UDAAN 2024

– FOR CLASS 10^{th} STUDENTS

Lecture No.- 01

- Subject Name- Mathematics

- Chapter Name- Circles

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Topic to be Covered

Topic — All basic term related to circle

Topic — Tangent and Secant

Topic — Theorem → A+ bati

What about Exams?

A) Exams hogye!

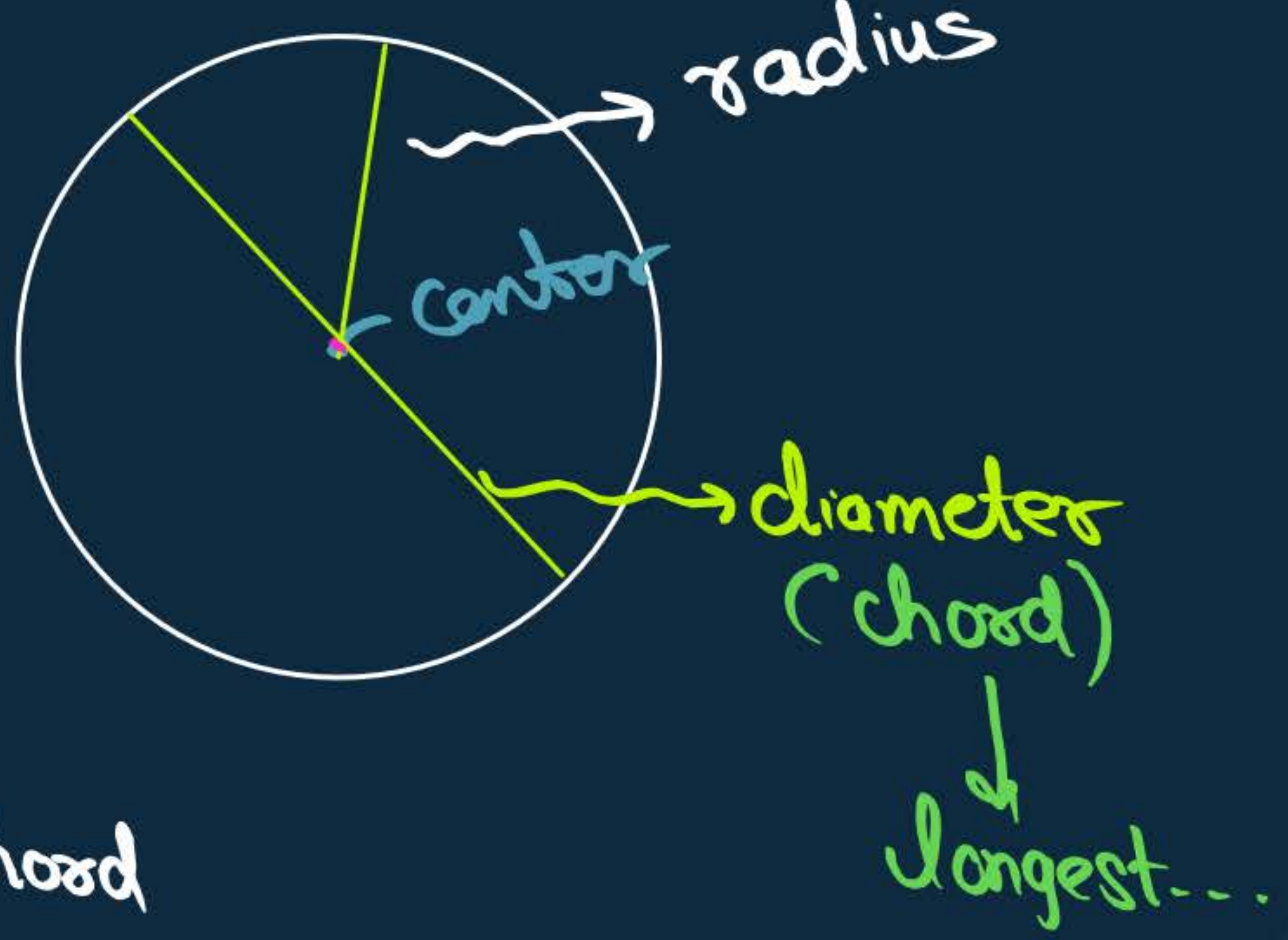
B) Abhi nahi huye.

C) Hogye or bahut badiya gaye.

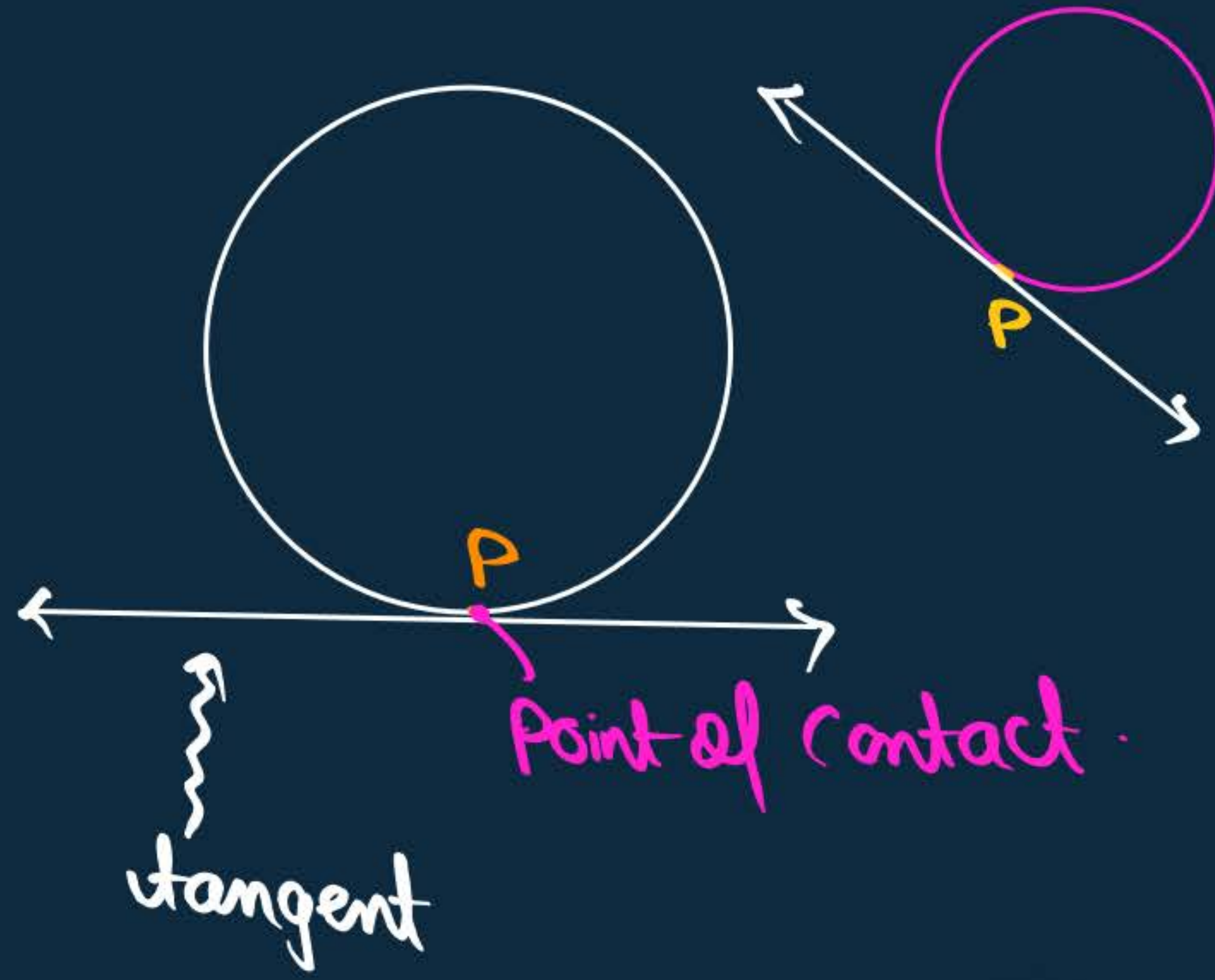
D) Theek thaak gaye.

Backlog → oneshot → NCERT… PYQ's

$$2r = d$$




secant


P
P
Point of contact.
tangent

Topic : Secant and Tangent

alg-alg

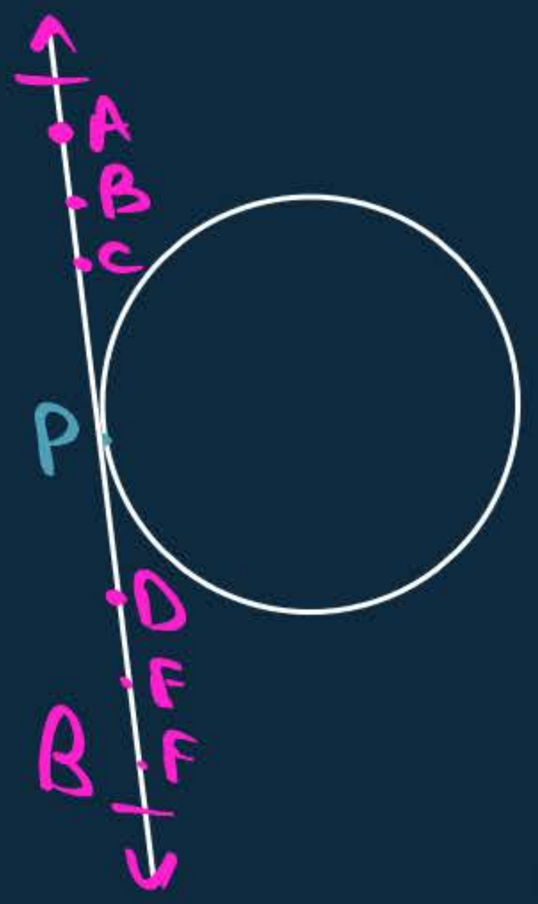
Secant : A line which intersects a circle in two distinct points is called a secant of the circle.

Tangent : A tangent to a circle is a line that intersects the circle in exactly one point.

The point is called the point of contact of the tangent and line is said to touch the circle at this point.

The word tangent is originated from the Latin word TANGERE Which means 'to touch".

NOTE : The point of contact is the only point which is common to the tangent and the circle and every other point on the tangent lies outside the circle. Thus of the points on a tangent to a circle, the point of contact is nearest to the centre of the circle

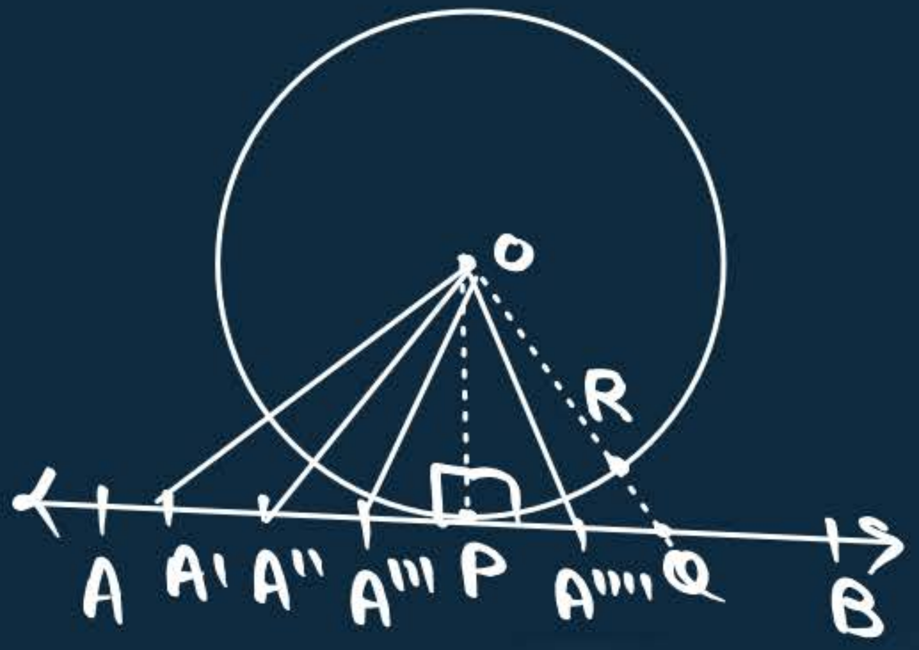


Topic : Theorem 1

A tangent to a circle is perpendicular to the radius through the point of contact.

To prove: $OP \perp AB$.   Gi: AB is a tangent to the $C(O, r)$

Proof: Take a point R on the circle and a point Q outside the circle on the tangent AB.



$OP = OR$ [radius of same circle]

$\Rightarrow OQ > OR$ [Q is outside the circle]

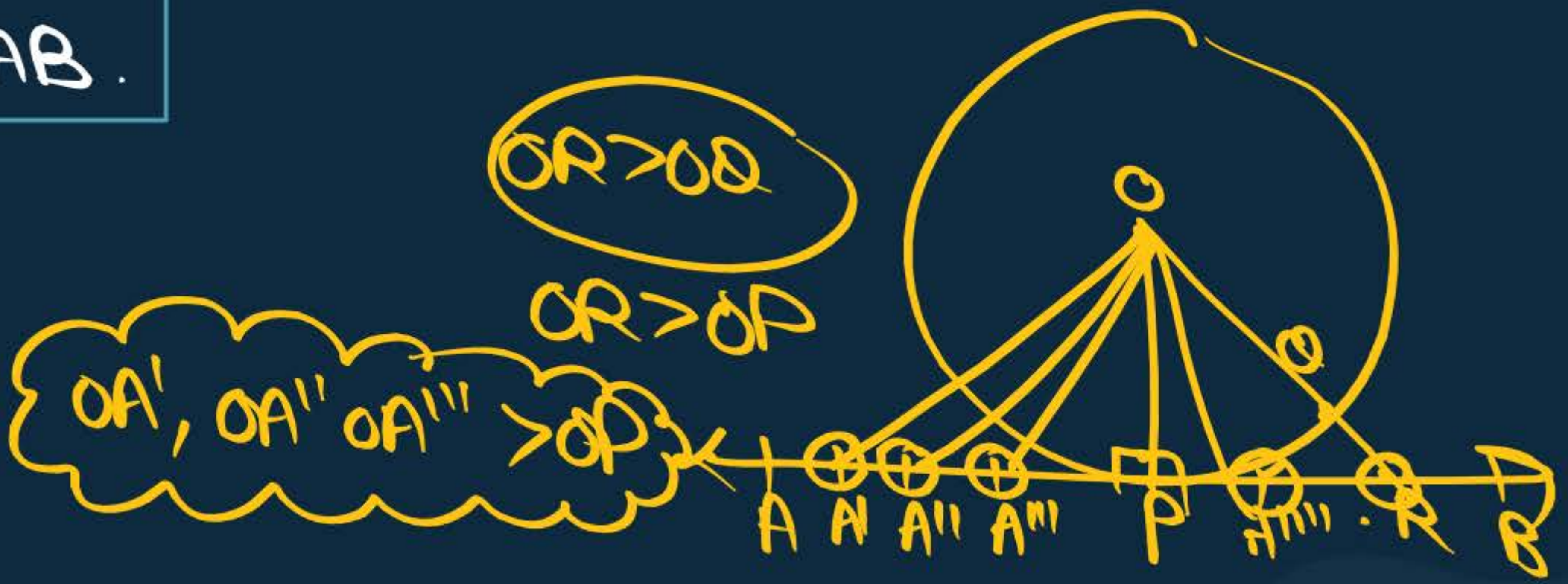
$\Rightarrow \boxed{OQ > OP}$

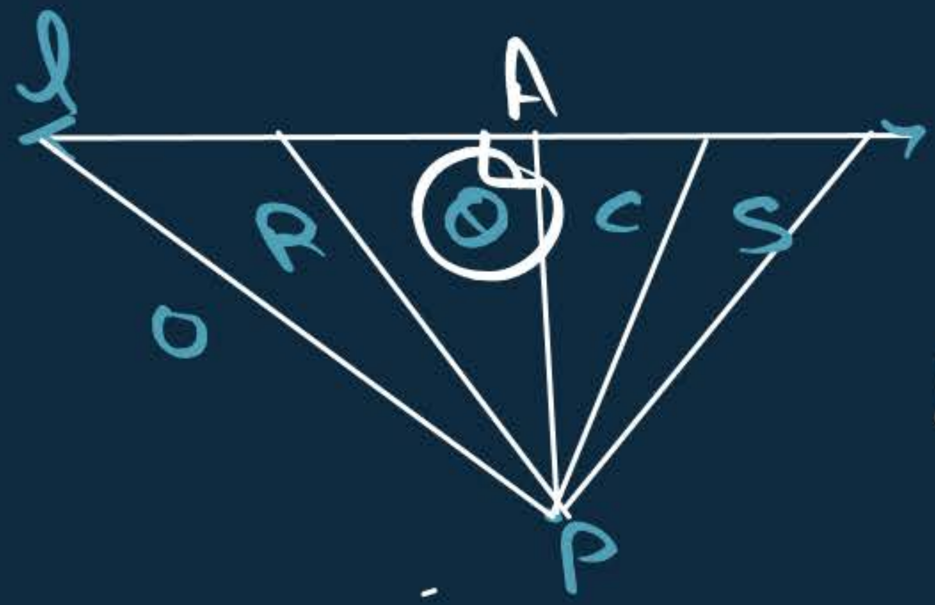
Similarly $OA', OA'', OA''', OA'''' > OP$

$\therefore$ OP is the shortest distance b/w 'O' and 'AB'.

and the shortest distance is the perpendicular distance.

$\boxed{\text{Hence } OP \perp AB.}$





AP is the shortest distance

Perpendicular distance...

Topic : Theorem 2

A line drawn through the end point of radius and perpendicular to it is a tangent to the circle.

Topic : Circle

#Q. A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 13 cm. Find the length of PQ. [NCERT]

G: $OQ = 13cm$

$OP = radius = 5cm$

To Find: PQ

Sol: $OP \perp PQ$ [tangent is perpendicular to the radius]

∴ In △ OPQ..

By 'P' theorem..

$OQ^2 = OP^2 + PQ^2$

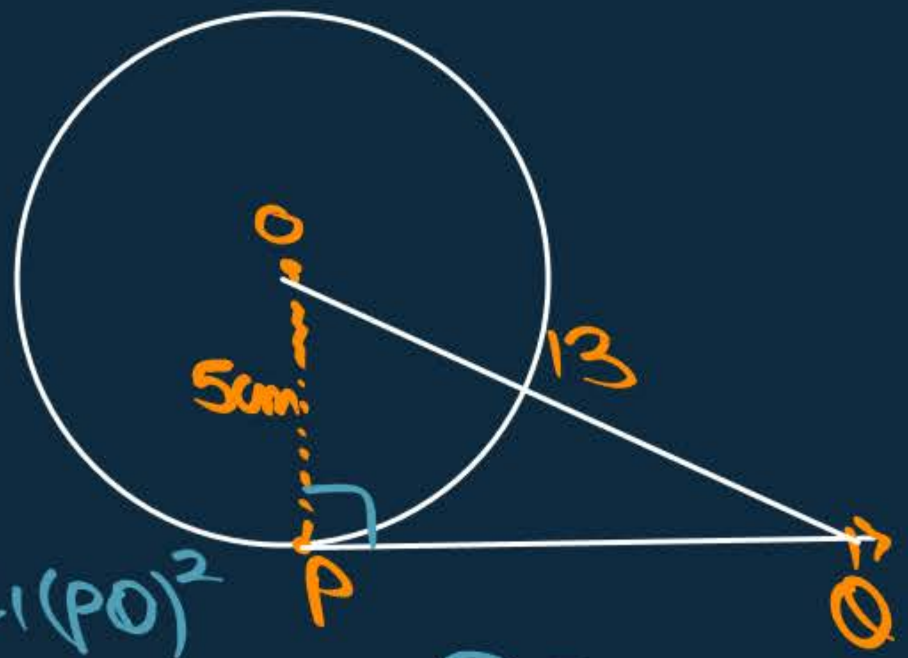
$(13)^2 = (5)^2 + (PQ)^2$

$169 - 25 = (PQ)^2$

$144 = (PQ)^2$

$\pm\sqrt{144} = PQ$

$PQ = +12cm$



Topic : Circle

#Q. **Fill in the blanks:** [NCERT]

(i) The common point of a tangent and the circle is called ___point of contact___.

(ii) A circle may have __________ parallel tangents.

(iii) A tangent to a circle intersects it in ___one___ point(s).

(iv) A line intersecting a circle in two points is called a ___Secant___

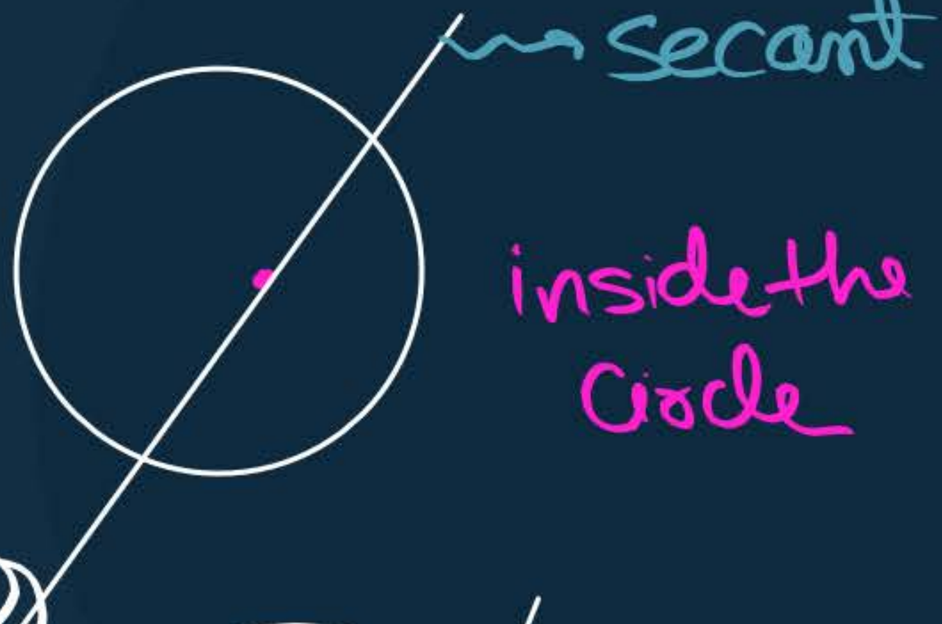
(v) The angle between tangent at a point on a circle and the radius through the point is ___90°___.

Topic : Circle

#Q. How many tangents can a circle have?

Infinite

1



inside the circle

No tangent

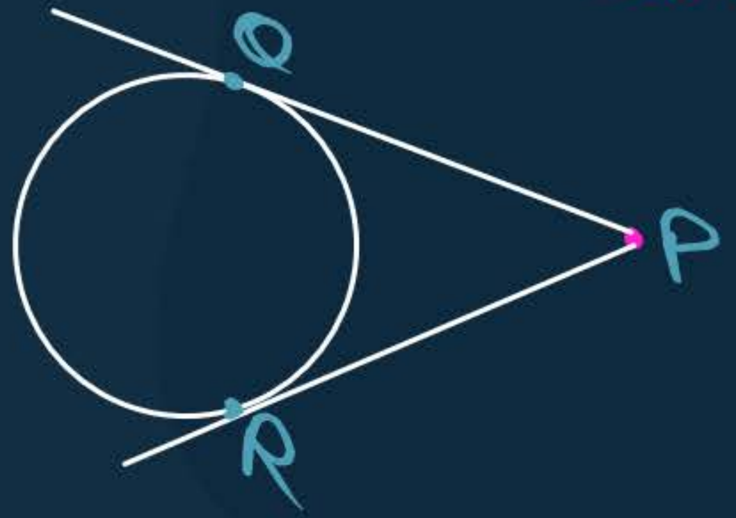
2

on the circle

only one tangent

3

Outside the circle.

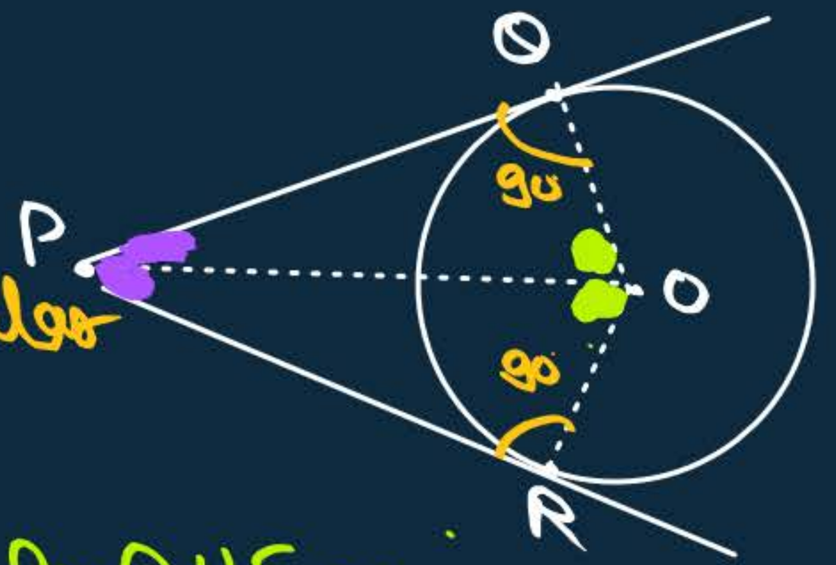


only '2' tangents

Topic : Theorem 3

The length of two tangents drawn form an external point to a circle are equal.

To prove: $\boxed{PQ = PR}$



Proof: $OQ \perp QP$ and $OR \perp PR$

(tangent is perpendicular to the radius)

In ΔPOQ and ΔPOR...

$\angle OQP = \angle ORP$ [each 90°] R

$PO = OP$ [Common side] H

$OQ = OR$ [radius of same circle] S

By RHS...

$\boxed{\Delta PQO \cong \Delta PRO}$

By C.P.C.T...

$PQ = PR$

Topic : Theorem 4

tangent

If two tangents are drawn to a circle from an external point, then:

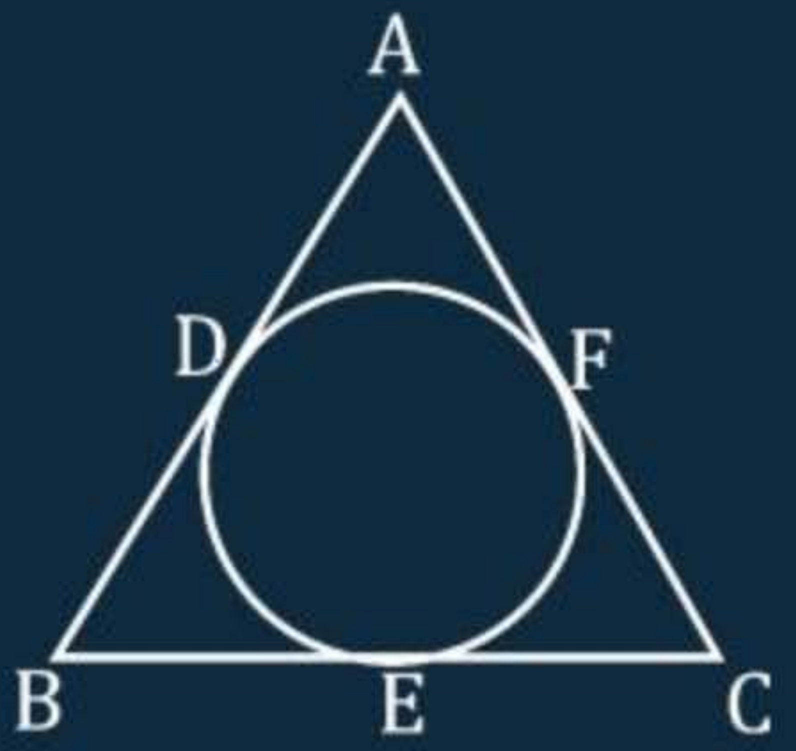
(i) They subtend equal angle at the centre

(ii) $\boxed{\text{They are equally inclined to the segment, joining the centre to that point.}}$

equal angle par tiki hui hain

Topic : Circle

#Q. In fig. $\boxed{\text{if } AB = AC}$, provethat $\boxed{BE = EC}$.



Gi: $AB = AC$

To prove: $\boxed{BE = EC}$

Proof: $AD = AF$, $BD = BE$, $CE = CF$ } tangents from external point are equal.

$AB = AC$

$AD + DB = AF + FC$

$\cancel{AD} + BE = \cancel{AF} + CE$

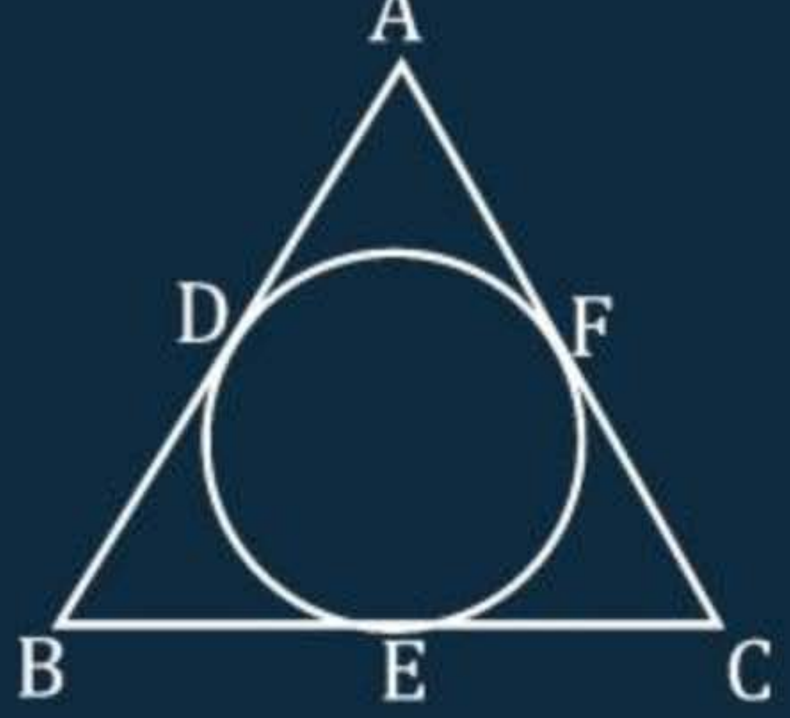
$\boxed{BE = EC}$

Topic : Circle

#Q. ABC is an isosceles triangle in which AB = AC, circumscribed about a circle, as shown in fig. Prove that the base is bisected by the point of contact.

BE = EC

[CBSE 2008, 2012, 2014]



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

To prove: $AQ = \frac{1}{2}$ (Perimeter of Δ ABC) **[CBSE 2000, 2001, 2002, NCERT Exemplar]**

$$\boxed{\begin{array}{l} BP = BQ \\ CP = CR \end{array}} \rightarrow \boxed{AQ = AR}$$

$AQ = AB + BQ$

$AQ - BQ = AB$

$AQ = \frac{1}{2}(AB + BC + AC)$

RHS $\frac{1}{2}(AB + BC + AC)$

$\frac{1}{2}\left[AQ - BQ + BP + PC + \overset{AQ}{AR} - CR\right]$

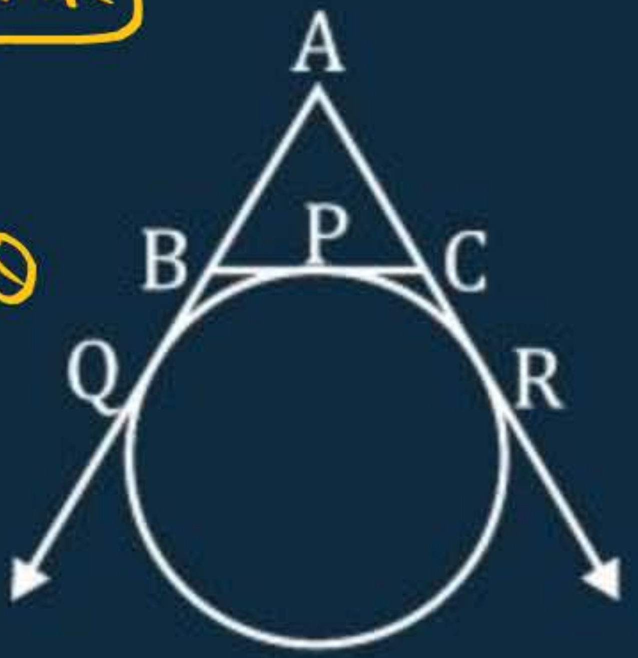
$\frac{1}{2}\left[AQ - \cancel{BP} + \cancel{BP} + \cancel{CR} + AQ - \cancel{CR}\right]$

$\frac{1}{2}\left[AQ + AQ\right]$

$\rightarrow \frac{1}{\cancel{2}} \times \cancel{2} AQ$

$= AQ$

$=$ L.H.S



Topic : Circle

#Q. From a point P which is at a distance of 13 cm from the centre O of a circle of radius 5 cm, the pair of tangent PQ and PR to the circle is drawn. Then, the area of the quadrilateral PQOR is

H.W

A $60\ \text{cm}^2$

B $65\ \text{cm}^2$

C $30\ \text{cm}^2$

D $32.5\ \text{cm}^2$

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]

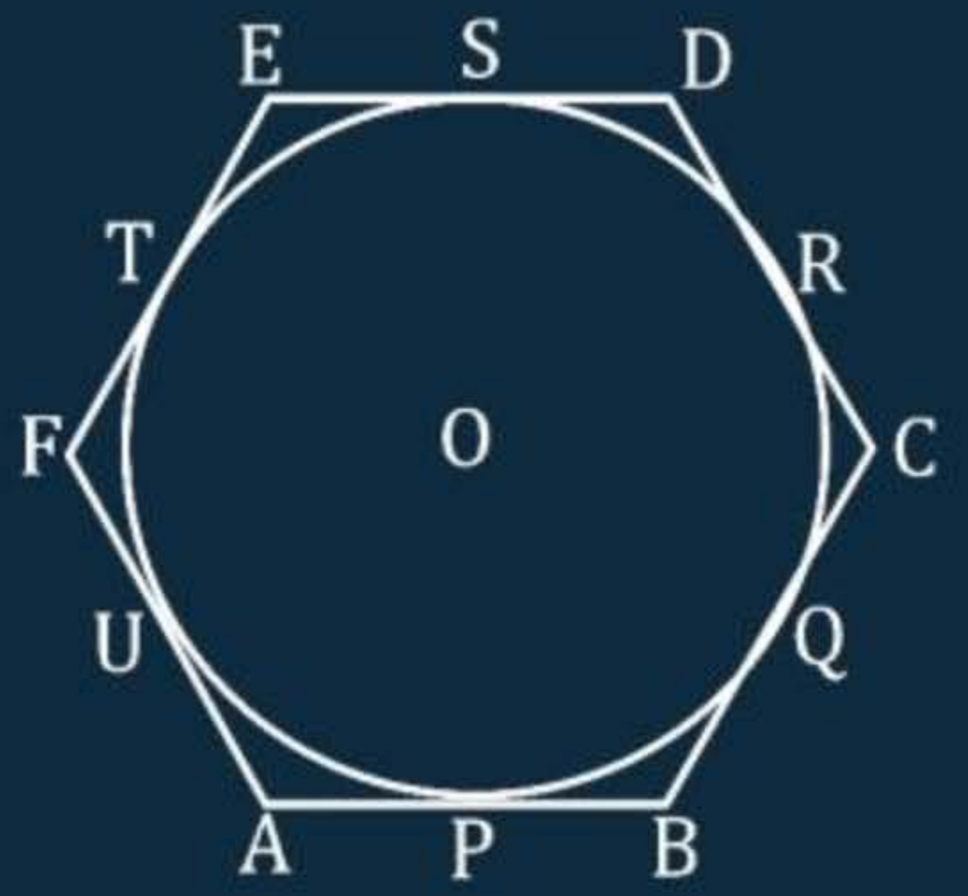
H.W

Topic : Circle

#Q. If a hexagon ABCDEF circumscribes a circle, prove that $AB + CD + EF = BC + DE + FA$.

[NCERT EXEMPLAR]

H.W



If you always do what you've always done, you'll always get what you've always got.


THANK
YOU