Ashwell Primary School
Maths Curriculum
Geometry: Properties of Shape and Position and Direction
Skills & Knowledge Progression

NURSERY – Shape, Position and Direction

Core knowledge to be acquired:

- Talk about and explore 2D and 3D shapes (for example, circles, rectangles, triangles and cuboids) using informal and mathematical language: 'sides', 'corners'; 'straight', 'flat', 'round'.
- Understand position through words alone – for example, "The bag is under the table," – with no pointing.
- Describe a familiar route.
- Discuss routes and locations, using words like 'in front of' and 'behind'.
- Make comparisons between objects relating to size, length, weight and capacity
- Select shapes appropriately: flat surfaces for building, a triangular prism for a roof etc.
- Combine shapes to make new ones – an arch, a bigger triangle etc.
- Talk about and identifies the patterns around them. For example: stripes on clothes, designs on rugs and wallpaper. Use informal language like 'pointy', 'spotty', 'blobs' etc.
- Create closed shapes with continuous lines, and begin to use these shapes to represent objects. (EAD)

Key Vocabulary:

<u>Shape:</u>
shape, pattern, round, sort, make, build, draw, size, bigger, larger, smaller, match, corner, side, rectangle, square, circle, triangle.

<u>Position and direction:</u>
over, under, above, below, top, bottom, side, on, in, outside, inside, around, in front, behind, front, back, next to, up, down, forwards, backwards.

What comes next:

- Select, rotate and manipulate shapes in order to develop spatial reasoning skills.
- Compose and decompose shapes so that children recognise a shape can have other shapes within it, just as numbers can.
- Continue, copy and create repeating patterns.

RECEPTION – Shape, Position and Direction

Core knowledge to be acquired:	**Key Vocabulary (in addition to previous year group):**
• Select, rotate and manipulate shapes in order to develop spatial reasoning skills. • Compose and decompose shapes so that children recognise a shape can have other shapes within it, just as numbers can. • Continue, copy and create repeating patterns.	<u>Shape:</u> flat, curved, straight, hollow, solid, symmetrical, repeating pattern, face, edge, vertex, vertices, cube, pyramid, sphere, cone. <u>Position and direction:</u> beside, opposite, apart, between, middle, edge, corner, direction, left, right, sideways, across, next to, close, near, far, along, through, towards, away from, movement, slide, roll, turn, stretch, bend, whole turn, half turn.
Prior knowledge / skills this builds on: ▪ Talk about and explore 2D and 3D shapes (for example, circles, rectangles, triangles and cuboids) using informal and mathematical language: 'sides', 'corners'; 'straight', 'flat', 'round'. ▪ Understand position through words alone – for example, "The bag is under the table," – with no pointing. ▪ Describe a familiar route. ▪ Discuss routes and locations, using words like 'in front of' and 'behind'. ▪ Make comparisons between objects relating to size, length, weight and capacity ▪ Select shapes appropriately: flat surfaces for building, a triangular prism for a roof etc. ▪ Combine shapes to make new ones – an arch, a bigger triangle etc. ▪ Talk about and identifies the patterns around them. For example: stripes on clothes, designs on rugs and wallpaper. Use informal language like 'pointy', 'spotty', 'blobs' etc. ▪ Create closed shapes with continuous lines, and begin to use these shapes to represent objects. (EAD)	**What comes next:** ▪ Recognise and name common 2-D shapes [e.g.: rectangles (including squares), circles and triangles]. ▪ Recognise and name common 3-D shapes [e.g.: cuboids (including cubes), pyramids and spheres]. ▪ Describe position, directions and movement, including half, quarter and three-quarter turns.

YEAR 1 – Shape, Position and Direction

Core knowledge to be acquired:	**Key Vocabulary (in addition to previous year group):**
▪ Recognise and name common 2-D shapes [e.g.: rectangles (including squares), circles and triangles]. ▪ Recognise and name common 3-D shapes [e.g.: cuboids (including cubes), pyramids and spheres]. ▪ Describe position, directions and movement, including half, quarter and three-quarter turns.	<u>Shape:</u> symmetry, symmetrical pattern, point, pointed, cuboid, cylinder. <u>Position and Direction:</u> underneath, centre, journey, quarter turn, three-quarter turn.
Prior knowledge / skills this builds on:	**What comes next:**
▪ Select, rotate and manipulate shapes in order to develop spatial reasoning skills. ▪ Compose and decompose shapes so that children recognise a shape can have other shapes within it, just as numbers can. ▪ Continue, copy and create repeating patterns.	▪ Compare and sort common 2-D and 3-D shapes and everyday objects. ▪ 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, [e.g.: a circle on a cylinder and a triangle on a pyramid]. ▪ 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 (clock-wise and anti-clockwise).

YEAR 2 – Shape, Position and Direction

Core knowledge to be acquired:	**Key Vocabulary (in addition to previous year group):**
▪ Compare and sort common 2-D and 3-D shapes and everyday objects. ▪ 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, [e.g.: a circle on a cylinder and a triangle on a pyramid]. ▪ 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 (clock-wise and anti-clockwise).	<u>Shape:</u> surface, line symmetry, rectangular, circular, triangular, pentagon, hexagon, octagon <u>Position and Direction:</u> route, higher, lower, clockwise, anti-clockwise, right angle, straight line.
Prior knowledge / skills this builds on:	**What comes next:**
▪ Recognise and name common 2-D shapes [e.g.: rectangles (including squares), circles and triangles]. ▪ Recognise and name common 3-D shapes [e.g.: cuboids (including cubes), pyramids and spheres]. ▪ Describe position, directions and movement, including half, quarter and three-quarter turns.	▪ Identify horizontal, vertical lines and pairs of perpendicular and parallel lines. ▪ Draw 2–D shapes. ▪ Make 3–D shapes using modelling materials; recognise 3–D shapes in different orientations and describe them. ▪ Recognise that angles are a property of shape or a description of a turn. ▪ 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.

YEAR 3 – Shape, Position and Direction

Core knowledge to be acquired:	**Key Vocabulary (in addition to previous year group):**
▪ Identify horizontal, vertical lines and pairs of perpendicular and parallel lines. ▪ Draw 2–D shapes. ▪ Make 3–D shapes using modelling materials; recognise 3–D shapes in different orientations and describe them. ▪ Recognise that angles are a property of shape or a description of a turn. ▪ 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.	<u>Shape:</u> pentagonal, hexagonal, octagonal, quadrilateral, right-angled, parallel, perpendicular, hemisphere, prism, triangular prism, kite. <u>Position and Direction:</u> compass point, horizontal, vertical, diagonal, angle, …is a greater/smaller angle than, acute angle, obtuse angle.
Prior knowledge / skills this builds on:	**What comes next:**
▪ Compare and sort common 2-D and 3-D shapes and everyday objects. ▪ 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, [e.g.: a circle on a cylinder and a triangle on a pyramid]. ▪ 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 (clock-wise and anti-clockwise).	▪ Compare and classify geometric shapes, including quadrilaterals and triangles based on their properties and sizes. ▪ 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. ▪ Identify acute and obtuse angles and compare and order angles up to two right angles by size. ▪ Describe movements between positions as translations of a given unit to the left/right and up/down. ▪ Describe positions on a 2–D grid as co-ordinates in the first quadrant. ▪ Plot specified points and draw sides to complete a given polygon.

YEAR 4 – Shape, Position and Direction

Core knowledge to be acquired:	**Key Vocabulary (in addition to previous year group):**
▪ Compare and classify geometric shapes, including quadrilaterals and triangles based on their properties and sizes. ▪ 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. ▪ Identify acute and obtuse angles, compare and order angles up to two right angles by size. ▪ Describe movements between positions as translations of a given unit to the left/right and up/down. ▪ Describe positions on a 2–D grid as co-ordinates in the first quadrant. ▪ Plot specified points and draw sides to complete a given polygon.	<u>Shape:</u> base, square-based, reflect, reflection, regular, irregular, two-dimensional, rectilinear, equilateral triangle, isosceles triangle, scalene triangle, heptagon, parallelogram, rhombus, trapezium, polygon, three-dimensional, spherical, cylindrical, tetrahedron, polyhedron. <u>Position and Direction:</u> translate, translation, rotate, rotation, degree, set square, angle measurer, compass, north-east, south-west, etc.
Prior knowledge / skills this builds on:	**What comes next:**
▪ Identify horizontal, vertical lines and pairs of perpendicular and parallel lines. ▪ Draw 2–D shapes ▪ Make 3–D shapes using modelling materials; recognise 3–D shapes in different orientations and describe them. ▪ Recognise that angles are a property of shape or a description of a turn. ▪ 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.	▪ 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. ▪ 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. ▪ Identify: – angles at a point and one whole turn (total 360°) – angles at a point on a straight line and ½ a turn (total 180°) – other multiples of 90°

	▪ Draw given angles and measure them in degrees (°). ▪ 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.

YEAR 5 – Shape, Position and Direction

Core knowledge to be acquired: ▪ 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. ▪ 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. ▪ Identify: – angles at a point and one whole turn (total 360°) – angles at a point on a straight line and ½ a turn (total 180°) – other multiples of 90° ▪ Draw given angles and measure them in degrees (°). ▪ 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.	**Key Vocabulary (in addition to previous year group):** <u>Shape:</u> radius, diameter, congruent, axis of symmetry, reflective symmetry, x-axis, y-axis, quadrant, octahedron. <u>Position and Direction:</u> coordinate, protractor.
Prior knowledge / skills this builds on: ▪ Compare and classify geometric shapes, including quadrilaterals and triangles based on their properties and sizes. ▪ 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. ▪ Identify acute and obtuse angles and compare and order angles up to two right angles by size. ▪ Describe movements between positions as translations of a given unit to the left/right and up/down. ▪ Describe positions on a 2–D grid as co-ordinates in the first quadrant. ▪ Plot specified points and draw sides to complete a given polygon.	**What comes next:** ▪ Compare and classify geometric shapes based on their properties and sizes. ▪ Describe simple 3–D shapes. ▪ Draw 2–D shapes using given dimensions and angles. ▪ Recognise and build simple 3D shapes, including making nets. ▪ Find unknown angles in any triangles, quadrilaterals and regular polygons. ▪ Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles. ▪ Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius. ▪ Draw and translate simple shapes on the co-ordinate plane, and reflect them in the axes. ▪ Describe positions on the full co-ordinate grid (all four quadrants). ▪ Solve problems involving similar shapes where the scale factor is known or can be found (link to Ratio strand).

YEAR 6 – Shape, Position and Direction

Core knowledge to be acquired:

- Compare and classify geometric shapes based on their properties and sizes.
- Describe simple 3–D shapes.
- Draw 2–D shapes using given dimensions and angles.
- Recognise and build simple 3D shapes, including making nets.
- Find unknown angles in any triangles, quadrilaterals and regular polygons.
- Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.
- Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius.
- Draw and translate simple shapes on the co-ordinate plane, and reflect them in the axes.
- Describe positions on the full co-ordinate grid (all four quadrants).
- Solve problems involving similar shapes where the scale factor is known or can be found (link to Ratio strand).

Key Vocabulary (in addition to previous year group) :

Shape:
circumference, concentric, arc, net, intersecting, intersection, plane, dodecahedron.

Position and Direction:
reflex angle.

Prior knowledge / skills this builds on:

- 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.
- 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.
- Identify:
  - angles at a point and one whole turn (total 360°)
  - angles at a point on a straight line and ½ a turn (total 180°)
  - other multiples of 90°
- Draw given angles and measure them in degrees (°).
- 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.

What comes next:

Key Stage 3: Geometry

- draw and measure line segments and angles in geometric figures, including interpreting scale drawings
- derive and use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle); recognise and use the perpendicular distance from a point to a line as the shortest distance to the line
- describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric
- use the standard conventions for labelling the sides and angles of triangle ABC, and know and use the criteria for congruence of triangles
- derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures [for example, equal lengths and angles] using appropriate language and technologies
- identify properties of, and describe the results of, translations, rotations and reflections applied to given figures
- identify and construct congruent triangles, and construct similar shapes by enlargement, with and without coordinate grids
- apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles

	▪ understand and use the relationship between parallel lines and alternate and corresponding angles ▪ derive and use the sum of angles in a triangle and use it to deduce the angle sum in any polygon, and to derive properties of regular polygons ▪ apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides, including Pythagoras' Theorem, and use known results to obtain simple proofs ▪ use Pythagoras' Theorem and trigonometric ratios in similar triangles to solve problems involving right-angled triangles ▪ use the properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinders, pyramids, cones and spheres to solve problems in 3-D ▪ interpret mathematical relationships both algebraically and geometrically.