

Class 10-Mathematics

Instructions for students: The notes provided must be copied to the Maths copy and then do the homework in the same copy.

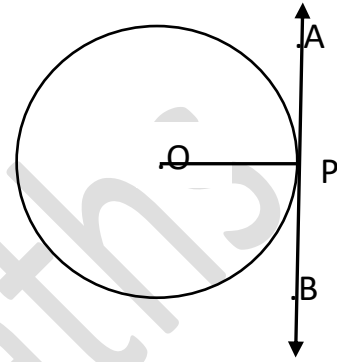
Chapter 15

Circles

Tangent and secant properties of circles

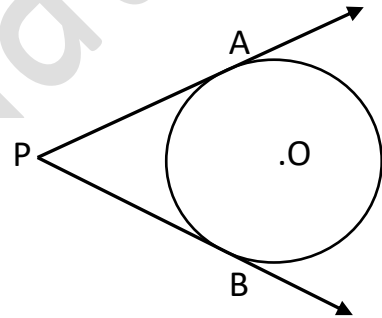
Theorem 1: The tangent at any point of a circle and radius through the point are perpendicular to each other.

$$\text{i. e. } OP \perp AB$$



Theorem 2: Two tangents can be drawn from an external point to a circle and they are of equal length.

$$\text{i.e } PA = PB$$



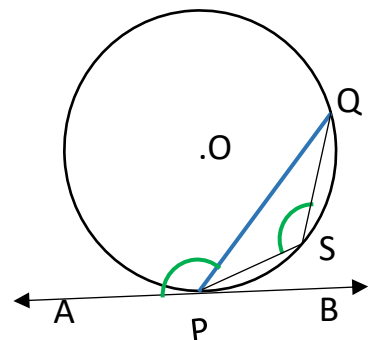
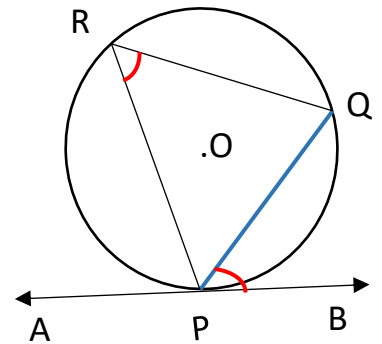
Theorem 3 (Alternate Segment Theorem): The Angle between a chord and a tangent is equal to the angle in the alternate segment.

$$\text{i.e., } \angle QPB = \angle PRQ$$

(For $\angle QPB$, segment PRQ is the Alternate segment)

$$\text{And, } \angle QPA = \angle PSQ$$

(For $\angle QPA$, segment PSQ is the Alternate segment)



Exercise 15.3

4. $OB = 13 \text{ cm}$

$OP = 5 \text{ cm}$

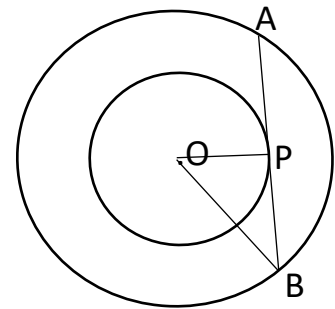
$OP \perp AB$ (Tangent and radius are \perp to each other)

$\triangle OPB$ is right angled.

$$PB = \sqrt{OB^2 - OP^2}$$

$$= \sqrt{13^2 - 5^2} = \sqrt{144} = 12 \text{ cm}$$

$AB = 2 \times 12 = 24 \text{ cm}$ (OP bisects AB as $OP \perp AB$)



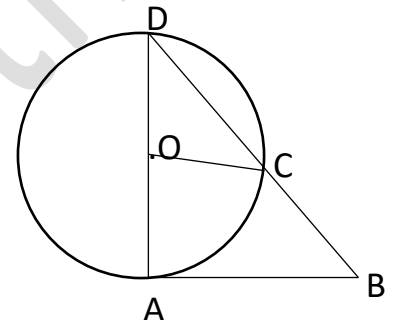
19. $\angle ABC = 50^\circ$

$\angle OAB = 90^\circ$

$\angle ODC = 180 - (90 + 50) = 40^\circ$

$\angle OCD = 40^\circ$ ($OD = OC$)

$\angle AOC = 40 + 40 = 80^\circ$



28. $\angle XTY = 90^\circ$

$\angle XOZ = 140^\circ$

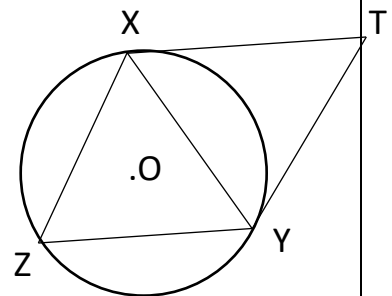
$\angle ZXO = \frac{180 - 140}{2} = 20^\circ$ ($OZ = OX$)

$\angle OXT = 90^\circ$ ((Tangent and radius are \perp to each other)

$\angle YXT = \frac{180 - 80}{2} = 50^\circ$ ($TX = TY$)

$\angle OXY = \angle OXT - \angle YXT = 90 - 50 = 40^\circ$

$\angle ZXY = \angle ZXO + \angle OXY = 20 + 40 = 60^\circ$



37. $AP = AS$

$BP = BQ$

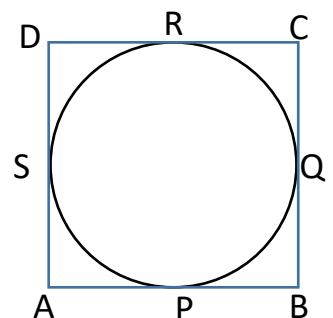
$CR = CQ$

$DR = DS$

From an external point tangents drawn to a circle are equal in length

Adding, we get

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



$$\Rightarrow AP + BP + CR + DR = AS + DS + BQ + CQ$$

$$\Rightarrow AB + CD = AD + BC$$

$AB = CD$ and $AD = BC$ (Opp.sides of a rectangle)

$$\Rightarrow AB + AB = BC + BC$$

$$\Rightarrow 2AB = 2BC$$

$$\Rightarrow AB = BC$$

Hence ABCD is a square.

Home Work:

- Solve **Exercise 15.3 Questions 2,4, 6, 7,8, 12, 20, 22, 23, 24, 26, 35 and 37** in the Maths copy.
- Practise exercise 15.3