CURRICULUM PROGRESSION: TRACKING BACK

GEOMETRY

HFL EDUCATION
PRIMARY MATHS TEACHING AND LEARNING TEAM

Titles in the series

Number and Place Value

Addition and Subtraction (including algebra)

Multiplication and Division (including algebra)

Fractions, Decimals and Percentages (including ratio and proportion)

Measurement

Geometry

Statistics

Guidance page

This document aims to show the progression in learning within key areas of mathematics. Its purpose is to support teachers to track back to appropriate starting points for pupils who are not currently able to access age appropriate learning so that they can make appropriate adaptations for them. This document should supplements the National Curriculum end of year statements and could be used alongside any schemes of learning you use in school.

In many circumstances, teachers will use the tracking back information to support them in providing appropriate scaffolding for pupils up and into new learning. In addition, it is also particularly helpful when making adaptations for pupils who are operating further away from age related expectations including pupils with SEND so that a clear progression can be seen for their learning.

This document will allow teachers to track back from any particular point in learning to see how the learning builds from Early Years across Primary so that an appropriate starting point and progression can be identified for all pupils.

The teaching of measurement has been separated into four related strands of learning. These strands are:

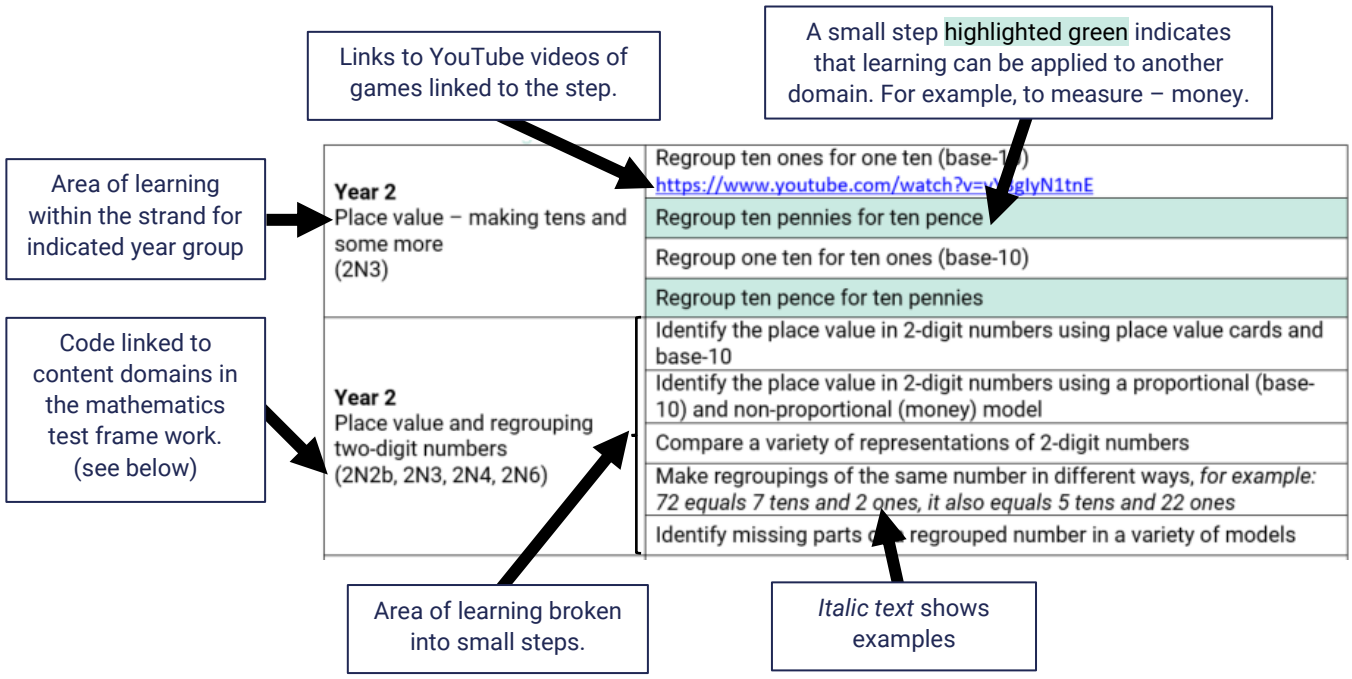
- Properties of 2D shape
- Properties of 3D shape
- Angles
- Position and translation

Within each strand, a short introduction outlines the main focus of learning and highlights key building blocks and potential areas of weakness to support teachers in assessment and planning. A progression is then identified showing a breakdown of the small steps of learning. This includes links to earlier learning including learning from EYFS. Pre-requisite learning and opportunities for application are identified through highlighted rows in each progression.

Pre-requisite learning - learning that will be built on within the progression
Identifies learning that needs to be secure before this stand can begin
OR
The link may be across domains and therefore make reference to another booklet in the series.
The link may be across strands and therefore make reference to another strand in this booklet.

Application
Learning is often highly connected and applications may be made across domains and contexts. Where this is the case, the step is highlighted green so that teachers can decide whether to explicitly make these links or continue through the progression at any one point.

Features of the strands



KS1 Content Domain – Geometry

Strand	Content domain reference Year 1		Content domain reference Year 2	
Geometry – properties of shapes	1G1a	recognise and name common 2-D shapes [e.g. rectangles (including squares), circles and triangles]	2G1a	compare and sort common 2-D shapes and everyday objects
	1G1b	recognise and name common 3-D shapes [e.g. cuboids (including cubes), pyramids and spheres]	2G1b	compare and sort common 3-D shapes and everyday objects
			2G2a	identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line
			2G2b	identify and describe the properties of 3-D shapes including the number of edges, vertices and faces
			2G3	identify 2-D shapes on the surface of 3-D shapes, [e.g. a circle on a cylinder and a triangle on a pyramid]

Strand	Content domain reference Year 1		Content domain reference Year 2	
Geometry – position and direction			2P1	order and arrange combinations of mathematical objects in patterns and sequences
	1P2	describe position, directions and movement, including half, quarter and three-quarter turns	2P2	use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)

Standards and testing agency (2015) KS1 Mathematics test framework National curriculum tests from 2016: for test developers Available from https://www.gov.uk/government/publications/key-stage-1-mathematics-test-framework

KS2 Content Domain – Geometry

Strand	Content domain reference			
	Year 3	Year 4	Year 5	Year 6
Geometry - properties of shape	**3G2** identify horizontal, vertical lines and pairs of perpendicular and parallel lines	**4G2a** compare and classify geometric shapes, including quadrilaterals and triangles based on their properties and sizes	**5G2a** use the properties of rectangles to deduce related facts and find missing lengths and angles	**6G2a** compare and classify geometric shapes based on their properties and sizes
		4G2b identify lines of symmetry in 2-D shapes presented in different orientations	**5G2b** distinguish between regular and irregular polygons based on reasoning about equal sides and angles	**6G2b** describe simple 3-D shapes
		4G2c complete a simple symmetric figure with respect to a specific line of symmetry		
	3G3a draw 2-D shapes			**6G3a** draw 2-D shapes using given dimensions and angles
	3G3b make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them		**5G3b** identify 3-D shapes including cubes and other cuboids, from 2-D representations	**6G3b** recognise and build simple 3-D shapes, including making nets
	3G4a recognise that angles are a property of shape or a description of a turn	**4G4** identify acute and obtuse angles and compare and order angles up to two right angles by size	**5G4a** know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles	**6G4a** find unknown angles in any triangles, quadrilaterals and regular polygons
	3G4b identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle		**5G4b** identify: - angles at a point and one - whole turn (total 360°) - angles at a point, on a straight line and half a turn (total 180°) - other multiples of 90°	**6G4b** recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles
			5G4c draw given angles and measure them in degrees (°)	
				6G5 illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius

Strand	Content domain reference			
	Year 3	Year 4	Year 5	Year 6
Geometry – position and direction		**4P2** describe movements between positions as translations of a given unit to the left / right and up / down	**5P2** identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed	**6P2** draw and translate simple shapes on the co-ordinate plane, and reflect them in the axes
		4P3a describe positions on a 2-D grid as co-ordinates in the first quadrant		**6P3** describe positions on the full co-ordinate grid (all four quadrants)
		4P3b plot specified points and draw sides to complete a given polygon		

Standards and testing agency (2015) KS2 Mathematics test framework National curriculum tests from 2016: for test developers Available from https://www.gov.uk/government/publications/key-stage-2-mathematics-test-framework licensed under Open Government Licence v3.0

Properties of 2D shape

Pupils need to build on skills of classification to identify and name 2D shapes and their properties. One way that shapes can be classified is through looking at their angles and therefore there are links to the learning in **Angles** strand within this booklet. Once the properties of shapes are secure, these are used to support other learning such as to name faces in 3D shape, to calculate missing angles and also to identify the position of points when a shape has been reflected or translated.

Pre-requisite learning	**Pattern –** Notice, copy and create patterns. **Classification –** Identify same and different. Begin to sort using properties of objects.
Reception Classification **ELG: Shape, space and measures:** They explore characteristics of everyday objects and shapes and use the mathematical language to describe them.	Identify objects that could be added to a set using criteria
	Identify an attribute that enables a collection to be classified and then sort into those that belong and those that don't
	Identify an attribute that enables a collection to be classified into multiple groups
	Create sets where some objects don't meet any criteria and some create an intersection by meeting both
	Compare the groups after being classified
Year 1 Geometry – names and properties of 2D and 3D shapes (**1G1a**)	Understand what a mathematical shape is
	Identify 2-D shapes through their properties in an unfamiliar context
Year 2 Geometry – properties of 2D and 3D shape, classify and sort (**2G1a, 2G2a)**	Name 2-D shapes and their properties
	Identify and classify shapes by their properties
Year 2 Geometry – symmetry (**2G2a**)	Link symmetry to halving
	Identify and sort shapes - symmetry
	Draw symmetrical patterns and shapes
Year 2 Geometry – Sequencing (**2G1a, 2G2a**)	Explore linear sequences including shapes
	Explore and create patterns with shapes
Angles – a measure of turn	
Year 3 Angles, right angles and estimation **(3G4a)**	Identify internal angles in 2-D shapes
	Classify shapes using internal angles as a property
Angles – perpendicular and parallel lines	
Year 3 Perpendicular and parallel lines (**3G2**)	Identify parallel and perpendicular (sides in shapes and lines)

Year 3 2D shape – properties and drawing (**3G3a**, 3G4a)	Connect the number of sides to the number of angles (and vertices) in a polygon
	Classify regular and irregular polygons
	Draw and construct polygons (property focus on vertices and congruence)
	Draw and construct polygons (properties)
Year 3 3D shape – build and properties (2G3, **3G3b)**	Describe the faces of polyhedra
Year 4 Properties of shape **(**3G2**,** 3G3a, **4G2a)**	Revisit properties of lines
	Describe properties of shape – vocabulary focus
	Classify quadrilaterals
	Draw quadrilaterals
Year 4 Symmetry (4G2a, **4G2b, 4G2c**)	Recognise reflective symmetry in simple shapes
	Recognise lines of symmetry in regular and irregular polygons
	Construct symmetrical shapes
	Construct quadrilaterals with a specific number of lines of symmetry
Angles – acute and obtuse	
Year 4 Geometry – angles (**4G4**)	Identify acute and obtuse angles within geometric shapes
Year 4 Geometry – properties of triangles **(4G2a)**	Describe the properties of triangles
	Classify triangles (equilateral, scalene or isosceles)
	Classify triangles according to more than one property
Position and translation – coordinates in the first quadrant	
Year 4 Geometry – position and direction incorporating angles and plotting points of a shape (4P3a, 4P3b, **4G2a**)	Plot points to create polygons
	Identify coordinates to create polygons
Year 5 Distinguish between regular and irregular polygons (4G2a, **5G2b, 5G4c**)	Classify polygons as regular or irregular
	Revisit 2-D shape vocabulary including regular and irregular
	Angles – draw angles
	Construct regular polygons, including using a protractor
Year 5 Use properties of rectangles (**5G2a**)	Calculate missing lengths in rectangles and shapes
	Use knowledge of rectangles and angles to calculate missing angles

Year 6 Properties of shape (**6G2a, 6G5)**	Use the language of 2-D shapes
	Classify 2-D shapes – triangles
	Classify 2-D shapes – quadrilaterals
	Illustrate and name parts of circles (radius, diameter, circumference)
	Use the relationship between radius and diameter
Position and translation – coordinates in all four quadrants	
Year 6 Reflection and translation (**6G2a, 6G3a,** 6P2, 6P3)	Draw and label shapes in all four quadrants
	Translate shapes in all four quadrants
	Reflect shapes in all four quadrants
Fractions, Decimals and Percentages: Percentages – calculating percentages	
Year 6 Constructing pie charts (**6G3a**, 6G5)	Construct simple pie charts - constructing circles
	Construct simple pie charts – divide a circle into segments

Properties of 3D shape

Pupils need to build on skills of classification to identify and name 3D shapes and their properties. This will build on the language and understanding within **Properties of 2D shapes** within this booklet. Where 2D shape understanding is insecure, this should be the starting point for pupils.

Once the difference between 2D and 3D shapes is established, nets provide an opportunity to further link these types of shapes. Pupils can find it hard to visualise nets and benefit from both building nets to create a shape and also de-constructing a shape back into a net.

Pre-requisite learning	**Pattern** – Notice, copy and create patterns. **Classification** – Identify same and different. Begin to sort using properties of objects.
Reception Classification **ELG: Shape, space and measures:** They explore characteristics of everyday objects and shapes and use the mathematical language to describe them.	Identify objects that could be added to a set using criteria
	Identify an attribute that enables a collection to be classified and then sort into those that belong and those that don't
	Identify an attribute that enables a collection to be classified into multiple groups
	Create sets where some objects don't meet any criteria and some create an intersection by meeting both
	Compare the groups after being classified
Year 1 Geometry – names and properties of 2D and 3D shapes (1G1a, **1G1b**)	Understand what a mathematical shape is
	Identify 2-D shapes through their properties in an unfamiliar context
	Classify 3-D shapes
	Explore the shape of the faces on 3-D shapes
Year 2 Geometry – properties of 2D and 3D shape, classifying and sorting (**2G1b**, **2G2b, 2G3**)	Name 2-D shapes and their properties
	Name 3-D shapes and their properties
	Identify and classify shapes by their properties
Year 2 Geometry – Sequencing (**2G1b, 2G2b**)	Explore linear sequences including 3-D shapes
	Explore and create patterns with 3-D shapes
Year 3 3D shape – build and identify properties (**3G3b**)	Build three-dimensional shapes
	Recognise three-dimensional shapes in different orientations
	Describe the faces of polyhedra
	Describe three-dimensional shapes
Year 5 3D shapes from 2D representations (**5G3b**)	Define cuboids and cubes
	Understand nets
	Draw nets using given measurements
Year 6 Properties of shape (**6G2b, 6G3b**)	Name and identify the properties of 3-D shapes
	Build 3-D shapes from nets

Angles

Pupils will develop their sense of angles as a measure of turn through exploration and physically moving and turning. This will require a development of both spatial thinking and associated language. Pupils will also need to identify angles within shapes and they can find it hard to make the connection to measure of turn. It can be helpful to follow the route of a shape and notice the turns that have to be made.

Links with fractions are made as quarter, half and ¾ turns are made and these are then used as benchmarks to compare the size of angles to. Once angle knowledge is secure other learning is connected. For example, calculating missing angles within shapes and also creating pie charts through understanding of proportion.

Pre-requisite learning	**Pattern –** Notice, copy and create patterns. **Classification –** Identify same and different. Begin to sort using properties of objects. **Comparison –** Compare the size and direction of movements
Reception Spatial Thinking **ELG: Shape, space and measures:** Children use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems.	Know and apply of the language of position
	Know and apply of directional language in the real world
	Compare routes
	Explain routes and positions of objects in scaled versions of known environments
	Explain routes and positions of objects in represented known environments where objects are replaced by abstract symbols
Year 1 Geometry – Positional language including ordinal numbers (**1P2**)	Use positional language
	Begin to follow instructions to turn
Year 1 Add precision to descriptions of turns (**1P2**)	Notice clockwise and anti-clockwise turns
	Identify the fraction of a turn using the context of a clock face
Fractions, Decimals and Percentages: Fractions of quantities - ¼, ½ and ¾	
Year 2 Time - Tell the time to: o'clock, half past, quarter past and to (**2P2**)	Name turns in the context of clock faces – quarter turn, half turn, three-quarter turn and full turn
Year 2 Geometry – rotation and right angles (**2P2**)	¼, ½ and ¾ turns clockwise and anti-clockwise
	¼ turn = a right angle
	Provide and follow directions
Year 3 Angles – within shapes and as a measure of turn. (including right angles and estimation) (**3G4a, 3G4b**)	Understand angles are measures of a turn
	Compare and order angles (using right angle as a benchmark)
	Identify internal angles in 2-D shapes
	Classify shapes using internal angles as a property

Year 3 Perpendicular and parallel lines, horizontal and vertical lines (**3G2**)	Know perpendicular lines are straight lines that will meet at a right angle to each other (where lines could also be diagonals)
	Know parallel lines are straight lines that have a constant distance between them and will never meet at a point
	Know parallel sides and sides that are perpendicular to each other in shapes and parallel and perpendicular lines on diagrams
	Know vertical lines are perpendicular to the horizon and horizontal lines are parallel to the horizon
Year 3 2D shape – properties and drawing (**3G4a**)	Connect the number of sides to the number of angles (and vertices) in a polygon
	Classify regular and irregular polygons
Year 4 Geometry – angles (acute and obtuse) (4G4)	Compare and order angles using the benchmark of a right angle
	Identify acute and obtuse angles
	Identify acute and obtuse angles within geometric shapes
Year 5 Estimate, compare, measure and draw angles (**5G4a, 5G4c**)	Recap prior angles learning including right angles and turns
	Name, compare and order acute, obtuse, reflex and right angles
	Measure angles accurately with a protractor
	Estimate angles in degrees and check by measuring
	Draw angles
Year 5 Identify Unknown Angles (**5G4a, 5G4b)**	Identify angles in a right angle and on a straight line
	Identify angles around a point, a whole turn and other multiples of 90
Year 5 Distinguish between regular and irregular polygons (**5G2b**)	Classify polygons as regular or irregular
	Construct regular polygons, including using a protractor
Year 5 Use Properties of Rectangles (**5G2a**, 5G4b)	Use knowledge of rectangles and angles to calculate missing angles rectangles
Year 6 Recognise (including vertically opposite) and find missing angles (**6G4a, 6G4b**)	Recognise and name angles
	Investigate vertically opposite angles
	Find missing angles from known facts (triangles, quadrilaterals, regular polygons, using vertically opposite, angles at a point or in a straight line)
Fractions, Decimals and Percentages: Percentages – calculating percentages	
Year 6 Constructing pie charts (5G4c, **6G4b**)	Construct simple pie charts. Part one – the process and constructing circles
	Construct simple pie charts. Part two – dividing up a circle into the segments

Position and translation

Initially position builds on spatial thinking and language to describe position. As this develops, links are made to directions, turns and also translations to describe how something can move position. Coordinates are then used to add precision and to identify exact positions. This knowledge is then combined with **Properties of 2D shape** so that pupils can work out missing points for shapes on a coordinate grid.

Pre-requisite learning	**Pattern –** Notice, copy and create patterns. **Classification –** Identify same and different. Begin to sort using properties of objects. **Comparison –** Compare the size and direction of movements
Reception Pattern **ELG: Shape, space and measures:** They recognise, create and describe patterns.	Comparing patterns – what's the same/different?
Reception Spatial Thinking **ELG: Shape, space and measures:** Children use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems.	Know and apply of the language of position
	Know and apply of directional language in the real world
	Compare routes
	Explain routes and positions of objects in scaled versions of known environments
	Explain routes and positions of objects in represented known environments where objects are replaced by abstract symbols
Year 1 Geometry – positional language including ordinal numbers (**1P2**)	Use positional language
	Begin to follow instructions to turn
	Describe postion using ordinal numbers
	Describe position using ordinal numbers from left and right
	Describe position using ordinal numbers within buildings
	Describe position within a grid
1LS31 Add precision to descriptions of turns (**1P2**)	Notice clockwise and anti-clockwise turns
	Identify the fraction of a turn using the context of a clock face
Fractions, Decimals and Percentages: Fractions of quantities - ¼, ½ and ¾	
Year 2 Time - Tell the time to: o'clock, half past, quarter past and to (**2P2**)	Name turns in the context of clock faces – quarter turn, half turn, three-quarter turn and full turn
Year 2 Geometry – sequencing (**2P1**)	Explore linear sequences including shapes
	Explore and create patterns with shapes
Year 2 Geometry – rotation and right angles (**2P2**)	Describe turns (¼, ½ and ¾ turns clockwise and anti-clockwise)
	Identify ¼ turn = a right angle
	Provide and follow directions

3LS13 Perpendicular and parallel lines, horizontal and vertical lines (**3G2**)	Know perpendicular lines are lines that will meet at a right angle to each other (where lines are vertical and horizontal)
	Know perpendicular lines are straight lines that will meet at a right angle to each other (where lines could also be diagonals)
	Know parallel lines are straight lines that have a constant distance between them and will never meet at a point
	Know parallel sides and sides that are perpendicular to each other in shapes and parallel and perpendicular lines on diagrams
	Know vertical lines are perpendicular to the horizon and horizontal lines are parallel to the horizon
Year 4 Geometry – coordinates in first quadrant and translations (**4P2, 4P3a**)	Use coordinates to describe position on a 2-D grid
	Describe movements between positions as translations
Year 4 Geometry – position and direction incorporating angles and plotting points of a shape (**4P3a, 4P3b**)	Plot points to create polygons
	Identify coordinates to create polygons
Year 5 Reflection and translation (**5P2**)	Translate shapes and know the shape has not changed
	Reflect patterns and shapes
	Translate and reflect in the first quadrant
Year 6 Reflection and translation (**6P2, 6P3**)	Draw and label axes in all four quadrants
	Plot positions on the full coordinate grid
	Draw and label shapes in all four quadrants
	Translate shapes in all four quadrants
	Reflect shapes in all four quadrants