CIRCLES
PPT-4

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 10
CHAPTER NAME : CIRCLES

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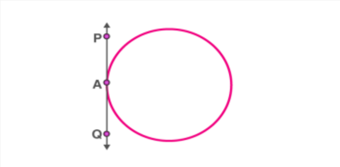
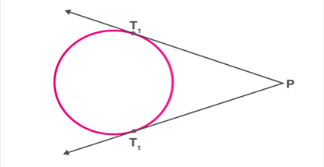
PREVIOUS KNOWLEDGE TEST

i) If the point is in an **interior region of the circle**, any line through that point will be a secant. So, **no tangent** can be drawn to a circle which passes through a point that lies inside it.

ii) When a point of tangency lies on the circle, there is **exactly one tangent** to a circle that passes through it.





iii) When the point lies outside of the circle, there are **accurately two tangents** to a circle through it

The length of the segment of the tangent from the external point and the point of contact with the circle is called the length of the tangent.

LEARNING OUTCOME

1.Students will be able to prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact

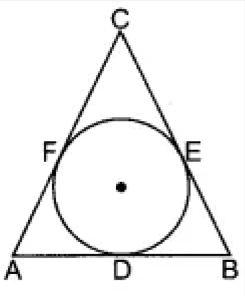
2. Students will be able to prove that he lengths of tangents drawn from an external point to a circle are equal.

3. Students will be able to apply the knowledge of above theorem in solving questions

Quick revision on Circles

https://youtu.be/JZ2cEB4_aAA (11.04)

1. A circle is inscribed in a ΔABC, such that it touches the sides AB, BC and CA at points D, E and F respectively. If the lengths of sides AB, BC and CA are 12 cm, 8 cm and 10 cm respectively, find the lengths of AD, BE and CF.



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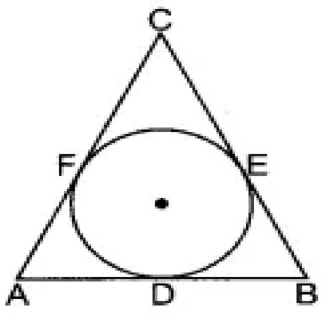


Given, AB = 12 cm, CA = 10 cm, BC = 8 cm

Let $AD = AF = x$ [$\because$ Tangent drawn from external point to circle are equal]

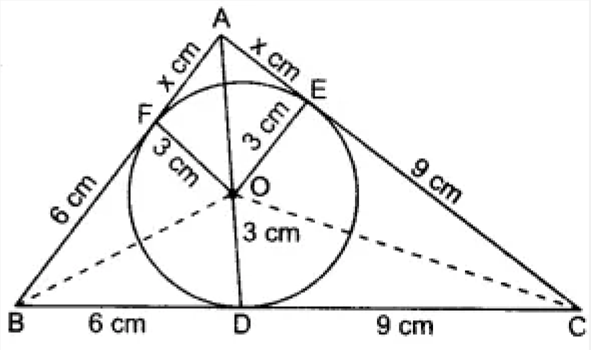
$\therefore$ $DB = BE = 12 - x$ and $CF = CE = 10 - x$

$BC = BE + EC \Rightarrow 8 = 12 - x + 10 - x$

$\Rightarrow$ $x = 7$

$\therefore$ AD = 7 cm, BE = 5 cm and CF = 3 cm

2. A triangle ABC is drawn to circumscribe a circle of radius 3 cm, such that the segments BD and DC are respectively of lengths 6 cm and 9 cm. If the area of ΔABC is 54 cm^2, then find the lengths of sides AB and AC.



2. A triangle ABC is drawn to circumscribe a circle of radius 3 cm, such that the segments BD and DC are respectively of lengths 6 cm and 9 cm. If the area of ΔABC is 54 cm², then find the lengths of sides AB and AC

Let AF = x cm, BC = (6 + 9) = 15 cm

$\because$ AF = AE [tangents drawn from an external point are equal]

$\therefore$ AE = x cm

Also BD = BF = 6 cm

and CD = CE = 9 cm

$\therefore$ AB = $(x + 6)$ cm

In ΔABC, AC = $(x + 9)$ cm

Area ΔABC = Area ΔBOC + Area ΔCOA + Area ΔAOB

$\Rightarrow$ $54 = \frac{1}{2} BC \times OD + \frac{1}{2} AC \times OE + \frac{1}{2} AB \times OF$

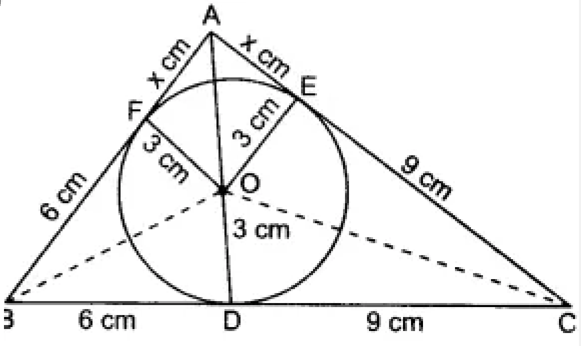
$\Rightarrow$ $54 \times 2 = 15 \times 3 + (9 + x) \times 3 + (6 + x) \times 3$

$108 = 45 + 18 + 3x + 27 + 3x$

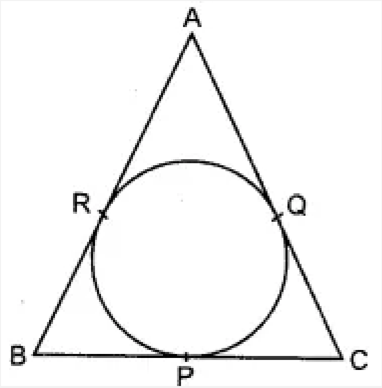
$6x = 18 \Rightarrow x = 3$

$\Rightarrow$ AB = $6 + x = 6 + 3 = 9$ cm

AC = $9 + x = 9 + 3 = 12$ cm



3. A circle inscribed in ΔABC, touches its sides BC, CA and AB at the points P, Q and R respectively. If AB = AC, then prove that BP = CP.



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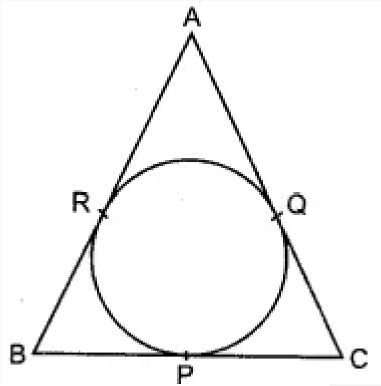

$AB = AC$

$\therefore \quad AR + BR = AQ + CQ$

$AR + BR = AR + CQ$

[AQ = AR, euqal tangents]

$\Rightarrow \quad BR = CQ$

Now, $BR = BP$ [Length of equal tangents]

$CQ = CP$

$\Rightarrow \quad BP = CP$

4..Prove that the parallelogram circumscribing a circle is a rhombus.

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Given: ABCD is parallelogram circumscribing a circle.

To prove: ABCD is a rhombus

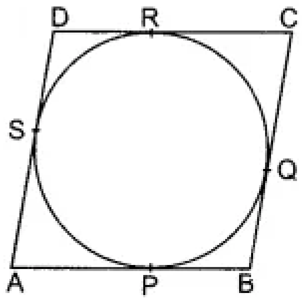
Proof: We have, DR = DS ...(*i*)

[Lengths of tangents drawn from an external point to a circle are equal]

Also, AP = AS ...(*ii*)

BP = BQ ...(*iii*)

CR = CQ ...(*iv*)



Adding (*i*), (*ii*), (*iii*) and (*iv*),

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

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

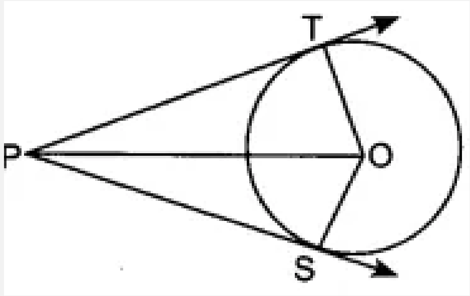
$\Rightarrow$ $2AB = 2AD$ [$\because$ In parallelogram, opposite sides are equal $AB = CD$ and $AD = BC$]

$\Rightarrow$ $AB = AD$

$\therefore$ $AB = AD = BC = CD$

Hence, ABCD is a rhombus as all sides are equal in rhombus.

5. From a point P, two tangents PT and PS are drawn to a circle with centre O such that ∠SPT = 120°, Prove that OP = 2PS



5. From a point P, two tangents PT and PS are drawn to a circle with centre O such that ∠SPT = 120°, Prove that OP = 2PS

Let PT = x = PS [∵ Tangent drawn from external point to circle are equal]

$\angle SPT = 120°$

In ΔOTP and ΔOSP, $\angle OTP = \angle OSP$ [∵ each equal to 90°, since tangent perpendicular r radius]

$OT = OS$ [∵ Equal radii]

$OP = OP$ [common]

⇒ $\Delta OSP \cong \Delta OTP$ [∵ By SAS congruence rule]

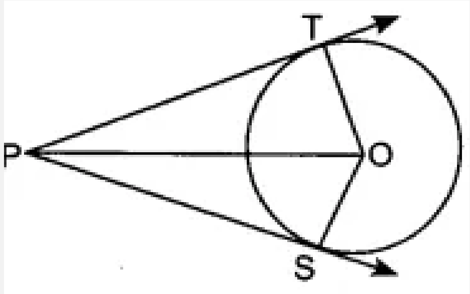
∴ $\angle TPO = \angle SPO$ [∵ By CPCT]

⇒ $\angle TPO = \frac{1}{2}\angle SPT = \frac{1}{2} \times 120 = 60°$

In ΔOTP, $\frac{OP}{x} = \text{Sec } 60°$

⇒ $\frac{OP}{x} = 2 \Rightarrow OP = 2x \Rightarrow OP = 2PS$

Hence proved.



HOME ASSIGNMENT CH10.

THANKING YOU

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