UDAAN 2024

– FOR CLASS 10th STUDENTS

Lecture No.- 02

- Subject Name- Mathematics
- Chapter Name- Circles

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Topic to be Covered

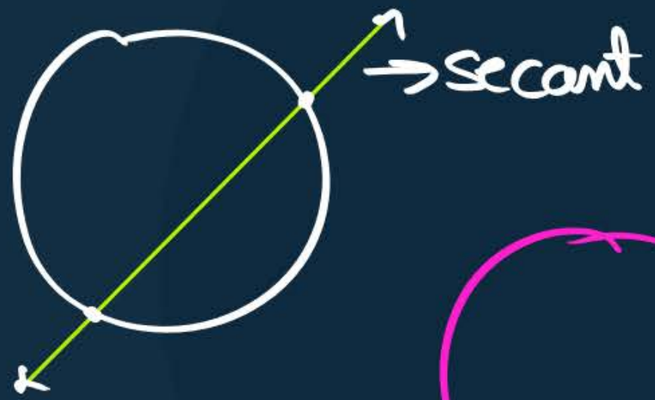
Topic Important Question (Part I)

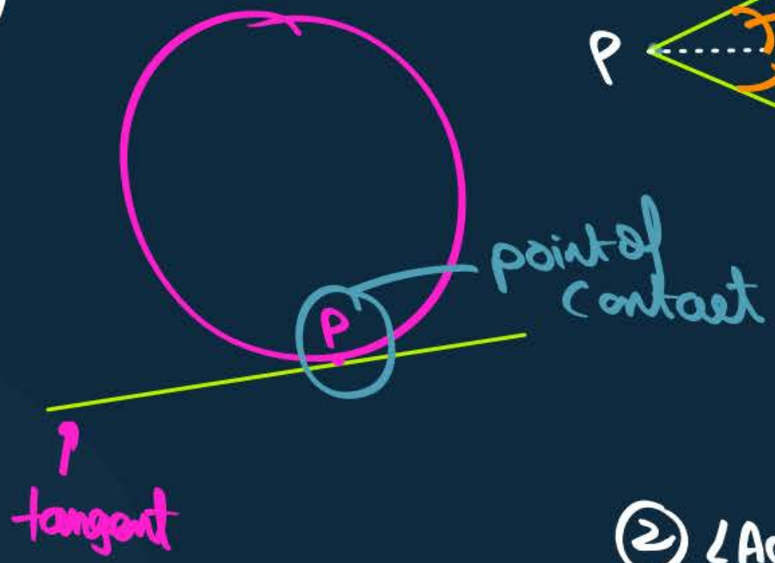
Recap of Previous Lecture

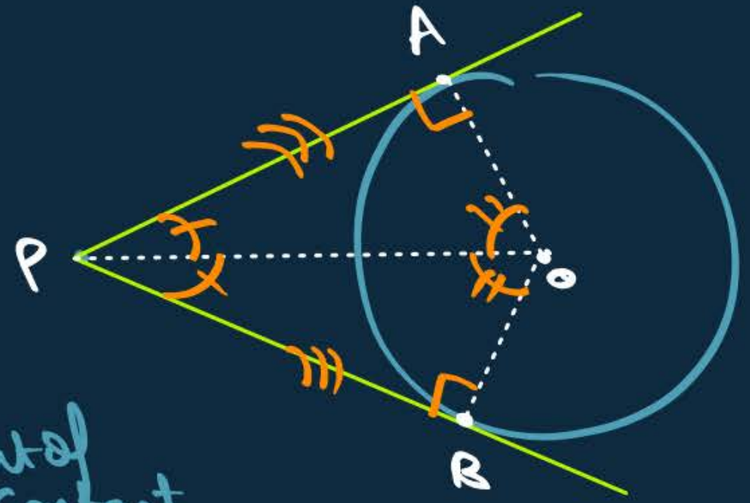
Topic All basic term related to circle

Topic Tangent and Secant

Topic Theorem







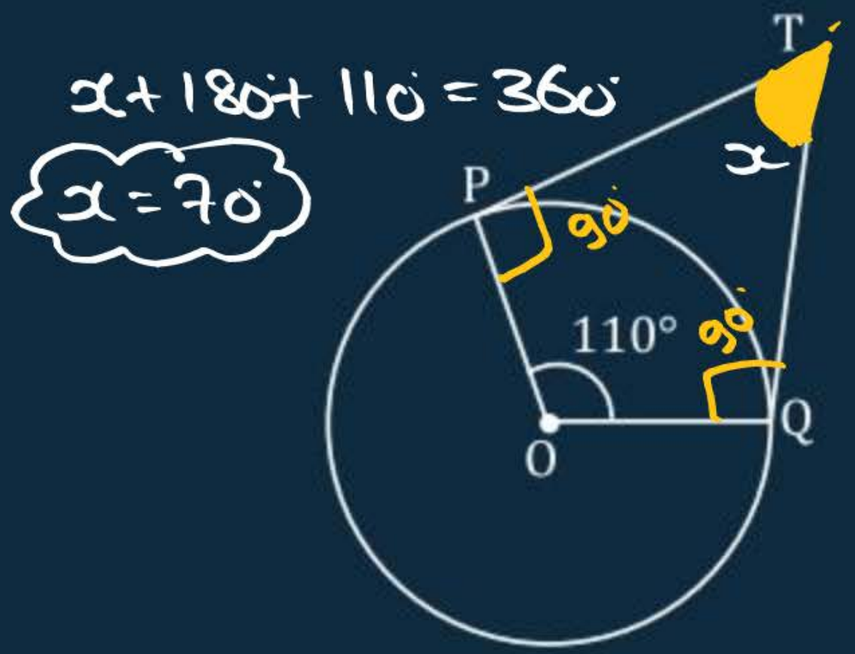
① $PA = PB$ [Tangents from external point are equal]

② $\angle AOP = \angle BOP$ [Tangents subtend equal angles at the Centre]

③ $\angle APO = \angle BPO$ [Tangents are equally inclined to the line segment joining the centre to that point]

Topic : Circle

#Q. In fig, if TP and TQ are the two tangents to a circle with centre O so that $\angle POQ = 110°$, then $\angle PTQ$ is equal to



$x + 180 + 110 = 360$

$x = 70$

A 60°

B 70°

C 80°

D 90°

Topic : Circle

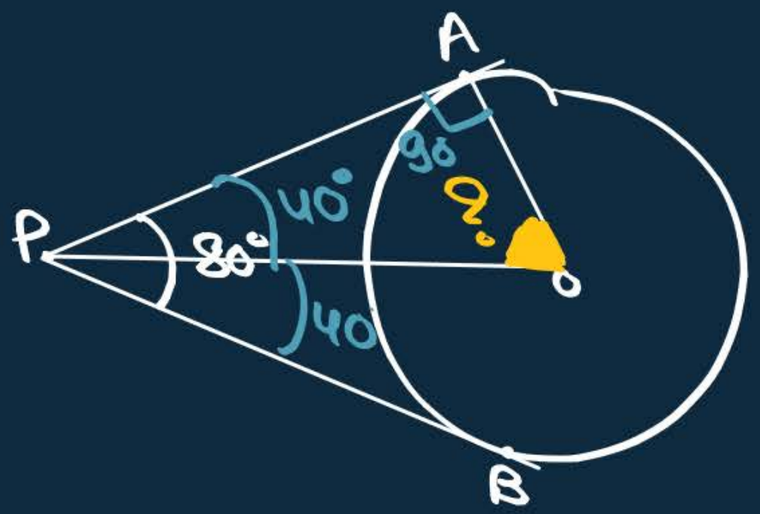
#Q. If tangent PA and PB form a point P to a circle with centre O are inclined to each other at angle of 80°, then ∠POA is equal to

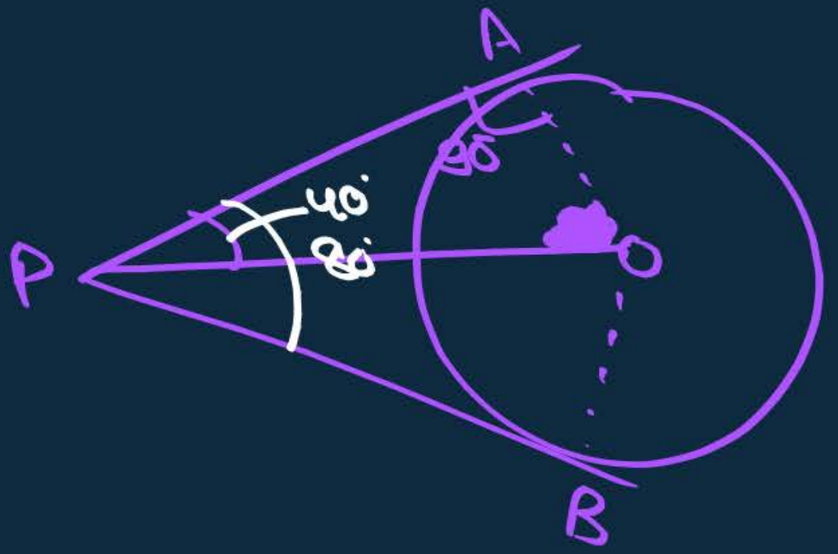
A 50°

B 60°

C 70°

D 80°





Topic : Circle

#Q. Shown below is a circle with 3 tangents KQ, KP and LM, QL = 2 cm and KL = 6 cm. $PM = \frac{1}{2}KL$. What is the measure of ∠LMK?

[CBSE Latest Practice Sheet Questions]

last year

A 50°

B 65°

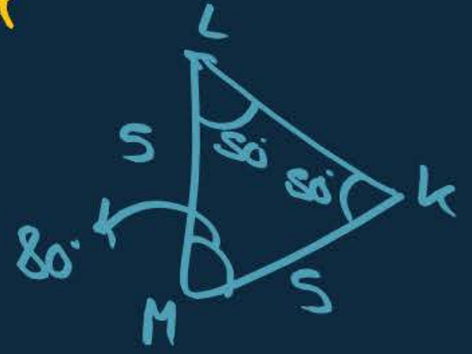
C 80°

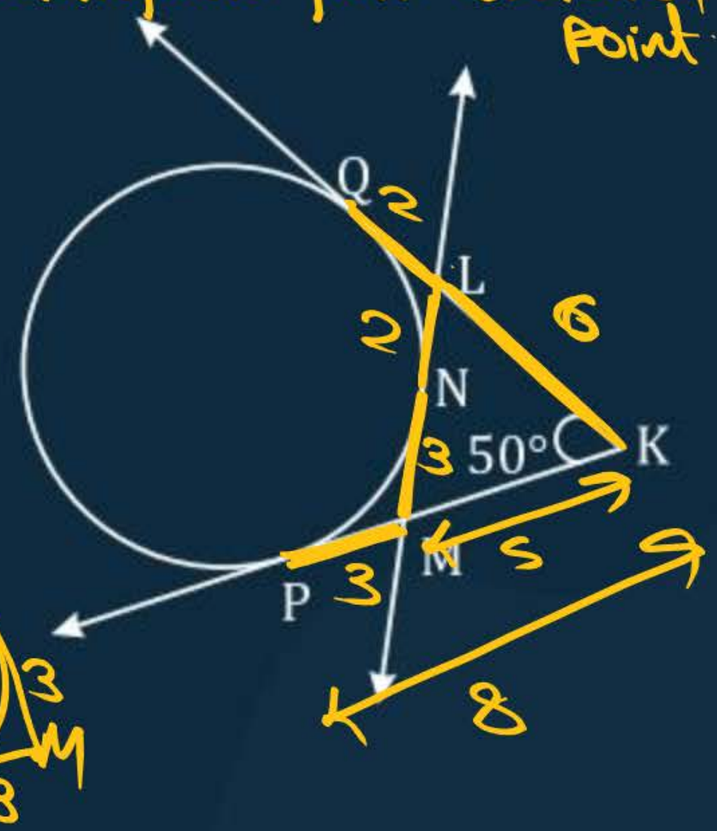
D Cannot be uniquely determined with the given information.

$PM = \frac{1}{2}(6)$

$PM = 3$

$KQ = KP$
$LN = LQ$
$MN = MP$
– tangents from external point



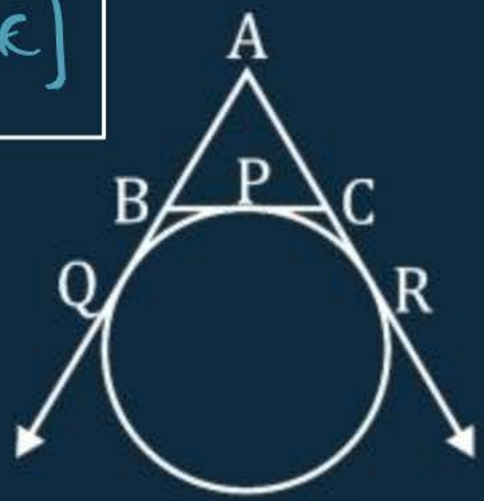


Topic : Circle

#Q. A circle is touching the side BC of ΔABC at P and touching AB and AC produced at Q and R respectively. Prove that $AQ = \frac{1}{2}$ (Perimeter of Δ ABC)

[CBSE 2000, 2001, 2002, NCERT Exemplar]

$AQ = \frac{1}{2}[AB+BC+AC]$



Topic : Circle

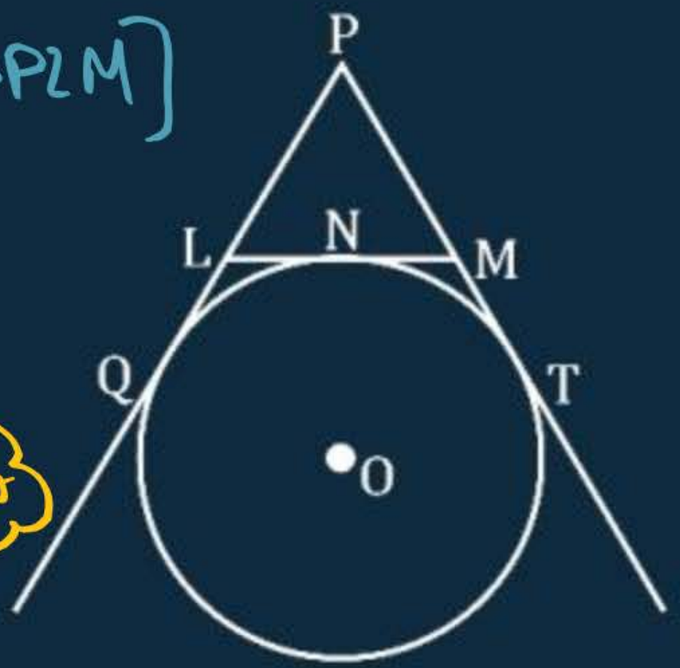
#Q. If PQ = 28 cm, then find the perimeter ΔPLM.

[CBSE SQP, 2020-21]

$PQ = \frac{1}{2}[\text{Perimeter of } \Delta PLM]$

$28 = \frac{1}{2} \times (P)$

56cm = Perimeter



Topic : Circle

#Q. PQ is a tangent to a circle with centre O at point P. If ΔOPQ is an isosceles triangle, then find $\angle OQP$. [CBSE SQP, 2020-21]

A) 40°

B) 45°

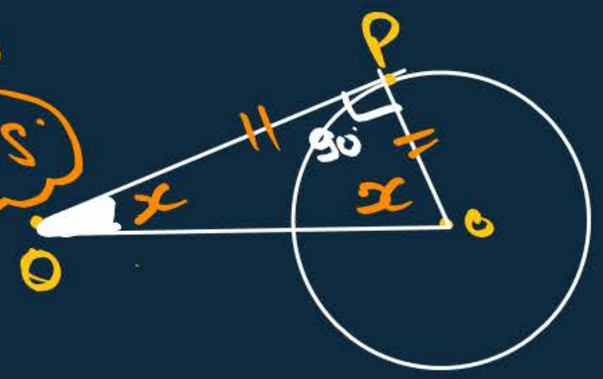
C) 50°

D) 55°

$90 + x + x = 180$

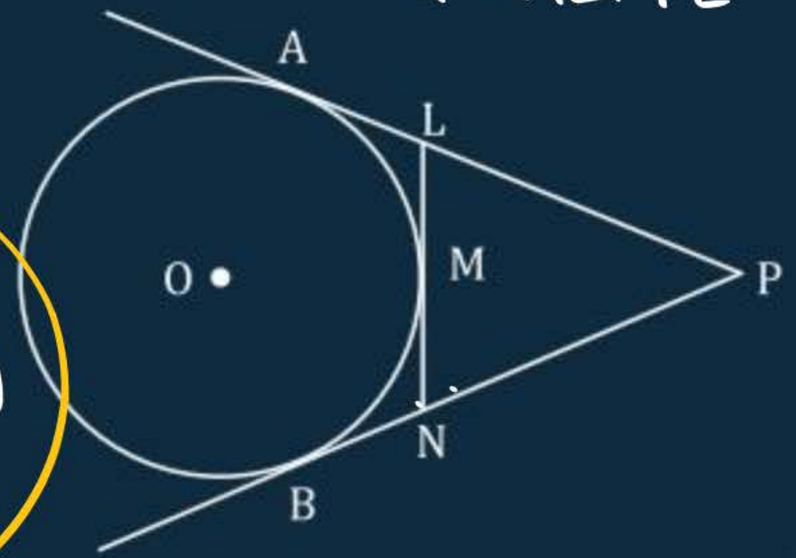
$2x = 90$

$x = 45°$



Topic : Circle

#Q. In fig. PA and PB are tangents from an external point P to a circle with centre O. LN touches the circle at M. Prove that PL + LM = PN + MN. [CBSE 2010]



AP = AL + PL

PA = PB
∠M = ∠A
NM = NB
} tangents from external point

To prove:

PA = PB

PL + AL = PN + NB

PL + LM = PN + MN

L.H.S
= PL + LM
= AP − AL + LM
= PB − ~~LM~~ + ~~LM~~
= PB

BN + PN
MN + PN
= R.H.S

Topic : Circle

#Q. A circle touches all the four sides of a quadrilateral ABCD. Prove that :

$AB + CD = BC + DA.$

[NCERT, CBSE 2008, 2009, 2012-2015 2017]

Method-1

L.H.S

$= AB + CD$

$= AR + BR + CP + DP$

$= AS + BQ + CQ + DS$

$= AD + BC$

$=$ R.H.S

$AS = AR$

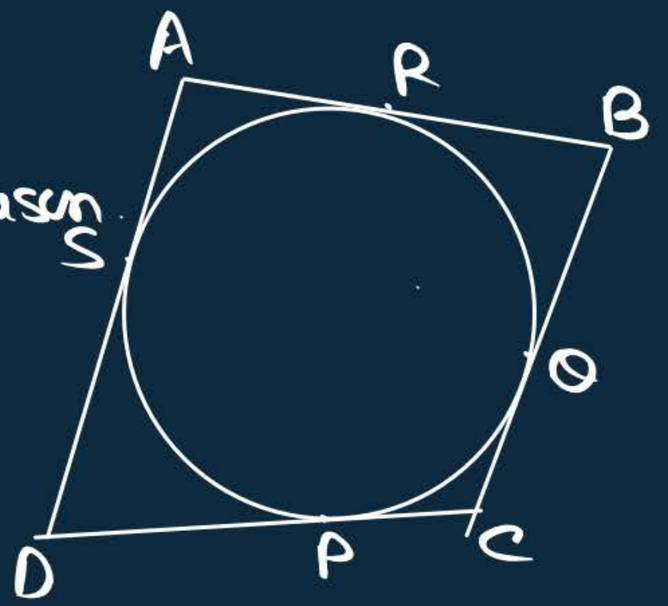
$DS = DP$

$BQ = BR$

$CQ = CP$

Reason

Method : 2



$AS + DS + BQ + CQ = AR + DP + BR + CP$

$AD + BC = AB + CD$

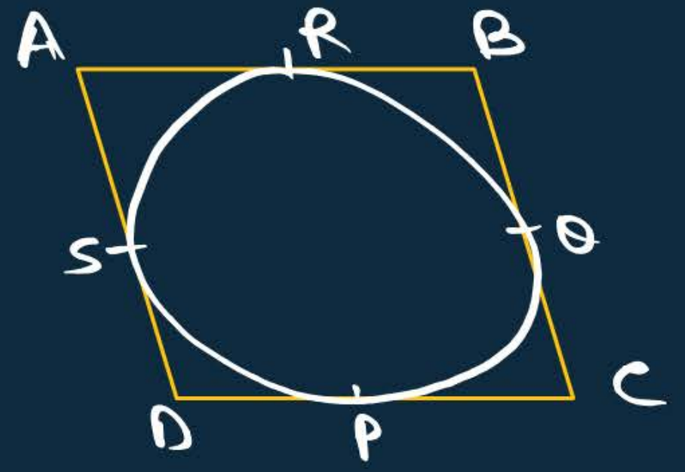
Topic : Circle

$AB=CD,\ AD=BC$ — (ii)

#Q. If all the side of a parallelogram touch a circle, show that the parallelogram is a rhombus.

To prove: ABCD is a Rhombus

$AB=BC=CD=AD$



Proof: $AB+CD=AD+BC$

Proved in the previous Question.

$AB+AB=AD+AD$

$2AB=2AD$

$AB=AD$ — (i)

By (i) and (ii)

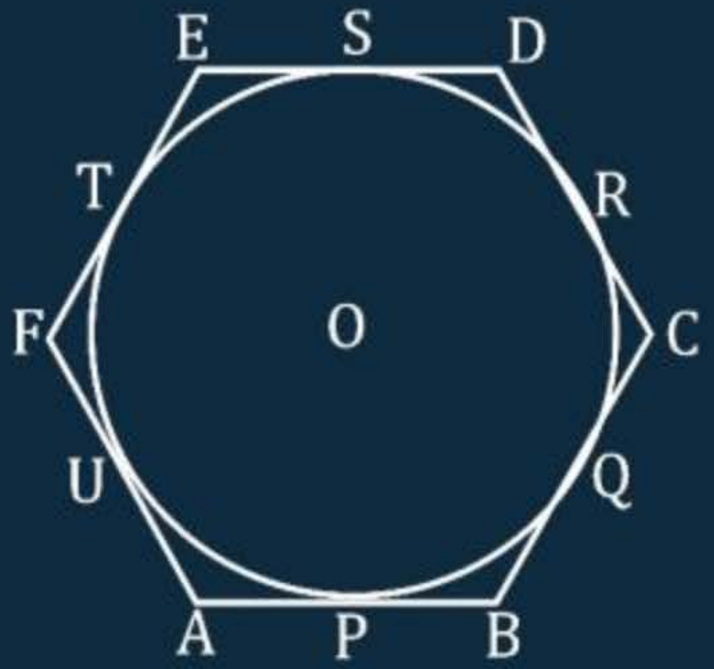
$AB=BC=CD=AD$

Topic : Circle

#Q. If a hexagon ABCDEF circumscribes a circle, prove that

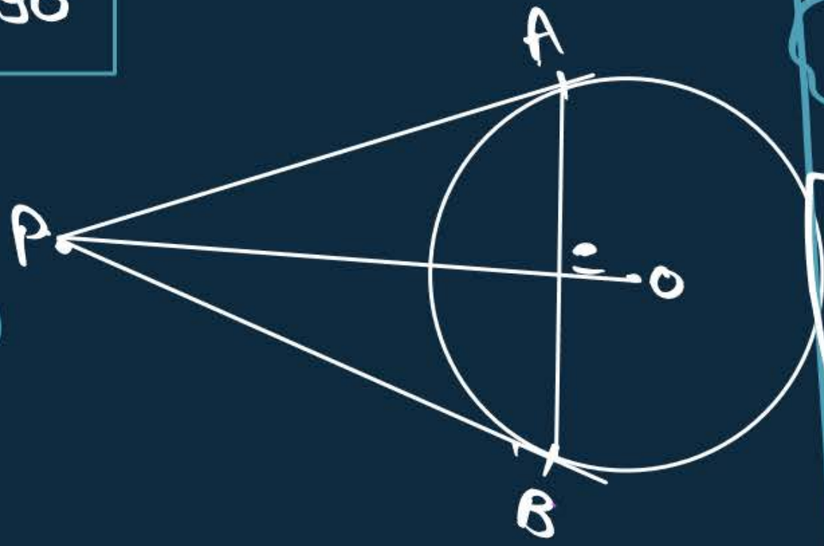
AB + CD + EF = BC + DE + FA.

[NCERT EXEMPLAR]



#Q. From an external point P, two tangents PA and PB are drawn to the circle with centre O. Prove that OP is the perpendicular bisector of AB.

To prove: $AC = BC$, $\angle ACO = \angle BCO = 90°$



Proof: In $\triangle APC$ and $\triangle BPC$

$PA = PB$ [tangents from external point]

$PC = CP$ [common side]

$\angle APC = \angle BPC$ [tangents are equally inclined to the line segment joining the centre to that point]

By SAS
$\triangle APC \cong \triangle BPC$

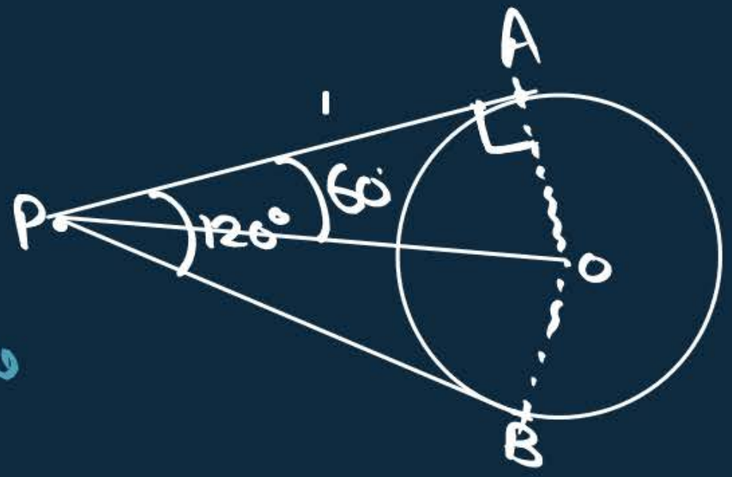
$AC = CB$
$\angle ACP = \angle BCP$
By C.P.C.T

$\therefore \angle ACP + \angle BCP = 180°$
[Linear Pair]

Topic : Circle

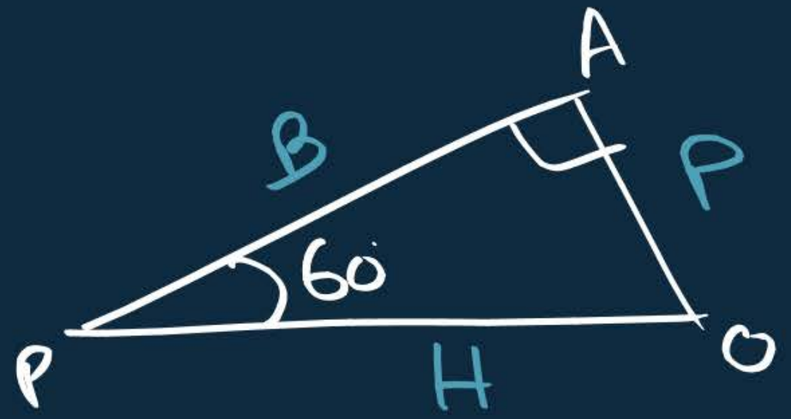
#Q. Two tangent segments PA and PB are drawn to a circle with centre O such that $\angle APB = 120°$. Prove that $OP = 2AP$. [CBSE 2014]

To prove: OP = 2AP



Proof: $\angle PAO = 90°$ [Tangent is the perpendicular to the radius]

$\angle APO = \angle BPO$ [. . . . . .]



$$\rightarrow \cos 60^\circ = \frac{B}{H}$$

$$\frac{1}{2} = \frac{AP}{OP}$$

$$\boxed{OP = 2AP}$$

Topic : Circle

#Q. In the figure, two tangents RQ and RP are drawn from an external point R to the circle with centre O. If $\angle PRQ = 120°$, then prove that OR = PR + RQ.

H.W

Topic : Circle

#Q. If two tangents inclined at 60° are drawn to a circle of radius 3 cm, then find length of each tangent.

[CBSE SQP, 2020-21]

A $3\sqrt{3}$ cm

B $\frac{3\sqrt{3}}{2}$ cm

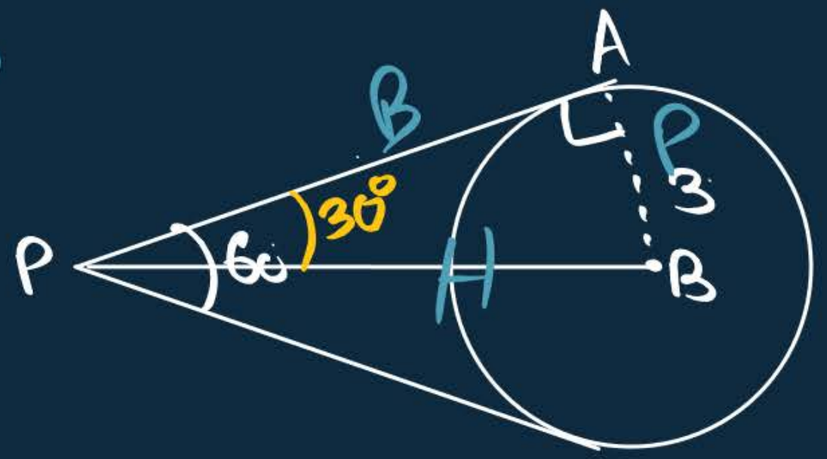
C $\frac{\sqrt{3}}{2}$ cm

D None of these

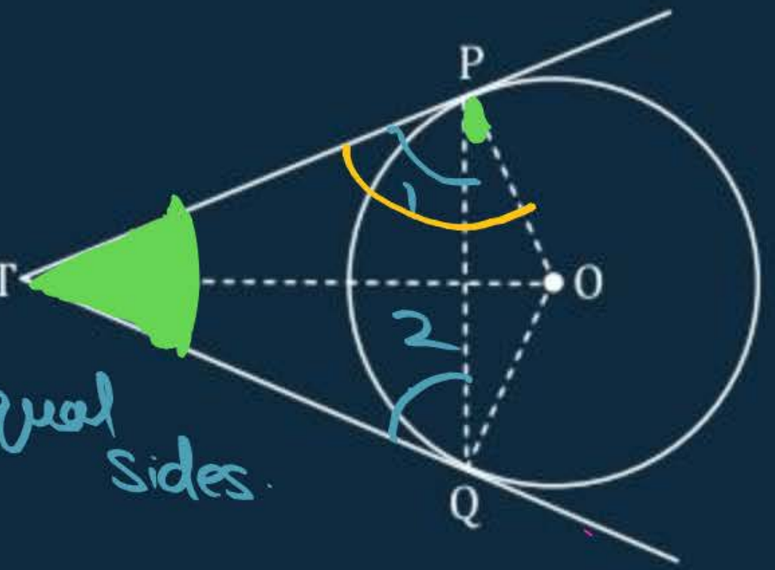
$\tan 30° = \frac{P}{B}$

$\frac{1}{\sqrt{3}} = \frac{AB}{AP}$

$AP = 3\sqrt{3}$ cm



#Q. Two tangent TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$.



$\angle PTQ + \angle TPQ + \angle TQP = 180°$

Since $TP = TQ$ [Tangents.....]

$\angle TQP = \angle TPQ$ → Angles opp. to equal sides.

$\angle PTQ + \angle TPQ + \angle TPQ = 180$

$\angle PTQ + 2\angle TPQ = 180$

$\angle PTQ + 2[90 - \angle OPQ] = 180$

$\angle PTQ + 180 - 2\angle OPQ = 180$

$\angle PTQ = 2\angle OPQ$

Blue = yellow - green

Topic : Circle

#Q. A circle is drawn. Two points are marked outside the circle such that only 3 tangents can be drawn to the circle using these two points.
Which of the following is true based on the above information?

Practice

HW

A All 3 tangents are equal in length.

B Both the points lie on one of the tangents.

C The tangents and the circle have two common points in total

D (such a situation is not possible as with 2 points, there will be 4 tangents to the circle)


THANK
YOU