|  |
| --- |
| **UNIT 15: Constructions: triangles, nets, plan and elevation, loci, scale drawings and bearings** |

[Return to Overview](#Overview)

**SPECIFICATION REFERENCES**

R2 use scale factors, scale diagrams and maps

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;

G2 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); use these to construct given figures and solve loci problems; know that the perpendicular distance from a point to a line is the shortest distance to the line

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

G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment

G12 identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres

G13 construct and interpret plans and elevations of 3D shapes

G15 measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings

**PRIOR KNOWLEDGE**

Students should be able to measure and draw lines.

**KEYWORDS**

Construct, circle, arc, sector, face, edge, vertex, two-dimensional, three-dimensional, solid, elevations, congruent, angles, regular, irregular, bearing, degree, bisect, perpendicular, loci, map, scale, plan, region

|  |  |
| --- | --- |
| **15b. Constructions, loci and bearings**  (R2, G2, G5, G15) | **Teaching time**  6-8 hours |

**OBJECTIVES**

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

* Understand congruence, as two shapes that are the same size and shape;
* Visually identify shapes which are congruent;
* Use straight edge and a pair of compasses to do standard constructions:
* understand, from the experience of constructing them, that triangles satisfying SSS, SAS, ASA and RHS are unique, but SSA triangles are not;
* construct the perpendicular bisector of a given line;
* construct the perpendicular from a point to a line;
* construct the bisector of a given angle;
* construct angles of 90°, 45°;
* Draw and construct diagrams from given instructions, including the following:
* a region bounded by a circle and an intersecting line;
* a given distance from a point and a given distance from a line;
* equal distances from two points or two line segments;
* regions may be defined by ‘nearer to’ or ‘greater than’;
* Find and describe regions satisfying a combination of loci;
* Use constructions to solve loci problems (2D only);
* Use and interpret maps and scale drawings;
* Estimate lengths using a scale diagram;
* Make an accurate scale drawing from a diagram;
* Use three-figure bearings to specify direction;
* Mark on a diagram the position of point *B* given its bearing from point *A*;
* Give a bearing between the points on a map or scaled plan;
* Given the bearing of a point *A* from point *B*, work out the bearing of *B* from *A*;
* Use accurate drawing to solve bearings problems;
* Solve locus problems including bearings.

**POSSIBLE SUCCESS CRITERIA**

Sketch the locus of point on a vertex of a rotating shape as it moves along a line, i.e. a point on the circumference or at the centre of a wheel.

**OPPORTUNITIES FOR REASONING/PROBLEM SOLVING**

Link problems with other areas of mathematics, such as the trigonometric ratios and Pythagoras’ Theorem.

**COMMON MISCONCEPTIONS**

Correct use of a protractor may be an issue.

**NOTES**

Drawings should be done in pencil.

Relate loci problems to real-life scenarios, including mobile phone masts and coverage.

Construction lines should not be erased.