Lesson plan

Properties of 2D shapes

1. Lesson objectives

- Name and identify the properties of a range of 2D shapes.
- Sort and classify different types of triangles and quadrilaterals according to their properties.
- Identify the sum of the interior angles of triangles and quadrilaterals.

2. GCSE curriculum

Geometry and measures

G1 use conventional terms and notations: 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 the written description

G2 apply the properties of angles at a point, angles at a point on a straight line, and 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

G5 use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS)

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

3. Lesson plan

This is an overview of the lesson. More notes can be found in the notes in the lesson slides.

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Introduction	Introduce the topic of the lesson and highlight lesson objectives.	3	Introduce the lesson and the objectives. Ask the learners to think about what shapes they might find in three different contexts.	Slides 1−2
Group Activity 1	Identify key types, characteristics, and properties of triangles, quadrilaterals, circles, and polygons	25	Learners work in groups to make a poster with all the maths facts they know about their given group of shapes (triangles, quadrilaterals, circles and other polygons). Give each group a poster topic (Handout 1) to begin a "poster". After 5 minutes, posters/groups are rotated, and learners add any further information they may have to the poster they are now at. Rotations continue until all posters have been seen by each group. Groups get their original posters back and present the key information on their poster. Explore a common misconception to help learners understand that the base angles of an isosceles triangle are not always at the bottom of the triangle. Review key vocabulary relating to the properties of shapes.	Slides 3−6 A3 paper or card for each group Poster topics and prompt cards (Resource 1 handout)

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Explore and Discuss 1	Explore different triangles and quadrilaterals, considering what makes them the same or different.	20	Using Geoboards or 9-dot dotty paper, learners try to draw as many different triangles and quadrilaterals as they can. A misconception example is used to highlight the concept of congruency and how different orientations do not change the properties of a shape. The concept of congruency is then compared to an example of similarity. The terms congruency and similarity are defined to reinforce the concepts. Learners then apply the principle of congruency to checking how many different triangles and quadrilaterals they were able to find.	Slides 7−13 9-pin Geoboards if available 9-dot dotty paper (Resource 2 handout) (Handout 3a on slides 11 and 12)
Pair activity 1	Use knowledge of shape properties to classify shapes, given certain constraints, and to reinforce key shape terminology	20	Learners work in pairs to sort a series of triangles and rectangles according to their properties. Learners use a table that has cells with different shape requirements. Learners consider the properties of the shape and the descriptions on the table and place the shape in the cell that matches its properties.	Slides 14−16 Shape cards (cut up) and table (Handouts 3a and 3b)
Explore and discuss 2	To visually demonstrate the theorems relating to the sum of angles in a triangle and in a quadrilateral	10	Each learner is given a diagram of a triangle or a quadrilateral and after shading or colouring the angles tears them off and lines up the straight edges. This will show them that the angles in a triangle form a straight line (180 degrees) and the angles in a quadrilateral form a circle or go around a point (360 degrees).	Slides 17−18 Set of triangles and quadrilaterals (Handout 4, cut)

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Exam questions	Learners check and consolidate their understanding by answering exam questions.	10	Learners work individually to answer one or two exam questions (which are varied in difficulty), followed by class feedback. Guidance notes and answers are available in the PowerPoint.	Slide 19−22 Exam questions (Handout 5)
Lesson closure	Review lesson objectives and recap key learning points	2	The tutor should close the lesson by looking at the objectives and recapping the key learning points with the class.	Slide 23