-style-type: none"> • <i>Identifies and uses all coins and notes to £20 and explores different ways of making the same total.</i> • <i>Records amounts accurately in different ways using the correct notation, for example, 149p = £1.49 and 7p = £0.07.</i> • <i>Uses a variety of coin and note combinations, to pay for items and give change within £10.</i> • <i>Applies mental agility number skills to calculate the total spent in a shopping situation and is able to calculate change.</i> • <i>Demonstrates awareness of how goods can be paid for using cards and digital technology.</i>

<p>Time</p>	<p><i>I can tell the time using 12 hour clocks, realising there is a link with 24 hour notation, explain how it impacts on my daily routine and ensure that I am organised and ready for events throughout my day.</i> MNU 1-10a</p> <p><i>I can use a calendar to plan and be organised for key events for myself and my class throughout the year.</i> MNU 1-10b</p> <p><i>I have begun to develop a sense of how long tasks take by measuring the time taken to complete a range of activities using a variety of timers.</i> MNU 1-10c</p>	<ul style="list-style-type: none"> • <i>Tells the time using half past, quarter past and quarter to using analogue and digital 12 hour clocks.</i> • <i>Records 12 hour times using am and pm and is able to identify 24 hour notation, for example, on a mobile phone or computer.</i> • <i>Records the date in a variety of ways, using words and numbers.</i> • <i>Uses and interprets a variety of calendars and 12 hour timetables to plan key events.</i> • <i>Knows the number of seconds in a minute, minutes in an hour, hours in a day, days in each month, weeks and days in a year.</i> • <i>Orders the months of the year and relates these to the appropriate seasons.</i> • <i>Selects and uses appropriate timers for specific purposes.</i>
<p>Measurement</p>	<p><i>I can estimate how long or heavy an object is, or what amount it holds, using everyday things as a guide, then measure or weigh it using appropriate instruments and units.</i> MNU 1-11a</p>	<ul style="list-style-type: none"> • <i>Uses knowledge of everyday objects to provide reasonable estimates of length, height, mass and capacity.</i> • <i>Makes accurate use of a range of instruments including rulers, metre sticks, digital scales and measuring jugs when measuring lengths, heights, mass and capacities using the most appropriate instrument for the task.</i> • <i>Records measurements of length, height, mass and capacity to the nearest standard unit, for example, millimetres (mm), centimetres (cm), grams (g), kilograms (kg), millilitres (ml), litres (l).</i>

		<p><i>I can estimate the area of a shape by counting squares or other methods.</i></p> <p><i>MNU 1-11b</i></p>	<ul style="list-style-type: none"> • <i>Compares measures with estimates.</i> • <i>Uses knowledge of relationships between units of measure to make simple conversions, for example, 1 m 58 cm = 158 cm.</i> • <i>Reads a variety of scales on measuring devices including those with simple fractions, for example, $\frac{1}{2}$ litre.</i> • <i>Uses square grids to estimate then measure the areas of a variety of simple 2D shapes to the nearest half square.</i> • <i>Creates shapes with a given area to the nearest half square using square tiles or grids.</i> • <i>Recognises that different shapes can have the same area (conservation of area).</i>
	<p>Mathematics – its impact on the world, past, present and future</p>	<p>I have discussed the important part that numbers play in the world and explored a variety of systems that have been used by civilisations throughout history to record numbers.</p> <p><i>MTH 1-12a</i></p>	<ul style="list-style-type: none"> • Investigates and shares understanding of the importance of numbers in learning, life and work. • Investigates and shares understanding of a variety of number systems used throughout history.
	<p>Patterns and relationships</p>	<p>I can continue and devise more involved repeating patterns or designs, using a variety of media.</p> <p><i>MTH 1-13a</i></p> <p>Through exploring number patterns, I can recognise and continue simple number sequences and can explain the rule I have applied.</p> <p><i>MTH 1-13b</i></p>	<ul style="list-style-type: none"> • Counts forwards and backwards in 2s, 5s and 10s from any whole number up to 1000. • Describes patterns in number, for example, in the multiplication tables and hundred square. • Continues and creates repeating patterns involving shapes, pictures and symbols. • Describes, continues and creates number patterns using addition, subtraction, doubling, halving, counting in jumps (skip counting) and known multiples.

	<p>Expressions and equations</p>	<p>I can compare, describe and show number relationships, using appropriate vocabulary and the symbols for equals, not equal to, less than and greater than.</p> <p style="text-align: right;">MTH 1-15a</p> <p>When a picture or symbol is used to replace a number in a number statement, I can find its value using my knowledge of number facts and explain my thinking to others.</p> <p style="text-align: right;">MTH 1-15b</p>	<ul style="list-style-type: none"> • Understands and accurately uses the terms ‘equal to’, ‘not equal to’, ‘less than’, ‘greater than’, and the related symbols ($=$, \neq, $<$, $>$) when comparing quantities. • Applies understanding of the equals sign as a balance, and knowledge of number facts, to solve simple algebraic problems where a picture or symbol is used to represent a number, for example, $\blacklozenge + 17 = 30$ and $\blacklozenge \times 6 = 30$.
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Shape, position and movement</p>	<p>Properties of 2D shapes and 3D objects</p>	<p>I have explored simple 3D objects and 2D shapes and can identify, name and describe their features using appropriate vocabulary.</p> <p style="text-align: right;">MTH 1-16a</p> <p>I can explore and discuss how and why different shapes fit together and create a tiling pattern with them.</p> <p style="text-align: right;">MTH 1-16b</p>	<ul style="list-style-type: none"> • Names, identifies and classifies a range of simple 2D shapes and 3D objects and recognises these shapes in different orientations and sizes. • Uses mathematical language to describe the properties of a range of common 2D shapes and 3D objects including side, face, edge, vertex, base and angle. • Identifies 2D shapes within 3D objects and recognises 3D objects from 2D drawings. • Identifies examples of tiling in the environment and applies knowledge of the features of 2D shapes to create tiling patterns incorporating two different shapes.

<p>Angle, symmetry and transformation</p>	<p>I can describe, follow and record routes and journeys using signs, words and angles associated with direction and turning. MTH 1-17a</p> <p>I have developed an awareness of where grid reference systems are used in everyday contexts and can use them to locate and describe position. MTH 1-18a</p> <p>I have explored symmetry in my own and the wider environment and can create and recognise symmetrical pictures, patterns and shapes. MTH 1-19a</p>	<ul style="list-style-type: none"> • Uses technology and other methods to describe, follow and record directions using words associated with angles, directions and turns including, full turn, half turn, quarter turn, clockwise, anticlockwise, right turn, left turn, right angle. • Knows that a right angle is 90°. • Knows and uses the compass points, North, South, East and West. • Uses informal methods to estimate, compare and describe the size of angles in relation to a right angle. • Finds right angles in the environment and in well-known 2D shapes. • Identifies where and why grid references are used. • Describes, plots and uses accurate two figure grid references, demonstrating knowledge of the horizontal and vertical location. • Identifies symmetry in patterns, pictures, nature and 2D shapes. • Creates symmetrical pictures and designs with more than one line of symmetry.
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Information handling	Data and analysis	<p><i>I have explored a variety of ways in which data is presented and can ask and answer questions about the information it contains.</i></p> <p style="text-align: right;"><i>MNU 1-20a</i></p> <p><i>I have used a range of ways to collect information and can sort it in a logical, organised and imaginative way using my own and others' criteria.</i></p> <p style="text-align: right;"><i>MNU 1-20b</i></p> <p>Using technology and other methods, I can display data simply, clearly and accurately by creating tables, charts and diagrams, using simple labelling and scale.</p> <p style="text-align: right;"><i>MTH 1-21a</i></p>	<ul style="list-style-type: none"> • Asks and answers questions to extract key information from a variety of data sets including charts, diagrams, bar graphs and tables. • Selects and uses the most appropriate way to gather and sort data for a given purpose, for example, a survey, questionnaire or group tallies. • Uses a variety of different methods, including the use of digital technologies, to display data, for example, as block graphs, bar graphs, tables, Carroll diagrams and Venn diagrams. • Includes a suitable title, simple labelling on both axes and an appropriate scale where one unit represents more than one data value in graphs.
	Ideas of chance and uncertainty	<p><i>I can use appropriate vocabulary to describe the likelihood of events occurring, using the knowledge and experiences of myself and others to guide me.</i></p> <p style="text-align: right;"><i>MNU 1-22a</i></p>	<ul style="list-style-type: none"> • Uses mathematical vocabulary appropriately to describe the likelihood of events occurring in everyday situations including, probable, likely/unlikely, certain/uncertain, possible/impossible, and fair/unfair. • Interprets data gathered through everyday experiences to make reasonable predictions of the likelihood of an event occurring.

Second Level Numeracy and Mathematics

	Curriculum organisers	Experiences and Outcomes for planning learning, teaching and assessment	Benchmarks to support practitioners' professional judgement of achievement of a level
Number, money and measure	Estimation and rounding	<p><i>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.</i></p> <p style="text-align: right;"><i>MNU 2-01a</i></p>	<ul style="list-style-type: none"> • <i>Rounds whole numbers to the nearest 1000, 10 000 and 100 000.</i> • <i>Rounds decimal fractions to the nearest whole number, to one decimal place and two decimal places.</i> • <i>Applies knowledge of rounding to give an estimate to a calculation appropriate to the context.</i>
	Number and number processes	<p><i>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.</i></p> <p style="text-align: right;"><i>MNU 2-02a</i></p> <p><i>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.</i></p> <p style="text-align: right;"><i>MNU 2-03a</i></p>	<ul style="list-style-type: none"> • <i>Reads, writes and orders whole numbers to 1 000 000, starting from any number in the sequence.</i> • <i>Explains the link between a digit, its place and its value for whole numbers to 1 000 000.</i> • <i>Reads, writes and orders sets of decimal fractions to three decimal places.</i> • <i>Explains the link between a digit, its place and its value for numbers to three decimal places.</i> • <i>Partitions a wide range of whole numbers and decimal fractions to three decimal places, for example, $3 \cdot 6 = 3$ ones and 6 tenths = 36 tenths.</i> • <i>Adds and subtracts multiples of 10, 100 and 1000 to and from whole numbers and decimal fractions to two decimal places.</i> • <i>Adds and subtracts whole numbers and decimal fractions to two decimal places, within the number range 0 to 1 000 000.</i> • <i>Uses multiplication and division facts to the 10th multiplication table.</i> • <i>Multiplies and divides whole numbers by multiples of 10, 100 and 1000.</i> • <i>Multiplies and divides decimal fractions to two decimal places by 10, 100 and 1000.</i> • <i>Multiplies whole numbers by two digit numbers.</i> • <i>Multiplies decimal fractions to two decimal places by a single digit.</i>

The statements in ***bold and italics*** in both the Experiences and Outcomes and the Benchmarks are the responsibility of all and as such, evidence from across the curriculum should be considered when making judgements about achieving a level.

		<p><i>I have explored the contexts in which problems involving decimal fractions occur and can solve related problems using a variety of methods.</i></p> <p style="text-align: right;"><i>MNU 2-03b</i></p> <p>Having explored the need for rules for the order of operations in number calculations, I can apply them correctly when solving simple problems.</p> <p style="text-align: right;"><i>MTH 2-03c</i></p> <p><i>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.</i></p> <p style="text-align: right;"><i>MNU 2-04a</i></p>	<ul style="list-style-type: none"> • <i>Divides whole numbers and decimal fractions to two decimal places, by a single digit, including answers expressed as decimal fractions, for example, $43 \div 5 = 8.6$.</i> • Applies the correct order of operations in number calculations when solving multi-step problems. • <i>Identifies familiar contexts in which negative numbers are used.</i> • <i>Orders numbers less than zero and locates them on a number line.</i>
	<p>Multiples, factors and primes</p>	<p>Having explored the patterns and relationships in multiplication and division, I can investigate and identify the multiples and factors of numbers.</p> <p style="text-align: right;"><i>MTH 2-05a</i></p>	<ul style="list-style-type: none"> • Identifies multiples and factors of whole numbers and applies knowledge and understanding of these when solving relevant problems in number, money and measurement.

	Powers and roots	There are no Experiences and Outcomes at second level.	There are no Experiences and Outcomes at second level.
	Fractions, decimal fractions and percentages	<p><i>I have investigated the everyday contexts in which simple fractions, percentages or decimal fractions are used and can carry out the necessary calculations to solve related problems.</i> MNU 2-07a</p> <p><i>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.</i> MNU 2-07b</p> <p>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</p>	<p>There are no Experiences and Outcomes at second level.</p> <ul style="list-style-type: none"> • <i>Uses knowledge of equivalent forms of common fractions, decimal fractions and percentages, for example, $\frac{3}{4} = 0.75 = 75\%$, to solve problems.</i> • <i>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%.</i> • <i>Calculates simple fractions of a quantity and uses this knowledge to solve problems, for example, find $\frac{3}{5}$ of 60.</i> • Creates equivalent fractions and uses this knowledge to put a set of most commonly used fractions in order. • Expresses fractions in their simplest form.

Money	<p><i>I can manage money, compare costs from different retailers, and determine what I can afford to buy.</i> MNU 2-09a</p> <p><i>I understand the costs, benefits and risks of using bank cards to purchase goods or obtain cash and realise that budgeting is important.</i> MNU 2-09b</p> <p><i>I can use the terms profit and loss in buying and selling activities and can make simple calculations for this.</i> MNU 2-09c</p>	<ul style="list-style-type: none"> • <i>Carries out money calculations involving the four operations.</i> • <i>Compares costs and determines affordability within a given budget.</i> • <i>Demonstrates understanding of the benefits and risks of using bank cards and digital technologies.</i> • <i>Calculates profit and loss accurately, for example, when working with a budget for an enterprise activity.</i>
	Time	<p><i>I can use and interpret electronic and paper-based timetables and schedules to plan events and activities, and make time calculations as part of my planning.</i> MNU 2-10a</p>

		<p><i>I can carry out practical tasks and investigations involving timed events and can explain which unit of time would be most appropriate to use.</i> MNU 2-10b</p> <p><i>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.</i> MNU 2-10c</p>	<ul style="list-style-type: none"> • <i>Chooses the most appropriate timing device in practical situations and records using relevant units, including hundredths of a second.</i> • <i>Selects the most appropriate unit of time for a given task and justifies choice.</i>
Measurement		<p><i>I can use my knowledge of the sizes of familiar objects or places to assist me when making an estimate of measure.</i> MNU 2-11a</p> <p><i>I can use the common units of measure, convert between related units of the metric system and carry out calculations when solving problems.</i> MNU 2-11b</p>	<ul style="list-style-type: none"> • <i>Uses the comparative size of familiar objects to make reasonable estimations of length, mass, area and capacity.</i> • <i>Estimates to the nearest appropriate unit, then measures accurately: length, height and distance in millimetres (mm), centimetres (cm), metres (m) and kilometres (km); mass in grams (g) and kilograms (kg); and capacity in millilitres (ml) and litres (l).</i> • <i>Calculates the perimeter of simple straight sided 2D shapes in millimetres (mm), centimetres (cm) and metres (m).</i> • <i>Calculates the area of squares, rectangles and right-angled triangles in square millimetres (mm²), square centimetres (cm²) and square metres (m²).</i> • <i>Calculates the volume of cubes and cuboids in cubic centimetres (cm³) and cubic metres (m³).</i> • <i>Converts between common units of measurement using decimal notation, for example, 550 cm = 5.5 m; 3.009 kg = 3009 g.</i> • <i>Chooses the most appropriate measuring device for a given task and carries out the required calculation, recording results in the correct unit.</i> • <i>Reads a variety of scales accurately.</i> • <i>Draws squares and rectangles accurately with a given perimeter or area.</i>

		<p><i>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.</i></p> <p><i>MNU 2-11c</i></p>	<ul style="list-style-type: none"> • <i>Demonstrates understanding of the conservation of measurement, for example, draw three different rectangles each with an area of 24 cm².</i> • <i>Shows awareness of imperial units used in everyday life, for example, miles or stones.</i>
	<p>Mathematics – its impact on the world, past, present and future</p>	<p>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.</p> <p><i>MTH 2-12a</i></p>	<ul style="list-style-type: none"> • 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.
	<p>Patterns and relationships</p>	<p>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.</p> <p><i>MTH 2-13a</i></p>	<ul style="list-style-type: none"> • 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.
	<p>Expressions and equations</p>	<p>I can apply my knowledge of number facts to solve problems where an unknown value is represented by a symbol or letter.</p> <p><i>MTH 2-15a</i></p>	<ul style="list-style-type: none"> • Solves simple algebraic equations with one variable, for example, $a - 30 = 40$ and $4b = 20$.

Shape, position and movement	Properties of 2D shapes and 3D objects	<p>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.</p> <p style="text-align: right; color: #4a7ebb;">MTH 2-16a</p> <p>Through practical activities, I can show my understanding of the relationship between 3D objects and their nets.</p> <p style="text-align: right; color: #4a7ebb;">MTH 2-16b</p> <p>I can draw 2D shapes and make representations of 3D objects using an appropriate range of methods and efficient use of resources.</p> <p style="text-align: right; color: #4a7ebb;">MTH 2-16c</p>	<ul style="list-style-type: none"> • 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. • 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.
	Angle, symmetry and transformation	<p>I have investigated angles in the environment, and can discuss, describe and classify angles using appropriate mathematical vocabulary.</p> <p style="text-align: right; color: #4a7ebb;">MTH 2-17a</p>	<ul style="list-style-type: none"> • Uses mathematical language including acute, obtuse, straight and reflex to describe and classify a range of angles identified within shapes in the environment. • Measures and draws a range of angles to within $\pm 2^\circ$. • Knows that complementary angles add up to 90° and supplementary angles add up to 180° and uses this knowledge to calculate missing angles. • Uses knowledge of the link between the eight compass points and angles to describe, follow and record directions. • Interprets maps, models or plans with simple scales, for example, 1 cm:2 km.

	<p>I can accurately measure and draw angles using appropriate equipment, applying my skills to problems in context. MTH 2-17b</p> <p>Through practical activities which include the use of technology, I have developed my understanding of the link between compass points and angles and can describe, follow and record directions, routes and journeys using appropriate vocabulary. MTH 2-17c</p> <p>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</p> <p>I can use my knowledge of the coordinate system to plot and describe the location of a point on a grid. MTH 2-18a / MTH 3-18a</p>	<ul style="list-style-type: none"> • Describes, plots and records the location of a point, in the first quadrant, using coordinate notation. • 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.
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		<p>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.</p> <p>MTH 2-19a / MTH 3-19a</p>	
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Information handling	Data and analysis	<p><i>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.</i> MNU 2-20a</p>	<ul style="list-style-type: none"> • <i>Devises ways of collecting data in the most suitable way for the given task.</i> • <i>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.</i> • <i>Analyses, interprets and draws conclusions from a variety of data.</i> • <i>Draws conclusions about the reliability of data taking into account, for example, the author, the audience, the scale and sample size used.</i> • Displays data appropriately making effective use of technology and chooses a suitable scale when creating graphs.
		<p><i>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.</i> MNU 2-20b</p>	
		<p>I can display data in a clear way using a suitable scale, by choosing appropriately from an extended range of tables, charts, diagrams and graphs, making effective use of technology. MTH 2-21a / MTH 3-21a</p>	

	<p>Ideas of chance and uncertainty</p>	<p>I can conduct simple experiments involving chance and communicate my predictions and findings using the vocabulary of probability.</p> <p>MNU 2-22a</p>	<ul style="list-style-type: none"> • <i>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 $\frac{1}{6}$.</i> • <i>Plans and carries out simple experiments involving chance with repeated trials, for example, 'what is the probability of throwing a six if you throw a die fifty times?'</i> • <i>Uses data to predict the outcome of a simple experiment.</i>
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Third Level Numeracy and Mathematics

	Curriculum organisers	Experiences and Outcomes for planning learning, teaching and assessment	Benchmarks to support practitioners' professional judgement of achievement of a level
Number, money and measure	Estimation and rounding	<p><i>I can round a number using an appropriate degree of accuracy, having taken into account the context of the problem.</i></p> <p><i>MNU 3-01a</i></p>	<ul style="list-style-type: none"> • <i>Rounds decimal fractions to three decimal places.</i> • <i>Uses rounding to routinely estimate the answers to calculations.</i>
	Number and number processes	<p><i>I can use a variety of methods to solve number problems in familiar contexts, clearly communicating my processes and solutions.</i></p> <p><i>MNU 3-03a</i></p> <p><i>I can continue to recall number facts quickly and use them accurately when making calculations.</i></p> <p><i>MNU 3-03b</i></p> <p><i>I can use my understanding of numbers less than zero to solve simple problems in context.</i></p> <p><i>MNU 3-04a</i></p>	<ul style="list-style-type: none"> • <i>Recalls quickly multiplication and division facts to the 10th multiplication table.</i> • <i>Uses multiplication and division facts to the 12th multiplication table.</i> • <i>Solves addition and subtraction problems working with whole numbers and decimal fractions to three decimal places.</i> • <i>Solves addition and subtraction problems working with integers.</i> • <i>Solves multiplication and division problems working with whole numbers and decimal fractions to three decimal places.</i> • <i>Solves multiplication and division problems working with integers.</i>

The statements in ***bold and italics*** in both the Experiences and Outcomes and the Benchmarks are the responsibility of all and as such, evidence from across the curriculum should be considered when making judgements about achieving a level.

	<p>Multiples, factors and primes</p>	<p>I have investigated strategies for identifying common multiples and common factors, explaining my ideas to others, and can apply my understanding to solve related problems. MTH 3-05a</p> <p>I can apply my understanding of factors to investigate and identify when a number is prime. MTH 3-05b</p>	<ul style="list-style-type: none"> • Identifies common multiples, including the lowest common multiple for whole numbers and can explain method used. • Identifies common factors, including the highest common factor for whole numbers and can explain method used. • Identifies prime numbers to 100 and can explain method used. • Solves problems using multiples and factors. • Writes a given number as a product of its prime factors.
	<p>Powers and roots</p>	<p>Having explored the notation and vocabulary associated with whole number powers and the advantages of writing numbers in this form, I can evaluate powers of whole numbers mentally or using technology. MTH 3-06a</p>	<ul style="list-style-type: none"> • Explains the notation and uses associated vocabulary appropriately, for example, index, exponent and power. • Evaluates whole number powers, for example, $2^4 = 16$. • Expresses whole numbers as powers, for example, $27 = 3^3$.

<p>Fractions, decimal fractions and percentages</p>	<p><i>I can solve problems by carrying out calculations with a wide range of fractions, decimal fractions and percentages, using my answers to make comparisons and informed choices for real-life situations.</i> MNU 3-07a</p> <p>By applying my knowledge of equivalent fractions and common multiples, I can add and subtract commonly used fractions. MTH 3-07b</p> <p>Having used practical, pictorial and written methods to develop my understanding, I can convert between whole or mixed numbers and fractions. MTH 3-07c</p> <p><i>I can show how quantities that are related can be increased or decreased proportionally and apply this to solve problems in everyday contexts.</i> MNU 3-08a</p>	<ul style="list-style-type: none"> • Converts fractions, decimal fractions or percentages into equivalent fractions, decimal fractions or percentages. • Adds and subtracts whole numbers and fractions, including when changing a denominator. • Converts between whole or mixed numbers, improper fractions and decimal fractions. • Uses knowledge of fractions, decimal fractions and percentages to carry out calculations with and without a calculator. • Solves problems in which related quantities are increased or decreased proportionally. • Expresses quantities as a ratio and where appropriate simplifies, for example, 'if there are 6 teachers and 60 children in a school find the ratio of the number of teachers to the total amount of teachers and children'.
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	<p>Money</p>	<p><i>When considering how to spend my money, I can source, compare and contrast different contracts and services, discuss their advantages and disadvantages, and explain which offer best value to me.</i></p> <p><i>MNU 3-09a</i></p> <p><i>I can budget effectively, making use of technology and other methods, to manage money and plan for future expenses.</i></p> <p><i>MNU 3-09b</i></p>	<ul style="list-style-type: none"> • <i>Demonstrates understanding of best value in relation to contracts and services when comparing products.</i> • <i>Chooses the best value for their personal situation and justifies choices.</i> • <i>Budgets effectively, using digital technology where appropriate, showing development of financial capability.</i> • <i>Demonstrates knowledge of financial terms, for example, debit/credit, APR, pa, direct debit/standing order and interest rate.</i> • <i>Converts between different currencies.</i>
	<p>Time</p>	<p><i>Using simple time periods, I can work out how long a journey will take, the speed travelled at or distance covered, using my knowledge of the link between time, speed and distance.</i></p> <p><i>MNU 3-10a</i></p>	<ul style="list-style-type: none"> • <i>Applies knowledge of the relationship between speed, distance and time to find each of the three variables.</i> • <i>Calculates time durations across hours and days.</i>

	Measurement	<p><i>I can solve practical problems by applying my knowledge of measure, choosing the appropriate units and degree of accuracy for the task, and using a formula to calculate area or volume when required.</i> MNU 3-11a</p> <p>Having investigated different routes to a solution, I can find the area of compound 2D shapes and the volume of compound 3D objects, applying my knowledge to solve practical problems. MTH 3-11b</p>	<ul style="list-style-type: none"> • <i>Chooses appropriate units for length, area and volume when solving practical problems.</i> • <i>Converts between standard units to three decimal places and applies this when solving calculations of length, capacity, volume and area.</i> • Calculates the area of a 2D shape where the units are inconsistent. • Finds the area of compound 2D shapes constructed from squares, rectangles and triangles. • Finds the volume of compound 3D objects constructed from cubes and cuboids.
	Mathematics – its impact on the world, past, present and future	<p>I have worked with others to research a famous mathematician and the work they are known for, or investigated a mathematical topic, and have prepared and delivered a short presentation. MTH 3-12a</p>	<ul style="list-style-type: none"> • Researches and communicates using appropriate mathematical vocabulary and notation, the work of a famous mathematician or a mathematical topic and explains the relevance and impact they have on society.

	<p>Patterns and relationships</p>	<p>Having explored number sequences, I can establish the set of numbers generated by a given rule and determine a rule for a given sequence, expressing it using appropriate notation.</p> <p style="text-align: right;">MTH 3-13a</p>	<ul style="list-style-type: none"> • Generates number sequences from a given rule, for example, $T = 4n + 6$. • Extends a given pattern and describes the rule. • Expresses sequence rules in algebraic notation, for example, the cost of hiring a car is £75 plus a charge of £0.05 per mile, 'm' driven, $C = 0.05m + 75$.
	<p>Expressions and equations</p>	<p>I can collect like algebraic terms, simplify expressions and evaluate using substitution.</p> <p style="text-align: right;">MTH 3-14a</p> <p>Having discussed ways to express problems or statements using mathematical language, I can construct, and use appropriate methods to solve, a range of simple equations.</p> <p style="text-align: right;">MTH 3-15a</p> <p>I can create and evaluate a simple formula representing information contained in a diagram, problem or statement.</p> <p style="text-align: right;">MTH 3-15b</p>	<ul style="list-style-type: none"> • Collects like terms, including squared terms, to simplify an algebraic expression. • Evaluates expressions involving two variables using both positive and negative numbers. • Solves linear equations, for example, $ax \pm b = c$ where a, b and c are integers. • Creates a simple linear formula representing information contained in a diagram, problem or statement. • Evaluates a simple formula, for example, $C = 0.05m + 75$.

Shape, position and movement	Properties of 2D shapes and 3D objects	Having investigated a range of methods, I can accurately draw 2D shapes using appropriate mathematical instruments and methods. MTH 3-16a	<ul style="list-style-type: none"> • Demonstrates a variety of methods to accurately draw 2D shapes, including triangles and regular polygons (given the interior angle), using mathematical instruments.
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<p>Angle, symmetry and transformation</p>	<p>I can name angles and find their sizes using my knowledge of the properties of a range of 2D shapes and the angle properties associated with intersecting and parallel lines. MTH 3-17a</p> <p>Having investigated navigation in the world, I can apply my understanding of bearings and scale to interpret maps and plans and create accurate plans, and scale drawings of routes and journeys. MTH 3-17b</p> <p>I can apply my understanding of scale when enlarging or reducing pictures and shapes, using different methods, including technology. MTH 3-17c</p> <p>I can use my knowledge of the coordinate system to plot and describe the location of a point on a grid. MTH 2-18a / MTH 3-18a</p>	<ul style="list-style-type: none"> • Names angles using mathematical notation, for example, $\angle ABC$ • Identifies corresponding, alternate and vertically opposite angles and uses this knowledge to calculate missing angles. • Uses the angle properties of triangles and quadrilaterals to find missing angles. • Applies knowledge and understanding of scale to enlarge and reduce objects in size showing understanding of linear scale factor. • Uses bearings in a navigational context, including creating scale drawings. • Identifies all lines of symmetry in 2D shapes. • Creates symmetrical patterns and pictures.
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		<p>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.</p> <p>MTH 2-19a / MTH 3-19a</p>	
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Information handling	Data and analysis	<p><i>I can work collaboratively, making appropriate use of technology, to source information presented in a range of ways, interpret what it conveys and discuss whether I believe the information to be robust, vague or misleading.</i></p> <p style="text-align: right; color: #4a7ebb;"><i>MNU 3-20a</i></p>	<ul style="list-style-type: none"> • Sources information or collects data making use of digital technology where appropriate. • Interprets data sourced or given. • Describes trends in data using appropriate language, for example, increasing trend. • Determines if information is robust, vague or misleading by considering, for example, the validity of the source, scale used, sample size, method of presentation and appropriateness of how the sample was selected. • Collects data by choosing a representative sample to avoid bias. • Organises and displays data appropriately in a variety of forms, for example, compound bar and line graphs and pie charts, making effective use of technology as appropriate.
		<p>When analysing information or collecting data of my own, I can use my understanding of how bias may arise and how sample size can affect precision, to ensure that the data allows for fair conclusions to be drawn.</p> <p style="text-align: right; color: #4a7ebb;">MTH 3-20b</p>	
		<p>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.</p> <p style="text-align: right; color: #4a7ebb;">MTH 2-21a / MTH 3-21a</p>	

	<p>Ideas of chance and uncertainty</p>	<p><i>I can find the probability of a simple event happening and explain why the consequences of the event, as well as its probability, should be considered when making choices.</i></p> <p><i>MNU 3-22a</i></p>	<ul style="list-style-type: none"> • <i>Uses the probability scale of 0 to 1 showing probability as a fraction or decimal fraction.</i> • <i>Demonstrates understanding of the relationship between the frequency of an event happening and the probability of it happening.</i> • <i>Uses a given probability to calculate an expected outcome, for example, ‘the probability of rain in June is 0.25 so how many days do we expect it to rain?’.</i> • <i>Calculates the probability of a simple event happening, for example, ‘what is the probability of throwing a prime number on a 12 sided die?’.</i> • <i>Identifies all of the mutually exclusive outcomes of a single event and calculates the probability of each.</i> • <i>Investigates real-life situations which involve making decisions on the likelihood of events occurring and the consequences involved.</i>
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Fourth Level Numeracy and Mathematics

	Curriculum organisers	Experiences and Outcomes for planning learning, teaching and assessment	Benchmarks to support practitioners' professional judgement of achievement of a level
Number, money and measure	Estimation and rounding	<p><i>Having investigated the practical impact of inaccuracy and error, I can use my knowledge of tolerance when choosing the required degree of accuracy to make real-life calculations.</i></p> <p style="text-align: right;"><i>MNU 4-01a</i></p>	<ul style="list-style-type: none"> • <i>Rounds answers to a specified significant figure.</i> • <i>Demonstrates that the context of the question needs to be considered when rounding.</i> • <i>Demonstrates the impact of inaccuracy and error, for example, the impact of rounding an answer before the final step in a multi-step calculation.</i> • <i>Uses a given tolerance to decide if there is an allowable amount of variation of a specified quantity, for example, dimensions of a machine part, 235 mm ± 1 mm.</i>
	Number and number processes	<p><i>Having recognised similarities between new problems and problems I have solved before, I can carry out the necessary calculations to solve problems set in unfamiliar contexts.</i></p> <p style="text-align: right;"><i>MNU 4-03a</i></p>	<ul style="list-style-type: none"> • <i>Interprets and solves multi-step problems using the four operations.</i> • Applies the correct order of operations in all calculations, including those with brackets.

The statements in ***bold and italics*** in both the Experiences and Outcomes and the Benchmarks are the responsibility of all and as such, evidence from across the curriculum should be considered when making judgements about achieving a level.

		<p>I have investigated how introducing brackets to an expression can change the emphasis and can demonstrate my understanding by using the correct order of operations when carrying out calculations.</p> <p style="text-align: right;">MTH 4-03b</p>	
	Multiples, factors and primes	<p>There are no Experiences and Outcomes at fourth level.</p>	<p>There are no Experiences and Outcomes at fourth level.</p>
	Powers and roots	<p>I have developed my understanding of the relationship between powers and roots and can carry out calculations mentally or using technology to evaluate whole number powers and roots, of any appropriate number.</p> <p style="text-align: right;">MTH 4-06a</p> <p>Within real-life contexts, I can use scientific notation to express large or small numbers in a more efficient way and can understand and work with numbers written in this form.</p> <p style="text-align: right;">MTH 4-06b</p>	<ul style="list-style-type: none"> • Shows understanding that square roots of whole numbers can have positive and negative values, for example, $\sqrt{9} = \pm 3$ • Uses knowledge of the inverse relationship between powers and roots to evaluate whole number roots of any appropriate number, $\sqrt[3]{27} = 3$. • Uses knowledge of mathematical notation to express numbers in scientific notation.

<p>Fractions, decimal fractions and percentages</p>	<p><i>I can choose the most appropriate form of fractions, decimal fractions and percentages to use when making calculations mentally, in written form or using technology, then use my solutions to make comparisons, decisions and choices.</i> MNU 4-07a</p> <p>I can solve problems involving fractions and mixed numbers in context, using addition, subtraction or multiplication. MTH 4-07b</p> <p><i>Using proportion, I can calculate the change in one quantity caused by a change in a related quantity and solve real-life problems.</i> MNU 4-08a</p>	<ul style="list-style-type: none"> • <i>Chooses the most efficient form of fractions, decimal fractions or percentages when making calculations.</i> • <i>Uses calculations to support comparisons, decisions and choices.</i> • <i>Calculates the percentage increase or decrease of a value.</i> • Applies addition, subtraction and multiplication skills to solve problems involving fractions and mixed numbers. • <i>Uses knowledge of proportion to solve problems in real-life which involve changes in related quantities.</i>
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	<p>Money</p>	<p><i>I can discuss and illustrate the facts I need to consider when determining what I can afford, in order to manage credit and debt and lead a responsible lifestyle.</i> MNU 4-09a</p> <p><i>I can source information on earnings and deductions and use it when making calculations to determine net income.</i> MNU 4-09b</p> <p><i>I can research, compare and contrast a range of personal finance products and, after making calculations, explain my preferred choices.</i> MNU 4-09c</p>	<ul style="list-style-type: none"> • <i>Applies understanding of credit and debit in relation to earnings and deductions.</i> • <i>Uses budgeting skills to manage income effectively and justifies spending and saving choices.</i> • <i>Calculates net income by selecting appropriate information.</i> • <i>Compares a range of personal finance products.</i> • <i>Communicates the impact of financial decisions.</i> • <i>Applies knowledge of currency conversion to determine best value.</i>
	<p>Time</p>	<p><i>I can research, compare and contrast aspects of time and time management as they impact on me.</i> MNU 4-10a</p>	<ul style="list-style-type: none"> • <i>Demonstrates effective time management skills, for example, working with different time zones or making plans, including across midnight.</i> • <i>Carries out calculations involving speed, distance and time involving decimal fraction hours.</i> • <i>Calculates time durations across hours, days and months.</i>

		<p><i>I can use the link between time, speed and distance to carry out related calculations.</i></p> <p><i>MNU 4-10b</i></p>	
	<p>Measurement</p>	<p><i>I can apply my knowledge and understanding of measure to everyday problems and tasks and appreciate the practical importance of accuracy when making calculations.</i></p> <p><i>MNU 4-11a</i></p> <p>Through investigating real-life problems involving the surface area of simple 3D shapes, I can explore ways to make the most efficient use of materials and carry out the necessary calculations to solve related problems.</p> <p><i>MTH 4-11b</i></p> <p>I have explored with others the practicalities of the use of 3D objects in everyday life and can solve problems involving the volume of a prism, using a formula to make related calculations when required.</p> <p><i>MTH 4-11c</i></p>	<ul style="list-style-type: none"> • <i>Demonstrates understanding of the impact of truncation and premature rounding.</i> • Calculates the area of kites, parallelograms and trapeziums. • Uses formulae and calculates the surface area of cylinders, cuboids and triangular prisms. • Calculates the volume of triangular prisms and cylinders using formulae.

	<p>Mathematics – its impact on the world, past, present and future</p>	<p>I have discussed the importance of mathematics in the real world, investigated the mathematical skills required for different career paths and delivered, with others, a presentation on how mathematics can be applied in the workplace.</p> <p>MTH 4-12a</p>	<ul style="list-style-type: none"> • Contributes to discussions and presentations on the role of mathematics in everyday life and in the workplace. • Investigates the mathematical skills required for a range of careers, including those in STEM subjects.
	<p>Patterns and relationships</p>	<p>Having explored how real-life situations can be modelled by number patterns, I can establish a number sequence to represent a physical or pictorial pattern, determine a general formula to describe the sequence, then use it to make evaluations and solve related problems.</p> <p>MTH 4-13a</p> <p>I have discussed ways to describe the slope of a line, can interpret the definition of gradient and can use it to make relevant calculations, interpreting my answer for the context of the problem.</p> <p>MTH 4-13b</p>	<ul style="list-style-type: none"> • Determines a general formula for the nth term to describe a sequence and uses it to solve related problems, linear examples only. • Calculates the gradient of lines in a coordinate diagram. • Draws conclusions about the gradient of a line, for example, ‘does the ramp meet building regulations?’. • Communicates the gradient of vertical and horizontal lines and states the equation of these lines as $x = a$ or $y = b$ or equivalent. • Uses a given formula to plot a straight line onto a Cartesian diagram.

		<p>Having investigated the pattern of the coordinate points lying on a horizontal or vertical line, I can describe the pattern using a simple equation. MTH 4-13c</p> <p>I can use a given formula to generate points lying on a straight line, plot them to create a graphical representation then use this to answer related questions. MTH 4-13d</p>	
	<p>Expressions and equations</p>	<p>Having explored the distributive law in practical contexts, I can simplify, multiply and evaluate simple algebraic terms involving a bracket. MTH 4-14a</p> <p>I can find the factors of algebraic terms, use my understanding to identify common factors and apply this to factorise expressions. MTH 4-14b</p>	<ul style="list-style-type: none"> • Expands brackets using the distributive law and simplifies. • Solves an extended range of linear equations involving the distributive law, for example, $ax \pm b = cx \pm d$, where a, b, c and d are integers. • Solves linear inequalities, including on simple closed intervals. • Solves problems by expressing the given information appropriately as an equation, in-equation or formula. • Evaluates algebraic expressions involving a bracket. • Factorises expressions with a numeric common factor.

		<p>Having discussed the benefits of using mathematics to model real-life situations, I can construct and solve inequalities and an extended range of equations.</p> <p style="text-align: right;">MTH 4-15a</p>	
<p>Shape, position and movement</p>	<p>Properties of 2D shapes and 3D objects</p>	<p>I have explored the relationships that exist between the sides, or sides and angles, in right-angled triangles and can select and use an appropriate strategy to solve related problems, interpreting my answer for the context.</p> <p style="text-align: right;">MTH 4-16a</p> <p>Having investigated the relationships between the radius, diameter, circumference and area of a circle, I can apply my knowledge to solve related problems.</p> <p style="text-align: right;">MTH 4-16b</p>	<ul style="list-style-type: none"> • Calculates the length of any side of a right-angled triangle using the Theorem of Pythagoras. • Calculates the size of an angle in a right-angled triangle using trigonometry. • Calculates the length of a side in a right-angled triangle using trigonometry. • Uses the formula $C = \pi D$ or $C = 2\pi r$ to calculate the circumference of a circle. • Uses the formula $A = \pi r^2$ to calculate the area of a circle. • Calculates diameter and radius of a circle when given the area or circumference.

<p>Angle, symmetry and transformation</p>	<p>Having investigated the relationship between a radius and a tangent and explored the size of the angle in a semi-circle, I can use the facts I have established to solve related problems. MTH 4-17a</p> <p>I can apply my understanding of the properties of similar figures to solve problems involving length and area. MTH 4-17b</p> <p>I can plot and describe the position of a point on a 4-quadrant coordinate grid. MTH 4-18a</p> <p>I can apply my understanding of the 4-quadrant coordinate system to move, and describe the transformation of, a point or shape on a grid. MTH 4-18b</p>	<ul style="list-style-type: none"> • Describes rotational properties of shapes, pictures and patterns, including the order of rotation. • Uses knowledge of rotational symmetry to complete designs. • Uses a four-quadrant Cartesian grid to read and plot coordinates. • Applies understanding of translation to reflect or translate an object on a four-quadrant grid. • Uses similarity to find unknown lengths of 2D shapes. • Applies knowledge of the relationship between the tangent and radius to calculate sizes of missing angles. • Applies knowledge of triangles, angles and circles, including semi-circles, to solve problems. • Identifies transformation by reflection or translation of a point or shape on a grid.
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		<p>Having investigated patterns in the environment, I can use appropriate mathematical vocabulary to discuss the rotational properties of shapes, pictures and patterns and can apply my understanding when completing or creating designs.</p> <p>MTH 4-19a</p>	
Information handling	<p>Data and analysis</p>	<p><i>I can evaluate and interpret raw and graphical data using a variety of methods, comment on relationships I observe within the data and communicate my findings to others.</i></p> <p>MNU 4-20a</p> <p>In order to compare numerical information in real-life contexts, I can find the mean, median, mode and range of sets of numbers, decide which type of average is most appropriate to use and discuss how using an alternative type of average could be misleading.</p> <p>MTH 4-20b</p>	<ul style="list-style-type: none"> • <i>Interprets raw and graphical data.</i> • <i>Uses statistical language, for example, correlations, to describe identified relationships.</i> • Calculates the mean, median, mode and range of a data set. • Selects the most appropriate statistical diagram to display a given data set, for example, stem and leaf. • Justifies the most appropriate statistical diagram to display a given data set. • Uses different types of charts to display discrete, continuous and grouped data appropriately.

		<p>I can select appropriately from a wide range of tables, charts, diagrams and graphs when displaying discrete, continuous or grouped data, clearly communicating the significant features of the data.</p> <p>MTH 4-21a</p>	
	<p>Ideas of chance and uncertainty</p>	<p><i>By applying my understanding of probability, I can determine how many times I expect an event to occur, and use this information to make predictions, risk assessment, informed choices and decisions.</i></p> <p>MNU 4-22a</p>	<ul style="list-style-type: none"> • <i>Calculates the probability and determines the expected occurrence of an event.</i> • <i>Applies knowledge and skills in calculating probability to make predictions.</i>