St Anne's Geometry Policy

Date approved:	6th January, 2025
Date of review:	Summer Term 2025

Rationale:

This policy lays out the expectations for geometry and has been created to support the teaching of a mastery approach to mathematics in line with the National Curriculum and the White Rose scheme, which forms the framework of our curriculum through its long- and medium-term planning outline and small steps. The concept of position and direction is also introduced throughout various units in Computing, including coding and the use of 2Logo, so for more information on that please refer to our Purple Mash coverage documents.

A Mastery Approach:

A mastery approach to learning involves the following five "big ideas" of effective maths teaching:

Coherence — a coherent learning progression offering deep and connected understanding

Representation and Structure concrete, pictorial and abstract representations are carefully structured to help pupils "see the maths"

Mathematical Thinking — looking for patterns and relationships, making connections, conjecturing, reasoning and generalising, communicating ideas using precise vocabulary

Fluency - - - efficient, accurate recall of key number facts and procedures, allowing pupils to move between different contexts and representations, choosing strategies

Variation - - - conceptual variation presents different representations of key features, while procedural variation presents different ways of proceeding through the learning journey (via scaffolding and support, etc)

Concrete – Pictorial – Abstract:

Mathematical understanding is developed through use of representations that are initially concrete (e.g. counters, multilink cubes, dienes, etc), and then pictorial (e.g. part-whole models, place value columns with images of counters in them, etc) to then facilitate abstract working (e.g. formal written methods).

If at any point a pupil is struggling with the abstract, they should revert to familiar pictorial and/or concrete materials/representations as appropriate. As children move through the different stages, representations should be modelled alongside each other to ensure a secure understanding is maintained. Children should only move onto the abstract method when they have a secure understanding of the concept through an appropriate concrete and pictorial representation. This policy should be used in conjunction with the St Anne's Mathematics policy, our Written Calculation Policies and the White Rose calculation policy, as well as our Key Instant Recall Facts documents, which we share with our families to supplement the learning children receive in school. Teachers are also encouraged to refer to the NCETM Ready-To-Progress Criteria resources in ascertaining when children are ready to move on to new learning.

Vocabulary:

Children will continually recap vocabulary learned in previous years to ensure that their understanding and usage of the terminology is fully developed, broad and specific in application. Vocabulary from previous years is included in each year group's columns in black, while new vocabulary that may not have been previously encountered is in green. Teachers are encouraged to check this list of vocabulary at the beginning and end of a relevant unit to ensure that they are modelling the full breadth and depth of vocabulary to the children, and that the children are using it in their verbal and written responses accurately and confidently.

Please see appendix 4 of the written calculation policies for notes on precise vocabulary, and for a comprehensive glossary, please see the separate document "NCETM Maths Glossary KS1-KS3" which is saved in PDF format with our calculation policies in the shared area.

Contents:

Geometry in Reception

"In addition, it is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures."

https://help-for-early-years-providers.education.gov.uk/areas-of-learning/mathematics

Properties of Shapes	Position and Direction
Vocabulary: 2D shape, rectangle, square, circle, triangle, properties, 3D shape, cuboid, cube, cone, sphere, curved, straight, flat, side, corner	**Vocabulary:** over/under, between, around, through, on, into, next to, in front of/behind, above/beneath, order, repeat, patterns, on top of, left/right, up/down, near/close/far, forwards/backwards, inside/outside, top/middle/bottom,

Geometry in Year 1

Properties of Shapes:

Pupils should be taught to:

- recognise and name common 2-D and 3-D shapes, including:
    - 2-D shapes [for example, rectangles (including squares), circles and triangles]
    - 3-D shapes [for example, cuboids (including cubes), pyramids and spheres]

Notes and guidance (non-statutory):

Pupils handle common 2-D and 3-D shapes, naming these and related everyday objects fluently. They recognise these shapes in different orientations and sizes, and know that rectangles, triangles, cuboids and pyramids are not always similar to each other.

Position and Direction:

Pupils should be taught to:

- describe position, direction and movement, including whole, half, quarter and three-quarter turns

Notes and guidance (non-statutory):

Pupils use the language of position, direction and motion, including: left and right, top, middle and bottom, on top of, in front of, above, between, around, near, close and far, up and down, forwards and backwards, inside and outside.

Pupils make whole, half, quarter and three-quarter turns in both directions and connect turning clockwise with movement on a clock face.

Properties of Shapes	Position and Direction
Vocabulary: 2D shape, rectangle, square, circle, triangle, properties, 3D shape, cuboid, cube, cone, pyramid, sphere, curved, straight, flat, side, corner, face	**Vocabulary:** over/under, between, around, through, on, into, next to, in front of/behind, above/beneath, order, repeat, patterns, on top of, left/right, up/down, near/close/far, forwards/backwards, inside/outside, top/middle/bottom, position, direction, movement, whole, turn, quarter turn, half turn, three-quarter turn

Geometry in Year 2

Properties of Shapes:

Pupils should be taught to:

- identify and describe the properties of 2-D shapes, including the number of sides, and line symmetry in a vertical line
- identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces
- identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]
- compare and sort common 2-D and 3-D shapes and everyday objects

Notes and guidance (non-statutory):

Pupils handle and name a wide variety of common 2-D and 3-D shapes including: quadrilaterals and polygons and cuboids, prisms and cones, and identify the properties of each shape (for example, number of sides, number of faces). Pupils identify, compare and sort shapes on the basis of their properties and use vocabulary precisely, such as sides, edges, vertices and faces.

Pupils read and write names for shapes that are appropriate for their word reading and spelling. Pupils draw lines and shapes using a straight edge.

Position and Direction:

Pupils should be taught to:

- order and arrange combinations of mathematical objects in patterns and sequences
- 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)

Notes and guidance (non-statutory):

Pupils should work with patterns of shapes, including those in different orientations.

Pupils use the concept and language of angles to describe 'turn' by applying rotations, including in practical contexts (for example, pupils themselves moving in turns, giving instructions to other pupils to do so, and programming robots using instructions given in right angles).

Properties of Shapes	Position and Direction
Vocabulary:	**Vocabulary:**
2D shape, rectangle, square, circle, triangle, properties, 3D shape, cuboid, cube, cone, pyramid, sphere, curved, straight, flat, side, corner, face, pentagon, hexagon, line of symmetry, cylinder, edge, vertices, vertex	over/under, between, around, through, on, into, next to, in front of/behind, above/beneath, order, repeat, patterns, on top of, left/right, up/down, near/close/far, forwards/backwards, inside/outside, top/middle/bottom, position, direction, movement, whole, turn, quarter turn, half turn, three-quarter turn, clockwise, anti-clockwise, straight line, rotation, arrange, sequence

Geometry in Year 3

Properties of Shapes:

Pupils should be taught to:

- draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them
- recognise angles as a property of shape or a description of a turn
- identify right angles, recognise that 2 right angles make a half-turn, 3 make three-quarters of a turn and 4 a complete turn; identify whether angles are greater than or less than a right angle
- identify horizontal and vertical lines and pairs of perpendicular and parallel lines

Notes and guidance (non-statutory):

Pupils' knowledge of the properties of shapes is extended at this stage to symmetrical and non-symmetrical polygons and polyhedra. Pupils extend their use of the properties of shapes. They should be able to describe the properties of 2-D and 3-D shapes using accurate language, including lengths of lines and acute and obtuse for angles greater or lesser than a right angle.

Pupils connect decimals and rounding to drawing and measuring straight lines in centimetres, in a variety of contexts.

Position and Direction:

The National Curriculum offers no guidance on Position and Direction in Year 3, so children in Year 3 will recap and consolidate prior knowledge from previous years in order to move on in Year 4 with confidence.

Properties of Shapes	Position and Direction
Vocabulary:	**Vocabulary:**
2D shape, rectangle, square, circle, triangle, properties, 3D shape, cuboid, cube, cone, pyramid, sphere, curved, straight, flat, side, corner, face, pentagon, hexagon, line of symmetry, cylinder, edge, vertices, vertex, right-angled triangle, heptagon, octagon, polygon, prism, orientation, angle, acute/obtuse/right angle, turn, half turn, ¾ of a turn, greater than/less than right angle, horizontal/vertical line, perpendicular/parallel line	over/under, between, around, through, on, into, next to, in front of/behind, above/beneath, order, repeat, patterns, on top of, left/right, up/down, near/close/far, forwards/backwards, inside/outside, top/middle/bottom, position, direction, movement, whole, turn, quarter turn, half turn, three-quarter turn, clockwise, anti-clockwise, straight line, rotation, arrange, sequence

Geometry in Year 4

Properties of Shapes:

Pupils should be taught to:

- compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes
- identify acute and obtuse angles and compare and order angles up to 2 right angles by size
- identify lines of symmetry in 2-D shapes presented in different orientations
- complete a simple symmetric figure with respect to a specific line of symmetry

Notes and guidance (non-statutory):

Pupils continue to classify shapes using geometrical properties, extending to classifying different triangles (for example, isosceles, equilateral, scalene) and quadrilaterals (for example, parallelogram, rhombus, trapezium).

Pupils compare and order angles in preparation for using a protractor and compare lengths and angles to decide if a polygon is regular or irregular.

Pupils draw symmetric patterns using a variety of media to become familiar with different orientations of lines of symmetry; and recognise line symmetry in a variety of diagrams, including where the line of symmetry does not dissect the original shape.

Position and Direction:

Pupils should be taught to:

- describe positions on a 2-D grid as coordinates in the first quadrant
- describe movements between positions as translations of a given unit to the left/right and up/down
- plot specified points and draw sides to complete a given polygon

Notes and guidance (non-statutory):

Pupils draw a pair of axes in one quadrant, with equal scales and integer labels. They read, write and use pairs of co-ordinates, for example (2, 5), including using co-ordinate-plotting ICT tools.

Properties of Shapes	Position and Direction
Vocabulary: 2D shape, rectangle, square, circle, triangle, properties, 3D shape, cuboid, cube, cone, pyramid, sphere, curved, straight, flat, side, corner, face, pentagon, hexagon, line of symmetry, cylinder, edge, vertices, vertex, right-angled triangle, heptagon, octagon, polygon, prism, orientation, angle, acute/obtuse/right angle, turn, half turn, ¾ of a turn, greater than/less than right angle, horizontal/vertical line, perpendicular/parallel line, isosceles, equilateral, scalene, trapezium, rhombus, parallelogram, kite, geometric shape, quadrilateral	**Vocabulary:** over/under, between, around, through, on, into, next to, in front of/behind, above/beneath, order, repeat, patterns, on top of, left/right, up/down, near/close/far, forwards/backwards, inside/outside, top/middle/bottom, position, direction, movement, whole, turn, quarter turn, half turn, three-quarter turn, clockwise, anti-clockwise, straight line, rotation, arrange, sequence co-ordinates, first quadrant, grid, translat(e)(ion), plot, polygon, axis/axes, x axis, y axis

Geometry in Year 5

Properties of Shapes:

Pupils should be taught to:

- identify 3-D shapes, including cubes and other cuboids, from 2-D representations
- know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles
- draw given angles, and measure them in degrees (°)
- identify:
    - angles at a point and 1 whole turn (total 360°)
    - angles at a point on a straight line and half a turn (total 180°)
    - other multiples of 90°
    - use the properties of rectangles to deduce related facts and find missing lengths and angles
    - distinguish between regular and irregular polygons based on reasoning about equal sides and angles

Notes and guidance (non-statutory):

Pupils become accurate in drawing lines with a ruler to the nearest millimetre, and measuring with a protractor. They use conventional markings for parallel lines and right angles.

Pupils use the term diagonal and make conjectures about the angles formed between sides, and between diagonals and parallel sides, and other properties of quadrilaterals, for example using dynamic geometry ICT tools.

Pupils use angle sum facts and other properties to make deductions about missing angles and relate these to missing number problems.

Position and Direction:

Pupils should be taught to:

- 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

Notes and guidance (non-statutory):

Pupils recognise and use reflection and translation in a variety of diagrams, including continuing to use a 2-D grid and coordinates in the first quadrant. Reflection should be in lines that are parallel to the axes.

Properties of Shapes	Position and Direction
Vocabulary:	**Vocabulary:**
2D shape, rectangle, square, circle, triangle, properties, 3D shape, cuboid, cube, cone, pyramid, sphere, curved, straight, flat, side, corner, face, pentagon, hexagon, line of symmetry, cylinder, edge, vertices, vertex, right-angled triangle, heptagon, octagon, polygon, prism, orientation, angle, acute/obtuse/right angle, turn, half turn, ¾ of a turn, greater than/less than right angle, horizontal/vertical line, perpendicular/parallel line, isosceles, equilateral, scalene, trapezium, rhombus, parallelogram, kite, geometric shape, quadrilateral, regular/irregular polygon, reflex angle, degree, one whole turn, angles on a straight line, angles around a point, vertically/horizontally opposite, missing angles	over/under, between, around, through, on, into, next to, in front of/behind, above/beneath, order, repeat, patterns, on top of, left/right, up/down, near/close/far, forwards/backwards, inside/outside, top/middle/bottom, position, direction, movement, whole, turn, quarter turn, half turn, three-quarter turn, clockwise, anti-clockwise, straight line, rotation, arrange, sequence, co-ordinates, first quadrant, grid, translat(e)(ion), plot, polygon, axis/axes, x axis, y axis, reflection

Geometry in Year 6

Properties of Shapes:

Pupils should be taught to:

- draw 2-D shapes using given dimensions and angles
- recognise, describe and build simple 3-D shapes, including making nets
- compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons
- illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius
- recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles

Notes and guidance (non-statutory):

Pupils draw shapes and nets accurately, using measuring tools and conventional markings and labels for lines and angles.

Pupils describe the properties of shapes and explain how unknown angles and lengths can be derived from known measurements.

These relationships might be expressed algebraically for example, $d = 2 \times r$; $a = 180 - (b + c)$.

Position and Direction:

Pupils should be taught to:

- describe positions on the full coordinate grid (all 4 quadrants)
- draw and translate simple shapes on the coordinate plane, and reflect them in the axes

Notes and guidance (non-statutory):

Pupils draw and label a pair of axes in all 4 quadrants with equal scaling. This extends their knowledge of one quadrant to all 4 quadrants, including the use of negative numbers.

Pupils draw and label rectangles (including squares), parallelograms and rhombuses, specified by coordinates in the four quadrants, predicting missing coordinates using the properties of shapes. These might be expressed algebraically for example, translating vertex (a, b) to $(a - 2, b + 3)$; (a, b) and $(a + d, b + d)$ being opposite vertices of a square of side d.

Properties of Shapes	Position and Direction
Vocabulary: 2D shape, rectangle, square, circle, triangle, properties, 3D shape, cuboid, cube, cone, pyramid, sphere, curved, straight, flat, side, corner, face, pentagon, hexagon, line of symmetry, cylinder, edge, vertices, vertex, right-angled triangle, heptagon, octagon, polygon, prism, orientation, angle, acute/obtuse/right angle, turn, half turn, ¾ of a turn, greater than/less than right angle, horizontal/vertical line, perpendicular/parallel line, isosceles, equilateral, scalene, trapezium, rhombus, parallelogram, kite, geometric shape, quadrilateral, regular/irregular polygon, reflex angle, degree, one whole turn, angles on a straight line, angles around a point, vertically/horizontally opposite, missing angles, radius diameter circumference dimensions	**Vocabulary:** over/under, between, around, through, on, into, next to, in front of/behind, above/beneath, order, repeat, patterns, on top of, left/right, up/down, near/close/far, forwards/backwards, inside/outside, top/middle/bottom, position, direction, movement, whole, turn, quarter turn, half turn, three-quarter turn, clockwise, anti-clockwise, straight line, rotation, arrange, sequence, co-ordinates, first quadrant, grid, translat(e)(ion), plot, polygon, axis/axes, x axis, y axis, reflection, four quadrants, plane