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| **UNIT 6: Angles, polygons and parallel lines** |

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**SPECIFICATION REFERENCES**

A8 work with coordinates in all four quadrants

G1 use conventional terms and notation: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries; use the standard conventions for labelling and referring to the sides and angles of triangles; draw diagrams from written description

G3 apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles; understand and use alternate and corresponding angles on parallel lines; derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons)

G4 derive and apply the properties and definitions of special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus; and triangles and other plane figures using appropriate language

G7 identify and describe congruent and similar shapes

G6 apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including … the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs

G11 solve geometrical problems on coordinate axes

G15 measure line segments and angles in geometric figures

**PRIOR KNOWLEDGE**

Students should be able to use a ruler and protractor.

Students should have an understanding of angles as a measure of turning.

Students should be able to name angles and distinguish between acute, obtuse, reflex and right angles.

Students should recognise reflection symmetry, be able to identify and draw lines of symmetry, and complete diagrams with given number of lines of symmetry.

Students should recognise rotation symmetry and be able to identify orders of rotational symmetry, and complete diagrams with given order of rotational symmetry.

**KEYWORDS**

Quadrilateral, angle, polygon, interior, exterior, proof, tessellation, rotational symmetry, parallel, corresponding, alternate, co-interior, vertices, edge, face, sides, triangle, perpendicular, isosceles, scalene, clockwise, anticlockwise, hexagons, heptagons, octagons, decagons, obtuse, acute, reflex, quadrilateral, triangle, regular, irregular, two-dimensional, three-dimensional, measure, line, angle, order, intersecting

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| **6b. Interior and exterior angles of polygons**  (G1, G3, G7) | **Teaching time**  3-5 hours |

**OBJECTIVES**

By the end of the sub-unit, students should be able to:

* Recognise and name pentagons, hexagons, heptagons, octagons and decagons;
* Understand ‘regular’ and ‘irregular’ as applied to polygons;
* Use the sum of angles of irregular polygons;
* Calculate and use the sums of the interior angles of polygons;
* Calculate and use the angles of regular polygons;
* Use the sum of the interior angles of an *n*-sided polygon;
* Use the sum of the exterior angles of any polygon is 360°;
* Use the sum of the interior angle and the exterior angle is 180°;
* Identify shapes which are congruent (by eye);
* Explain why some polygons fit together and others do not;

**POSSIBLE SUCCESS CRITERIA**

Deduce and use the angle sum in any polygon.

Derive the angle properties of regular polygons.

Given the size of its exterior angle, how many sides does the polygon have?

**OPPORTUNITIES FOR REASONING/PROBLEM SOLVING**

Problems whereby students have to justify the number of sides that a regular polygon has given an interior or exterior angle.

**COMMON MISCONCEPTIONS**

Pupils may believe, incorrectly, that all polygons are regular.

**NOTES**

Study Escher drawings.

Use examples of tiling patterns with simple shapes to help students investigate if shapes ‘fit together’.