Benchmarks

Numeracy and Mathematics

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Guidance on using the Benchmarks for Assessment
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The two key resources which support teachers to plan learning, teaching and assessment are:

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

The Benchmarks support teacher professional judgement of achievement of a level. They set out very clear statements about what children need to know and be able to do to achieve each level of the curriculum. They streamline and embed a wide range of existing assessment guidance (significant aspects of learning and progression frameworks) into one key resource to support teachers' professional judgement.

Assessment judgements should be made using the Benchmarks for each curriculum level. The Benchmarks describe the standards that children and young people need to meet to achieve a level. The Benchmarks are grouped together to support holistic assessment and avoid assessment of individual Experiences and Outcomes.

Assessment is an on-going process to support learning. The Benchmarks should be used to help monitor progress towards achievement of a level and to support overall professional judgement of when a learner has achieved a curriculum level. They support professional dialogue, moderation and monitoring of progress in learning.

Evidence of progress and achievement will come from:

- observing day-to-day learning within, and outwith, the classroom.
- coursework, including tests.
- learning conversations.
- planned periodic holistic assessments.
- information from standardised assessments.

Achievement of a level is based on evidence and on overall professional judgement. Benchmarks should be used to review a body of evidence to determine if the 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.
- demonstrated application of what they have learned in new and unfamiliar situations.

It is not necessary for learners to demonstrate evidence of every aspect of learning within the Benchmarks before moving on to the next level. However, it is important that this is interpreted in ways which ensure no major gaps in children's and young people's learning, for example with respect to the relevant organisers in each curriculum area.

Early Level Numeracy and Mathematics

	*Curriculum Organisers	Experiences and Outcomes for planning learning, teaching and assessment	Benchmarks to support teachers' professional judgement of achievement of a level
Number, money and measure	**Estimation and rounding**	*I am developing a sense of size and amount by observing, exploring, using and communicating with others about things in the world around me.* *MNU 0-01a*	• *Identifies the amount of objects in a group and uses this information to estimate the amount of objects in a larger group.* • *Checks estimates by counting.* • *Demonstrates skills of estimation in the contexts of number, money, time and measure using relevant vocabulary, for example, 'less than', 'longer than'.*
	Number and number processes	*I have explored numbers, understanding that they represent quantities, and I can use them to count, create sequences and describe order.* *MNU 0-02a* *I use practical materials and can 'count on and back' to help me understand addition and subtraction, recording my ideas and solutions in different ways.* *MNU 0-03a*	• *Explains that zero means there is none of a particular quantity and is represented by the numeral '0'.* • *Recalls the number sequence forward and backward, from zero to at least 30, from any given number.* • *Recognises number names and numerals to at least 20.* • *Orders numbers forwards and backwards to at least 20. Identifies the number before, the number after and missing numbers in a sequence.* • *Uses one-to-one correspondence to count a given number of objects to at least 20.* • *Identifies 'how many?' in regular and irregular dot patterns, arrays, five frames, ten frames and dice without having to count (subitising).* • *Uses ordinal numbers in real life contexts, for example, 'I am third in the line', including the language of before, after and in-between.* • *Counts on and back in ones to demonstrate understanding of addition and subtraction.* • *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.* • *Doubles numbers to a total of at least 20 mentally, for example, $9 + 9 = 18.$* • *Groups items recognising that the appearance of the group has no effect on the overall total (conservation of number).* • *Partitions single digit numbers into two or more parts and recognises that this does not affect the total, for example, $3 + 2 = 5$ and $1 + 1 + 1 + 2 = 5.$*

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			• *Demonstrates understanding of all possible partitions of numbers to at least 10, for example, 4 can be partitioned into $4 + 0$, $3 + 1$, $2 + 2$, $1 + 3$ and $0 + 4$.* • *Uses a range of strategies to add and subtract mentally to at least 10.* • *Uses appropriately the mathematical symbols $+$, $-$, $=$.* • *Links 'number families' when explaining mental strategies for addition and subtraction, for example, $3 + 5 = 8$, $5 + 3 = 8$, $8 - 3 = 5$ and $8 - 5 = 3$.* • *Solves simple missing number equations, for example, $3 + \blacklozenge = 10$* • *Counts in jumps (skip counts) in 2s, 5s and 10s and begins to use this as a useful strategy to find how many in a larger group.*
	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	*I can share out a group of items by making smaller groups and can split a whole object into smaller parts.* *MNU 0-07a*	• *Splits a whole into smaller parts and explains that 'equal parts' are the same size.* • *Uses appropriate vocabulary to describe each part, at least halves and quarters.* • *Shares out a group of items equally into smaller groups.*
	Money	*I am developing my awareness of how money is used and can recognise and use a range of coins.* *MNU 0-09a*	• *Identifies all coins up to at least £1.* • *Applies number skills (addition and subtraction) and uses at least the 1p, 2p, 5p and 10p coins to pay the exact value for items costing up to at least 20p.*
	Time	*I am aware of how routines and events in my world link with times and seasons, and have explored ways to record and display these using clocks, calendars and other methods.* *MNU 0-10a*	• *Links daily routines and personal events to time sequences.* • *Names the days of the week in sequence, knows the months of the year and talks about features of the four seasons in relevant contexts.* • *Recognises, talks about, and, where appropriate, engages with everyday devices used to measure or display time, including clocks, calendars, sand timers and visual timetables.* • *Reads analogue and digital o'clock and half past times (12 hour only) and*

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			represents these times on a digital display or clock face. • *Uses appropriate language when discussing time, for example, before, after, o'clock, half past, hour hand and minute hand.*
	Measurement	*I have experimented with everyday items as units of measure to investigate and compare sizes and amounts in my environment, sharing my findings with others.* *MNU 0-11a*	• *Shares relevant experiences in which measurements of length, height, weight and capacity are used, for example, in baking.* • *Describes common objects using appropriate measurement language, for example, tall, heavy and empty.* • *Compares and describes lengths, heights, weights and capacity using everyday language including longer, shorter, taller, heavier, lighter, more and less.* • *Estimates, then measures, the length, height, weight and capacity of familiar objects using a range of appropriate non-standard units.*
	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	I have spotted and explored patterns in my own and the wider environment and can copy and continue these and create my own patterns. MTH 0-13a	• Copies, continues and creates simple patterns involving objects, shapes and numbers. • Explores, recognises and continues simple number patterns and describes them using appropriate mathematical vocabulary. • Finds missing numbers on a number line ranging from 0 to at least 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**	I enjoy investigating objects and shapes and can sort, describe and be creative with them. MTH 0-16a	• 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	In movement, games, and using technology I can use simple directions and describe positions. MTH 0-17a	• Understands and correctly uses the language of position and direction to solve simple problems in movement games and technology, for example, in front, behind, above, below, left, right, forwards and backwards. • Identifies, describes and creates symmetrical pictures with at least one line of symmetry.

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		I have had fun creating a range of symmetrical pictures and patterns using a range of media. MTH 0-19a	
Information handling	**Data and analysis**	*I can collect objects and ask questions to gather information, organising and displaying my findings in different ways.* *MNU 0-20a* *I can match objects, and sort using my own and others' criteria, sharing my ideas with others.* *MNU 0-20b* *I can use the signs and charts around me for information, helping me plan and make choices and decisions in my daily life.* *MNU 0-20c*	• *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, make 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 and communicates the process and justifies choice of criteria.* • *Interprets simple graphs, charts and signs and demonstrates how they support planning, choices and decision making in familiar situations.*
	Ideas of chance and uncertainty	There are no experiences and outcomes at early level.	There are no experiences and outcomes at early level.

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First Level Numeracy and Mathematics

	*Curriculum Organisers	Experiences and Outcomes for planning learning, teaching and assessment	Benchmarks to support teachers' professional judgement of achievement of a level
Number, money and measure	**Estimation and rounding**	*I can share ideas with others to develop ways of estimating the answer to a calculation or problem, work out the actual answer, then check my solution by comparing it with the estimate.* *MNU 1-01a*	• *Uses different strategies to estimate an answer to a calculation or problem, for example, doubling.* • *Checks the reasonableness of calculations by comparing the final solution with the estimate.* • *Rounds whole numbers to at least the nearest 10 and 100 and uses this skill routinely to estimate and check the reasonableness of a solution.*
	Number and number processes	*I have investigated how whole numbers are constructed, can understand the importance of zero within the system and can use my knowledge to explain the link between a digit, its place and its value.* *MNU 1-02a*	• *Reads, writes, orders and recites whole numbers up to at least 1000, starting from any number in the sequence.* • *Demonstrates understanding of zero as a placeholder in whole numbers to at least 1000.* • *Identifies the value of each digit in a whole number with up to at least 3 digits.* • *Partitions whole numbers with at least two digits into standard component parts to aid mental calculation.* • *Demonstrates understanding of the commutative law and uses this to solve problems involving addition and multiplication, for example, $6 + 3,\ 3 + 6,\ 2 \times 4,\ 4 \times 2$.* • *Applies a range of strategies to solve addition and subtraction problems with up to at least 3 digit whole numbers and justifying choice of strategy.* • *Recognises, explains and uses the connections between addition and subtraction and multiplication and division to complete mental and written calculations.* • *Checks answers routinely using inverse operations in both mental and written calculations.* • *Counts forwards and backwards in at least 10s and 100s. Adds at least 10s or 100s to any whole number up to at least 1000.* • *Solves problems mentally by multiplying and dividing whole numbers by at least 10 and 100 (whole number answers only).* • *Applies a range of strategies to determine multiplication facts, for example, counting*

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		I can use addition, subtraction, multiplication and division when solving problems, making best use of the mental strategies and written skills I have developed. *MNU 1-03a*	*in jumps (skip counting), doubling, repeated addition and arrays.* • *Applies a range of strategies to determine division facts, for example, repeated subtraction, grouping, arrays and multiplication facts.* • *Uses correct mathematical vocabulary when discussing the four operations, for example, subtract, add, sum of, total, multiply, product, divide and shared.* • *Interprets a range of word problems, including those with more than one step, and applies the correct operations to complete the calculation.*
	Multiples, factors and primes	There are no experiences and outcomes at first level.	There are no experiences and outcomes at first level.
	Powers and roots	There are no experiences and outcomes at first level.	There are no experiences and outcomes at first level.
	Fractions, decimal fractions and percentages	*Having explored fractions by taking part in practical activities, I can show my understanding of:* • *how a single item can be shared equally* • *the notation and vocabulary associated with fractions* • *where simple fractions lie on the number line.* *MNU 1-07a* *Through exploring how groups of items can be shared equally, I can find a fraction of an amount by applying my knowledge of division.* *MNU 1-07b*	• *Explains what a fraction is using concrete materials, pictorial representations and appropriate mathematical vocabulary.* • *Demonstrates understanding that the greater the number of portions, the smaller the size of each equal share.* • Uses the correct notation for simple fractions, up to at least tenths, for example, $1/2$, $2/3$ and $5/8$. • *Compares the size of fractions and places simple fractions in order on a number line.* • Uses pictorial representations and other models to demonstrate understanding of simple equivalent fractions, for example, $1/2 = 2/4 = 3/6$. • *Explains the role of the numerator and denominator.* • *Uses known multiplication and division facts and other strategies to find unit fractions of whole numbers, for example, $1/2$ or $1/4$.*

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		Through taking part in practical activities including use of pictorial representations, I can demonstrate my understanding of simple fractions which are equivalent. MTH 1-07c	
	Money	*I can use money to pay for items and can work out how much change I should receive.* *MNU 1-09a* *I have investigated how different combinations of coins and notes can be used to pay for goods or be given in change.* *MNU 1-09b*	• *Identifies and uses all coins and notes up to at least £20 and explores different ways of making the same total.* • *Records amounts accurately in different ways using the correct notation, for example,* $149p = £1 \cdot 49 \ and \ 7p = £0 \cdot 07.$ • *Uses a variety of coin and note combinations, up to at least £20, to pay for items and give change.* • *Applies mental agility number skills to calculate the total spent in a shopping situation and is able to calculate change.* • *Demonstrates awareness of how goods can be paid for using cards and digital technology.*
	Time	*I can tell the time using 12 hour clocks, realising there is a link with 24 hour notation, explain how it impacts on my daily routine and ensure that I am organised and ready for events throughout my day.* *MNU 1-10a* *I can use a calendar to plan and be organised for key events for myself and my class throughout the year.* *MNU 1-10b*	• *Tells the time in 5 minute intervals or smaller intervals using analogue and digital 12 hour clocks.* • *Record 12 hour times using am and pm and is able to identify 24 hour notation in real life examples.* • *Records the date in a variety of ways, using words and numbers.* • *Uses and interprets a variety of calendars and 12 hour timetables to plan key events and calculate durations.* • *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.* • *Sequences the months of the year and relates these to the appropriate seasons.* • *Selects and uses appropriate timers for specific purposes.* • *Uses relevant experiences, for example, through practical activities and real life contexts, to estimate time durations in appropriate units of seconds, minutes or hours and then compares estimate with actual measurements.*

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		I have begun to develop a sense of how long tasks take by measuring the time taken to complete a range of activities using a variety of timers. *MNU 1-10c*	
	Measurement	*I can estimate how long or heavy an object is, or what amount it holds, using everyday things as a guide, then measure or weigh it using appropriate instruments and units.* *MNU 1-11a* *I can estimate the area of a shape by counting squares or other methods.* *MNU 1-11b*	• *Uses knowledge of everyday objects to provide reasonable estimates of length, height, weight and capacity.* • *Makes accurate use of a range of instruments including rulers, metre sticks, digital scales and measuring jugs when measuring length, height, weight, mass and capacity using the most appropriate instrument for the task.* • *Records measurements of length, height, weight, mass and capacity using the appropriate standard units, for example, millimetres (mm), centimetres (cm), grams (g), kilograms (kg), millimetres (ml), litres (l). Compares the measure with the estimate.* • *Uses knowledge of relationships between units of measure to make simple conversions, for example, $1m\ 58cm = 158cm$.* • *Applies knowledge of fractions to read accurately a variety of scales on measuring devices, to the nearest graduation.* • *Uses square grids to estimate then measure the areas of a variety of simple 2D shapes to at least the nearest half square.* • *Creates shapes with a given area to at least the nearest half square using square tiles or grids.* • *Recognises that different shapes can have the same area (conservation of area).*
	Mathematics – its impact on the world, past, present and future	I have discussed the important part that numbers play in the world and explored a variety of systems that have been used by civilisations throughout history to record numbers. MTH 1-12a	• 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.

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	Patterns and relationships	I can continue and devise more involved repeating patterns or designs, using a variety of media. MTH 1-13a Through exploring number patterns, I can recognise and continue simple number sequences and can explain the rule I have applied. MTH 1-13b	• Counts forwards and backwards in 2s, 5s and 10s from any whole number up to at least 1000. • Describes patterns in number, for example, in the multiplication tables and hundred square. • Continues and creates repeating patterns involving shapes, pictures, symbols and movements, making use of a variety of media. • Describes, continues and creates number patterns using addition, subtraction, doubling, halving, counting in jumps (skip counting) and known multiples and is able to explain the rule applied.	
	Expressions and equations	I can compare, describe and show number relationships, using appropriate vocabulary and the symbols for equals, not equal to, less than and greater than. MTH 1-15a When a picture or symbol is used to replace a number in a number statement, I can find its value using my knowledge of number facts and explain my thinking to others. MTH 1-15b	• Understands and accurately uses the terms 'equal to', 'not equal to', 'less than', 'greater than', and the related symbols $(=, \neq, <, >)$ when comparing sets of 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, $\blacklozenge \times 6 = 30$ or $120 \div \blacklozenge = 40$	
Shape, position and movement	**Properties of 2D shapes and 3D objects**	I have explored simple 3D objects and 2D shapes and can identify, name and describe their features using appropriate vocabulary. MTH 1-16a	• 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, for example, side, face, edge, corner, 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 at least two different shapes.	

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		I can explore and discuss how and why different shapes fit together and create a tiling pattern with them. MTH 1-16b	
	Angle, symmetry and transformation	I can describe, follow and record routes and journeys using signs, words and angles associated with direction and turning. MTH 1-17a I have developed an awareness of where grid reference systems are used in everyday contexts and can use them to locate and describe position. MTH 1-18a I have explored symmetry in my own and the wider environment and can create and recognise symmetrical pictures, patterns and shapes. MTH 1-19a	• Uses technology and other methods to describe, follow and record directions using words associated with angles, directions and turning including full turn, half turn, quarter turn, clockwise, anticlockwise, right turn, left turn, right angle and associated angles measured in degrees. • Knows and uses compass points, for example, North, South-West and relates these to the appropriate angles. • Uses informal methods to estimate, measure 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 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.
Information handling	**Data and analysis**	*I have explored a variety of ways in which data is presented and can ask and answer questions about the information it contains.* *MNU 1-20a*	• *Asks and answers questions to extract key information from a variety of data sets including charts, diagrams, bar graphs and tables. Uses this to inform choices and decisions.* • *Selects and uses the most appropriate way to gather and sort data for a given purpose, justifying choice of method, 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

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		I have used a range of ways to collect information and can sort it in a logical, organised and imaginative way using my own and others' criteria. **MNU 1-20b** Using technology and other methods, I can display data simply, clearly and accurately by creating tables, charts and diagrams, using simple labelling and scale. MTH 1-21a	unit represents more than one data value in graphs.
	Ideas of chance and uncertainty	*I can use appropriate vocabulary to describe the likelihood of events occurring, using the knowledge and experiences of myself and others to guide me.* **MNU 1-22a**	• *Uses mathematical vocabulary appropriately to describe the likelihood of events occurring in everyday situations, for example, probable, likely/unlikely, certain/uncertain, never, possible/impossible, fair/unfair.* • *Interprets data gathered through everyday experiences to make reasonable predictions of the likelihood of an event occurring.*

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Second Level Numeracy and Mathematics

	*Curriculum Organisers	Experiences and Outcomes for planning learning, teaching and assessment	Benchmarks to support teachers' professional judgement of achievement of a level
Number, money and measure	Estimation 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**	• *Rounds whole numbers and decimal fractions up to and including at least 2 decimal places.* • *Applies knowledge of rounding to give an estimate to a calculation appropriate to the context, and uses it to check the reasonableness of the solution.* • *Shares solutions with others.*
	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** *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**	• *Reads, writes, and sequences numbers forwards and backwards, using the number range 0 to 1 000 000.* • *Partitions a wide range of whole numbers and decimal fractions with up to at least 3 decimal places, for example, $3 \cdot 6$ is three and six tenths, $3 \cdot 042$ is three and forty-two thousandths.* • *Explains the link between a digit, its place and its value for whole numbers up to at least 1 000 000.* • *Explains the link between a digit, its place and its value for numbers with at least 3 decimal places.* • *Reads, writes, orders and sequences sets of decimal fractions with up to at least 3 decimal places.* • *Uses knowledge of inverse operations in problem solving.* • *Adds and subtracts 10, 100 and 1000 mentally to and from whole numbers and decimal fractions with at least 3 decimal places.* • *Multiplies and divides whole numbers and decimal fractions with at least 3 decimal places mentally by 10, 100 and 1000.* • *Adds and subtracts multiples of 10 to and from whole numbers and decimal fractions with at least 3 decimal places.* • *Multiplies and divides whole numbers and decimal fractions with at least 3 decimal places by multiples of 10.* • *Recognises where decimal fractions are used in everyday life and applies this knowledge to record and convert amounts in money and measure accurately, for example, $501p = £5 \cdot 01, 9cm = 0 \cdot 09m, 7g = 0 \cdot 007kg$.*

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		I have explored the contexts in which problems involving decimal fractions occur and can solve related problems using a variety of methods. ***MNU 2-03b*** Having explored the need for rules for the order of operations in number calculations, I can apply them correctly when solving simple problems. MTH 2-03c ***I can show my understanding of how the number line extends to include numbers less than zero and have investigated how these numbers occur and are used.*** ***MNU 2-04a***	• ***Interprets and solves multi-step problems by selecting and carrying out appropriate mental and written calculations, and sharing chosen approach with others.*** • ***Provides the answer as a decimal fraction when dividing a whole number by a single digit, for example,*** $43 \div 5 = 8 \cdot 6$. • Applies the correct order of operations in number calculations when solving multi-step problems. • ***Talks about familiar contexts in which negative numbers are used.*** • ***Locates and orders numbers less than zero.***
	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	• 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.

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	Fractions, decimal fractions and percentages	*I have investigated the everyday contexts in which simple fractions, percentages or decimal fractions are used and can carry out the necessary calculations to solve related problems.* *MNU 2-07a* *I can show the equivalent forms of simple fractions, decimal fractions and percentages and can choose my preferred form when solving a problem, explaining my choice of method.* *MNU 2-07b* I have investigated how a set of equivalent fractions can be created, understanding the meaning of simplest form, and can apply my knowledge to compare and order the most commonly used fractions. MTH 2-07c	• *Uses knowledge of equivalent forms of fractions, decimal fractions and percentages, for example, $3/4 = 0 \cdot 75 = 75\%$, to solve problems, justifying choice of method used.* • *Calculates simple percentages of a quantity, with and without a calculator, 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 in everyday contexts, for example, find $3/5 \, of \, 60$.* • Creates equivalent fractions and uses this knowledge to put a set of the most commonly used fractions in order. • Expresses fractions in their simplest form.
	Money	*I can manage money, compare costs from different retailers, and determine what I can afford to buy.* *MNU 2-09a*	• *Carries out money calculations involving the four operations.* • *Compares costs and determines affordability within a given budget.* • *Demonstrates understanding of the benefits and risks of using bank cards and digital technologies.* • *Calculates profit and loss accurately, for example, when working with a budget for an enterprise activity.*

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		I understand the costs, benefits and risks of using bank cards to purchase goods or obtain cash and realise that budgeting is important. **MNU 2-09b** *I can use the terms profit and loss in buying and selling activities and can make simple calculations for this.* **MNU 2-09c**	
	Time	*I can use and interpret electronic and paper-based timetables and schedules to plan events and activities, and make time calculations as part of my planning.* **MNU 2-10a** *I can carry out practical tasks and investigations involving timed events and can explain which unit of time would be most appropriate to use.* **MNU 2-10b** *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**	• *Reads and records any 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 $1\,{}^3/_4$ 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.* • *Estimates the duration of a journey based on knowledge of the link between speed, distance and time.* • *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.*

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	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* *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* *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*	• *Uses the comparative size of familiar objects to make reasonable estimations of length, weight, area and capacity.* • *Estimates to the nearest appropriate unit, then measures accurately: length, height and perimeter in millimetres (mm), centimetres (cm) and metres (m); distances in kilometres (km); weights in grams (g) and kilograms (kg); capacity in millilitres (ml) and litres (l).* • *Calculates the perimeter of simple 2D shapes in millimetres (mm), centimetres (cm) and metres (m) and explains the choice of method used.* • *Calculates the area of 2D shapes in square millimetres (mm^2), square centimetres (cm^2) and square metres (m^2) and explains the choice of method used.* • *Calculates the volume of simple 3D objects in cubic centimetres (cm^3) and cubic metres (m^3) and explains the choice of method used.* • *Converts between common units of measurement using decimal notation, for example, $550cm = 5 \cdot 5m$; $3 \cdot 009kg = 3\,kg\,9\,g$ and applies this knowledge when solving problems.* • *Chooses the most appropriate measuring device for a given task, reading scales accurately, carrying out the required calculation and recording results in the correct unit.* • *Draws shapes accurately with a given perimeter or area.* • *Demonstrates understanding of the conservation of measurement.* • *Shows awareness of imperial units used in everyday life, for example, miles or stones.*
	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	• Researches and presents examples of the impact mathematics has in the world of life and work, for example, the use of triangles in construction. • Contributes to discussions and activities on the role of mathematics in the creation of important inventions, now and in the past.
	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	• Explains and uses a rule to extend well known number sequences including square numbers, triangular numbers, Pascal's triangle and Fibonacci sequence. • Applies knowledge of multiples, factors, square numbers and triangular numbers to generate number patterns for others to continue.

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	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	• Solves simple algebraic equations with one variable, for example, $3x + 1 = 10$; $2x - 4 = 14$.
Shape, position and movement	**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 Through practical activities, I can show my understanding of the relationship between 3D objects and their nets. MTH 2-16b I can draw 2D shapes and make representations of 3D objects using an appropriate range of methods and efficient use of resources. MTH 2-16c	• Uses mathematical language to describe the properties of a wide range of regular and irregular 2D shapes and 3D objects. • Describes 2D shapes and 3D objects using specific vocabulary including face, edge, vertex, angle, diagonal, radius, diameter and circumference and applies this knowledge to demonstrate understanding of the relationship between 3D objects and their nets. • Identifies and describes 2D shapes and 3D objects within the environment and explains why their properties match their function, for example, the importance of triangles in a bridge structure. • Knows that the radius is half of the diameter and uses this knowledge to draw circles using a pair of compasses. • Makes use of digital technologies and mathematical instruments to draw representations of 3D objects showing understanding that not all parts of the 3D object can be seen.
	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	• Uses mathematical language, for example, acute, obtuse, straight and reflex to describe and classify a range of angles identified within shapes in the environment. • Measures and draws accurately a range of angles using rulers and protractors and applies knowledge of the relative size of angles to solve problems in a range of contexts. • Knows that complementary angles add up to 90 degrees and supplementary angles add up to 180 degrees and uses this knowledge to calculate missing angles. • Uses knowledge of the link between compass points and angles to describe, follow and record directions. • Interprets maps, models or plans with simple scales, for example, $1cm:1km$.

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

Through practical activities which include the use of technology, I have developed my understanding of the link between compass points and angles and can describe, follow and record directions, routes and journeys using appropriate vocabulary.
MTH 2-17c

Having investigated where, why and how scale is used and expressed, I can apply my understanding to interpret simple models, maps and plans.
MTH 2-17d

I can use my knowledge of the coordinate system to plot and describe the location of a point on a grid.
MTH 2-18a / MTH 3-18a

I can illustrate the lines of symmetry for a range of 2D shapes and apply my understanding to create and complete symmetrical pictures and patterns.
MTH 2-19a / MTH 3-19a | • Describes, plots and records the location of a point on a grid using coordinate notation.
• Identifies and illustrates all lines of 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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	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* *I have carried out investigations and surveys, devising and using a variety of methods to gather information and have worked with others to collate, organise and communicate the results in an appropriate way.* *MNU 2-20b* I can display data in a clear way using a suitable scale, by choosing appropriately from an extended range of tables, charts, diagrams and graphs, making effective use of technology. MTH 2-21a / MTH 3-21a	• *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, pie charts and spreadsheets.* • *Analyses, interprets and draws conclusions from a variety of data and communicates findings effectively.* • *Draws conclusions about the reliability of data taking into account, for example, the author, the audience, the scale and sample size used.* • Displays data appropriately making effective use of technology and chooses a suitable scale when creating graphs.

Information handling

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	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*	• *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 $1:6$.* • *Plans and carries out simple experiments involving chance with repeated trials, for example, what is the probability of throwing a double six if you throw two dice fifty times?* • *Uses data to predict the outcome of a simple experiment and explains reasons for the prediction.*

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Third Level Numeracy and Mathematics

	*Curriculum Organisers	Experiences and Outcomes for planning learning, teaching and assessment	Benchmarks to support teachers' professional judgement of achievement of a level
Number, money and measure	**Estimation and rounding**	*I can round a number using an appropriate degree of accuracy, having taken into account the context of the problem.* *MNU 3-01a*	*Rounds numbers to at least 3 decimal places.* *Rounds numbers to at least 3 significant figures.* *Uses rounding to routinely estimate the answers to calculations.* *Rounds in a way which is appropriate for the context when solving problems and determines the reasonableness of the solution.*
	Number and number processes	*I can use a variety of methods to solve number problems in familiar contexts, clearly communicating my processes and solutions.* *MNU 3-03a* *I can continue to recall number facts quickly and use them accurately when making calculations.* *MNU 3-03b* *I can use my understanding of numbers less than zero to solve simple problems in context.* *MNU 3-04a*	*Quickly recalls number facts including at least the 12th multiplication table and square numbers up to 144.* *Solves written addition and subtraction problems accurately working with whole numbers and decimal fractions with up to at least 3 decimal places and selects and communicates the processes and solutions.* *Solves written multiplication and division problems accurately working with whole numbers and decimal fractions with up to at least 3 decimal places.* *Solves mental problems accurately involving the four operations.* *Interprets and solves multi-step problems in familiar contexts ensuring correct order of operations.* *Communicates and justifies strategies used to solve problems.*

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* Curriculum organisers in some previous documents have been referred to as sub-divisions

	Multiples, factors and primes	I have investigated strategies for identifying common multiples and common factors, explaining my ideas to others, and can apply my understanding to solve related problems. MTH 3-05a I can apply my understanding of factors to investigate and identify when a number is prime. MTH 3-05b	• Identifies common multiples for whole numbers and can explain method used. • Identifies common factors for whole numbers and can explain method used. • Identifies prime numbers up to at least 100 and can explain method used. • Solves problems using multiples and factors.
	Powers and roots	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	• Evaluates simple whole number powers, for example, $2^4 = 16$. • Expresses whole numbers as powers, for example, $27 = 3^3$. • Explains the notation and uses associated vocabulary appropriately.
	Fractions, decimal fractions and percentages	*I can solve problems by carrying out calculations with a wide range of fractions, decimal fractions and percentages, using my answers to make comparisons and informed choices for real-life situations.* *MNU 3-07a*	• *Converts any fraction, decimal fraction or percentage into an equivalent fraction, decimal fraction or percentage.* • Adds and subtracts commonly used 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 or 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.* • *Selects and communicates processes and solutions.*

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		By applying my knowledge of equivalent fractions and common multiples, I can add and subtract commonly used fractions. MTH 3-07b Having used practical, pictorial and written methods to develop my understanding, I can convert between whole or mixed numbers and fractions. MTH 3-07c *I can show how quantities that are related can be increased or decreased proportionally and apply this to solve problems in everyday contexts.* *MNU 3-08a*	
	Money	*When considering how to spend my money, I can source, compare and contrast different contracts and services, discuss their advantages and disadvantages, and explain which offer best value to me.* *MNU 3-09a*	• *Demonstrates understanding of best value in relation to contracts and services when comparing products and chooses the best value for their personal solution and justifies choices.* • *Budgets effectively, using technology, showing development of increased financial capability.*

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		I can budget effectively, making use of technology and other methods, to manage money and plan for future expenses. *MNU 3-09b*	
	Time	*Using simple time periods, I can work out how long a journey will take, the speed travelled at or distance covered, using my knowledge of the link between time, speed and distance.* *MNU 3-10a*	• *Applies knowledge of the relationship between speed, distance and time to find each of the three variables, including working with simple fractional and decimal fractional hours, for example, ½, 0·5, ¼, 0·25, ¾, 0·75.* • *Calculate time durations across hours and days.*
	Measurement	*I can solve practical problems by applying my knowledge of measure, choosing the appropriate units and degree of accuracy for the task and using a formula to calculate area or volume when required.* *MNU 3-11a* Having investigated different routes to a solution, I can find the area of compound 2D shapes and the volume of compound 3D objects, applying my knowledge to solve practical problems. MTH 3-11b	• *Chooses appropriate units for length, area and volume when solving practical problems.* • *Converts between standard units to at least 3 decimal places and applies this when solving calculations of length, capacity, volume and area.* • Calculates the area of a 2D shape where the units are inconsistent. • Finds the area of compound 2D shapes and explains the method used. • Uses a formula to calculate the area of parallelograms, rhombuses and kites. • Uses a formula to calculate the volume of regular prisms and cuboids. • Calculates the volume of a 3D shape where the units are inconsistent. • Finds the volume of compound 3D objects and explains the method used.

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	Mathematics – its impact on the world, past, present and future	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	• 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.
	Patterns and relationships	Having explored number sequences, I can establish the set of numbers generated by a given rule and determine a rule for a given sequence, expressing it using appropriate notation. MTH 3-13a	• Generates number sequences from a given rule, for example, $T = 4x + 6$. • Determines the rule defining a sequence of numbers, for example, $4, 11, 18, 25 \ldots$ • 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, $C = 0 \cdot 05m + 75$.
	Expressions and equations	I can collect like algebraic terms, simplify expressions and evaluate using substitution. MTH 3-14a Having discussed ways to express problems or statements using mathematical language, I can construct, and use appropriate methods to solve, a range of simple equations. MTH 3-15a	• Collects like terms up to at least cubic terms to simplify an algebraic expression. • Evaluates expressions involving at least two variables using both positive and negative values. • Interprets problems and creates linear equations which model them. • Solves linear equations. • Creates a simple linear formula representing information contained in a diagram, problem or statement. • Evaluates a simple linear formula, for example, $= 3x + 4$.

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Shape, position and movement	Properties of 2D shapes and 3D objects	I can create and evaluate a simple formula representing information contained in a diagram, problem or statement. MTH 3-15b	
	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	• Demonstrates a variety of methods to accurately draw 2D shapes, including triangles and regular polygons, using mathematical instruments.
	Angle, symmetry and transformation	I can name angles and find their sizes using my knowledge of the properties of a range of 2D shapes and the angle properties associated with intersecting and parallel lines. MTH 3-17a Having investigated navigation in the world, I can apply my understanding of bearings and scale to interpret maps and plans and create accurate plans, and scale drawings of routes and journeys. MTH 3-17b	• Names angles using notation such as $\angle ABC$. • Identifies corresponding angles. • Identifies alternate angles. • Identifies vertically opposite 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. • Plots and describes a location point on a grid using coordinates in the first quadrant. • Identifies all lines of symmetry in 2D shapes. • Creates symmetrical patterns and pictures.

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		I can apply my understanding of scale when enlarging or reducing pictures and shapes, using different methods, including technology. **MTH 3-17c** I can use my knowledge of the coordinate system to plot and describe the location of a point on a grid. **MTH 2-18a / MTH 3-18a** I can illustrate the lines of symmetry for a range of 2D shapes and apply my understanding to create and complete symmetrical pictures and patterns. **MTH 2-19a / MTH 3-19a**	
Information handling	**Data and analysis**	*I can work collaboratively, making appropriate use of technology, to source information presented in a range of ways, interpret what it conveys and discuss whether I believe the information to be robust, vague or misleading.* ***MNU 3-20a***	- *Sources information or collects data making use of technology where appropriate.* - *Interprets data sourced or given.* - *Analyses data and draws appropriate conclusions.* - *Determines if data 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 including compound bar and line graphs, stem and leaf charts, scatter graphs and pie charts making effective use of technology as appropriate. - Describes trends in data using appropriate language, for example, upwards.

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		When analysing information or collecting data of my own, I can use my understanding of how bias may arise and how sample size can affect precision, to ensure that the data allows for fair conclusions to be drawn. MTH 3-20b I can display data in a clear way using a suitable scale, by choosing appropriately from an extended range of tables, charts, diagrams and graphs, making effective use of technology. MTH 2-21a / MTH 3-21a	
	Ideas of chance and uncertainty	*I can find the probability of a simple event happening and explain why the consequences of the event, as well as its probability, should be considered when making choices.* *MNU 3-22a*	• *Uses the probability scale of 0 to 1 showing probability as a fraction, decimal fraction or percentage.* • *Demonstrates understanding of the relationship between the frequency of an event happening and the probability of it happening.* • *Calculates the probability of a simple event happening, for example, the probability of selecting a face card from a standard deck of cards.* • *Identifies all of the mutually exclusive outcomes of a single event and calculates the probability of each.* • *Investigates real-life situations which involve making decisions on the likelihood of events occurring and the consequences involved.*

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Fourth Level Numeracy and Mathematics

	*Curriculum Organisers	Experiences and Outcomes for planning learning, teaching and assessment	Benchmarks to support teachers' professional judgement of achievement of a level
Number, money and measure	**Estimation and rounding**	*Having investigated the practical impact of inaccuracy and error, I can use my knowledge of tolerance when choosing the required degree of accuracy to make real-life calculations.* *MNU 4-01a*	• *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.* • *Uses tolerance to choose the most appropriate degree of accuracy for real-life calculations, selects and communicates processes and solutions.*
	Number and number processes	*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.* *MNU 4-03a* 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. MTH 4-03b	• *Interprets and solves multi-step problems using the four operations.* • *Communicates and justifies use of the most effective strategy for the given task.* • Applies the correct order of operations in calculations which involve brackets and explains process and solutions.
	Multiples, factors and primes	There are no experiences and outcomes at fourth level.	There are no experiences and outcomes at fourth level.

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	Powers and roots	I have developed my understanding of the relationship between powers and roots and can carry out calculations mentally or using technology to evaluate whole number powers and roots, of any appropriate number. MTH 4-06a Within real-life contexts, I can use scientific notation to express large or small numbers in a more efficient way and can understand and work with numbers written in this form. MTH 4-06b	• Uses knowledge of the relationship between powers and roots to evaluate whole number powers of any appropriate number, for example, $3^4 = 81$. • Uses knowledge of the relationship between powers and roots to evaluate whole number roots of any appropriate number, for example, $\sqrt[3]{27} = 3$. • Uses knowledge of mathematical notation to express large numbers in scientific notation. • Uses knowledge of mathematical notation to express small numbers in scientific notation. • Shows understanding that the square root is the inverse process of squaring a number.
	Fractions, decimal fractions and percentages	*I can choose the most appropriate form of fractions, decimal fractions and percentages to use when making calculations mentally, in written form or using technology, then use my solutions to make comparisons, decisions and choices.* *MNU 4-07a* I can solve problems involving fractions and mixed numbers in context, using addition, subtraction or multiplication. MTH 4-07b *Using proportion, I can calculate the change in one quantity caused by a change in a related quantity and solve real-life problems.* *MNU 4-08a*	• *Chooses the most efficient form of fractions, decimal fractions or percentages when making calculations and justifies the methods used.* • *Uses calculations to support comparisons, decisions and choices and justifies the method used.* • *Calculates the percentage increase/decrease of a value.* • *Expresses one value as a percentage of another.* • Applies addition, subtraction and multiplication skills to solve problems involving fractions and mixed numbers. • *Uses knowledge of proportion to solve problems in real-life which involve changes in related quantities.*

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	Money	*I can discuss and illustrate the facts I need to consider when determining what I can afford, in order to manage credit and debt and lead a responsible lifestyle.* *MNU 4-09a* *I can source information on earnings and deductions and use it when making calculations to determine net income.* *MNU 4-09b* *I can research, compare and contrast a range of personal finance products and, after making calculations, explain my preferred choices.* *MNU 4-09c*	• *Applies understanding of credit and debit in relation to earnings and deductions.* • *Uses budgeting skills to manage income effectively and justifies spending and saving choices.* • *Calculates net income by selecting appropriate information.* • *Compares a range of personal finance products.* • *Communicates the impact of financial decisions.*
	Time	*I can research, compare and contrast aspects of time and time management as they impact on me.* *MNU 4-10a* *I can use the link between time, speed and distance to carry out related calculations.* *MNU 4-10b*	• *Demonstrates effective time management skills, for example, working with different time zones or making plans, including across midnight.* • *Carries out calculations involving speed, distance and time involving decimal and decimal fraction hours.* • *Calculates time durations across hours, days and months.*
	Measurement	*I can apply my knowledge and understanding of measure to everyday problems and tasks and appreciate the practical importance of accuracy when making calculations.* *MNU 4-11a*	• *Demonstrates the impact of inaccuracy and error, for example, the impact of rounding an answer before the final step in a multi-step calculation.* • Using formulae, calculates the surface area of cylinders, cuboids and triangular prisms and uses it to solve problems involving efficient use of materials.

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		Through investigating real-life problems involving the surface area of simple 3D shapes, I can explore ways to make the most efficient use of materials and carry out the necessary calculations to solve related problems. MTH 4-11b I have explored with others the practicalities of the use of 3D objects in everyday life and can solve problems involving the volume of a prism, using a formula to make related calculations when required. MTH 4-11c	• Using formulae, calculates the volume of cuboids, triangular prisms and cylinders and uses this to make practical decisions.
	Mathematics – its impact on the world, past, present and future	I have discussed the importance of mathematics in the real world, investigated the mathematical skills required for different career paths and delivered, with others, a presentation on how mathematics can be applied in the workplace. MTH 4-12a	• Contributes to discussions on the role of mathematics in everyday life and in the workplace. • Contributes to 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.

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	Patterns and relationships	Having explored how real-life situations can be modelled by number patterns, I can establish a number sequence to represent a physical or pictorial pattern, determine a general formula to describe the sequence, then use it to make evaluations and solve related problems. MTH 4-13a I have discussed ways to describe the slope of a line, can interpret the definition of gradient and can use it to make relevant calculations, interpreting my answer for the context of the problem. MTH 4-13b Having investigated the pattern of the coordinate points lying on a horizontal or vertical line, I can describe the pattern using a simple equation. MTH 4-13c I can use a given formula to generate points lying on a straight line, plot them to create a graphical representation then use this to answer related questions. MTH 4-13d	• Determines a general formula to describe a sequence and uses it to solve related problems. • Calculates the gradient of lines in a co-ordinate diagram. • Calculates the gradient of lines from 2 given coordinates. • Draws conclusions about the gradient of a line. • Communicates the gradient of vertical and horizontal lines and states the equation of these lines as $x = a \; or \; y = b$ or equivalent. • Uses the formula $y = mx + c$ to express the equation of a line. • Uses a given formula to plot a straight line. • Uses a graph of a straight line to interpret real-life situations and solve related problems.
	Expressions and equations	Having explored the distributive law in practical contexts, I can simplify, multiply and evaluate simple algebraic terms involving a bracket. MTH 4-14a	• Expands brackets using the distributive law. • Solves an extended range of linear equations involving the distributive law. • 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.

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		I can find the factors of algebraic terms, use my understanding to identify common factors and apply this to factorise expressions. MTH 4-14b Having discussed the benefits of using mathematics to model real-life situations, I can construct and solve inequalities and an extended range of equations. MTH 4-15a	• Factorises expressions with a numeric common factor.
Shape, position and movement	**Properties of 2D shapes and 3D objects**	I have explored the relationships that exist between the sides, or sides and angles, in right-angled triangles and can select and use an appropriate strategy to solve related problems, interpreting my answer for the context. MTH 4-16a Having investigated the relationships between the radius, diameter, circumference and area of a circle, I can apply my knowledge to solve related problems. MTH 4-16b	• 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.

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.

	Angle, symmetry and transformation	Having investigated the relationship between a radius and a tangent and explored the size of the angle in a semi-circle, I can use the facts I have established to solve related problems. MTH 4-17a I can apply my understanding of the properties of similar figures to solve problems involving length and area. MTH 4-17b I can plot and describe the position of a point on a 4-quadrant coordinate grid. MTH 4-18a I can apply my understanding of the 4-quadrant coordinate system to move, and describe the transformation of, a point or shape on a grid. MTH 4-18b Having investigated patterns in the environment, I can use appropriate mathematical vocabulary to discuss the rotational properties of shapes, pictures and patterns and can apply my understanding when completing or creating designs. MTH 4-19a	• Rotates objects using rotational symmetry. • Demonstrates understanding of transformation by reflecting and translating objects on a four quadrant grid. • Uses similarity to find unknown lengths and areas of 2D shapes. • Applies knowledge of the relationship between the tangent and radius to calculate sizes of missing angles. • Applies knowledge of the angles in a semi-circle to solve problems. • Uses a 4-quadrant Cartesian grid to read and plot coordinates.

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.

Information handling	**Data and analysis**	*I can evaluate and interpret raw and graphical data using a variety of methods, comment on relationships I observe within the data and communicate my findings to others.* *MNU 4-20a* In order to compare numerical information in real-life contexts, I can find the mean, median, mode and range of sets of numbers, decide which type of average is most appropriate to use and discuss how using an alternative type of average could be misleading. MTH 4-20b I can select appropriately from a wide range of tables, charts, diagrams and graphs when displaying discrete, continuous or grouped data, clearly communicating the significant features of the data. MTH 4-21a	• *Interprets raw and graphical data.* • *Uses statistical language, for example, correlations to describe identified relationships.* • Calculates the mean, median, mode and range of a data set. • Selects the most appropriate statistical diagram to display a given data set. • 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.

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.

	Ideas of chance and uncertainty	*By applying my understanding of probability, I can determine how many times I expect an event to occur, and use this information to make predictions, risk assessment, informed choices and decisions.* *MNU 4-22a*	• *Determines the expected occurrences of an event.* • *Applies knowledge and skills in calculating probability to make predictions.* • *Assesses risk and makes informed decisions in real-life contexts.*

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.

Progression in numeracy and mathematical skills

Numeracy and mathematics skills are embedded in the experiences and outcomes and cannot be taught in isolation. These skills can be developed through the planning of activities, questions and assessments which encourage learners to think about the concepts, going beyond the recall of knowledge and encouraging the exemplification of understanding. As learners progress through curriculum for excellence levels, they should demonstrate increasing sophistication in their ability to demonstrate, link, transfer and apply the following skills in a range of increasingly more challenging contexts and with increasing independence:

- 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 the rationale for each skill and some guidance on how to support learners with their development.

Numeracy and mathematical skills	Early Level ⟶ Fourth Level
Interpret questions	Learners need to interpret questions successfully in order to work out solutions. This involves selecting the relevant information and identifying redundant or missing information in a question. Interpretation of a question can also include interpreting data where learners need to understand information presented to be able to work out the solution. Learners can be supported to develop their skills of interpreting questions by highlighting key words or phrases, taking notes or drawing diagrams. These strategies will help learners to make important decisions about which operation to choose when solving a word problem. The sophistication of question and the knowledge base needed to solve the problem will increase as children progress in their learning.
Select and communicate processes and solutions	To demonstrate understanding, learners need to be able to explain why they have chosen a particular process as it demonstrates their understanding of the task, question or assessment. Learners need frequent opportunities to discuss their thinking with their peers and teachers. They need to select from a range of processes and as they progress in their learning, they should increasingly choose processes which are most efficient. Learners should also be able to discuss their solutions to verbalise their thought process, either through explaining their thinking, or demonstrating it pictorially. As learners progress through the increased challenges of the levels, they will become more confident in their abilities to select from a growing repertoire of strategies, articulate their chosen approaches with increasing clarity and make greater use of specialised vocabulary.

Justify choice of strategy used	Asking learners to justify their choice of strategy provides a valuable opportunity for them to 'talk through' their thinking and explain why they adopted the chosen approach. By sharing their thinking with others, the learner will be able to better understand their own strategies, learn from others and identify the most efficient strategies for different types of tasks. This process also provides evidence to support teachers' assessment of the learner's understanding. In developing this skill in learners, teachers should regularly ask the question, 'Why did you choose that strategy?' and ask learners to show their working. Asking learners to justify their strategy will ensure that they have not arrived at the right answer for the wrong reason. As learners progress through the levels, they will become increasingly reflective and draw on experiences which ensure greater confidence in their ability to justify their choice of strategy, comparing it to others which may have been used.
Link mathematical concepts	As they develop more sophisticated understanding across the range of learning in numeracy and mathematics, learners need to be able to link mathematical concepts to solve problems. Learners should be supported to see that their learning in one area can be transferred to another. For example, learning about scale can be used when reading measurements or creating graphs. It is essential that when staff are planning for learning, they consider how mathematical concepts are connected and make this explicit to learners. As learners progress through the levels and concepts become embedded, they will, more independently, identify an increasing number of connections across aspects of mathematics in both prior and current learning and use these links intuitively to solve problems.
Use mathematical vocabulary and notation	Encouraging the consistent use of correct mathematical language from early level onwards provides learners with a common vocabulary and a shared understanding. As learners develop understanding of new concepts, teachers should ensure that the correct terminology and notation are used. As learners progress through the levels, they will develop an extended and more specialised range of vocabulary and notation and use these appropriately in more complex situations.
Mental agility	Mental agility is an essential life skill which must be developed from the early stages. In all learning in numeracy and mathematics, lack of fluency in mental processes can be a significant barrier to progress. Learners who, from an early level, develop a sound knowledge of key number bonds and an understanding of the number families will be more able to calculate mentally using a range of strategies. As learners progress through the levels, they will become increasingly skilled in manipulating a wider range of numbers and can choose from a range of strategies to mentally solve more open-ended, multi-step problems in a range of real life contexts.

Reason algebraically	Understanding that numbers can be replaced by pictures or symbols is fundamental to all algebraic reasoning. Using pictures and symbols is an early step in understanding variables and constants and introduces the concept of finding the unknown quantity. This takes learners beyond the immediate, single numerical problem to working with similar problems which can be solved algebraically. An early focus on algebraic reasoning provides a stronger basis for later, formal learning in algebra. As learners progress they will build their understanding of commutative, associative and distributive laws and use these, along with a sound knowledge of number, patterns and relationships to work confidently with expressions and equations.
Determine the reasonableness of a solution	The development of early estimation skills lays the foundation for more refined comparisons and for approximations to be made as learners progress. Learners should use rounding skills routinely to estimate and check the reasonableness of a solution. This will include being able to select the most appropriate degree of accuracy for the task. As learners progress they will use skills of estimation and rounding routinely when working with a large range of numbers in real-life contexts. After calculating, they will, with increasing confidence, independently use the estimate to verify the reasonableness of the solution, justifying their approach.