

Constructions Loci

GCSE Maths · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Construct the perpendicular bisector of a line AB that is 8 cm long.

Step 1 · Open the compasses to about 5 cm (more than half of 8 cm)

Keep this width for every arc

Step 2 · Put the point on A and draw arcs above and below the line

Repeat from B

Step 3 · Join the two points where the arcs cross

This line cuts AB at 4 cm, at right angles

Answer: A line through the midpoint of AB, at 90° , with the arcs left visible

Check: Measure: it crosses AB 4 cm from each end, at 90° ✓

2. Now try one with the steps

Bisect an angle of 70° .

Step 1 · From the vertex, draw an arc cutting both arms

Step 2 · From each of those points, draw arcs of equal radius that cross

Step 3 · Join the vertex to the crossing point

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Describe the locus of points 4 cm from a fixed point P. [1]

2. Describe the locus of points that are the same distance from two points A and B. [1]

3. Describe the locus of points the same distance from two lines that meet at a point. [1]

4. Which construction gives a 90° angle at a point on a straight line? [1]
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5. How can you construct a 60° angle with only a ruler and compasses? [2]
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6. How can you construct a 30° angle? [1]
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7. A goat is tied to a post in a large field by a 5 m rope. What area can it graze, in m^2 , to 1 decimal place? [2]
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8. The goat's 5 m rope is instead tied to a ring on a long straight wall. What area can it graze now, in m^2 , to 1 decimal place? [2]
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9. Find the length of the boundary of all points within 2 cm of a 6 cm line segment, in cm, to 1 decimal place. [2]
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10. A and B are 8 km apart. How many points are exactly 5 km from both A and B? [1]
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11. A and B are 8 km apart. How many points are exactly 4 km from both A and B? [1]
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12. A and B are 8 km apart. How many points are exactly 3 km from both A and B? [1]
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13. A map has scale 1 cm : 2 km. A phone mast has a range of 7 km. What radius should be drawn on the map, in cm? [1]
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14. Describe the region of points in a garden that are closer to tree A than to tree B and less than 3 m from A. [2]

15. A dog is tied to the outside corner of a 4 m by 3 m shed with a 2 m lead. What area can it reach, in m^2 , to 2 decimal places? [3]

4. Before you hand it in

Rubbing out the construction arcs

The arcs ARE the evidence of a construction. Without them the examiner cannot award the marks.

Changing the compass width between arcs from A and from B

For a perpendicular bisector the arcs from A and B must have the same radius, or the line will not be at the midpoint.

Drawing the locus round a line segment two parallel lines

Points beyond each end are also 2 cm from the segment — add a semicircle at each end.

Shading the wrong side of a perpendicular bisector

Pick a point in the region you think is right and check it: is it really closer to A than to B?