

4.4.3 Constructions

Name: _____ Class: _____ Date: _____

KEY WORDS locus

<!-- Session 2 native-skill companion -->

Objective

Practise constructions within the labelled native lessons. Public original tasks; locally authored answer guidance.

1 Key knowledge and worked examples

■ Constructions, loci and geometric conditions · Foundation

Points equally distant from A and B lie on the perpendicular bisector of AB. Points at fixed distance r from C lie on a circle. Points equally distant from two intersecting lines lie on their angle bisectors.

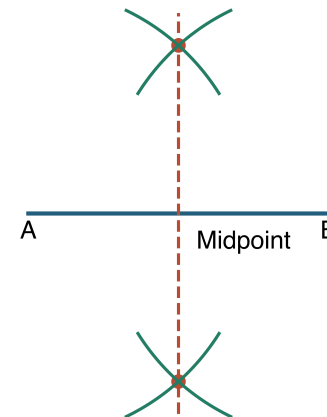
$$PA = PB, \quad h^2 + 3^2 = 5^2$$

For endpoints A and B 6 cm apart, draw equal-radius arcs above and below AB, with compass opening greater than 3 cm. Join the arc intersections to obtain the perpendicular bisector, crossing AB at its midpoint 3 cm from each end. To construct a perpendicular from P to a line, use a circle centred at P to mark two line points, then bisect their segment. For a perpendicular at P on the line, mark equal distances on each side of P and use equal arcs. For an angle bisector, draw one vertex-centred arc meeting both arms, then equal arcs from those two points; join their intersection to the vertex. Equal-radius circles centred at the endpoints of a segment construct an equilateral triangle and hence a 60° angle. For a point equally distant from A and B and 5 cm from A, intersect the bisector with a 5 cm circle centred at A. Each intersection is 4 cm perpendicular to AB by a 3–4–5 triangle. The shortest point-to-line distance follows a perpendicular, since any slanted route is a longer hypotenuse.

The perpendicular bisector concerns distance to two points; the angle bisector concerns distance to two lines. A sketch is not a ruler-and-compass construction: preserve arcs as evidence of the method.

AQA G2 uses ruler-and-compass constructions, including a 60° angle, perpendiculars, bisectors and intersections of loci. Preserve construction arcs and justify the equidistance condition.

Equal compass radii: join the two arc intersections



Original native-lesson illustration; labels belong to its worked example.

2 Practice

2.1 (Foundation) Find the midpoint x-coordinate between (0,0) and (6,0).

2.2 (Foundation) A locus intersection is 5 cm from A and its midpoint foot is 3 cm from A. Find its perpendicular height in cm.

2.3 (Foundation) Find the distance from (3,4) to (0,0).

3 Exam-style questions

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: Points equally distant from two points always lie on their angle bisector.

Solutions

2.1 Midpoint x-coordinate= $(0+6)/2=3$.

2.2 The right triangle has hypotenuse 5 and horizontal leg 3: $h^2=5^2-3^2=16$, so the positive height is 4.

2.3 Distance= $\sqrt{3^2+4^2}=5$.

3.1 False. $A=(-1,0)$, $B=(1,0)$: all points $(0,y)$ are equally distant from A and B, forming the perpendicular bisector of AB. Two points alone do not specify the vertex and two arms of an angle bisector.

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.