

Exercise walk-through

4.5.1

Circles

AQA · GCSE · Mathematics

46. Constructions, loci and geometric conditions · Foundation

Constructions, loci and geometric conditions · Foundation

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.

80. Circle parts and geometric definitions · Foundation

Circle parts and geometric definitions · Foundation

For centre O and radius 5 cm, every circumference point is 5 cm from O and the diameter is 10 cm. A chord 3 cm from O has half-length $\sqrt{(5^2-3^2)}=4$ cm, so its whole length is 8 cm. The perpendicular from O meets the chord at its midpoint. Joining the two chord endpoints to O creates a sector; the smaller region between chord and arc is a segment. At the rightmost circumference point, the vertical touching line is tangent and the horizontal radius is perpendicular to it. The circumference is a length, $2\pi r=10\pi$ cm, rather than an area.

118. Tangents, chords and the alternate segment · Higher

Tangents, chords and the alternate segment · Higher

At contact T, the radius OT is perpendicular to the tangent: a non-perpendicular line through T would have a smaller centre-to-line distance than the radius and cut the circle twice. For tangents PA and PB, $OA=OB$, OP is shared and both contact angles are 90° . RHS makes OAP and OBP congruent, so $PA=PB$. For a centre perpendicular OM to chord AB, $OA=OB$ and OM is shared; RHS gives $AM=MB$. If $OA=5$ and $OM=3$, $AM=4$, hence $AB=8$. For a chord AB with minor central angle ϕ , triangle OAB has base angle $(180-\phi)/2$.

Exercises 2.1·2.3

2.1 (Higher) Find the circumference angle corresponding to a 100° central angle.

2.2 (Higher) Find the angle opposite 112° in a cyclic quadrilateral.

2.3 (Higher) Find the angle between a radius and its tangent in degrees.

3 Exam-style questions

Exercises 2.1·2.3

2.1 (Higher) Find the circumference angle corresponding to a 100° central angle.

2.1 For the same chord and corresponding arc, centre angle=twice circumference angle:
 $100/2=50^\circ$.

2.2 (Higher) Find the angle opposite 112° in a cyclic quadrilateral.

2.2 Opposite cyclic angles sum to 180° , so $180-112=68^\circ$.

2.3 (Higher) Find the angle between a radius and its tangent in degrees.

3 Exam-style questions

2.3 A radius and its tangent are perpendicular at contact: 90° .

Exercise 3.1

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: Every quadrilateral has opposite angles summing to 180° .

Exercise 3.1

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: Every quadrilateral has opposite angles summing to 180° .

3.1 False. A parallelogram with successive angles $60^\circ, 120^\circ, 60^\circ, 120^\circ$ has opposite sums 120° and 240° . The 180° theorem requires a cyclic quadrilateral.

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