Circles

CHAPTER 10

TRY YOURSELF — SOLUTIONS

1. Since, tangent at any point of a circle is perpendicular to the radius through the point of contact.

$\therefore$ $OA \perp PQ \Rightarrow \angle OAQ = 90°$

$\therefore$ In ΔOAQ, $x + 30° + 90° = 180°$ [By angle sum property]

$\Rightarrow$ $x = 180° - 90° - 30° = 60°$

Also, $\tan 30° = \frac{OA}{AQ} \Rightarrow \frac{1}{\sqrt{3}} = \frac{6}{AQ}$ [$\because$ Radius, $OA = 6$ cm]

$\Rightarrow$ $AQ = 6\sqrt{3}$ cm

2. Since, tangent at any point of a circle is perpendicular to the radius through the point of contact.

$\therefore$ $OD \perp AB \Rightarrow \angle ODB = 90°$

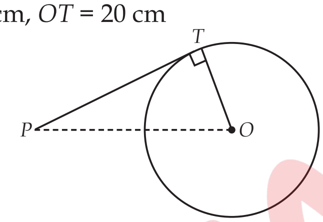
Also, $PQ \parallel AB$

$\therefore$ $x = \angle ODB$ [Corresponding angles]

$\Rightarrow$ $x = 90°$

3. Let PT be the tangent and O be the centre of circle.

$\therefore$ $OP = 29$ cm, $OT = 20$ cm



Now, $OT \perp PT$ [$\because$ Tangent at any point of a circle is perpendicular to the radius through the point of contact]

$\therefore$ In ΔPTO,

$PT^2 = OP^2 - OT^2$ [By Pythagoras theorem]

$= 29^2 - 20^2 = 841 - 400 = 441$

$\Rightarrow$ $PT = 21$ cm

4. Since, length of tangents drawn from an external point to a circle are equal.

$\therefore$ $PA = PB$ [Tangents from P] ...(i)

$CA = CQ$ [Tangents from C] ...(ii)

$DB = DQ$ [Tangents from D] ...(iii)

Now, $PC = PA - CA = PB - CQ$ [Using (i) and (ii)]

$= 10 - 2 = 8$ cm

5. Since, length of tangents drawn from an external point to a circle are equal.

$\therefore$ $PA = PB$ [Tangents from P] ...(i)

$CA = CE$ [Tangents from C] ...(ii)

$DE = DB$ [Tangents from D] ...(iii)

Now, perimeter of $\Delta PCD = PC + CD + PD$

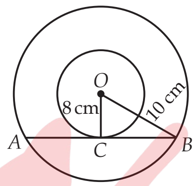
$= (PA - CA) + (CE + DE) + (PB - BD)$

$= PA + PB - CA + CE + DE - DB$

$= 14 + 14 - CA + CA + DE - DE$ [Using (i), (ii) and (iii)]

$= 28$ cm

6. Let AB is the required chord which touches the smaller circle.



Since, AB is the tangent to smaller circle.

$\therefore$ $OC \perp AB$ [$\because$ Tangent at any point of a circle is perpendicular to the radius through the point of contact]

$\Rightarrow$ ΔOCB is the right angle triangle

In ΔOCB,

$OB^2 = OC^2 + BC^2$ [By Pythagoras theorem]

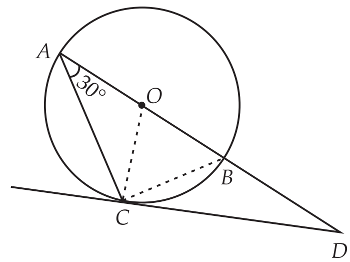
$\Rightarrow$ $10^2 = 8^2 + BC^2 \Rightarrow BC^2 = 100 - 64 = 36$

$\Rightarrow$ $BC = 6$ cm

Also, OC bisects the chord AB

$\therefore$ $AB = 2BC = 12$ cm

7. Join BC and OC.



Given, $\angle BAC = 30°$

$\Rightarrow$ $\angle BCD = 30°$ [By alternate segment theorem]

$\because$ $OC \perp CD$ and $OA = OC$ = radius

$\Rightarrow$ $\angle OAC = \angle OCA = 30°$

$\therefore$ $\angle ACD = \angle ACO + \angle OCD = 30° + 90° = 120°$

In ΔACD,

$\angle DAC + \angle ACD + \angle CDA = 180°$ [By angle sum property]

$\Rightarrow$ $30° + 120° + \angle CDA = 180°$

$\Rightarrow$ $\angle CDA = 180° - (30° + 120°) = 30°$

$\because$ $\angle CDA = \angle BCD$

$\Rightarrow$ $BC = BD$ [$\because$ Sides opposite to equal angles are equal]

8. Join OP and OS.

Since, length of tangents drawn from an external point to a circle are equal.

$\therefore$ $AP = AS$ [Tangents from A] ...(i)

$CQ = CR$ [Tangents from C] ...(ii)

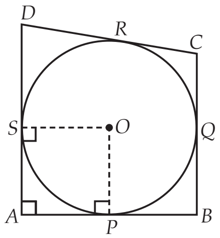
$DR = DS$ [Tangents from D] ...(iii)

Now, $CQ = CR \Rightarrow CR = 18$ cm

[$\because$ $CQ = 18$ cm (given)]

$DR = DC - CR = 35 - 18 = 17$ cm

[$\because$ $CD = 35$ cm (given)]



$\therefore$ $DS = 17$ cm [Using (iii)]

$AS = AD - DS = 40 - 17 = 23$ cm

[$\because$ $AD = 40$ cm (given)]

$\therefore$ $AP = 23$ cm [Using (i)]

Now, $OP \perp AP$ and $OS \perp AS$

[$\because$ Tangent at any point of circle is perpendicular to the radius through the point of contact]

Also, $\angle DAB = 90°$ [Given]

Since, all angles are of 90° and adjacent sides are equal in *APOS*, so *APOS* is a square.

$\therefore$ $OP = OS = AS = AP = 23$ cm

Thus, radius of the circle is 23 cm.