Circles

CHAPTER

\land TRY YOURSELF

SOLUTIONS

Since, tangent at any point of a circle is 1. perpendicular to the radius through the point of contact. $OA \perp PQ \implies \angle OAQ = 90^{\circ}$ *:*.. In $\triangle OAQ$, $x + 30^{\circ} + 90^{\circ} = 180^{\circ}$ *:*. [By angle sum property] $x = 180^{\circ} - 90^{\circ} - 30^{\circ} = 60^{\circ}$ \Rightarrow Also, $\tan 30^\circ = \frac{OA}{AQ} \Rightarrow \frac{1}{\sqrt{3}} = \frac{6}{AQ} [\because \text{ Radius, } OA = 6 \text{ cm}]$ $AQ = 6\sqrt{3}$ cm \Rightarrow Since, tangent at any point of a circle is perpendicular 2. to the radius through the point of contact. $OD \perp AB \implies \angle ODB = 90^{\circ}$ *.*.. Also, $PQ \parallel AB$ [Corresponding angles] $x = \angle ODB$ *:*.. $x = 90^{\circ}$ \Rightarrow

- Let *PT* be the tangent and *O* be the centre of circle. 3.
- *.*.. OP = 29 cm, OT = 20 cm



Now, $OT \perp PT$ [:: 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] $= 29^2 - 20^2 = 841 - 400 = 441$ PT = 21 cm \Rightarrow

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

∴ 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		

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 $\triangle PCD = PC + CD + PD$ = (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

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



Since, *AB* is the tangent to smaller circle.

 $\therefore OC \perp AB$ [:: Tangent at any point of a circle is perpendicular to the radius through the point of contact] $\Rightarrow \Delta OCB$ is the right angle triangle

In $\triangle OCB$,

$$OB^2 = OC^2 + BC^2$$

$$DB^{2} = OC^{2} + BC^{2} \qquad [By Pythagoras theorem]$$

$$DB^{2} = 0C^{2} + BC^{2} \rightarrow BC^{2} = 100 - 64 = 36$$

$$\Rightarrow BC = 6 \text{ cm}$$

Also, OC bisects the chord AB

- $\therefore AB = 2BC = 12 \text{ cm}$
- 7. Join BC and OC.



Given, $\angle BAC = 30^{\circ}$

 $\Rightarrow \angle BCD = 30^{\circ}$ [By alternate segment theorem]

÷ $OC \perp CD$ and OA = OC = radius

 $\angle OAC = \angle OCA = 30^{\circ}$ \Rightarrow

$$\therefore \quad \angle ACD = \angle ACO + \angle OCD = 30^\circ + 90^\circ = 120^\circ$$

In $\triangle ACD$,

 $\angle DAC + \angle ACD + \angle CDA = 180^{\circ}$

[By angle sum property]

$$\Rightarrow 30^{\circ} + 120^{\circ} + \angle CDA = 180^{\circ}$$

$$\Rightarrow \angle CDA = 180^{\circ} - (30^{\circ} + 120^{\circ}) = 30^{\circ}$$

$$\therefore \angle CDA = \angle BCD$$

$$\Rightarrow BC = BD$$

[:: Sides opposite to equal angles are equal]

Join OP and OS. 8.

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)

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$\therefore DS = 17 \text{ cm}$	[Using (iii)]
AS = AD - DS = 40 - 17 = 23 cm	
	[∵ <i>AD</i> = 40 cm (given)]
$\therefore AP = 23 \text{ cm}$	[Using (i)]
Now, $OP \perp AP$ and $OS \perp AS$	
[: Tangent at any point of circl	e is perpendicular to the
radius thro	ugh the point of contact]
Also, $\angle DAB = 90^{\circ}$	[Given]
Since, all angles are of 90° and ac	djacent sides are equal in
APOS, so APOS is a square.	
$\therefore OP = OS = AS = AP = 23 \text{ cm}$	n
Thus, radius of the circle is 23 cr	n.



[∵ *CQ* = 18 cm (given)]

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



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