

Exercise walk-through

4.5.3

Circle Angle Proofs

AQA · GCSE · Mathematics

46. Constructions, loci and geometric conditions · Foundation

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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.

118. Tangents, chords and the alternate segment · Higher

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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 $(180-\phi)/2$.

152. Arcs, sectors and reverse angle calculations · Foundation

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At $r=6$ cm and $\theta=120^\circ$, the fraction is $1/3$: arc is 4π cm, area is 12π cm² and perimeter is $4\pi+12$ cm. If another $r=6$ sector has area 9π cm², its fraction is $9\pi/36\pi=1/4$ and angle is 90° . If its arc instead measures 3π cm, its fraction is $3\pi/12\pi=1/4$, giving the same angle. A full 360° sector has the whole circle area, while the circle boundary has no extra radii. A 60° sector of radius 3 has area $(1/6)\times 9\pi=1.5\pi$ cm².

Exercises 2.1·2.3

2.1 (Higher) Find a circumference angle standing on the same arc as a 100° central angle.

2.2 (Higher) Find the angle subtended by a diameter at the circumference.

2.3 (Higher) Find the opposite cyclic angle to 112° .

3 Exam-style questions

Exercises 2.1·2.3

2.1 (Higher) Find a circumference angle standing on the same arc as a 100° central angle.

2.1 Half the central angle is 50° .

2.2 (Higher) Find the angle subtended by a diameter at the circumference.

2.2 Half of 180° is 90° .

2.3 (Higher) Find the opposite cyclic angle to 112° .

3 Exam-style questions

2.3 Opposite angles sum to 180° : $180-112=68^\circ$.

Exercise 3.1

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: Any two circumference angles are equal regardless of their chords and segments.

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3.1 False. A diameter subtends 90° , while a chord subtending 60° at the centre subtends 30° at the circumference on the other arc. Equal angles require the same chord and segment.

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