VIDYA BHAWAN, BALIKA VIDYAPITH

Shakti Utthan Ashram, Lakhisarai-811311(Bihar)

(Affiliated to CBSE up to +2 Level)

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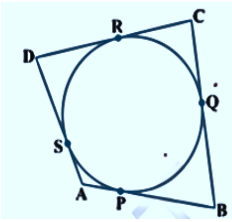
EXERCISE 10.2

Q.8. A quadrilateral ABCD is drawn to circumscribe a circle (see figure). Prove that:
AB + CD = AD + BC

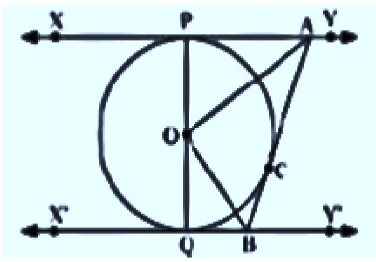
Sol. Since the sides of quadrilateral ABCD, i.e., AB, BC, CD and DA touch the circle at P, Q, R and S respectively, and the lengths of two tangents to a circle from an external point are equal.



AP = AS
BP = BQ
DR = DS
CR = CQ

Adding them, we get
(AP + BP) + (CR + RD) = (BQ + QC) + (DS + SA)
⇒ AB + CD = BC + DA
which was to be proved.

Q.9. In the figure, XY and X'Y'are two parallel tangents to a circle with centre 0 and another tangent AB with point of contact C intersecting XY at A and XY' at B. Prove that ZAOB = W.



Sol. ∵The tangents drawn to a circle from an external point are equal.
∴ AP = AC
In Δ PAO and Δ AOC, we have:

AO = AO [Common]
OP = OC [Radii of the same circle]
AP = AC

⇒ ΔPAO ≌ ΔAOC

$\therefore \angle PAO = \angle CAO$

$\angle PAC = 2\angle CAO$ ...(1)

Similarly $\angle CBQ = 2\angle CBO$ ...(2)

Again, we know that sum of internal angles on the same side of a transversal is 180°.

$\therefore \angle PAC + \angle CBQ = 180°$

$\Rightarrow 2\angle CAO + 2\angle CBO = 180°$ [From (1) and (2)]

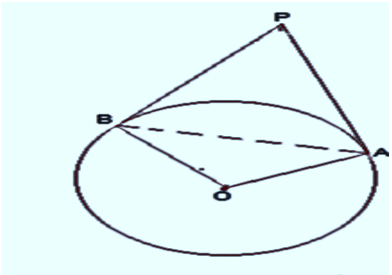
$\Rightarrow 90° + \angle AOB = 180°$

$\Rightarrow \angle AOB = 180° - 90°$

$\Rightarrow LAOB = 90°$.

Q.10. Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line-segment joining the points of contact at the centre.

Sol. Here, let PA and PB be two tangents drawn from an external point P to a circle with centre O.



Now, in right Δ OAP and right Δ OBP, we have

PA = PB [Tangents to circle from an external point P]

OA = OB [Radii of the same circle]

OP = OP [Comm]

∴ By SSS congruency,

$\Delta OAP \cong OBP$

∴ Their corresponding parts are equal.

$\angle OAA = \angle OPB$

And $\angle AOP = \angle BOP$

$\Rightarrow \angle APB = 2\angle OPA$ and $\angle AOS = 2\angle AOP$

But $\angle AOP = 90° - LOPA$

$\Rightarrow 2\angle AOP = 180° - 2\angle OPA$

$\Rightarrow \angle AOB = 180° - \angle APB$

$\Rightarrow \angle AOB + \angle APB = 180°$.