

UNIT 4 (Core) GEOMETRY

Recommended Prior Knowledge

It is strongly recommended that candidates have a thorough knowledge and understanding of the topics in Unit 1 and Unit 3.

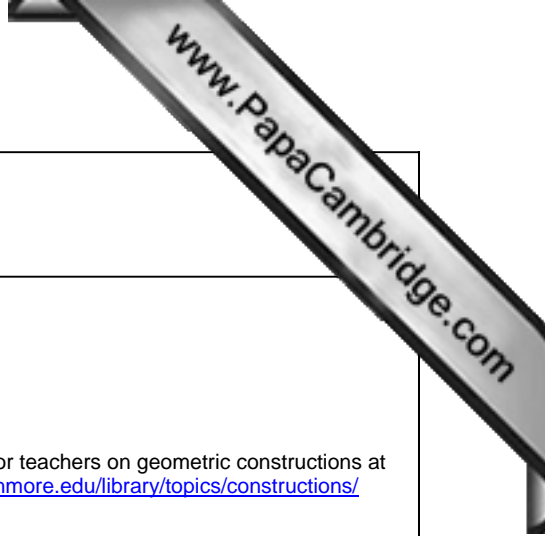
Context

This unit draws on basic geometrical ideas to establish a deeper understanding.

Outline

The topics in this unit may be studied sequentially. There is some element of choice, however, and Centres may wish to teach topics in a different order. Work on loci and symmetry is completed together with work on simple circle theorems. In addition, candidates learn how to construct various geometrical figures using a straight edge and a pair of compasses only. With all sections it is expected that candidates will be set questions of varying difficulty to complete for themselves. The unit gives candidates the opportunity to work investigatively and thus establish the skills needed for the submission of coursework.

	Learning Outcomes	Suggested Teaching Activities	Resources
30	Use the following loci and the method of intersecting loci for sets of points in two dimensions: (a) which are at a given distance from a given point, (b) which are at a given distance from a given straight line, (c) which are equidistant from two given points, (d) which are equidistant from two given intersecting straight lines.	Draw simple diagrams to illustrate (a), (b), (c) and (d). Use the convention of a broken line to represent a boundary that is not included in the locus of points. Class activity: A rectangular card is 'rolled' along a flat surface. Trace out the locus of one of the vertices of the rectangle as it moves.	
28	Recognise rotational and line symmetry (including order of rotational symmetry) in two dimensions and properties of triangles, quadrilaterals and circles directly related to their symmetries.	Discuss the conditions for congruent triangles. Point out that in naming triangles which are congruent it is usual to state letters in corresponding order, i.e. $\triangle ABC$ is congruent to $\triangle EFG$ implies that the angle at A is the same as the angle at E . Introduce similar triangles / shapes. Use the fact that corresponding sides are in the same ratio to calculate the length of an unknown side. Define the terms line of symmetry and order of rotational symmetry for two dimensional shapes. Revise the symmetries of triangles (equilateral, isosceles) and quadrilaterals (square, rectangle, rhombus, parallelogram, trapezium, kite). Class activity: Investigate tessellations. Produce an Escher-type drawing.	Pictures of tessellations produced by Escher at http://library.thinkquest.org/16661/



29	<p>Calculate unknown angles using the following geometrical properties:</p> <p>(a) angle in a semi-circle, (b) angle between tangent and radius of a circle.</p>	<p>Use diagrams to introduce the angle properties (a) and (b). Solve a variety of problems which involve the angle properties. (Build on the work on angle properties in Unit 3)</p>	
27	<p>Measure lines and angles; construct a triangle given the three sides using ruler and compasses only; construct other simple geometrical figures from given data using protractors and set squares as necessary; construct angle bisectors and perpendicular bisectors using straight edges and compasses only; read and make scale drawings.</p>	<p>Class activity: Reinforce accurate measurement of lines and angles through various exercises. For example, each student draws two lines that intersect. Measure the length of each line to the nearest millimetre and one of the angles to the nearest degree. Each student should then measure another student's drawing and compare answers.</p> <p>Show how to: construct a triangle using a ruler and compasses only, given the lengths of all three sides; bisect an angle using a straight edge and compasses only; construct a perpendicular bisector using a straight edge and compasses only.</p> <p>Class activity: Construct a range of simple geometrical figures from given data, e.g. construct a circle passing through three given points.</p> <p>Use a straightforward example to revise the topic of scale drawing. Show how to calculate the scale of a drawing given a length on the drawing and the corresponding real length. Point out that measurements should not be included on a scale drawing and that the scale of a drawing is usually written in the form $1 : n$.</p> <p>Class activity: Draw various situations to scale and interpret results. For example, draw a plan of a room in your house to scale and use it to determine the area of carpet needed to cover the floor, plan an orienteering course, etc.</p>	<p>Information and ideas for teachers on geometric constructions at http://www.forum.swarthmore.edu/library/topics/constructions/</p>