

Exercise walk-through

4.5.4

Circle Tangent Proofs

AQA · GCSE · Mathematics

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

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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 $(180-\phi)/2$.

183. Reasoning and check

Reasoning and check

Angle ACB is 90 degrees because an angle in a semicircle is a right angle. Triangle angles give $\angle ABC = 180 - 90 - 32 = 58$ degrees. By the alternate segment theorem, the angle between chord AC and the appropriate tangent ray equals angle ABC, 58 degrees. The other angle on the tangent's straight line is 122 degrees. Naming the acute angle selects 58; the drawing's apparent scale is unnecessary. The diameter and tangent facts are required hypotheses.

Exercises 2.1·2.3

2.1 (Higher) Find the radius–tangent angle.

2.2 (Higher) One tangent from P has length 7. Find the other tangent length.

2.3 (Higher) Find the alternate-segment angle for a 35° tangent–chord angle.

3 Exam-style questions

Exercises 2.1·2.3

2.1 (Higher) Find the radius–tangent angle.

2.1 A tangent is perpendicular to the radius at contact.

2.2 (Higher) One tangent from P has length 7. Find the other tangent length.

2.2 Tangents from the same external point have equal length.

2.3 (Higher) Find the alternate-segment angle for a 35° tangent–chord angle.

3 Exam-style questions

2.3 Apply the alternate segment theorem to the same chord.

Exercise 3.1

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: Any line through a circle centre bisects every chord it meets.

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3.1 False. In a unit circle, the horizontal diameter meets the chord from $(0,1)$ to $(1,0)$ at its endpoint $(1,0)$, not its midpoint $(1/2, 1/2)$. A perpendicular from the centre bisects a chord.

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