Community Services: Education

Numeracy and Mathematics Progression Framework

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GUIDELINES FOR USING THE PROGRESSION FRAMEWORK

This framework sets out a clear progression for skills, knowledge and understanding from the following Curriculum for Excellence Numeracy and Mathematics ***Significant Aspects of Learning:***

Using knowledge and understanding of the number system, patterns and relationships

Using knowledge and understanding of measurement and its application

Researching and evaluating data to assess risks and make informed choices

Using knowledge and understanding of shape and space

Applying numeracy and mathematical skills

The purpose of this document is to offer a continuum of learning through to the end of the Broad General Education (CfE Early – Third/Fourth Levels). The progression is intended to assist teachers as they plan their Numeracy and Mathematics curriculum and assess evidence of learning.

Level	Stage
Early	The pre-school years and P1, or later for some.
First	To the end of P4, but earlier or later for some.
Second	To the end of P7, but earlier or later for some.
Third and Fourth	S1 to S3, but earlier for some. The fourth level broadly equates to Scottish Credit and Qualifications Framework level 4. The fourth level experiences and outcomes are intended to provide possibilities for choice. Young people's programmes will not include all of the fourth level outcomes.

The aims of the Progression are to:

- ***enhance planning and assessment;***
- ***provide staff with a framework to promote progression in learning and teaching;***
- ***enable the sharing of standards within schools and across school clusters.***

The document is structured using each of the Numeracy and Mathematics significant aspects of learning. These are then sub-divided further using Curriculum levels and the CfE Experiences and Outcomes. The document details the learner's progression within and through each of the Levels.
The document details the learner's progression within and through each of the Levels and have been checked throughout with the Benchmarks.

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 make 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.

NUMERACY and MATHEMATICS

Significant Aspects of Learning (SALs)

Sub-divisions

Using knowledge and understanding of the number system, patterns and relationships

- Number and number processes
- Estimation and Rounding
- Fractions, decimal fractions and percentages
- Money
- Multiples, factors and primes
- Powers and roots
- Mathematics: it's impact on the world past, present and future
- Patterns and relationships
- Expressions and equations

Using knowledge and understanding of measurement and its application

- Measurement
- Time

Researching and evaluating data to assess risks and make informed choices

- Data and analysis
- Ideas of chance and uncertainty

Using knowledge and understanding of shape and space

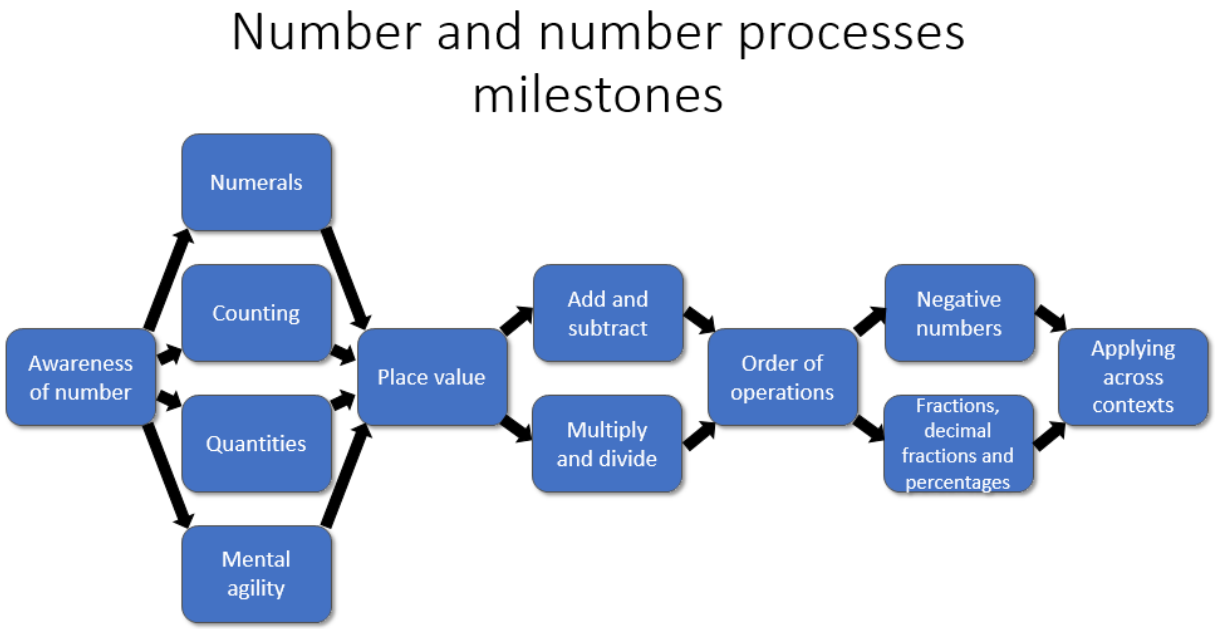
- Properties of 2D shapes and 3D objects
- Angle, symmetry and transformation

Applying numeracy and mathematical skills

- 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
- determine the reasonableness of a solution

Using knowledge and understanding of the Number system, Patterns and Relationships

Progression



Significant aspect of learning:

Applying numeracy and mathematical skills

It is important that learners develop numeracy and mathematical skills as they build their knowledge and understanding. As learners progress, they should demonstrate an increasing sophistication in their ability to:

- 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
- determine the reasonableness of a solution

These skills should be evident across the other significant aspects of learning in Numeracy and Mathematics. Staff should actively promote the development of these skills and ensure they are embedded in planning for learning, teaching and assessment.

Number and number processes		Significant aspect of learning: Use knowledge and understanding of the number system, patterns and relationships	
	Milestone	During Early Level	By the end of Early Level
I have explored numbers, understanding that they represent quantities, and I can use them to count, create sequences and describe order. **MNU 0-02a**	**Awareness of number**	• I can describe groups of objects by saying which is bigger, smaller or if they are the same. • I can sort the objects using familiar or given criteria e.g. colour.	• I can count the objects to decide which has the most or least. • I can sort and create groups of objects by number. I can describe their position using ordinal numbers.
	Numerals	• I can identify all the numbers from 0-20. • I can say the number word sequences forwards and backwards in the range 0-20.	• I can identify all the numbers from 0-100. • I can say the number word sequences forwards and backwards in the range 0-100.
	Quantities • **Subitising** • **Arrays**	• I recognise patterns to 5, i.e. subitise.	• I recognise patterns to 10.
I use practical materials and can 'count on and back' to help me to understand addition and subtraction, recording my ideas and solutions in different ways. **MNU 0-03a**	**Counting** • **The importance of zero** • **One-to-one correspondence** • **Developing counting skills** • **Language** • **Counting forwards and backwards**	• I can match the counting words with objects by touching each in turn. • I can use concrete materials to count a set of objects. • I know that when we count we start from zero. • I can skip count for easy multiples 2 and 5. • I know that the last number I count tells me the total of the set. • I can describe groups of objects by saying which is bigger, smaller or if they are the same. • I can say the number before and after a given number in the range 0-10 i.e. count on and back.	• I know that it does not matter which way I add the numbers I get the same answer. • I can solve addition and subtraction problems using a count all strategy and imaging. • I can demonstrate that when we add on zero the number stays the same. • I can demonstrate that when we subtract zero the number stays the same. • I can use counting words in a one-to-one relationship. • I can skip count for a range of multiples 2, 5, 10. • I can say the number before and after a given number in the range 0-20 i.e. count on and back.
	Mental agility	• I have learned the basic facts for addition and subtraction and number families up to 5 by investigating patterns and groupings. *Please refer to the document Guidance on Mental Agility for further details.*	• I have learned the basic facts for addition and subtraction and number families to 10.

	Milestone	At the beginning of First Level	During First Level	By the end of First Level
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**	**Counting** • **The importance of zero** • **One-to-one correspondence** • **Developing counting skills** • **Language** • **Counting forwards and backwards**	• I count on and back to solve number problems. • I can say the number before and after a given number in the range 0-20 i.e. count on and back.	• I use the commutative property to add by counting from the biggest number. • I can say the number before and after a given number in the range 0-100 i.e. count on and back.	• I can say the number before and after a given number in the range 0-1000 i.e. count on and back.
	Quantities • **Subitising** • **Arrays**	• I can make groups of numbers and write their number sentence.	• I can count arrays of numbers.	• I can quickly build, describe and count arrays of numbers.
	Place value • **Zero as a place holder** • **Language of place value** • **Grouping and partitioning** • **Working with decimal fractions** • **Mental agility**	• I know the value of the number depends on where the digits are placed. • Know zero is a place holder. • I can describe the value of each digit in a numeral to at least 100. • I am beginning to build my knowledge of multiplication facts.	• I know how to construct 2 digit numbers. • I can be flexible in the way I partition numbers to make calculations easy. • I can recall some multiplication facts from memory.	• I know how to construct 2 digit numbers and can put them in order. • I can describe the value of each digit in a numeral to at least 1000. • I can use place value to partition numbers. I also use other forms of partitioning such as tidy numbers to help during calculation. • I can recall some multiplication and division facts from memory. • I have a range of mental methods to solve problems.
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**	**Mental agility**	• I have learned the basic facts for addition and subtraction and number families to 20. ***Please refer to the document Guidance on Mental Agility for further detail.***	• I have learned the basic facts for addition and subtraction and number families to 100.	• I have a range of mental methods to solve problems.
	Add and subtract • **Relationship between addition and subtraction** • **Algorithms**	• I can use a number line or pictures to show my calculation strategy. • I can describe how I solve a variety of addition and subtraction tasks to 20 using my knowledge of inverse operations.	• I can use doubles, halves and similar strategies to add and subtract numbers. • I can use the associative property to make addition easier.	• I can use an empty number line or my own jottings to show the jumps I make when solving problems. • I can describe how I solve a variety of higher decade addition and subtraction tasks using my knowledge of inverse operations.
	Multiply and divide • **Relationship between multiplication and division**	• I use repeated addition and subtraction to solve multiplication and division problems. • I can make array patterns to show multiplication. • I know when we divide by 2 we share between 2 using our knowledge of the 2 times table.	• I can use jumps groups and sharing to solve multiplication problems. • I know when we divide by 2,5,10 we share using our knowledge of the times tables.	• I can use jumps, groups and sharing to solve multiplication and division problems. • I know when we divide by 2, 3, 4,5,10 we share using our knowledge of the times tables.

	Milestone	At the beginning of Second Level	During Second Level	By the end of Second Level
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**	**Add and subtract** • **Relationship between addition and subtraction** • **Algorithms**	• I can record the results of calculations using (horizontal) number sentences. • I can use column addition and subtraction when it is appropriate.	• I can demonstrate the calculation on a number line or with a diagram.	• I can add and subtract 10, 100 and 1000 mentally to and from whole numbers and decimal fractions with at least 3 decimal places. • I have a range of mental strategies that I can use to solve problems with whole numbers.
	Multiply and divide • **Relationship between multiplication and division**	• I can multiply by common multiples of 10. • I can recall some multiplication facts from memory. • I know when we divide within the times tables we share using our knowledge of the times tables.	• I can multiply and divide by common multiples of 10. • Multiply and divide whole numbers mentally by 10, 100 and 1000 • I can recall al the multiplication facts from memory.	• I can multiply and divide by common multiples of 10 and powers of 10. • I can recall all of the multiplication and division facts from memory. • I can perform multiplication and division sums by a single digit number using written methods where it is appropriate e.g. 5976x8 and 3579÷ 9 • I know when we divide out with the times tables, we share using our knowledge of the times tables.
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**	**Order of operations** • **Understanding and application of the order of operations** • **Commutative, distributive and associative properties**	• I have explored the rules for the order of operations of x, ÷, +, -. • I understand that addition is commutative. • I understand that addition is associative and can use this to solve a problem by grouping numbers. • I understand the distributive law and can split numbers to solve multiplication calculations out with the times tables. E.g. 5x15=5x10+5x5.	• I can apply the order of operations to problems involving x, ÷, +, -. • I can use the commutative property of addition to solve a problem by changing the order of the numbers. • I can use the associative property of addition to solve a problem by grouping numbers.	• I can apply the order of operations to problems involving brackets and indices. • I understand that multiplication is commutative and can use this to solve a problem by changing the order of the factors. • I understand that multiplication is associative and can use this to solve a problem by grouping numbers. • I can interpret and solve multi-step problems by selecting and carrying out appropriate mental and written calculations, and share my chosen approach with others.
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**	**Negative numbers** • **Integers** • **Ordering** • **Calculations** • **Application in real life contexts**	• I can explain what negative numbers are and when they might be used.	• I can construct a number line to answer questions that involve negative numbers.	• I can solve problems involving negative numbers mentally. • I can use negative numbers in everyday contexts and familiar applications. • I can locate and order numbers that are less than zero.

I have extended the range of whole numbers I can work with and having explored how decimal fractions are constructed, can explain the link between a digit, its place and its value. **MNU 2-02a** I have explored the contexts in which problems involving decimal fractions occur and can solve related problems using a variety of methods. **MNU 2-03b**	**Fractions, decimal fractions and percentages** • **Interrelationship**	• I can use place value to partition numbers up to one decimal place. • I can explain how zero is used as a place holder for whole numbers and decimals. • *See Fractions, Decimal Fractions and Percentages.*	• I have extended my understanding of place value to decimal numbers up to at least two decimal places including whole numbers up to at least 1 000 000. • I use the notation and vocabulary consistently. • I can recognise where decimal fractions are used in everyday life and apply this knowledge to record and convert amounts in money and measure accurately e.g. 501p=£5.01	• I can explain the link between a digit, its place and its value for whole numbers and decimal fractions with up to 3 decimal places and up to at least 1 000 000. • I have a range of mental strategies that I can use to solve problems with whole numbers, decimals and fractions. • Reads, writes and sequences numbers forwards and backwards, using the number range 0 to 1 000 000 • I can partition a wide range of whole numbers and decimal fractions with up to at least 3 decimal places e.g. 3.042 is three and forty-two thousandths

	Milestone	During Third Level	By the end of Third Level
I can use my understanding of numbers less than zero to solve simple problems in context. **MNU 3-04a**	**Negative numbers** • **Integers** • **Ordering** • **Calculations** • **Application in real life contexts**	• I can put whole numbers, negative numbers and decimals in order for simple problems.	• I can order numbers, including decimals and negative numbers. • I have a range of strategies that I can use to solve problems with whole numbers, negative numbers, decimals and fractions.
I can continue to recall number facts quickly and use them accurately when making calculations. **MNU 3-03b**	**Fractions, decimal fractions and percentages** • **Interrelationship**	• I have a range of mental strategies that I can use to solve problems with whole numbers, negative numbers, decimals and fractions.	• In addition to my mental strategies I can also use column addition and subtraction for whole numbers and decimals, and multiply and divide by a single digit number.
I can use a variety of methods to solve number problems in familiar contexts, clearly communicating my processes and solutions. **MNU 3-03a**	**Applying across contexts**	• I have a range of mental strategies that I can use to solve problems in familiar contexts with whole numbers, negative numbers, decimal fractions and fractions. • I can interpret and solve multi-step problems in familiar contexts ensuring correct order of operations.	• I can use column addition and subtraction to solve problems accurately working with whole numbers and decimal fractions up to at least 3 decimal places. • I can solve written multiplication and division problems accurately working with • I can use long multiplication to solve problems in a familiar context. • I can quickly recall number facts including at least the 12 x table and square numbers up to 144.
	Milestone	During Fourth Level	By the end of Fourth Level
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**	**Applying across contexts**	• I can solve problems involving whole numbers, negative numbers, decimal fractions and fractions set in familiar contexts.	• I can interpret and solve multi-step problems using the four operations. • I can communicate and justify my use of the most effective strategy for the given task.
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 **MNU 4-03b**	**Order of operations**		• I can apply the correct order of operations in calculations which involve brackets and explain my process and solution

Estimation and rounding milestones

Significant aspect of learning:

Applying numeracy and mathematical skills

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- interpret questions
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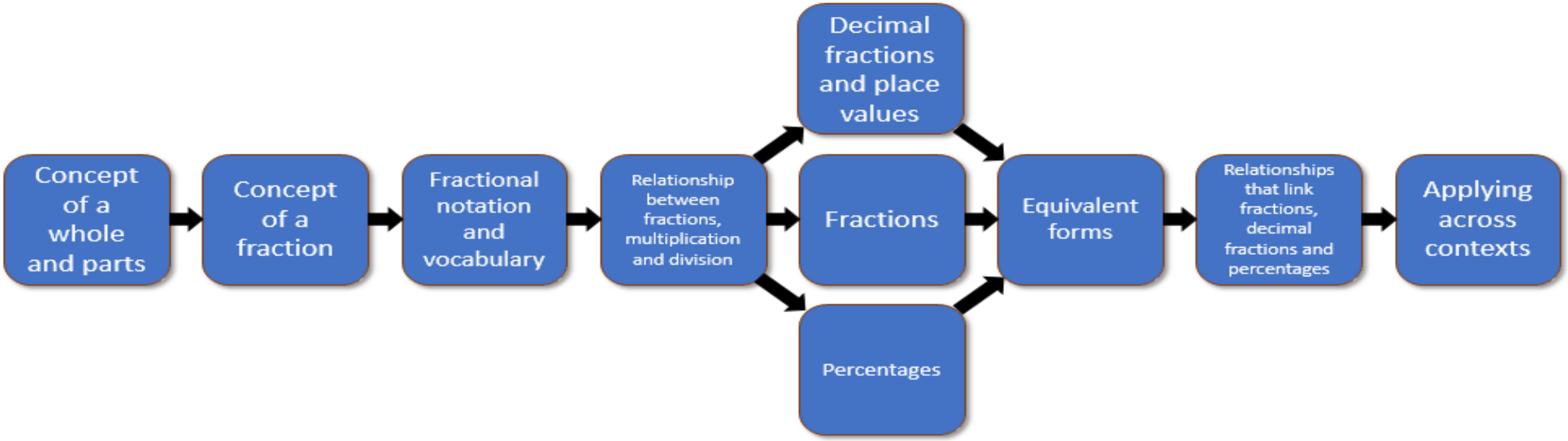
These skills should be evident across the other significant aspects of learning in Numeracy and Mathematics. Staff should actively promote the development of these skills and ensure they are embedded in planning for learning, teaching and assessment.

Estimation and rounding		*Significant aspect of learning:* *Use knowledge and understanding of the number system, patterns and relationships*		
	Milestone	During Early Level	By the end of Early Level	
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**	**Awareness of size and amount**	• I can describe groups of objects by saying which is bigger, smaller or if they are the same. • I can sort my objects into groups using simple criteria, explain how I did this and talk about their position using first, second etc.	• I can count the objects to decide which has the most or least. • I can sort and create groups of objects by number. I can describe their position using ordinal numbers.	
	Milestone	At the beginning of First Level	During First Level	By the end of First Level
I can share ideas with others to develop ways of estimating the answer to a calculation or problem, work out the actual answer, then check my solution by comparing it with the estimate. **MNU 1-01a**	**Concept of estimation**	• I can estimate to the nearest 10 using a number line. • I can make reasonable estimates of small quantities to 10. • I can choose the best approximate answer to additions and subtractions involving 2 digit numbers.	• I can make reasonable estimates of small quantities to 20. • I can choose the best approximate answer to additions and subtractions involving 3 digit numbers.	• I can estimate the position of numbers to 100 and beyond on a number line. • I can make reasonable estimates of quantities to 100. • I can compare an estimation with the answer to a calculation and decide if the answer is reasonable.
	Concept of rounding	• I can round numbers to the nearest ten.	• I can round numbers to the nearest 100.	• I can round numbers to the nearest 1000.
	Milestone	At the beginning of Second Level	During Second Level	By the end of Second Level
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**	**Concept of rounding**	• I can round numbers to the nearest unit.	• I can round numbers to 1 decimal place.	• I can round numbers to at least 2 decimal places.
	Accuracy within rounding	• I understand how rounded numbers can be used to estimate.	• I can use rounded numbers to estimate.	• I can use rounded numbers to estimate and check reasonable answers. • I can share my solutions with others.

	Milestone	During Third Level	By the end of Third Level
I can round a number using an appropriate degree of accuracy, having taken into account the context of the problem. **MNU 3-01a**	**Accuracy within rounding**	• I can round a number to 1 significant figure.	• I can round a number to at least 3 decimal places. • I can round a number to at least 3 significant figures. • I can use rounding to routinely estimate the answer to a calculation. • I use the context of the problem to decide on a suitable degree of accuracy including 3 decimal places.
	Milestone	During Fourth Level	By the end of Fourth Level
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**	**Tolerance**	• I know what is meant by tolerance. • I can write tolerances in the form 200cm± 2cm.	• I can interpret tolerances e.g. 200cm ± 2cm. • I know that rounding numbers inappropriately in a calculation will lead to an insufficiently accurate answer. • I can analyse a problem and choose an appropriate degree of accuracy for rounding. • I can use tolerance to choose the most appropriate degree of accuracy for real-life calculations, select and communicate my process and my solution.

Fractions, decimal fractions and percentages milestones



Significant aspect of learning: Applying numeracy and mathematical skills

It is important that learners develop numeracy and mathematical skills as they build their knowledge and understanding. As learners progress, they should demonstrate an increasing sophistication in their ability to:

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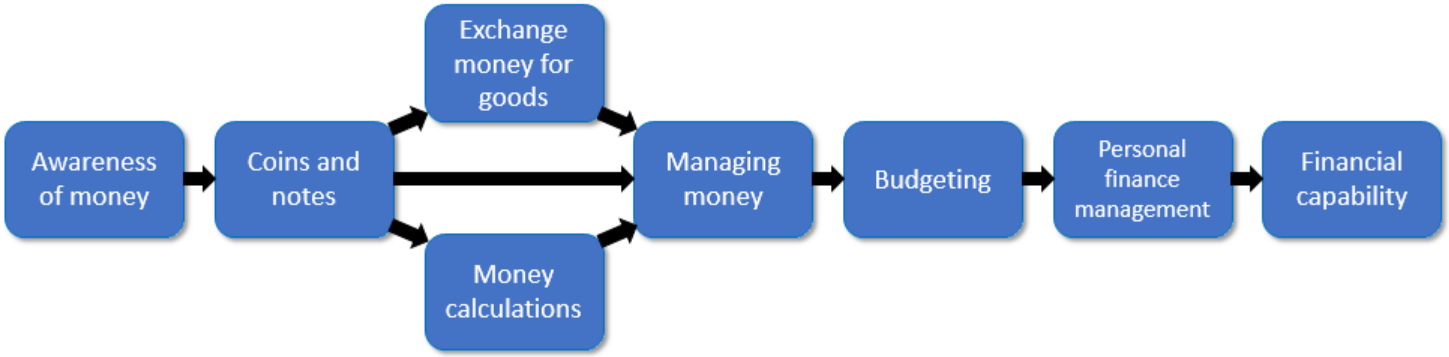
These skills should be evident across the other significant aspects of learning in Numeracy and Mathematics. Staff should actively promote the development of these skills and ensure they are embedded in planning for learning, teaching and assessment.

Fractions, decimal fractions and percentages		*Significant aspect of learning: Use knowledge and understanding of the number system, patterns and relationships*		
	Milestone	During Early Level		By the end of Early Level
I can share out a group of items by making smaller groups and can split a whole object into smaller parts. **MNU 0-07a**	**Concept of a whole and parts** • **One object, shape or quantity can be shared into parts** • **A group of items can be shared out** • **Equal parts**	• I can split a whole object into halves. • I can share out a group of items, dealing them out one at a time using concrete materials. • I know that I have to use all of the whole.		• I can split a whole object into equally sized parts and use the associated vocabulary, at least halves and quarters. • I can share out a group of items and find out how many are in the smaller groups. I can decide what to do with any leftovers and if they can be shared further or not. • I can use symmetry to partition groups into two, four or eight parts and use the associated vocabulary.
	Milestone	At the beginning of First Level	During First Level	By the end of First Level
Having explored fractions by taking part in practical activities, I can show my understanding of • how a single item can be shared equally • the notation and vocabulary associated with fractions • where simple fractions lie on the number line **MNU 1-07a**	**Concept of a fraction** • **Fractions with equal parts** • **Sharing with no remainder** • **Equal sharing**	• I am aware that any sized group of items can be shared equally.	• I can show how a single object can be divided into a given common fraction including halves, quarters and eighths.	• I understand that a fraction is an equal part of a whole. • I know that the greater the number of portions, the smaller the size of each equal share. • I can place simple fractions in order on a number line
	Fractional notation and vocabulary • **Numerator and denominator**	• I can show how to share a single item equally and use the associated vocabulary. • I understand that the denominator tells how many equal parts the whole has been divided into and the numerator tells how many of the equal parts are used.	• I can link the number of shares with the vocabulary of fractions e.g. if I make 6 equal portions, then each portion is one sixth of the whole. • I am beginning to compare simple fractions, e.g. quarters.	• I can read and write fractions using fraction notation e.g.one eighth is $\frac{1}{8}$ up to at least tenths • I understand that a comparison can be made between fractions with the same denominator.
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**	**Relationship between fractions, multiplication and division**	• I can use concrete materials, to find the fraction of an amount.	• I can use pictures or informal jottings to find the fraction of an amount.	• I can find the fraction of an amount using division.
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**	**Equivalent forms**	• I can use materials to partition and re-partition amounts to show fractions that are equivalent.	• I can draw pictures to partition and re-partition amounts to show fractions that are equivalent. I record my answers using words e.g. 1 third=2 sixths.	• I can draw pictures to partition and re-partition amounts to show fractions that are equivalent and record my answers using fraction notation.

	Milestone	At the beginning of Second Level	During Second Level	By the end of Second Level
I have investigated the everyday contexts in which simple fractions, percentages or decimal fractions are used and can carry out the necessary calculations to solve related problems. **MNU 2-07a**	**Decimal fractions and place value** • **The decimal point**	• I can work with decimal fractions to 1 decimal place (tenths) including addition and subtraction. • I can add/subtract decimal fractions with 1 decimal place. • I can multiply/divide decimal fractions with 1 decimal place by a whole number. • I can multiply/divide decimal fractions by 10. • I know that the decimal point separates the whole number part from the fractional part.	• I can work with decimal fractions to 2 decimal places (tenths, hundredths). • I can add/subtract decimal fractions with 2 decimal places. • I can multiply/divide decimal fractions with 2 decimal places by a whole number. • I can multiply/divide decimal fractions by 100.	• I can work with decimal fractions to 3 decimal places (tenths, hundredths and thousandths). • I can add/subtract decimal fractions with 3 decimal places. • I can multiply/divide decimal fractions with 3 decimal places by a whole number. • I can multiply/divide decimal fractions by 1000.
	Fractions	• I can find the fraction of an amount by using concrete materials, pictures or informal jottings e.g. $\frac{2}{3} of\ 15$. • I know that a mixed number is one with a whole number and a fraction part e.g. $4\frac{3}{4}$. • I know that an improper fraction is a fraction greater than one where the numerator is greater than the denominator e.g. $\frac{8}{3}$.	• I can find the fraction of an amount by using pictures or informal jottings e.g. $\frac{2}{3} of\ 15$. • I can convert an improper fraction to a mixed number.	• I can find the fraction of an amount by using multiplication and division e.g. $\frac{2}{3} of\ 15$. • I can convert between mixed numbers and improper fractions e.g. $\frac{5}{3} = 1\frac{2}{3}$.
	Percentages	• I understand that a percentage is a fraction with a denominator of 100. • I can carry out calculations with 25%, 50% and 100%.	• I can carry out calculations with 1%, 10%, 20%, 25%, 50%, 75% and 100%.	• I can carry out calculations with any percentage.
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**	**Equivalent forms**	• I can use multiplication and division to find equivalent fractions.	• I can use equivalent fractions to compare the size of commonly used fractions and put them in order.	• I can reduce fractions to the simplest form.
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**	**Relationships that link fractions, decimal fractions and percentages** • **Comparisons between fractions, decimal fractions and percentages**	• I understand what is meant by the term equivalent and can show the equivalence between fractions and decimal fractions using counters or a picture. • I can calculate with simple fractions and decimal fractions to solve simple problems in everyday contexts. • I can show where simple fractions and decimal fractions lie on a number. • I can count up in fractions, showing this on a number line.	• I can show the equivalence between fractions, decimal fractions and percentages using counters or a picture e.g. ½ = 50% = 0.5 because all 3 amounts cover half a square. • I can calculate with simple fractions, decimal fractions and percentages to solve problems in everyday contexts. • I can show where simple fractions and decimal fractions lie on a number line and use my knowledge of fractions to estimate where other common fractions and decimal fractions lie.	• I can show the equivalent forms and convert between simple fractions, decimal fractions and percentages. • I can calculate with simple fractions, decimal fractions and percentages to solve problems in everyday contexts, choose my preferred form and explain my choices. • I can show where any fraction, decimal fraction or percentage lies on a number line.

	Milestone	During Third Level	• By the end of Third Level
I can solve problems by carrying out calculations with a wide range of fractions, decimal fractions and percentages, using my answers to make comparisons and informed choices for real-life situations. **MNU 3-07a** By applying my knowledge of equivalent fractions and common multiples, I can add and subtract commonly used fractions. **MTH 3-07b** Having used practical, pictorial and written methods to develop my understanding, I can convert between whole or mixed numbers and fractions. **MTH 3-07c** I can show how quantities that are related can be increased or decreased proportionally and apply this to solve problems in everyday contexts. **MNU 3-08a**	**Applying across contexts** • **Applying across contexts** • **Linking fractions and ratio** • **Proportion**	• I can add and subtract commonly used fractions and mixed numbers with common denominators. • I can solve problems with a wide range of fractions, decimal fractions, improper fractions, mixed numbers and percentages both with and without a calculator. • I can increase and decrease quantities proportionally using multiplication and division. • I understand the relationship between proportion and ratio.	• I can convert any fraction, decimal fraction or percentage into an equivalent fraction, decimal fraction or percentage. • I can add and subtract simple fractions and mixed numbers e.g. $\frac{3}{4} + 2\frac{3}{8}$ including when changing a denominator • I can solve problems in which related quantities are increased or decreased proportionally. • I can express quantities as a ratio and simplify where appropriate e.g. if there are 6 teachers and 60 children in a school find the ratio of the numbers of teachers to the total amount of people.
	Milestone	During Fourth Level	• By the end of Fourth Level
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**	**Applying across contexts** • **Applying across contexts** • **Linking fractions and ratio** **Proportion**	• I can multiply and divide fractions. • I can solve problems and use the solutions to make comparisons, decisions and informed choices for real-life situations.	• I can apply addition, subtraction and multiplication skills to solve problems involving fractions and mixed numbers. • I can choose the most efficient form of fractions, decimal fractions or percentages when making calculations and justify the methods used. • I can increase and decrease quantities proportionally to solve problems in everyday contexts. • I can calculate the % increase/decrease of a value. • I can express one value as a % of another.

Money milestones



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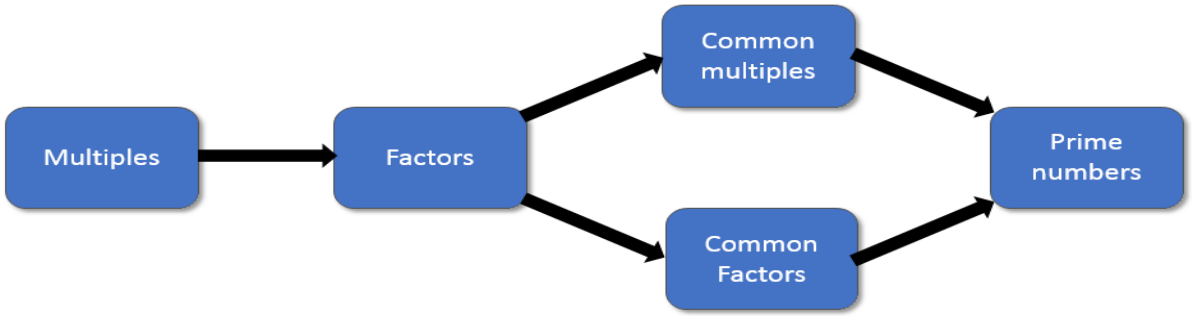
Money		Significant aspect of learning: Use knowledge and understanding of the number system, patterns and relationships		
	Milestone	During Early Level	By the end of Early Level	
I am developing my awareness of how money is used and can recognise and use a range of coins. **MNU 0-09a**	**Awareness of money**	• I am developing an awareness of how money is used in real life. • I understand that coins have different values.	• I am developing an awareness that coins/money can be exchanged for goods and services.	
	Coins and notes • **Using coins and notes** • **Real life contexts** • **The interrelationship between different sets of coins and notes**	• I can recognize the value of some coins. • I can use a variety of coins in real life contexts.	• I can recognize the value of all coins up to at least £1. • I can use my number skills in addition and subtraction to pay the exact value for items costing up to at least 20p.	
	Milestone	At the beginning of First Level	During First Level	By the end of First Level
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**	**Coins and notes** • **Using coins and notes** • **Real life contexts** • **The interrelationship between different sets of coins and notes**	• I can recognize notes and coins. • I can read and write monetary values in pence. • I use simple strategies to count money and keep a track of how much I have. • I can use notes and coins to make up monetary values.	• I understand the relative value of notes and coins. • I can read and write monetary values, including using the appropriate symbols. • I am developing a range of mental strategies and informal jottings to count money and how much change is due. • I can use a variety of notes and coins to make up monetary values and work out how to give change.	• I ca use and identify all coins and notes up to at least £20 and explore different ways of making the same total. • I use the equivalence of pounds and pence when using money e.g. 149p=£1.49, 7p=£0.07 • I can read and write monetary values using correct notation including the decimal point. • I use a range of mental strategies and informal jottings to calculate the cost of a collection of items and how much change they should get, in a range of contexts. • I can use a variety of notes and coins, up to at least £20, to make up monetary values and work out the most efficient way to give change in real life contexts. • I am aware of how goods can be paid for using cards and digital technology.

	Milestone	At the beginning of Second Level	During Second Level	By the end of Second Level
I can manage money, compare costs from different retailers, and determine what I can afford to buy. **MNU 2-09a**	**Exchange money for goods** • **Application in everyday life**	• I can work out the cost of an item or selection of items.	• I can work out how much money I will have left over after paying for an item or selection of items.	• I can compare the price of goods against my given budget and determine if I can afford to buy them. • I can solve real life problems, using the four operations, involving money.
	Money calculations • **Applying the four operations in calculations involving money**	• I can read and write monetary values using the correct notation. • I can add and subtract monetary values with a decimal point.	• I can use decimals in the context of money. • I have further developed the range of written and mental calculation strategies to +,-,x and ÷ with money.	• I can use decimals and negative numbers in the context of money. • I choose the best method of written and mental calculation strategies to add, subtract, multiply and divide with money and use technology when appropriate.
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**	**Managing money** • **Profit and loss** • **Best value** • **Making informed financial decisions** • **Bank cards**	• I understand the terms profit and loss. • I can find the cost of items from a range of sources. • I can plan purchases within a given budget. • I have investigated banks and their role.	• I can talk about profit and loss in buying and selling activities and make calculations for this. • I can find the cost of the same or similar items/services from a range of retailers to find the best value. • I can plan purchases, making appropriate decisions within given budgeting constraints.	• I can calculate profit and loss accurately in buying and selling activities. • I can find the cost of the same or similar items/services from a range of retailers and determine the best value including calculating discounts. • I can use budgeting skills to make responsible decisions regarding spending. • I know and use the vocabulary associated with personal banking and understand the benefits and risks of using bank cards and digital technologies.

	Milestone	During Third Level	By the end of Third Level
When considering how to spend my money, I can source, compare and contrast different contracts and services, discuss their advantages and disadvantages, and explain which offer best value to me. **MNU 3-09a** I can budget effectively, making use of technology and other methods, to manage money and plan for future expenses. **MNU 3-09b**	**Budgeting**	• I can use technology and other methods to keep a budget for an event e.g. planning a holiday. • I can use the internet and other sources to find goods and services, compare them and discuss their advantages and disadvantages. • I can calculate simple interest.	• I can use technology and other methods to budget effectively. • I can plan personal spending and budget in a responsible way including planning for future spending. • 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 offers best value to me. • I have investigated the effects of interest and % rates in the context of contracts and services.
	Milestone	**During Fourth Level**	**By the end of Fourth Level**
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**	**Budgeting** • **Debt** • **Income** • **Deductions** • **Borrowing** • **Salaries and pensions**	• I know how to read information from wage slips, earnings summaries, budgets etc. • I understand the terms credit and debt and I can explain their advantages and disadvantages.	• I can apply my understanding of credit and debit in relation to earnings and deductions. • I understand the vocabulary associated with income e.g. gross, net pay, earnings, deductions, overtime, bonus etc. • I can calculate income and deductions in order to find gross and net pay.
I can source information on earnings and deductions and use it when making calculations to determine net income. **MNU 4-09b**	**Personal finances management** • **Making informed financial decisions**	• I can work out the total of monthly/weekly bills. • I can work out the total income and total expenditure.	• I can create a budget taking into account income and expenditure over the short and long term. • As I plan ahead and budget I can make and explain decisions that lead to a responsible lifestyle.
I can research, compare and contrast a range of personal finance products and, after making calculations, explain my preferred choices. **MNU 4-09c**	**Financial capability**	• I understand the vocabulary of financial products e.g. APR, repayment schemes, mutual etc. • I know where to find information on personal financial products to source and compare them.	• I can use calculations to determine the differences between financial products to make informed decisions to decide which the best product to take is. • I use a range of factors such as quality, depth of cover, reputation, future earnings, economy and ethical aspects to make my decisions and I can communicate the impact of financial decisions.

Multiples, factors and primes milestones



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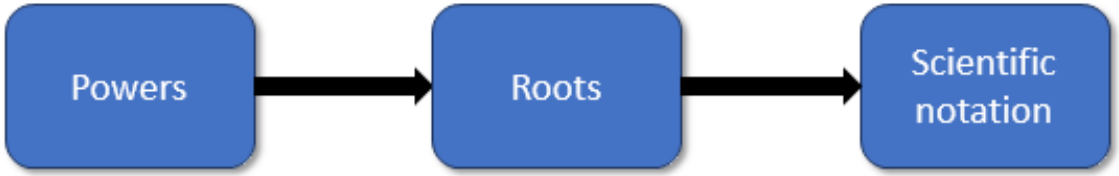
Multiples, factors and primes		*Significant aspect of learning: Use knowledge and understanding of the number system, patterns and relationships*		
	Milestone	At the beginning of Second Level	During Second Level	By the end of Second Level
Having explored the patterns and relationships in multiplication and division, I can investigate and identify the multiples and factors of numbers. **MTH 2-05a**	**Multiples**	• I can describe what multiples are and how to generate a sequence of multiples. • I can skip count forwards and backwards to identify multiples.	• I can use repeated addition, subtraction, doubles and other part-whole strategies to identify multiples.	• I use my knowledge of multiplication facts to identify multiples of whole numbers. • I can identify multiples for fractions and decimals. • I can apply my knowledge and understanding of multiples when solving relevant problems in number, money and measurement.
	Factors	• I can describe what a factor is. • I can find some of the factors of a simple number.	• I can find all of the factors of a whole number.	• I write factors in an organised list and use a strategy to check that I have found all the possible factors. • I can apply my knowledge and understanding of factors when solving relevant problems in number, money and measurement.
	Milestone	During Third Level	By the end of Third Level	
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**	**Common Multiples**	• I can find the common multiples of a small set of numbers and explain the method used. • I can identify the lowest common multiple of a small set of numbers.	• I can solve problems relating to multiples, common multiples and lowest common multiples.	
	Common Factors	• I can find the common factors of a small set of numbers. • I can identify the highest common factor of a small set of numbers and explain the methods used.	• I can solve problems relating to factors, common factors and highest common factors.	
I can apply my understanding of factors to investigate and identify when a number is prime. **MTH 3-05b**	**Prime Numbers**	• I can use my knowledge of factors to identify prime numbers. • I can use a factor tree to identify numbers up to 100.	• I can identify prime numbers up to at least 100 and I can explain the method used. • I can solve problems relating to prime numbers.	

Powers and roots milestones



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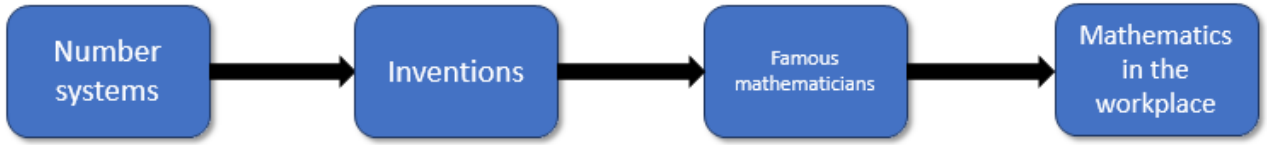
Powers and roots		***Significant aspect of learning:*** ***Use knowledge and understanding of the number system, patterns and relationships***	
	Milestone	During Third Level	By the end of Third Level
Having explored the notation and vocabulary associated with whole number powers and the advantages of writing numbers in this form, I can evaluate powers of whole numbers mentally or using technology. **MTH 3-06a**	**Powers**	• I can use the notation and vocabulary of powers. • I can evaluate simple whole number powers e.g. $2^4 = 16$ • I can use a calculator or other technology to evaluate whole number powers.	• I can use a calculator or other technology to evaluate whole number powers. • I can express whole numbers as powers e.g. $27 = 3^3$ • I can solve problems with whole number powers, choosing the appropriate notation and calculation strategy.
	Milestone	During Fourth Level	By the end of Fourth Level
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**	**Powers** **Roots**	• I can use the notation and vocabulary of powers and roots. • I can evaluate whole number powers and roots of any appropriate number using a mental calculation strategy.	• I can explain and use the relationship between powers and roots when solving problems e.g. $\sqrt[3]{27} = 3$ • I can use a calculator or other technology to evaluate whole number powers and roots of any appropriate number. • I can solve problems with whole number powers and roots of any appropriate number, choosing the appropriate notation and calculation strategy. • I can understand that the square root is the inverse.
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**	**Scientific Notation**	• I can explain the applications and benefits of using scientific notation. • I can use scientific notation to express large and small numbers.	• I can convert between scientific notation and decimal notation. • I can solve real life problems by reading values in scientific notation and performing simple calculations with numbers expressed in scientific notation. • I can explain the process of squaring a number.

Mathematics: its impact on the world past, present and future milestones



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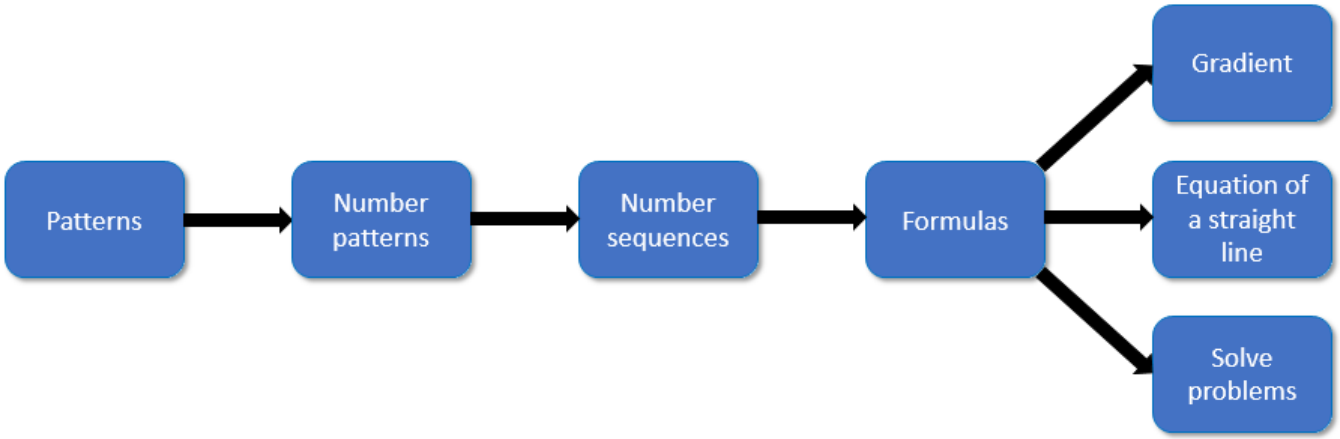
Mathematics – its impact on the world, past present and future		***Significant aspect of learning:*** ***Use knowledge and understanding of the number system, patterns and relationships***		
	Milestone	At the beginning of First Level	During First Level	By the end of First Level
I have discussed the important 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**	**Number systems**	• I have investigated some of the earliest number systems e.g. "bundle of sticks" and Egyptian number systems.	• I have investigated number systems used by the Greeks, Romans, Indians and from Arabic countries. • I have investigated the importance of numbers in learning, life and work.	• I have investigated the binary number system and understand its importance in modern technology. • I can share my understanding of the importance of numbers in learning, life and work. • I can share my understanding of a variety of number systems used throughout history.
	Milestone	At the beginning of Second Level	During Second Level	By the end of Second Level
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**	**Inventions**	• I have worked with others to research how mathematics has played a part in inventions, e.g. the wheel, map of the world.	• I have worked with others to research how mathematics has played a part in advances in society e.g. measuring time, code breaking.	• I can research and present my findings on the impact mathematics has in the world of life and work e.g. the use of triangles in construction. • I can contribute to discussions on the role of mathematics in the creation of important inventions, now and in the past.
	Milestone	During Third Level		By the end of Third Level
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**	**Famous mathematicians**	• I have worked with others to research famous mathematicians and the work they were known for e.g. Archimedes, Emmy Noether.		• I have worked with others to research famous mathematicians and can deliver a presentation on the topic using appropriate technology, explaining the relevance and the impact they have on society. • I can use appropriate mathematical vocabulary and notation when explaining the impact they have had.
	Milestone	During Fourth Level		By the end of Fourth Level
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**	**Mathematics in the workplace**	• I have worked with others to investigate the role mathematics plays in everyday life and in the workplace. • I have worked with others to investigate the mathematical skills required for a range of careers including those in STEM subjects.		• I can contribute to discussions and presentations on the role mathematics plays in the workplace and in everyday life.

Patterns and relationships milestones



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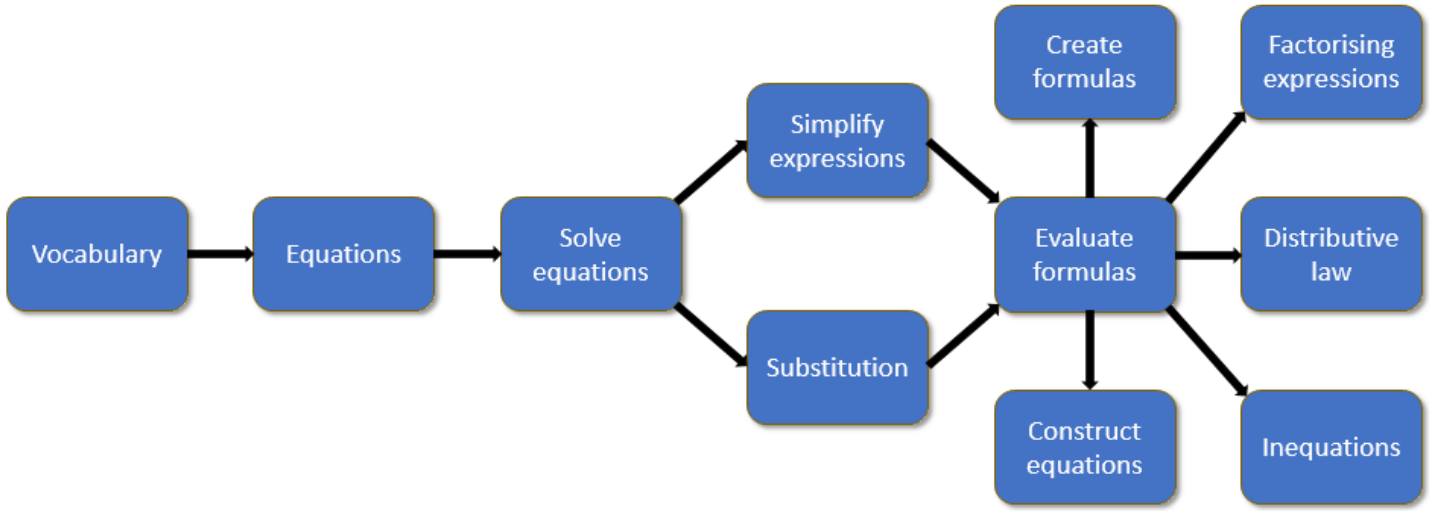
Patterns and relationships		*Significant aspect of learning: Use knowledge and understanding of the number system, patterns and relationships*		
	Milestone	During Early Level	By the end of Early Level	
I have spotted and explored patterns in my own and the wider environment and can copy and continue these and create my own patterns. **MTH 0-13a**	**Patterns**	• I can recognize simple numeric and non-numeric patterns. • I can copy and continue simple patterns involving objects and shapes. • I can use simple language such as repeat, again, pattern etc. to describe these patterns.	• I can copy, continue and create simple patterns involving objects, shapes and numbers. • I can explore, recognize and continue simple number patterns and I can describe what I am doing using appropriate mathematical vocabulary. • I can find missing numbers on a number line ranging from 0 to at least 20.	
	Milestone	At the beginning of First Level	During First Level	By the end of First Level
I can continue and devise more involved repeating patterns or designs, using a variety of media. **MTH 1-13a**	**Patterns**	• I can recognise, duplicate and extend non-numeric patterns.	• I can explain the rules for repeating patterns. •	• I can create a pattern of my own design and explain the rule for generating the sequence • I can continue and create repeating patterns involving shapes, pictures, symbols and movements, making use of a variety of media.
	Number patterns	• I can recognise, duplicate and extend numeric patterns.	• I can explain the rules for number patterns.	• I can create a number pattern of my own design and explain the rule for generating the sequence. • I can describe patterns in numbers e.g. in the times tables and hundred squares.
Through exploring number patterns, I can recognise and continue simple number sequences and can explain the rule I have applied. **MTH 1-13b**	**Number sequences**	• I can recognise and continue simple number sequences. • I can count forwards and backwards in 2s and 10s	• I can describe how a sequence continues. • I can count forwards and backwards in 2s, 5s and 10s	• I recognise when a sequence is ambiguous and check my own patterns to ensure they are not. • I can count forwards and backwards in 2s, 5s, and 10s from any whole number up to at least 1000.
	Milestone	At the beginning of Second Level	During Second Level	By the end of Second Level
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**	**Number sequences**	• For number patterns involving the four operations, I can identify the pattern and extend the sequence.	• I can write a rule for a sequence, stating the start number and operation e.g. start and 2 and add on 3 or start at 3 and keep doubling.	• I have explored number sequences such as the Fibonacci sequence, square numbers, Pascal's triangle or triangular numbers and can explain the rule for these sequences. • I can use a function machine to generate a number sequence. • Apply knowledge of multiples, factors, square numbers and triangular numbers to generate number patterns for others to continue.

	Milestone	During Third Level	By the end of Third Level
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**	**Formulas**	• I can convert a pattern into a sequence of numbers and use a table to help me analyse the sequence of numbers. • I can recognise relationships between successive terms and use this to write a rule for a sequence of numbers.	• I can generate number sequences from any given rule, e.g. T = 4x + 6 • I can determine the rule defining a sequence of numbers e.g. 4, 11, 18, 25 • I can express sequence rules in algebraic notation for real life situations.
	Milestone	**During Fourth Level**	**By the end of Fourth Level**
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**	**Formulas** **Solve problems**	• I can model real life situations using number patterns and graphs. • I can determine a general formula to describe the sequence.	• I can use the general formulae to find missing terms and solve problems related to the pattern.
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**	**Gradient**	• I understand the concept of slope in context.	• I can find the gradient for a straight line. I understand positive and negative gradients and the gradient of horizontal and vertical lines.
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**	**Equation of a straight line**	• I understand the link between the gradient of a straight line and the formula that generates the points on that line.	• I can use a formula to create a graph and interpret the gradient to solve problems in context.

Expressions and equations milestones



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- reason algebraically
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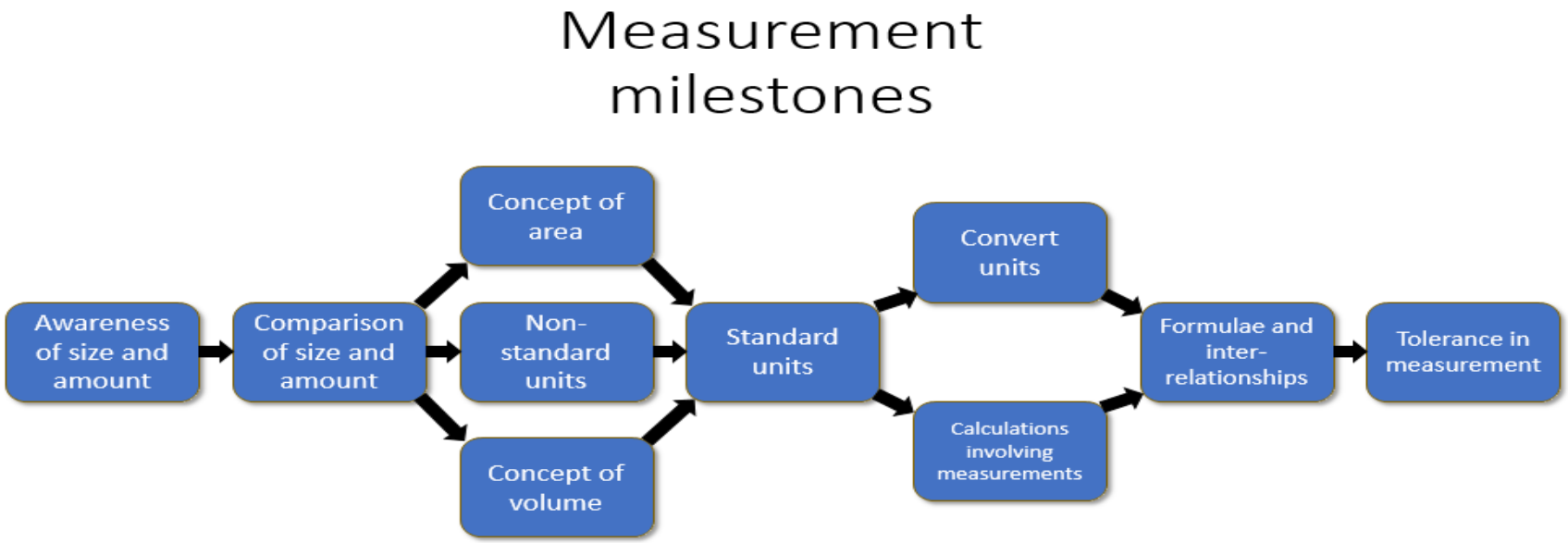
These skills should be evident across the other significant aspects of learning in Numeracy and Mathematics. Staff should actively promote the development of these skills and ensure they are embedded in planning for learning, teaching and assessment.

Expressions and equations		***Significant aspect of learning: Use knowledge and understanding of the number system, patterns and relationships***		
	Milestone	At the beginning of First Level	During First Level	By the end of First Level
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**	**Vocabulary**	• I understand that the = sign signifies balance in a number sentence.	• I can use the ≠ sign in a number sentence or to compare quantities.	• I can use the inequalities signs in a number sentence or to compare quantities.
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**	**Equations**	• I understand that a picture or symbol can represent a number or sign in an equation.	• I can calculate the value of a missing number from an equation involving addition and subtraction.	• I can solve a missing number problem using my knowledge of number facts.
	Milestone	At the beginning of Second Level	During Second Level	By the end of Second Level
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**	**Solve equations**	• I have explored the concept of a variable in a range of contexts. • I can solve missing number problems using inverses.	• I can describe what a variable is. • I can form and solve simple equations.	• I can investigate variables by substituting into and evaluating formulae. • I can solve simple algebraic equations with one variable, e.g. 3x + 1 = 10

	Milestone	During Third Level	By the end of Third Level
I can collect like algebraic terms, simplify expressions and evaluate using substitution. **MTH 3-14a**	**Simplify expressions**	• I can collect like terms to simplify an expression for additive terms including powers of algebraic terms up to 3. • I can create an expression to represent a situation and simplify it by collecting like terms.	• I can collect like terms to simplify an expression for both additive and multiplicative terms. • I can evaluate expressions involving at least two variables using both positive and negative values.
	Substitution	• I can substitute to evaluate expressions for additive terms.	• I can substitute to evaluate expressions for additive and multiplicative terms. • I can evaluate expressions that include powers.
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**	**Construct equations**	• I can solve an equation using inverses and by balancing. • I can interpret problems and create linear equations which model them.	• I can construct and then solve a range of linear equations using an appropriate method.
I can create and evaluate a simple formula representing information contained in a diagram, problem or statement. **MTH 3-15b**	**Create formulas**	• I can complete tables using information from patterns.	• I can create a simple formula representing information contained in a diagram, problem or statement.
	Evaluate formulas	• I can substitute to evaluate formulae for additive terms. • I can evaluate a simple linear formula, e.g. =3x +4	• I can substitute to evaluate formulae for additive and multiplicative terms. • I can evaluate formulae that include powers.
	Milestone	During Fourth Level	By the end of Fourth Level
Having explored the distributive law in practical contexts, I can simplify, multiply and evaluate simple algebraic terms involving a bracket. **MTH 4-14a**	**Distributive law**	• I have explored the distributive law in practical contexts. • I can expand brackets using the distributive law. • I can evaluate algebraic expressions involving a bracket.	• I can simplify, multiply and evaluate simple algebraic terms involving brackets. • I can use the distributive law to solve an extended range of equations.
I can find the factors of algebraic terms, use my understanding to identify common factors and apply this to factorise expressions. **MTH 4-14b**	**Factorising expressions**	• I can find the factors of algebraic terms.	• I can factorise simple expressions with a numeric common factor. • I can use factorising to solve equations.
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**	**Inequations**	• I have explored how to use mathematics to model real life situations. • I can construct and solve inequalities including on simple closed intervals.	• I can solve problems by expressing the given information appropriately as an equation, in-equation or formula.

Using knowledge and understanding of measurement and its application

Progression



Significant aspect of learning: Applying numeracy and mathematical skills

It is important that learners develop numeracy and mathematical skills as they build their knowledge and understanding. As learners progress, they should demonstrate an increasing sophistication in their ability to:

- 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
- determine the reasonableness of a solution

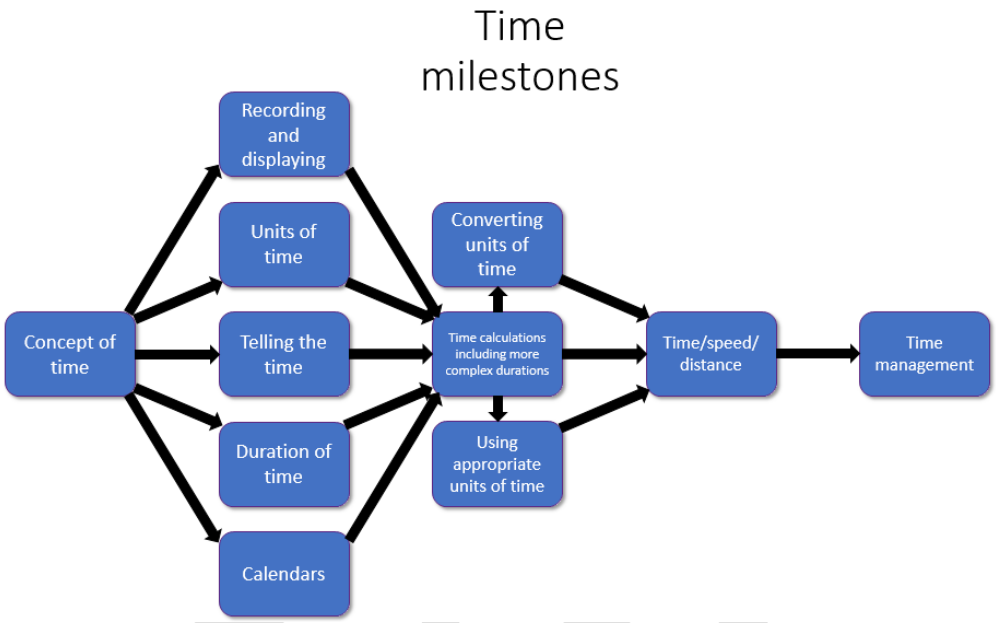
These skills should be evident across the other significant aspects of learning in Numeracy and Mathematics. Staff should actively promote the development of these skills and ensure they are embedded in planning for learning, teaching and assessment.

Measurement		Significant aspect of learning: Use knowledge and understanding of measurement and its application		
	Milestone	During Early Level		By the end of Early Level
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**	**Awareness of size and amount**	• I am beginning to use appropriate measurement language such as tall, short, heavy, light, wide, big, small, full and empty. • I can share relevant experiences in which measurements of length, height, weight and capacity are used for example in baking.		• I can estimate and then use familiar objects to measure the length, weight or capacity of items to help me compare them e.g. how many marbles fit in a jar or how many cups in a jug of water or the number of hands across a table. • I can describe common objects using appropriate measurement language.
	Comparison of size and amount • **Ordering** • **Conservation of size, weight and volume**	• I am beginning to use comparative language to describe the attributes of familiar items e.g. bigger/smaller, taller/shorter. • I can compare two objects by comparing their length, weight or capacity.		• I can use descriptive language such as heavy, light, wide, big, small, heavier, lighter, more or less small to compare and describe lengths, heights, weights and capacity of familiar objects. • I can put objects in order of length, weight or capacity by comparing them directly.
	Milestone	At the beginning of First Level	During First Level	By the end of First Level
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**	**Comparison of size and amount** • **Ordering** • **Conservation of size, weight and volume** • **Conversion**	• I understand that the length of a shape does not change when moved or reshaped.	• I know that the weight/volume/length of an object/liquid cannot change even when moved or reshaped. • I can use my knowledge of everyday objects to provide reasonable estimates of length, height, weight and capacity. • I can use my knowledge of relationships between units of measure to make simple conversions e.g. 1m 58cm = 158cm	• I know that the weight/volume/length of an object/liquid remains the same even when measured using different units (e.g. feet vs metres, kg vs stones, ml vs pints). • I can record measurement of length, height, weight, mass and capacity using the appropriate standard units. • I can make accurate use of a range of instruments including rulers, metre sticks, digital scales, measuring jugs when measuring, selecting the most appropriate instrument for the task. • I can apply my knowledge of fractions to read accurately a variety of scales on measuring devices, to the nearest gradation.
	Concept of volume • **Units of volume** • **Estimating volume** • **Capacity**	• I can compare the size of two objects by using a third object (e.g. arm lengths or a piece of string). • I have explored the concept of volume using familiar items. • I am beginning to estimate the volume of an item, using the language of non-standard units, by comparing it to something I already know the volume of.	• I can use non-standard units of measurement to compare the volume of two objects. • When I measure volume I take care to measure accurately (e.g. I try not to spill when measuring).	• I can use standard units of measurement to compare objects. I use the correct language for naming each unit as well as the correct conventions and symbols for writing them. • I can justify my estimates of the volume of an item, using the language of standard units, by comparing it to something I already know the volume of.

I can estimate the area of a shape by counting squares or other methods. **MNU 1-11b**	**Concept of area** • **Understanding area** • **Estimating area** **Units of area**	• I have explored the concept of area using familiar items. • I can compare areas by putting one item onto another item. • I can use non-standard units of measurement to measure area.	• I can estimate the area of regular and irregular shapes using a shape template, counting squares or similar method. • I can estimate the area of regular shapes by drawing around shape templates and counting the total. • I can estimate the area of an item using the language of standard units by comparing it to something I already know the area of e.g. using a square grid	• I can justify my estimates of the area by comparing them to familiar objects. • I know that the area of a shape cannot change even when moved or reshaped. • I can create shapes with a given area to at least the nearest half square using square tiles or grids. • I can use standard units of measurement to measure area and use the correct language for naming each unit and the correct symbols for writing them.
	Milestone	At the beginning of Second Level	During Second Level	By the end of Second Level
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**	**Non-standard units**	• I am beginning to choose the best way to measure an item. • When I measure an item I sometimes leave gaps or overlap my units and do not worry about spills when measuring capacity.	• I know that the unit must not change during the measuring activity (i.e. if I am using pictures of feet they must all be the same size or I must use the same picture repeatedly). • I can choose an appropriate unit of measurement (e.g. to measure a pencil I use fingers, not feet) to compare items. • I can use the comparative size of familiar objects to make reasonable estimations of length, weight, area and capacity.	• I can estimate to the nearest appropriate unit. • When I measure I take care to measure accurately. • I can choose the most appropriate measuring device for a given task, read scales accurately, and record results in the correct unit. • I can measure accurately: length, height and perimeter in mm, cm and m; distances in km; weights in grams and kilograms; capacity in millilitres and litres.
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**	**Standard units** • **Measure using standard units** • **Inter-relationship between units of measurement** • **Link between concept and formula of area**	• I am beginning to choose when it is best to estimate and when to measure. • I know the relationship between some of the standard units of measure e.g. 10mm=1cm. • I know the standard units of measure. • I have an awareness of imperial units used in everyday life e.g. miles, stones.	• I know the relationship between some of the standard units of measure e.g. 10mm=1cm, 100cm=1m. • I can use standard units of measurement and choose which unit to use. • I know the relationship between the standard units of measure e.g. 10mm=1cm, 100cm=1m, 1000cm^3=1l.	• I know when it is appropriate to estimate and when to measure. • I can use standard units of measurement and justify my choice of unit. • I can justify my estimates by drawing on my experiences with the length, mass or capacity of everyday objects and explain how confident I am of my estimates. • I can draw shapes accurately with a given perimeter or area.
	Convert units	• I can convert between some of the related units of the metric system e.g. converting between cm and mm.	• I can convert between the units of length mm, cm, m, km.	• I can convert between common units of measurement using decimal notation and apply this knowledge when solving problems.
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**	**Calculations involving measurement** • **Select the most appropriate calculation**	• I can calculate the perimeter of simple 2D shapes in mm, cm and metres. • I can explain how different methods can be used to find the perimeter of a shape.	• I can calculate the area of simple 2D shapes in mm², cm² and metres² and explain the choice of method used. • I can explain how different methods can be used to find the area of a simple shape	• I use a problem solving process, a range of problem solving strategies and appropriate calculation methods when I solve measurement problems. • I can calculate the volume of simple 3D objects

	dependant on the situation and context			in cm^3 and m^3. • I can explain how different methods can be used to find the volume of a simple 3D shape.

	Milestone	During Third Level	By the end of Third Level
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**	**Formulae and inter-relationships**	• I can detect unrealistic estimates or measurements. • I ensure the units are consistent across the problem by converting between metric units. • I can choose the degree of accuracy (decimal places) to work with by considering the information given or instrument used. • I can calculate area and volume using an array. • I can break a compound shape into smaller parts to find its area. • I can choose the appropriate degree of accuracy (sig figs) to work with by considering the information given or instrument used. • I can calculate the area of a parallelogram, trapezium, rhombus, kite, circle, triangle, square, rectangle using a formula. • I can find the area of compound 2D shapes where the units are inconsistent and explain the method used.	• I can detect unrealistic estimates or measurements, justifying my reasons and suggesting alternatives. • I choose appropriate units and ensure that the units are consistent across the problem. • I can choose the appropriate degree of accuracy (sig figs) to work with by considering the information given or instrument used. • I can calculate the area of parallelograms, rhombuses and kites using formula. • I can calculate the volume of regular prisms and cuboids using a formula. • I can find the area and volume of compound 2D and 3D shapes to solve and explain the methods used. • I can calculate the volume of a 3D shape where the units are inconsistent.
	Milestone	During Fourth Level	By the end of Fourth Level
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**	**Formulae and inter-relationships**	• I can apply my knowledge and understanding of measure to a wide range of everyday problems and tasks. • I consider the practical importance of accuracy when making calculations.	• I can apply my knowledge and understanding of measure to a wide range of everyday problems and tasks. • I can use formulae to calculate the surface area of cylinders, cuboids and triangular prisms and use it to solve problems. • I can use formulae to calculate the volume of cuboids, triangular prisms and cylinders and use this to make practical decisions.
	Tolerance in measurement	• I know what is meant by tolerance. • I can write tolerances in the form 200cm± 2cm.	• I can interpret tolerances e.g. 200cm ± 2cm. • I know that rounding numbers inappropriately in a calculation will lead to an insufficiently accurate answer. • I can analyse a problem and choose an appropriate degree of accuracy for rounding.



Significant aspect of learning:

Applying numeracy and mathematical skills

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Time		Significant aspect of learning: Use knowledge and understanding of measurement and its application		
	Milestone	During Early Level		By the end of Early Level
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**	**Concept of time**	• I can use the names of the days of the week. • I can describe the seasons and the special events associated with them. • I can use a weekly planner. • I know that an event has a duration. • I can recognize, talk about and engage with everyday objects used to measure or display time such as clocks, calendars, sand timers and visual timetables. • I can tell the time to whole hours.		• I know the names and sequence of the days of the week and can plan events for future weeks. • I can describe the seasons and their order through the year. • I know the names and sequences of the months of the year. • I can use a calendar to plan or record an event. • I can use non-standard units to measure the duration of an event. • I can read analogue and digital o'clock and half past times for the 12 hour clock. • I can represent o'clock and half past times on a digital display or a clock face.
	Milestone	At the beginning of First Level	During First Level	By the end of First Level
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**	**Recording and displaying**	• I can record the time using 12 hour notation.	• I can record the time using 12 and 24 hour notation.	• I can record the time using both 12 and 24 hour notation from analogue and digital clocks.
	Telling the time Analogue and digital	• I can tell the time using 12 hour notation. • I can show time on an analogue clock, demonstrating the position of the hour and minute hands for on the hour.	• I can record 12 hours times using am and pm. • I can show the time on an analogue clock, demonstrating the relative position of the hour and minute hand for half past and quarter past the hour.	• I can tell the time in 55 minute intervals or smaller intervals using analogue and digital 12 hour clocks. • I can show time on an analogue clock, demonstrating the relative position of the hour and minute hand. • I can identify 24 hour notation in real life examples.
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**	**Units of time** • **Relationships** • **Appropriate use**	• I can use the vocabulary associated with clocks. • I know how many seconds there are in a minute. • I know how many days there are in a year. • I can sequence the months of the year and relate these to the appropriate seasons.	• I know how many seconds there are in a minute and how many minutes in an hour. • I am beginning to learn the number of days in each month. • I can use some units of time appropriately in familiar experiences.	• I can use the vocabulary associated with clocks and calendars. • I know how many seconds there are in a minute, minutes in an hour and hours in a day. • I know how many days there are in each month. • I can use seconds, minutes, hours, days, months and years appropriately in familiar experiences e.g. how long does it take to drive to Oban?
	Duration of time • **Timing of tasks** • **Simple timetables**	• I can use a variety of timers to measure events using minutes. • I can use non-standard units of time to measure the duration of events and use these	• I can use a variety of timers to measure events using minutes and seconds. • I can use non-standard units of time to measure the duration of events and use these	• I can use a variety of timers to measure events using hours, minutes and seconds. • I can use non-standard units of time to measure the duration of events and use these

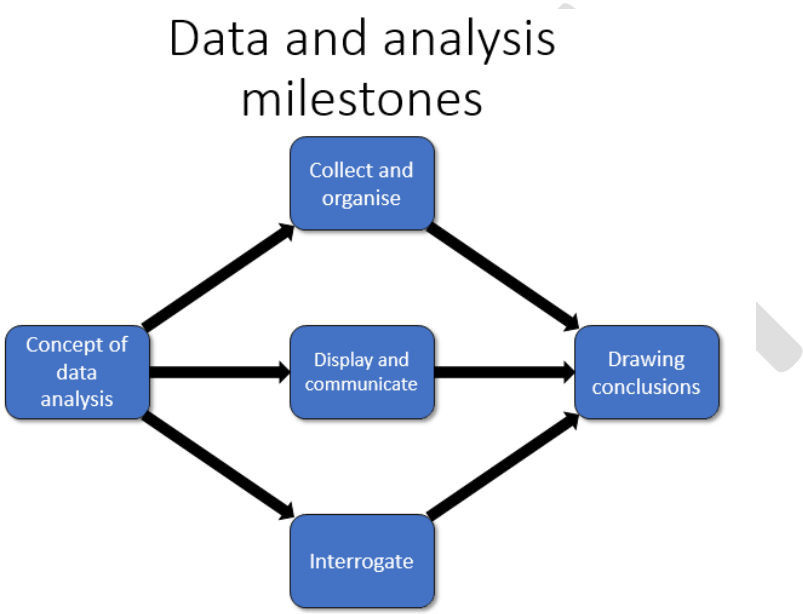
	• **Estimating duration**	to estimate in minutes.	to estimate minutes and seconds.	to estimate hours, minutes and seconds.

I can use a calendar to plan and be organised for key events for myself and my class throughout the year. **MNU 1-10b**	**Calendars**	• I can plan events over the course of a week or month.	• I can use a calendar to plan events. • I can record the date in a variety of ways, using words and numbers.	• I can use a calendar to plan events for myself and others.
	Milestone	At the beginning of Second Level	During Second Level	By the end of Second Level
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**	**Duration of time** • **Timing of tasks** • **Simple timetables** • **Estimating duration**	• I can plan a journey given a limited number of times presented in 12 hour notation.	• I can read timetables using 12 hour time to plan a journey.	• I can apply my knowledge of 12 and 24 hour notation to plan a journey using timetables.
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**	**Converting units of time**	• I can convert a number of seconds into minutes and seconds.	• I can convert a number of minutes into hours and minutes.	• I can convert between minutes, seconds, hours and days. • I can read and record any time in both 12 hour and 24hour notation and convert between the two.
	Time calculations including more complex durations • **Calendars and timetables** • **Journey times**	• If I know the start time and duration of an event (e.g. journey, movie) I can calculate when it ends (within the hour). • I can use a calendar to calculate the number of days between events within the month. • I can calculate time intervals from timetables in 12 hour notation, both mentally and using a written format. • I can calculate the length of a journey within the hour if I know the start and finish times.	• If I know the start time and duration of an event (e.g. journey, movie) I can calculate when it ends. (bridging across the hour). • I can use a calendar to calculate the number of days between events over a few weeks bridging over the months.	• If I know the end time and duration of an event, I can calculate when it started. • I can estimate the time taken for a journey given the speed and distance for easy values e.g. If I a car travels 100km at 50kph how long does the journey take? • I can use a calendar to calculate the number of days between events. • I can calculate time intervals from timetables both mentally and using a written format. • I can calculate the length of a journey across the hour if I know the start and finish times.
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 appropriate units of time**	• I am beginning to use timing devices to time practical activities.	• I can choose the most appropriate timing device to use to time practical activities.	• I can time practical activities and record using the relevant units, including hundredths of a second. • I can select the most appropriate units of time for a given task and justify my choice.

	Milestone	During Third Level	By the end of Third Level
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**	**Time/Speed/ Distance** • **Estimation in relation to time/speed/ distance** • **Calculations** • **Graphs**	• I can use the formula for calculating speed, distance and time (whole numbers only) • I can determine approximate speed, distance and time for a journey for easy values. • I can calculate or measure time intervals.	• I can use the link between speed, distance and time to find each of the three variables including working with simple fractional and decimal fractional hours, e.g. ½, 0.5, ¼, 0.25. • I can apply my knowledge of the relationship between speed, distance and time to determine an approximate speed, distance or time for a journey. • I can calculate or measure time intervals and use this in a speed or distance calculation. • I can calculate times durations across hours and days. • I can display and interpret solutions using graphs and timelines.
	Milestone	During Fourth Level	By the end of Fourth Level
I can use the link between time, speed and distance to carry out related calculations. **MNU 4-10b**	**Time/Speed/ Distance** • **Estimation in relation to time/speed/ distance** • **Calculations** • **Graphs**	• I can use the link between speed, distance and time to calculate an unknown, including fractions and decimal fractions of time. • I can convert time into fractions and decimal fractions of time for ½ or ¼ of an hour.	• I can use the link between speed, distance and time to calculate an unknown, including fractions and decimal fractions of time and where the units need to be converted. • I can convert time into fractions and decimal fractions of time. • I can calculate time durations across hours, days and months.
I can research, compare and contrast aspects of time and time management as they impact on me. **MNU 4-10a**	**Time management**	• I can demonstrate effective time management skills, e.g. working with different time zones or making plan, including across midnight. • I can find the solution to time problems. • I can interpret graphs and timelines.	• I have a range of research and problem solving skills that I use to solve real life time problems. • I can interpret the solutions to time problems and relate to the personal impact of these solutions. • I can display and interpret solutions using graphs and timelines.

Researching and evaluating data to assess risks and make informed choices

Progression



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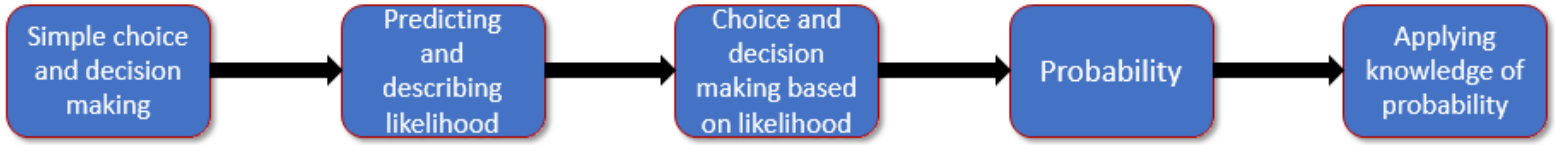
Data and analysis		Significant aspect of learning: Research and evaluate data to assess risks and make informed choices		
	Milestone	During Early Level	By the end of Early Level	
I can use the signs and charts around me for information, helping me plan and make choices and decisions in my daily life. **MNU 0-20c**	**Concept of data analysis**	• I can tell my teacher and peers what signs in my immediate environment mean.	• I gain information from simple displays e.g. how many dogs are there or what are the most common pets.	
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**	**Collect and organise** • **Matching, sorting and comparing** • **Gathering and organising**	• I can collect a group of objects to answer a question posed by me or someone else. • I can sort my data into groups using simple criteria and explain how I did this. • I can draw a picture to make a display of my findings. I can talk about my findings and what the display shows.	• I can ask simple questions to collect data for a specific purpose. • I can use individual tally marks to collect information or to answer a question posed by me or someone else. • I can sort and group my objects or data using a range of criteria and explain my reasons for choosing this method. • I can apply my counting skills to ask and answer questions, • I can make relevant choices and decisions based on the data I have collected. • I can draw a pictograph or block graph to make a display of my findings and summarise the information in the display by counting.	
	Milestone	At the beginning of First Level	During First Level	By the end of First Level
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**	**Collect and organise** • **Matching, sorting and comparing** • **Gathering and organising**	• I can use a range of data collection methods designed by others.	• I am beginning to design my own data collection methods.	• I can design and use my own data collection methods.
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	**Display and communicate** • **Types of display** • **Communicating findings**	• I can draw simple diagrams, tables and charts to display data I have collected. E.g. to create a pictograph I have equally sized pictures that I glue onto a poster. • I write on labels and a title.	• I can draw simple diagrams tables and charts to display data I have collected e.g. a bar chart with labels, frequency and a title. • I can write a few sentences to describe the results of my data collection.	• I can use a variety of different methods to display data e.g. as block graphs, bar graphs, tables, Carroll diagrams and Venn diagrams. • I can use digital technologies to display my data. • I can include a suitable title, simple labelling on both axes and an appropriate scale where one unit represents more than one data value in graphs.

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**	**Interrogate** • **Critical analysis of data**	• I can read information from diagrams and tables (1-1 correspondence only). • I can make simple predictions and collect information to test them.	• I can read information from diagrams and tables e.g. frequencies (one-one correspondence only) and describe the important features of the data represented e.g. say, "Their graph tells me that most children asked had dogs as pets". • I can make predictions and collect information to test them.	• I can read information from diagrams and tables (1-1 correspondence only) and describe the important features of the data represented. • I can assess the accuracy and appropriateness of diagrams. • I can make predictions and collect information to test them using my own criteria.
	Milestone	At the beginning of Second Level	During Second Level	By the end of Second Level
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**	**Display and communicate** • **Types of display** • **Communicating findings**	• I can suggest information to collect to answer particular questions. • I can represent data, using suitable scales, using an extended range of tables, charts, diagrams, plots and graphs.	• I can clarify questions to decide what data to collect e.g. when collecting data about favourite fruit. • I can represent data, using suitable scales, from an extended range of tables, charts, diagrams, plots and graphs. I can explain what the diagrams show.	• I can create my own categories when collecting data and explain what these should include and exclude. • I can collect, organize and display data accurately in a variety of ways including through the use of digital technologies e.g. creating surveys, tables, bar graphs, line graphs, frequency tables, pie charts and spreadsheets.
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**	**Interrogate** • **Critical analysis of data**	• I can check the data has been recorded accurately. • I can read information from a range of tables, charts, diagrams, plots and graphs (including 1 to many correspondence).	• I can say if my data is accurate and helps me answer my questions or if I need to refine it. • I can compare different displays of the same data by discussing the key features of each.	• I can reflect on the process of collection and say if any misleading or inaccurate data has been collected. • I can draw conclusions about the reliability of data taking into account factors such as the author, the audience, the scale and sample size used. • I can compare different displays of the same data. I can also explain why a presentation might be misleading. • I can analyze, interpret and draw conclusions from a variety of data and communicate my findings effectively.

	Milestone	During Third Level	By the end of Third Level
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**	**Interrogate** • **Critical analysis of data**	• I can find information in text, numerical, pictorial form from a variety of sources. • I can organize and display data in an appropriate form. • I can describe trends in data using appropriate language e.g. upwards.	• I can interpret, describe and discuss the important features of a data set and discuss whether I believe the information to be robust, vague or misleading. • I can source information or collect data making use of technology where appropriate. • Organize and display data appropriately in a variety of forms including compound, bar and line graphs, stem and leaf charts, scatter graphs and pie charts and make use of technology if needed.
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**	**Drawing conclusions** • **Readability and validity** • **Bias and sample size** • **Statistical calculation**	• I can justify the sample size for my data collection and explain how bias may arise.	• I can analyze data and draw appropriate conclusions. • I can interpret data that has been sourced or given.
	Milestone	During Fourth Level	By the end of Fourth Level
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**	**Drawing conclusions** • **Readability and validity** • **Bias and sample size** • **Statistical calculation**	• I understand what is meant by average and can calculate the mode and median. • I can use a range of methods to evaluate and interpret data. • I can select the most appropriate statistical diagram to display a given data set. • I can justify the most appropriate statistical diagram to display a given data set and communicate my reasoning clearly. • I can interpret raw and graphical data.	• I can calculate the mean, median, mode and range of a data set and justify which average I use. • I can use a variety of methods to evaluate and interpret data and comment on relationships I find in the data, communicating my findings clearly. • I can justify the most appropriate statistical diagram to display a given data set and communicate my reasoning clearly. • I can use statistical phrases to describe relationships in data e.g. correlations. • I can use different types of charts to display discrete, continuous and grouped data appropriately.

Ideas of chance and uncertainty milestones



Significant aspect of learning:

Applying numeracy and mathematical skills

It is important that learners develop numeracy and mathematical skills as they build their knowledge and understanding. As learners progress, they should demonstrate an increasing sophistication in their ability to:

- 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
- determine the reasonableness of a solution

These skills should be evident across the other significant aspects of learning in Numeracy and Mathematics. Staff should actively promote the development of these skills and ensure they are embedded in planning for learning, teaching and assessment.

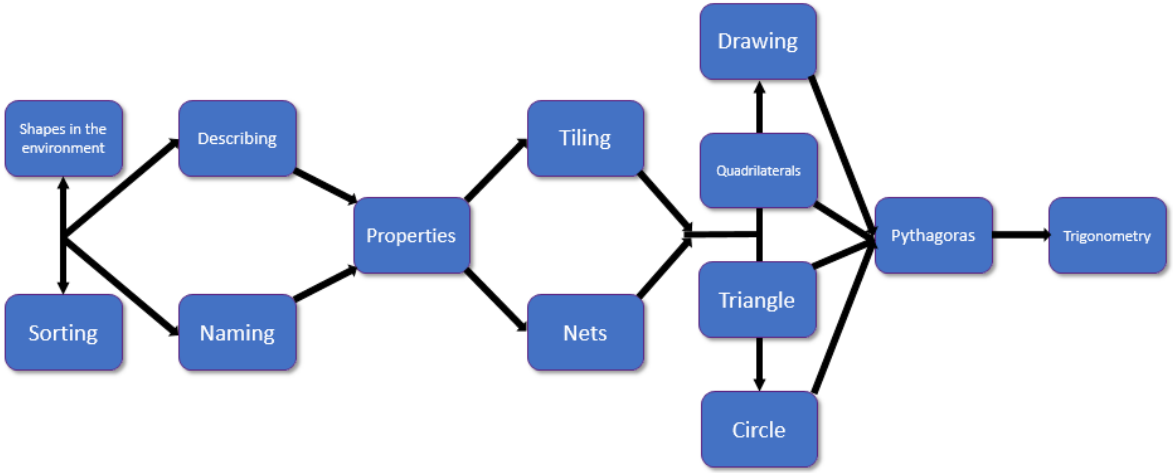
Ideas of chance and uncertainty		*Significant aspect of learning: Research and evaluate data to assess risks and make informed choices*		
	Milestone	At the beginning of First Level	During First Level	By the end of First Level
I can use appropriate vocabulary to describe the likelihood of events occurring, using the knowledge and experiences of myself and others to guide me. **MNU 1-22a**	**Simple choice and decision making**	• I am beginning to use words such as likely, probable, unlikely, certain and uncertain to describe outcomes.	• I can use words such as likely, probable, unlikely, certain, uncertain, possible and impossible to describe the likelihood of events occurring in everyday situations.	• I use vocabulary such as likely, probable, unlikely, certain, uncertain, never, possible, impossible fair and unfair to describe the likelihood of events occurring in everyday situations and I can justify my choice. • I can interpret data gathered through everyday experiences to make reasonable predictions of the likelihood of an event occurring.
	Milestone	At the beginning of Second Level	During Second Level	By the end of Second Level
I can conduct simple experiments involving chance and communicate my predictions and findings using the vocabulary of probability. **MNU 2-22a**	**Predicting and describing likelihood** • **Language of chance** • **Scale**	• I understand that the probability of an event lies between impossible and certain. • I understand that by matching events to a number line I can record probability of events.	• I can identify 1 as certain and 0 as impossible on the number line. • I can place events on a number line to demonstrate simple probabilities (e.g. probability of tossing a coin and it landing heads up is 0.5).	• I can use a number line from 0 to 1, where 0 is impossible and 1 is certain, to investigate and describe probability. • I can place events on a number line to demonstrate the probability of any event. • I can use the language of probability accurately to describe the likelihood of a simple event occurring for example equal chance, fifty fifty, one in two, two in three, percentage chance, 1:6
	Choice and decision making based on likelihood • **Choice and decision making** • **Conducting chance experiments** • **Order the chance of specified outcomes**	• I understand the concept of equally likely events. • I can list all the possible outcomes of simple events using tree diagrams and organized lists.	• I can arrange events in order to determine which is most or least likely to occur. • I can estimate probability by conducting experiments e.g. coin tosses, dice throws. • I understand that the more you carry out an experiment, the more confident you become in predicting the result.	• I am aware of how implications of chance are used in daily routines, decision making and the media. • I can plan and carry out simple experiments involving chance with repeated trials e.g. what is the probability of throwing a double six if you throw two dice fifty times? • I can use data to predict the outcome of a simple experiment and explain reasons for the prediction.

	Milestone	During Third Level	By the end of Third Level
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**	**Probability** • **Assigning numerical values** • **Interpreting probability** • **Notation**	• I know that probability is the likelihood of an event occurring. • I can list all the possible mutually exclusive outcomes of an event e.g. roll of a dice. • I can use the probability scale of 0 to 1 showing probability as a fraction, decimal fraction or percentage. • I can investigate real-life situations which involve making decisions on the likelihood of events occurring and the consequences involved.	• I can place events and results of experiments on a probability scale and use it to compare the probability of events occurring. • I can calculate the probability of a simple event happening, e.g. the chance of selecting a face card from a standard deck of cards. • I can use information collected in the past to make predictions or risk assessments for the future. • I can use experiments and practical activities to make links between the frequency of an event occurring and the probability of the event occurring.
	Milestone	During Fourth Level	By the end of Fourth Level
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**	**Applying knowledge of probability** • **Formula**	• I can calculate the expectation of an event i.e. how many times I expect the event to occur in a trial. • I can make decisions in real life situations based on the likelihood of events occurring and consider the implications of possible decisions before choosing the way ahead.	• I can identify all the possible mutually exclusive outcomes of two successive events. • I can determine the expected occurrences of an event. • I can assign numerical values to a combination of successive events. • I can apply my knowledge and skills in calculating probability to make predictions. • I can assess risk and make informed decisions in real-life contexts. • I can use the formula $P(A) = \frac{number\ of\ ways\ event\ A\ can\ occur}{total\ number\ of\ possible\ outcomes}$.

Using knowledge and understanding of shape and space

Progression

Properties of 2D shapes and 3D objects milestones



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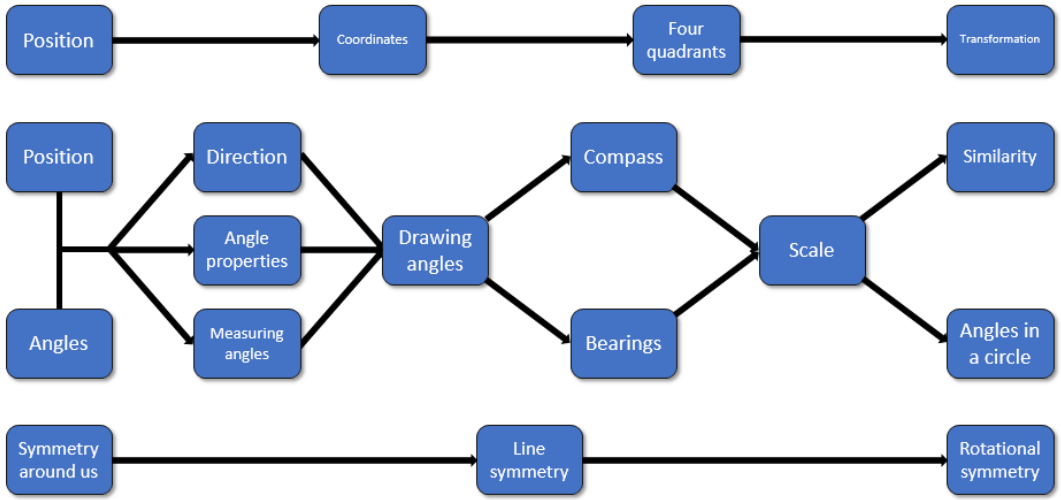
Properties of 2D shapes and 3D objects		***Significant aspect of learning: Use knowledge and understanding of shape and space***		
	Milestone	During Early Level		By the end of Early Level
I enjoy investigating objects and shapes and can sort, describe and be creative with them. **MTH 0-16a**	**Sorting shapes and objects**	• I can sort objects using my own or a given criteria e.g. colour.		• I can talk about the dynamic properties of shapes e.g. it rolls, slides, stacks etc. and use these to sort shapes and objects. • I can sort common 2D shapes and 3D objects according to various criteria e.g. straight, round, flat.
	Describing shapes and objects	• I use the properties of familiar objects to help me name shapes I am using e.g. wheel for circle. • I can use language such as straight, curved, flat, corner etc. to describe objects.		• I can recognize and describe common 2D shapes and 3D objects according to various criteria e.g. straight, round, flat and curved.
	Milestone	At the beginning of First Level	During First Level	By the end of First Level
I have explored simple 3D objects and 2D shapes and can identify, name and describe their features using appropriate vocabulary. **MTH 1-16a**	**Naming shapes and objects**	• I can recognize and name a range of simple 2D shapes such as rectangle, square, triangle and circle.	• I can recognise and name a range of simple 3D objects such as cubes, cuboids, cones, cylinders and spheres.	• I can name, identify and classify a range of simple 2D shapes and 3D objects and recognize these shapes in different orientations and sizes.
	Describing shapes and objects	• I can describe the features of a range of simple shapes and objects using language such as side, angle, corner, face and edge.	• I can recognise that the faces of 3D objects are composed of 2D shapes and I can describe the properties of these shapes.	• I can use mathematical language to describe the properties of a range of common 2D shapes and 3D objects including side, face, edge, corner, base and angle. • I can recognize 3D objects from 2D drawings.
I can explore and discuss how and why different shapes fit together and create a tiling pattern with them. **MTH 1-16b**	**Tiling**	• I can choose simple shapes to make a tiling pattern.	• I can predict if a shape can tessellate or not and test my theory by drawing a tiling pattern. • I can identify examples of tiling in the environment.	• I can say if a range of shapes will tessellate or not based on my understanding of the properties of the shapes, e.g. rectangles and squares tessellate because right angles fit together. • I can apply my knowledge of the features or 2D shapes to create tiling patterns incorporating at least two different shapes.
	Milestone	At the beginning of Second Level	During Second Level	By the end of Second Level
Having explored a range of 3D objects and 2D shapes, I can use mathematical language to describe their properties, and through investigation can	**Naming shapes and objects**	• I can recognise and name a range of 2D shapes including polygons.	• I can recognise and name quadrilaterals e.g. rectangle, kite, trapezium, rhombus, parallelogram. • I can recognise and name triangles e.g. equilateral, isosceles, right-angled, scalene.	• I can recognise and name a range of 3D objects both solid and skeletal.

discuss where and why particular shapes are used in the environment. **MTH 2-16a**	**Describing shapes and objects**	• I can describe the features of a range of shapes and objects using language such as side, angle, vertex, face, edge, radius, diameter and circumference.	• I can use the properties of shapes to classify them into given groups or groups of my own design. • I understand the terms regular, irregular, isosceles and equilateral.	• I can use mathematical language to describe the properties of a wide range of regular and irregular 2D shapes and 3D objects. • I can describe 2D shapes and 3D objects using specific vocabulary including face, vertex, angle, diagonal, radius, diameter and circumference. • I can discuss why different shapes and objects are used in the environment.
Through practical activities, I can show my understanding of the relationship between 3D objects and their nets. **MTH 2-16b**	**Nets**	• I can construct a cube or cuboid from its net.	• I can construct a range of objects from their nets.	• I can draw the nets for a range of 3D objects, including prisms, pyramids and other polyhedra. • I have explored how nets are used in everyday life.
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**	**Drawing shapes**	• I can accurately draw a range of 2D shapes using a ruler, angle measure and for circles a compass. • I know that the radius is half of the diameter and I can use this knowledge to draw circles using a pair of compasses.	• I can use isometric or hexagonal grid paper to make 2D representations of cubes and cuboids. • I can show an understanding that not all parts of the 3D object can be seen.	• I can use oblique techniques to make 2D representations of 3D objects. • I can make use of digital technologies and mathematical instruments to draw representations of 3D objects

	Milestone	During Third Level	By the end of Third Level
Having investigated a range of methods, I can accurately draw 2D shapes using appropriate mathematical instruments and methods. **MTH 3-16a**	**Drawing shapes**	• I have investigated and can use a range of methods to draw triangles. • I can calculate missing sides in problem solving situations.	• I have investigated and can use a range of methods to draw quadrilaterals and polygons. • I can demonstrate a variety of methods to accurately draw 2D shapes, including triangles and regular polygons, using mathematical instruments.
	Milestone	During Fourth Level	By the end of Fourth Level
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**	**Pythagoras**	• I have investigated and can use the Pythagorean relationship to calculate the length of any side of a right-angled triangle.	• I can use the converse of Pythagoras theorem.
	Trigonometry	• I can find the length of a side in a right-angled triangle using trigonometry. • I can find the size of an angle in a right-angled triangle using trigonometry.	• I can solve problems using trigonometry including coordinate systems. • I can choose between trigonometry and Pythagoras to solve problems in real life contexts.
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**	**Circle**	• I have investigated and can use the relationship between the radius, diameter and circumference of a circle to solve related problems. • I can use the formula $C = \pi D$ OR $C = 2\pi r$ to calculate the circumference of a circle. • I can use the formula $A = \pi r^2$ to calculate the area of a circle • I can calculate diameter and radius of a circle when given the area or circumference.	• I can solve related problems for compound shapes choosing the appropriate method to apply. • I recognise that there may be more than one route to find a solution to the problem. • I have investigated and can use the relationship between the radius and area of a circle to solve related problems.

Angle, symmetry and transformation milestones



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Angle, symmetry and transformation		*Significant aspect of learning: Use knowledge and understanding of shape and space*		
	Milestone	During Early Level	By the end of Early Level	
In movement, games, and using technology I can use simple directions and describe positions. **MTH 0-17a**	**Position**	• Use left and right to differentiate between identical body parts. • I can describe the position of an object by using positional words such as behind, in front of, above and below.	• I can understand and use correctly the language of position and direction to solve simple problems in movement games and technology, e.g. in front, behind, above, below, left, right, forwards and backwards.	
	Directions	• I can describe a sequence of directions, that involve turning, to a partner • I can follow a sequence of directions that involve turning.	• I can program a sequence of directions into a programmable toy or similar technology.	
I have had fun creating a range of symmetrical pictures and patterns using a range of media. **MTH 0-19a**	**Symmetry around us**	• I can create a symmetry picture using a fold. • I can create a symmetry picture or pattern using a flip or fold.	• I can identify, describe and create symmetrical pictures with at least one line of symmetry.	
	Milestone	At the beginning of First Level	During First Level	By the end of First Level
I can describe, follow and record routes and journeys using signs, words and angles associated with direction and turning. **MTH 1-17**	**Directions**	• I can give and follow verbal directions for a route or journey (supported) using language such as full turn, half turn, quarter turn, right turn and left turn. • I can demonstrate half and quarter turns along with clockwise and anti-clockwise. • I can find right angles in the environment and in well-known 2D shapes. • I know and can use the compass points for North, South, East and West.	• I can give and follow verbal directions for a route or journey (independent) using language such as full turn, half turn, quarter turn, clockwise, anticlockwise, right turn, left turn. • I can use left and quarter turn anti-clockwise as part of instructions for routes and journeys. • I can use informal methods to estimate, measure and describe the size of angles in relation to a right angle. • I know and can use compass points such as North, South-West.	• I can investigate and create instructions for a journey that I am unfamiliar with. • I can use 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. • I can produce signs or a simple plan to help others navigate. • I can compare different angles using an angle estimator and relate my estimates to right angles. • I can use all of the compass points and relate these to the appropriate angles.

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**	**Coordinates**	• I have investigated the use of grid systems. • I can describe when they might be useful.	• I can find objects on a grid and give its location. • I can plot objects onto a grid. • I can describe pathways between objects on a grid, plan or map.	• I can describe, plot and use accurate grid references, demonstrating knowledge of the horizontal and vertical location.
I have explored symmetry in my own and the wider environment and can create and recognise symmetrical pictures, patterns and shapes. **MTH 1-19a**	**Symmetry around us**	• I can recognise symmetrical pictures, patterns and shapes. • I can describe why pictures patterns and shapes are symmetrical.	• I can identify symmetry in patterns, pictures, nature and 2D shapes. • I can create symmetrical pictures, patterns and shapes with one line of symmetry	• I can create symmetrical pictures patterns and shapes with more than one line of symmetry.
	Milestone	At the beginning of Second Level	During Second Level	By the end of Second Level
I have investigated angles in the environment, and can discuss, describe and classify angles using appropriate mathematical vocabulary. **MTH 2-17a**	**Angles**	• I know the connection between quarter turns, right angles, half turns and full turns.	• I can identify right, acute, obtuse, reflex angles and full turns.	• I can discuss angles I have seen in the environment and can describe them using appropriate vocabulary. • I know that complementary angles add up to 90 degress and supplementary angles add up to 180n degress and I can use this knowledge to calculate missing angles.
I can accurately measure and draw angles using appropriate equipment, applying my skills to problems in context. **MTH 2-17b**	**Measuring angles**	• I know the measurements of a few basic angles e.g. right angles, straight lines and full turn.	• I can use these measurements to estimate the size of an angle. • I can use a protractor to check the estimates of the size of an angle.	• I can measure angles accurately using rulers and protractors and apply my knowledge of the relative size of angles to solve problems in a range of contexts.
	Drawing angles	• I can draw right angles.	• I can draw right, acute, obtuse, reflex angles and full turns.	• I can draw angles using degrees with increasing accuracy to produce shapes and solve related problems.
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**	**Compass**	• I know the basic compass points and the connections with right angles.	• I know and can use the eight point compass rose. • I can use the compass points to describe, follow and record direction routes and journeys.	• I know the link between the compass rose and angles. • I can apply this to practical situations. • I can use angles to describe, follow and record direction routes and journeys.

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**	**Scale**	• I can use the words enlargement and reduction to describe a transformation.	• I can apply a simple enlargement or reduction • I understand that scaled objects, maps, plans keep the same shape and look.	• I can use and interpret simple scales on maps, plans or models.
I can use my knowledge of the coordinate system to plot and describe the location of a point on a grid. **MTH 2-18a**	**Coordinates**	• I can find objects on a coordinate grid given its coordinates.	• I can use the notation of coordinate grids. • I can plot coordinates on a coordinate grid.	• I can describe how to move from one point on a grid to another point using mathematical language. • I can describe, plot and record the location of a point on a grid using coordinate notation.
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**	**Line symmetry**	• I can find and draw the lines of symmetry on simple pictures, patterns or objects.	• I can complete simple pictures or patterns that have line symmetry.	• I can identify and illustrate all lines of symmetry on a wide range of 2D shapes and apply this understanding to complete a range of symmetrical patterns, with and without the use of digital technologies.

	Milestone	During Third Level	By the end of Third Level
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**	**Angle properties**	• I can find and identify right, acute, obtuse, reflex angles within 2D shapes and where a transversal crosses parallel lines. • I can use standard notation to label and name angles.	• I can use the properties of parallel lines and transversals of these lines to calculate angles that are supplementary and complementary, corresponding, interior and alternate. • I can describe and apply the angle properties of regular and irregular polygons for a range of shapes.
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**	**Bearings**	• I can measure bearings on a map or plan. • I can measure and read distance from a scale map or plan. • I can draw bearings onto a map or plan to plot a route or journey. • I can draw routes or journeys onto a scale map or plan.	• I can create a scale map or plan and record routes or journeys with bearings and distances. • I can calculate bearings and distances from a scale map or plan.
I can apply my understanding of scale when enlarging or reducing pictures and shapes, using different methods, including technology. **MTH 3-17c**	**Scale**	• I have explored how technology can be used to enlarge or reduce pictures. • I can use a scale factor to enlarge a picture or shape.	• I have used and understand that a fractional scale factor can create a reduction.
I can use my knowledge of the coordinate system to plot and describe the location of a point on a grid. **MTH 3-18a**	**Coordinates**	• I can find objects on a coordinate grid given its coordinates. • I can use the notation of coordinate grids.	• I can plot coordinates on a coordinate grid. • I can describe how to move from one point on a grid to another point.
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 3-19a**	**Line symmetry**	• I can find and draw the lines of symmetry on a picture, pattern or object. • I can complete pictures or patterns that have line symmetry.	• I can create pictures with line symmetry, identifying where my line or lines of symmetry are. • I can identify all lines of symmetry in 2D shapes. • I can create symmetrical patterns and pictures.
	Milestone	During Fourth Level	By the end of Fourth Level
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**	**Angles in a circle**	• I understand the relationship between the radius and tangent to a circle.	• I can calculate the angles in a semi-circle and solve related problems. • I can apply my knowledge of the relationship between the tangent and radius to calculate sizes of missing angles.

I can apply my understanding of the properties of similar figures to solve problems involving length and area. **MTH 4-17b**	**Similarity**	• I can identify when shapes are congruent or similar. • I can calculate the scale factor.	• I can find missing angles and sides for similar shapes. • I have explored the effect of changing scale on area and can solve related problems. • I can use similarity to find unknown lengths and areas of 2D shapes.
I can plot and describe the position of a point on a 4-quadrant coordinate grid. **MTH 4-18a**	**4 Quadrants**	• I can find objects on a coordinate grid given its coordinates (including a negative coordinate). • I can use the notation of coordinate grids (including a negative coordinate).	• I can plot coordinates on a coordinate grid (including a negative coordinate). • I can describe how to move from one point on a grid to another point (including a negative coordinate). • I can use a 4-quadrant Cartesian grid to read and plot coordinates.
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**	**Transformation**	• I can describe how to move from one point on a grid to another point.	• I can predict the result of a transformation on a point or shape and draw the result accurately on a four quadrant grid.
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**	**Rotational symmetry**	• I can describe rotational symmetry using appropriate mathematical vocabulary. • I can identify and discuss the rotational symmetry of shapes, pictures and patterns.	• I can complete pictures or patterns that have rotational symmetry. • I can create pictures with rotational symmetry. • I can rotate objects using rotational symmetry.