Overview Progression

Document to support *gap finding* and the planning for progression in all areas of maths.

Indexed to Small-step Progression Ladders

Updated February 2020

Contents

Mathematics Learning Objectives

1. To know and use numbers
2. To add and subtract
3. To multiply and divide
4. To understand and use ratio
5. To know and use geometric facts
6. To represent geometric constructions
7. To use measures
8. To handle data

The national curriculum for mathematics aims to ensure that all pupils:

• *become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately*

• ***reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language*

• *can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.'*

Fluency

Fluency involves…

- quick recall of facts and procedures - *Practice makes Permanent.* Daily Practice in the maths session, throughout the day and beyond the school day
- the flexibility and fluidity to move between different contexts and representations of mathematics
- the ability to recognise relationships and make connections in mathematics

Reasoning

Reasoning distinguishes mathematics from other academic subjects: constructing sequences of logically connected statements that, cumulatively, have explanatory power is what mathematicians, uniquely, do.
Developing mathematical reasoning in our pupils and students is therefore more than a curriculum-motivated requirement: *it's our duty* if we are going to ensure the next generation of mathematical thinkers.

Reasoning should be ***integral to every*** mathematics session, it is not to be treated as an additional objective, or exclusively as an 'extension', *all* children need to access reasoning in order to experience working at depth before breadth. *Practice therefore needs to be inclusive*. It requires 'Intelligent Practice'…Noticing things that stay the same, things that change, providing the opportunities to reason make connections. Teachers must apply Variation Theory.

In designing exercises, the teacher is advised to avoid mechanical repetition and to create an appropriate path for practising the thinking process with increasing creativity. (Gu, 1991)

Variation *offers a systematic way to look at mathematical exercises in terms of what is available for the learner to notice. (Marton, Runesson & Tsui, 2003)*

There is progression in reasoning questioning that ensures all children can engage.

- What do you notice?
- What's the same?
- What's different/changed?
- Higher order question eg What else do you know?

Reasoning requires a shift from… Answers as *the* product to… Answers as *part of* the product.

Once children have practised multiple examples to secure fluency, the key is then *fewer examples at greater depth*.

Supplementary materials to support teachers' planning for reasoning:
LINK NCETM Reasoning Progression Maps and Using the NCETM resources summary

Supplementary materials to support teachers' planning for variation:
LINK DJ Training PowerPoint exercises

Problem Solving

'You cannot use and apply what you do not yet know'. Richard Dunne

Problem Solving involves making a link between a real-life Context and mathematical symbols (Symbolic Maths). The trouble is, conventional approaches to problem solving try too hard, too soon, to make this connection. It is routinely assumed, for instance, that it is appropriate to teach
(i) 'division' (ie mathematics) by using 'sharing' (ie real life);
(ii) 'fractions' (ie mathematics) by using 'pizzas' (ie real life);
(iii) 'negative numbers' (ie mathematics) by using 'temperature' or 'bank accounts' or 'blocks of flats' (ie real life); and so on.

In other words, the link between mathematics and real-life is made straight away – by using real-life to teach mathematics.
I know it sounds obvious to do this; I know it sounds like a good idea – but, in fact, it is not! It is the root cause of the difficulty most people have with maths.

It feels as if it ought to flow naturally that, faced with a real-life problem, pupils will have mathematics easily available to solve it. They do not. They never have done. And, when this approach is adopted, they never will. This is true, at different levels of sophistication, throughout their school life. The reasoning is quite clear. It is because mathematics is an abstract language using specialised symbols (we call it Symbolic Maths) there is a desire to 'start them off with things that are familiar'.
The thinking proceeds like this. "Maths is abstract and symbolic; that means it is hard! We must make it easier. We must use something familiar to help the pupils! Obvious! We must use real life things to make it easy for them." This mistake has seduced mathematics education.

MMS, on the other hand, focuses on teaching mathematics (Symbolic Maths) in a way that is detached from real life. MMS carefully ensures pupils become very familiar with concrete objects (cups and cards and sticks), together with physical actions, which are designed to 'match' mathematics very closely. The concrete objects, and the way they are used, provide a clear representation of the structure of mathematics. Real life does not match mathematics well enough. Real life is too complex - too messy.

MMS refers to symbolic mathematics as the Maths Story. MMS uses a completely artificial, but very powerful, representation (using cups and cards and sticks) to ease pupils into this symbolism - referred to as the Real Story (it is quite simply a carefully designed Learning System). This is the major focus for MMS *at the beginning and throughout* the course: making a connection between the abstract, symbolic Maths Story and the artificial, concrete, accurate, accessible Real Story. That is why we so often use the two instructions (i) I will write the Maths Story. You act the Real Story (ii) I will act the Real Story. You write the Maths Story.

This emphasis ensures that the abstract symbolic Maths Story is closely connected with its 'meaning' as defined by the artificial, concrete, accurate, accessible Real Story. That is why we so often use the instruction 'Look at this Maths Story. Read what it says. Read what it means'. What, then, of the Real-Life Story (the Context)? These are studied in relation to the very familiar Maths Story (Symbolic Maths) assisted by the very familiar Real Story (the Learning System). We secure the final set of connections by working hard at inventing Real-Life Stories that are provoked by a particular Maths Story.

For every Maths Story there is just one Real Story associated with it but there is an infinite number of Real-Life Stories associated with it.

The Maths Story defines what it is that is the same about a whole series of Real-Life Stories, that is, there are Real-Life Stories about apples, dogs, metres, sausages and much else that are all associated with just one Maths Story. That is what pupils do not recognise when they find Problem Solving difficult; that is what they need to be taught; that is the purpose of MMS defining and emphasising the Maths Story, the Real Story and then the Real-Life Story. Moreover, the relentless effort to secure the connections among the three stories leads to 'Think about the word problem'

The three preparatory stages are:

1. Make connections between the Maths Story, Real Story and Real-Life Story (Developed in MMS1 Re B3, B4 & A2 B5 B6)

No problems with questions are met at this stage: we start with a Maths Story and ***construct*** an embellished real-life story, then from an embellished real-life story (no question) find and write the Maths Story.

Look at this Maths Story. Read what it says. Read what it means.

* I will write the Maths Story. You act the Real Story
* I will act the Real Story. You write the Maths Story.
* Look at this Maths Story. Read what it says. Read what it means. Now make up a Basic Real-Life Story.
* What is your Basic Real-Life Story about?
* Now embellish your Basic Real-Life Story.
* What is the context of your *Embellished* Real-Life Story?

2. Dramatic reconstruction (Developed in MMS1 Re B3, B4 & A2 B5 B6 and continued in MMS2 A2 B1, B2 & Re B3, B4)

*Small groups of pupils plan a piece of acting that puts into visual form an 'embellished' Real-Life Story. They make the 'props' (which may be quite rudimentary) and decide on the actors and what they will say.

* Pupils act their Real-Life Story to the class.

The purpose of Stage 1 is both to ensure that pupils appreciate the differences among the three stories and to ensure that the three stories are connected.

The purpose of Stage 2 is to ensure that the spoken form of the Real-Life Story is given an actual, visual and physical meaning.

You will notice that none of this has done anything explicitly about solving problems. It has concentrated on the distinction among the three stories and the connections among the three stories. It is Stage 3 that carries all this forward into sensible problem solving.

3. Analysis of Text.

* Look at this Real-Life Story. Tell me the Explicit Information.
* Look at this Real-Life Story again. Tell me some Implicit Information.
* *Draw* or act out the Real-Life Story (representations)
* *'Think About the Word Problem'* steps now support children for KS1 SAT and through lower KS2. Introduced MMS2 Re B3, 4, 5

Step 1. *Read the word problem*.
• *Find the question or instruction.
• Look for the explicit information.

Step 2. *Say what the basic Real-Life Story is about. Describe the context.*
• Draw or act out the Real-Life Story.

Step 3. *Write the Maths Story.*
• Act the Real Story with cups (or other representation).

Step 4. *Speak the basic Real-Life Story.*

Step 5. *Write the answer.*

*This is followed later in KS2 Y3/4 by:

*Look at this item. Underline the Questions. Underline [differently] the Instructions.

This emphasis on two kinds of information, as well as formally identifying the questions and instructions, provides a framework for the future, dealing with the items (word problems) that typically appear in textbooks and test papers. The items, without the questions and instructions, are essentially an *embellished Real-Life Story.* The difficulty in being presented with an embellished story is to identify what is relevant and what is irrelevant to problem solving. However, the purpose of the questions and the instructions is to point us to 'What the Real-Life Story is about' – and this reveals what we have to focus on. We can then examine the Explicit Information for information relevant to 'What the Real-Life Story is about'; and then set up a Maths Story to deduce Implicit Information that is needed to solve the problem.

The above work (Y1-Y4) provides detailed attention to the stages as rigorous preparation for Problem Solving.

It is in Y5 that all this work comes together to enable pupils to undertake Problem Solving in a disciplined and thoughtful manner when pupils work with a wide range of examples across all strands.

Y5/6 Think about the problem!

Step 1: Decide what to say

It is just a calculation	It is drawing or measurement
It is a puzzle	It is a Real-Life Story with a context

Step 2: Get started

Think ahead: Is there a question? Is there an instruction?
Get a feeling for the problem: think about explicit information
Get a few ideas: think about implicit information

Step 3: Decide if these will help

Jot some calculations
Say what the basic Real-Life Story is about
Draw the basic Real-Life Story
Write a Maths Story

Progression Grids

The following progression grids for Arithmetic do not include U&A problem solving contexts; aspects of these are outlined in the Curriculum Guidance document but of course U&A would be a natural step in a mastery teaching approach to gain breadth.
The key objectives are indexed to match the Small-step Progression Ladders.
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LO 1	
EYFS/KS1	KS2
Number songs and rhymes, repetition and actions EYFS preparatory	Count from 0 in multiples of 4, 8 (and 2,3,5,10) 21
Count forwards from any number crossing 10 boundaries (0–100, then apply up to 1000) EYFS preparatory	Count in multiples of 50 and 100 22
Count backwards from any number crossing 10 boundaries (0–100, then apply up to 1000) EYFS preparatory	Find 10 or 100 more/less than a given number 23
Count up to 3, then 5, then 10 objects. How many...?, reply with the correct number 'How much is there here?' reply with [number] cups EYFS preparatory	Recognise the value of each digit in a 3-digit & 4-digit number by partitioning 24
Subitise (recognise quantities without counting) up to 5 EYFS preparatory	Compare and order number up to 1000 use <, > & = symbols 25
Read, say and match numbers 0–9 EYFS preparatory	Round any number to the nearest 10 & 100 26
Read, say and match numbers 10–20 in English and 'Maths' EYFS preparatory	Read/Write numbers up to 1000 in numerals & words 27
Match the number of objects to the numeral EYFS preparatory	Count in steps of ½, ¼ , 1/3, 1/5, 1/10 from 0 or any 2- digit number 28
Sequence numbers in order EYFS preparatory	Recognise that tenths arise from dividing an object into 10 equal parts and in dividing 1-digit numbers or quantities by ten 29
Recognise & write numbers 0-9 EYFS preparatory	Compare and order unit fractions 30
Recognise & write numbers 10 –20 EYFS preparatory	Compare and order fractions with the same denominators 31
Recognise & write fractions ½ ¼ EYFS preparatory	Count in multiples of 6,7,9 (and 2,3,4,5,8,10) 32, 33
Identify one more /less than a given number 0-100 and know this means add/subtract one EYFS preparatory, 1	Count in multiples of 25 and 1000 (use Logic of Language) 34
Read and Write numbers to 100 in numerals 2	Recognise the value of each digit in a 4-digit number 35
Read and write numbers from 1 to 20 in numerals and words 3	Read & write numbers to at least 1 000 000 and determine the value of each digit 36
Count to & across 10 boundaries & 100 forwards and backwards from 0 or any given number 4	Count forwards/backwards in steps of powers of 10 for any given number up to 1 000 000 37
Order : first, second, third 5	Use index notation for powers of 10 38
Recognise odd and even numbers 6	Find 1000 more/less than a given number 39
Count in 2's, then 5's then 10's 7,8,9	Count backwards through 0 to include negative numbers 40
Find 10 more / less than a number 10	Order and compare numbers beyond 1000 41
Read and Write numbers to at least 100 in numerals and words 11	Round any number to the nearest 10, 100 or 1000 42
Compare and order numbers from 0 to 100, use <, > and = 12	Count up and down in steps of 1/10, 1/100, 1/1000 as vulgar/decimal from 0 or any single/two digit number 43
Recognise the value of each digit in a 2-digit (tens/ones; ty/cups) a 3-digit (& 4 digit) number by partitioning 13, 14	Recognise that 100ths arise from dividing into 100 equal parts and in dividing tenths by ten 44

EYFS/KS1	KS2
Count forwards/backwards in steps of 2 and 5 from 0 15	Read & write decimal fractions to 3d.p. 45
Count forwards/backwards in steps of 10 from any number 16	Read & write numbers written in decimal notation (to 3d.p.) as vulgar fractions using tenths, hundredths and thousandths 46
Count forwards/backwards in steps of 3 from 0 17	Say the value of any indicated digit or combination of digits in a 4-digit number and in a 4-digit number to the third decimal place 47
Arrange events in Chronological order 18	Use the symbol ≈ for 'approximately equal to' 48
Create and describe number patterns (inc odd/even) 19	Round 1d.p. and 2d.p. numbers to the nearest whole number 49
Count in ½ and ¼ from 0 and any single digit number to 10 20	Round an answer with 2 dp to the nearest 1 dp eg 33.92 ≈ 33.9 50
	Compare and order decimal fractions (up to 2d.p.) 51
	Read Roman Numerals to 100 (I to C) 52
	Round any number up to 1 000 000 to nearest 10, 100, 1000, 10 000 and 100 000 53
	Compare and order fractions whose denominators are all multiples of the same number 54
	Identify, name and write equivalent fractions of a given fraction, including tenths and hundredths 55
	Recognise mixed numbers and improper fractions and convert from one form to the other 56
	Read Roman Numerals to 1000 M and recognise years written in Roman Numerals 57
	Read, write, order & compare numbers up to 10 000 000 & determine the value of each digit 58
	Round any number to the required degree of accuracy 59
	Compare and order fractions including >1 60
Continue to/from KS2 steps	Write recurring infinite decimals as abbreviations using the conventional notation of 'dots' above one or two digits NC3

LO 2		LO 3	
Addition	Subtraction	Multiplication	Division
1 digit + 1 digit 1-4	1 digit - 1 digit 1-4	Double facts to 10 EYFS preparatory	Halving in everyday sharing context EYFS prep
Whole numbers and Fractions 5	Whole numbers and Fractions 5	1 digit x 1 digit 1, 2	1 digit ÷ 1 digit 1, 2
Numbers to 20 6 -10	Numbers to 20 6-10	Whole numbers and Fractions 3	Find $^1/_2$ and $^1/_4$ of shapes 3, 4
0, 00 and 000 11, 12	0, 00 and 000 11,12	Recognise connection between repeated addition & multiplication 4, 5	Whole numbers and Fractions 5
Horizontal to Vertical (no tricky columns) 13, 14	Vertical (no tricky columns) 13, 14	6,7 DP LO1 facts x2,5,10	Grid 1 digit ÷ 1 digit as inverse of multiplication 6, 7
2 digit + 2 digit 15-17	2 digit - 2 digit 15 -17	Recognise commutativity 8,9,10	Recognise connection between repeated subtraction and division 8
For addition Maths Story use the commutative law 18	Know the inverse of add is take away and that subtraction is not commutative 18,19, 20	Grid 1 digit x 1 digit 11	Identify Type 1 (Grouping) and Type 2 (Sharing) Real Stories 9
Vertical (1 tricky column) 19-20	Solve missing number problems such as 7 = ? – 9 21, 22	Multiply 1 digit x 0/00/000 12, 13, 14	Use Type 2 Division to find $^1/_2$ and $^1/_4$ of amounts and objects (and 1/3 & 2/3) 9
Partition 2-digit number in different ways to add mentally 21, 22	Vertical (1 tricky column) 23 – 27,	Grid 1 digit x 0/00/000 13,14	Calculate Division with Remainders 10
Vertical (2 then 3 tricky columns) 23-26	Partition 3-digit number in different ways to subtract mentally 28	15 DP LO1 facts x 3, 4, 8	Find halves and quarters and thirds of numbers and objects 11, 12
Mixed numbers involving $^1/_2$ $^1/_4$ 27	Vertical (2 then 3 tricky columns) 29, 30, 31, 32	With $^1/_5$ 16a	0/ 00/000 ÷ 0/00/000 (Type 1) 0/00/000 ÷ 1 digit (Type 2) Both as inverse of multiplication 13
With $^1/_5$ 28	Mixed numbers involving $^1/_2$ $^1/_4$ 33	Mixed numbers $^1/_5$ $^1/_7$ (no mixed denominations) 16b	With $^1/_5$ 14
Mixed numbers involving $^1/_5$ $^1/_7$ (no mixed denominations) 27,28,29, 30, 36	With $^1/_5$ 34	Negative numbers 16c	Mixed numbers $^1/_5$ $^1/_7$ (no mixed denominations) 15
$^1/_{10}$ and decimals (1dp) 31,32, 36	Mixed numbers involving $^1/_5$ $^1/_7$ (no mixed denominations) 35, 36	$^1/_{10}$ and Decimals (1dp) 16d	Remainders using times table facts (expression remainders as 'r' and fractions) 16
Negative numbers (no combining negative and positive unless the result is 0) 33, 36	$^1/_{10}$ and decimals (1dp) 37, 38	2 digit x 1 digit by partitioning and calculating the sum of two products 17	Negative numbers 17
Negative numbers 34	Negative numbers (no tricky examples) 39	Grid 2 digit x 1 digit 18	$^1/_{10}$ and decimals (1dp) 18
Group and rearrange 35	Negative numbers 40	Squares and Square roots 19	$^1/_{100}$ and decimals (2dp) 18, 19

Progression in Maths: LO 2 / LO 3 Four Operations (page 2 of 2)

Addition	Subtraction	Multiplication	Division
Vertical with 1dp (no tricky columns) 37	Group and rearrange 41	20 DP LO1 facts to 12 x 12	$^1/_{1000}$ and decimals (3dp) 18, 19
Vertical with 1dp (one tricky column) 38	Vertical with decimal numbers (no tricky columns) 43	Calculate multiplication terms in an expression combining addition and subtraction 21	Deduce division Maths Stories for products of two multiples of ten 20
$^1/_{100}$ and decimals (2dp) 39	Vertical with decimal numbers (one tricky columns) 44	Calculate products of two multiples of ten using 1 digit x 1 digit 22	Expanded Grid 2 digit ÷ 1 digit using remainders and fractions 21
$^1/_{1000}$ and decimals (3dp) 39	$^1/_{100}$ and decimals (2dp) 45	Mentally Calculate add & subtract combined with multiplication for decimal fractions 23	Expanded Grid 3 digit ÷ 1 digit using remainders and fractions 22
Vertical with decimal numbers (any tricky column) 39	$^1/_{1000}$ and decimals (3dp) 45	Grid 2 digit x 2 digit 24	Divide mixed numbers and vulgar fractions by a whole number (Type 2) 23
Group and rearrange 40	Group and rearrange 46	Recognise & use factor pairs 25	Solve word problems (involving capacity, volume or length) using Type1/2 division 24
Algebraic expressions 42	Subtract with tricky negative numbers 47	Mentally calculate the product of three 1-digit numbers 26	Use $^a/_b$ and a ÷ b interchangeably 25 Convert vulgar fractions to finite decimal fractions 26
Vertical (any tricky column) 43	Algebraic expressions 48	Calculate a product of two numbers, each a decimal fraction up to two decimal places 27	Expanded Grid to Shortened Grid 4 digit ÷ 1 digit expressing remainders as fractions. 27
Vertical with decimal numbers (any tricky column) 44	Vertical (any tricky column) 49	Multiply and divide vulgar fractions and mixed numbers by a whole number 28	Divide decimal numbers by multiples of powers of 10 28
Vulgar fractions or mixed numbers with the same denominator 45	Vertical with decimal numbers (any tricky column) 50	Recognise that $^a/_b$ x $^b/_c$ = $^a/_c$ 29	Shortened Grid to Standard Short Division method 3 digit ÷ 1 digit 29
Addition (combined with other operations) to evaluate terms in an expression 46	Vulgar fractions or mixed numbers with the same denominator 51	Grid 3 digit x 2 digit 30 Grid 3 digit x 2 digit decimals (up to 2dp) 31	Standard Short Division method 3 digit ÷ 2 digit including to 2 d.p. 30
Solve algebraic equations 47	Subtraction (combined with other operations) to evaluate terms in an expression 52	Distinguish factor and proper factor 33 Use divisibility tests 34 Identify prime numbers 35	Standard Long Division 4 digit ÷ 2 digit including to 2 d.p. 31
Vulgar fractions and mixed numbers (different denominators) 48	Solve algebraic equations 53	Identify terms within an expression 37, 38	Vulgar fractions and mixed numbers (different denominators) 32, 33
	Vulgar fractions and mixed numbers (different denominators) 54	Standard Long Multiplication 36 to Short method 39 for 2 digit x 2 digit; 3 digit x 2 digit and 4 digit x 2 digit. Estimation strategies 40, 41	
		Solve algebraic expressions 43, 43	
		Vulgar fractions and mixed numbers (different denominators $^a/_b$ x $^d/_c$ = $^{ad}/_{bc}$) 45	

LO 4
Ratio
Respond using cups *bigger/smaller/same* 1
Compare two ratio sticks using the vocabulary *bigger/smaller/same* 2
Compare two ratio sticks and respond to: *Say it in English* with, e.g. *Smaller*. *Say it in Maths* with, e.g. *Two to three* and replace cups. 3
Calculate fractions of quantities using pupil cups, e.g. $^{2}/_{3}$ of 6 = 4 4, 5, 6
Interpret information in data grids - use the vocabulary *What is the ratio of the number of …?; What fraction of all the …?* Apply comparison language Two to three; 2 : 3; 2/3. 7, 8
Write 3 : 7 as $^{3}/_{7}$, write divisions with remainders as a mixed number, e.g. 31 ÷ 7 = 4 $^{3}/_{7}$. 9
Identify shaded fraction of a shape 10
Read metric prefixes, from milli- to kilo-, with any of the basic units of length, mass and volume, and convert between units of measure 11, 12, 13
Calculate whole number percentages of a whole number quantity (no tricky) 14, 16, 18
Use a calculator to complete the calculation, e.g. 5.3% of 400 = 21.2 15, 17, 18
Calculate equivalent fractions by drawing ratio sticks 19
Calculate fractions of quantities and recognise that using an equivalent fraction gives the same answer 20
Use ratio to convert between pounds and euros, miles and km 21
Use ratio to convert between seconds, minutes and hours 22
Find a percentage of a value or the result of a percentage increase or decrease 23
Multiply two vulgar fractions where the denominator of one and the numerator of the other are equal (double replacement) 24
Use equivalent fractions in calculations to add & subtract 25
Convert between metric units 26, 30
Convert between imperial units 27
Solve problems involving measures and fractions 28, 29
Convert between metric and imperial units of measure 31 (&41)
Use equivalent fractions in calculations with each of the four operations 32
Convert a vulgar fraction to a percentage 33
Convert a percentage to a decimal fraction 34
Convert a decimal fraction to a percentage. 35

Ratio
Express vulgar fractions as percentages. 36
Write the ratio of one quantity to another 37
Write a quantity as a fraction or percentage of the total quantity 38
Calculate a quantity following a percentage increase or decrease. 39
Solve problems involving ratio and proportion by scaling up or scaling down 40
Convert between yards and metres 41 (& 31)
Measure the probability of events 42
Understand 'the golden ratio', Ψ(phi), is a constant 43
Calculate ratios, and use ratios to calculate lengths and construct shapes 44

LO 5	LO 5	LO 6	LO 6	LO 6
Properties of Shape (1)	Turn & Angles (2)	Drawing (1)	Transformations (2)	Coordinate Geometry (3)
Name and describe 2D shapes (triangle, quadrilateral, pentagon, hexagon, circle and ellipse) *1-11*	Make ½ ¼ and ¾ turns 1-5 preparatory for 6 + 7(NC)	Draw a line with a ruler (horizontal and vertical) 1-2	Identify a line of symmetry in a 2D shape 1-4	Draw a pair of axes 1
Begin to use & describe basic properties of solid 3D shapes (eg cube, cuboid, cone, triangular based pyramid, square based pyramid, sphere) 5-7	Draw right angles 8-10	Draw an open and closed shape 3-5	Draw the image of an object in the mirror line 1-4	Plot points on an axis specified by their name and coordinates eg (3,4) (first quadrant) 2-3
Identify shapes as 1D, 2D or 3D 12-13	Draw an angle 10-13	Draw polygons using a ruler 4	Draw image of object in a vertical, horizontal or oblique mirror line 5	Draw line segments parallel and perpendicular to AB 4-5
Sort 2D and 3D shapes according to criteria (number of sides etc) 12-14	Recognise, name and use clockwise and anti-clockwise 11	Draw a line segment using a ruler. Know that the length of a line is 'infinity' and that a line segment has a length that can be measured 6-7	Name lines of symmetry 6	Plot points on an axis specified by their name and coordinates e.g. (-3,4) (four quadrants) 6
Name 2D faces on 3D shapes 15-16	Make ½ ¼ and ¾ turns and describe the turn in degrees 12 -14	Use a compass to draw arcs 8	Recognise reflection, translation, enlargement and rotation as forms of transformations 7-14	Draw a triangle by plotting points 6
Describe 2D and 3D shapes using side, corner, face, edge, vertex 17-19	Measure angles using angle templates (multiples of 10°) 13	Use compass and ruler to draw a triangle 8	Draw an object and its image for a vector translation 11-13 & Coord Ge steps 9-10	Draw circles and polygons on a pair of axis (four quadrants) 7
Identify and name polygons (up to 10 sided shape) 20	Draw angles using angle templates (multiples of 10°) 13	Use a compass to draw a circle 9	Draw lines of symmetry 15	Draw the image of a polygon in a mirror line 8,11
Name special triangles – equilateral, isosceles and right angled 21-22	Use a protractor to draw angles in 5° intervals then to within 1° accuracy 15	Draw a regular hexagon using a compass and ruler 9	Write number of lines of symmetry of any polygon 16	Complete the drawing of a named, partially-drawn shape on a pair of axes 12
Identify 3D shapes – prisms and pyramids 23-24	Say whether an angle is acute, obtuse or reflex 16-19	Draw a circle and a triangle in it 9	Recognise orders of rotational symmetry 17	Complete the coordinates of the corners of a named shape using knowledge of its properties 13

LO 5	LO 5	LO 6	LO 6	LO 6
Properties of Shape (1)	Turn & Angles (2)	Drawing (1)	Transformations (2)	Coordinate Geometry (3)
Use nets to make 3D shapes 25	Measure angles using a protractor in 5° intervals then to within 1° accuracy 17 -19	Draw and label a convex polygon 10		
Recognise lines of polygons as parallel and not parallel 26-27	Name and calculate vertically opposite angles and supplementary angles 20 -21	Draw the perpendicular bisector of a line segment 11-12		
Draw arrow symbols to indicate parallel lines on polygons 28	Recognise and write values of vertically opposite and opposite angles 22-24	Draw the circum-circle and in-circle of a triangle 13-14		
Name parallelograms 29	Draw and mark the exterior angles on a convex polygon 25-27			
Compare triangles – saying whether congruent or not 30	Find the sum of the interior angles of a polygon 28			
Recognise and identify pyramid or prism from its net 31-32	Calculate angles in an isosceles triangle 29			
Describe triangles – scalene 33	Calculate an exterior and interior angles of regular polygon 30-31			
Identify parts of a circle 34	Calculate the third angle of a triangle 32			
Draw a convex polygon 35				
Recognise and identify all polygons including rhombus and trapezium 36				

LO 7	LO 7	LO 7	LO 7	LO 8	LO 8
Use measuring instruments Length/Area/Volume, *Mass (1)	Calculate Length/Area/Volume (2)	Money (3)	Time (4)	Grids/Charts (1)	Statistics (2)
Use a range of measures vocabulary including comparative and superlative terms 1 -7	Calculate the area of a rectangle by counting squares 1	Identify coins 1p – 10p 1-5	Tell the time - o'clock 1;6	Make simple block graphs using concrete objects 1-8	Recognise descriptive statistics and summary statistics 1
Use a range of measuring equipment – non-standard and standard 1-7	Calculate the volume of cuboids by counting cubes 2	Find the total of money (up to 10p) 1-6	Use sand timers to measure minutes 2-5;7	Find information in a grid 9-10	Calculate the mean of a sample pile of cups 1-2
Measure in dm 8-9	Calculate perimeter 3	Work out which coins to use (1p, 2p and 5p) 6	Recognise Days of week & Months of year EYFS pre-prep; 8-10;	Answer simple questions (explicit) about a grid or bar chart – how many chose…, which is the most popular/least popular 11	Find the mode in a bar chart 3-4
Measure lines in cm 10; 12	Calculate the area of a rectangle 4 , 6, 10	Identify coins (20p, 50p, £1. £2) 7	Count hours in 1s and minutes in 5s 11;13	Find explicit and implicit information 12-14	Calculate mean, mode, median and range of a sample 5-6
Measure in m 10	Calculate the volume of cuboids 5, 11	Give change from 10p 8	Draw long hands and short hands on clock 11-12	Copy a grid 11	
Begin to use kg and g 11; 13,14	Steps 7,8,9 , 15, 18 Refer to LO4 Ratio Steps 11-13 ;16-17	Find the total of money (up to £1) 9	Memorise months of year and number of days in each month 14-15	Find explicit and implicit information in a grid 11	
Use ml; associate particular volumes with different objects 15	Use formulae to calculate the circumference and diameter of a circle 12, 16	Give change from £1 9 - 13	Draw hands on clock to show the time to the quarter hour 16-17	Copy a bar chart 13	
	Steps 13,14, 21 refer to LO2 LO3 four operations				
	Calculate area of a circle 17				

Use measuring instruments Length/Area/Volume, *Mass (1)	Calculate Length/Area/Volume (2)	Money (3)	Time (4)	Grids/Charts (1)	Statistics (2)
Select and use appropriate measuring tools 16,17,18	Calculate the perimeter and area of compound shapes Recognise that shapes with the same areas can have different perimeters 19,20, 24	Find the total of money 9-13	Tell the time – o'clock, half past, quarter to, quarter past 16-17; 19	Answer questions about a bar chart – how many and difference between 12-13	
Write cm in dm and cm 19	Use formulae for volume of a cylinder and volume of a cuboid 22, 23	Add amounts of money together e.g. £1.57 + £3.21 (without then with tricky columns) 14-15	Write and draw 12 hour time in figures – recording the number of hours and minutes 18	Interpret bar chart and pictogram with scale of 1:1 scale 12-13	
Measure in g or kg /ml or litres scale with simple 1:1 scaling eg 1kg,2kg,3kg 20,21	Calculate the area of parallelograms and triangles 25,26	Calculate difference between two prices e.g. £3.28 and £1.21 (without, then with tricky columns) 14-15	Write and draw the time – 1 hour later 21-22	Interpret bar chart and pictogram with scale of 1:many (multiples of 2, 5 and 10) 12-13	
Measure in g/ml, with scale increments (multiples of 2, 5 and 10 eg 50ml,100ml, 150ml,200ml etc) 20,21		Calculate change from any amount (£2, £5, £10, £20) 16	Write and say times in digital & analogue form 23-24	Use 2-decision sorting Venn/Carroll diagram 14	
Measure in mixed units, kg &g; l &ml scale with jumped increments eg 250ml; 500ml, 750ml, 1l etc 20,21		Calculate with money in context inc % 17-22	Read/write time in Roman Numerals 27	Create a grid 15	
Compare & order length, mass, volume/capacity & record the results using <, > and = 22			Write a.m. and p.m. times as 24 hour times (NC3 MMS5) 28-31	Create a bar chart 15	
Measure lines in mm 23			Calculate time duration 26; 31,32,33	Interpret data in grid, bar chart or pie chart – how many more, difference between, what is the total, what is the ratio, what is the fraction 16-20, 22	

Use measuring instruments Length/Area/Volume, *Mass (1)	Calculate Length/Area/Volume (2)	Money (3)	Time (4)	Grids/Charts (1)	Statistics (2)
Measure lines in mm, cm and mm and to the nearest cm 24			Use a calendar to find specific dates 34, 35	Create a tally chart and bar chart 21	
Estimate & Measure with a thermometer 25			Interpret timetables 36	Interpret & present discrete and continuous data 8-24	
Use compasses and a pencil to measure accurately and draw a circle 26,27			Calculate in hours and minutes 37-44	Solve comparison, sum & difference problems using information presented in charts 8-24	
Measure the perimeter of simple 2D shapes 28			Calculate time durations for a.m. and p.m. times and 24 hour clock times 37-44	Interpret a distance-time graph 26-28; 30-31	
Estimate, measure and write mass using kg/g and capacity using l/ml 29,30				Create tally chart and frequency chart 29,33,36	
Compare measures by simple integer scaling eg twice as long 31					
32/33 ref LO6 GD step 17				Create a pie chart 29	
Identify metric and non-metric (imperial) units of measure 34,35,36				Interpret temperature-time graphs 32	
Read mass accurately on a scale 37,38,39				Collect, select, process and present data 33-37	

*Mass, volume and density are three of an object's most basic properties. Mass is how heavy something is, volume tells you how 'big' it is, and density is mass divided by volume. Mass objectives, therefore, feature alongside 1D, 2D and 3D aspects of measure.