Guide to:
Circle theorem proof

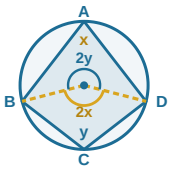
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Explanation:

Higher tier papers can ask you to prove standard circle theorems from first principles. The key construction is to **draw radii from the centre O to the vertices on the circumference**, creating isosceles triangles (since all radii are equal).

Label the equal base angles of the isosceles triangles as **x** and **y**, then use angles in a triangle (180°) and angles around a point (360°) or tangent-radius (90°) to link the angles algebraically. Always state geometric reasons at every step.

Example 1: Prove that opposite angles in a cyclic quadrilateral ABCD add up to 180°.

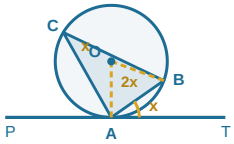


Solution:

Join B, D to O. Let ∠BAD = x, ∠BCD = y ⇒ ∠BOD = **2x** and **2y**

Angles around O: 2x + 2y = 360° ⇒ **x + y = 180°**

Example 2: Prove the alternate segment theorem: for tangent PT at A and chord AB, ∠BAT = ∠ACB.



Solution:

Let ∠BAT = x. ∠OAT = 90° ⇒ ∠OAB = ∠OBA = **90° − x**

∠AOB = 180° − 2(90° − x) = **2x** ⇒ ∠ACB = $\frac{1}{2}$(2x) = **x**

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ken@mathslinks.co.uk