MATHS

BOOKS - NAGEEN PRAKASHAN

ENGLISH

CIRCLES

Solved Examples

1. Find the length of tangent drawn to a circle of radius 6 cm, from a point at a distance of 10

cm from the centre.

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2. AP is tangent to circle O at point P, What is the length of OP?

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3. If the angle between two tangents drawn from an external point P to a circle of radius 'a'

and centre O, is 60°, then find the length of OP.

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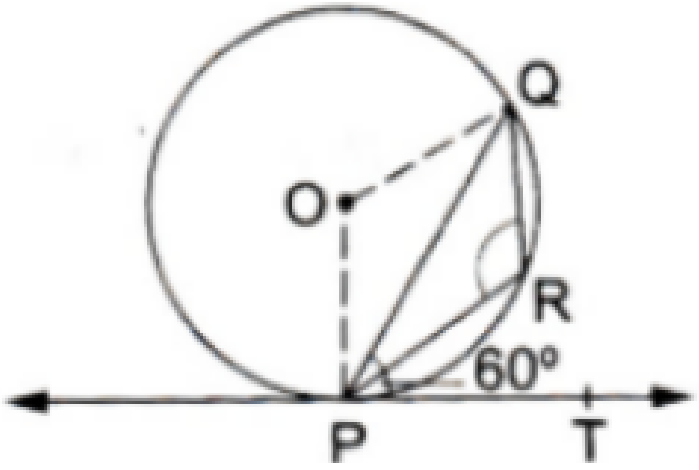
4. In the adjoining figure, PQ is a chord of a circle and PT is the tangent at P such that

$\angle QPT = 60^\circ$. Find $\angle PRQ$.



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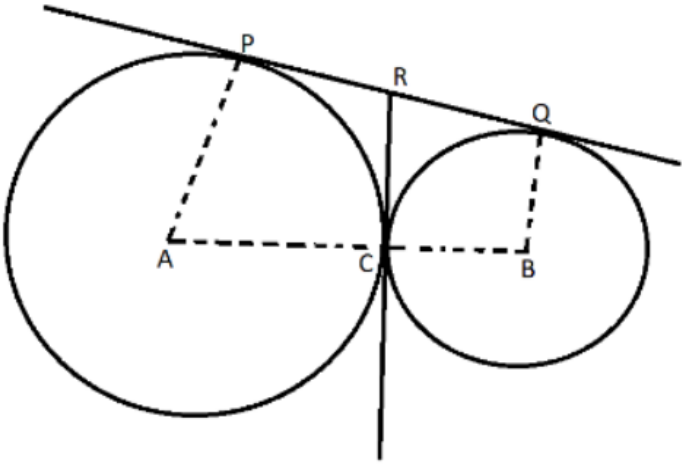
5. In the figure, two circles touch each other at the point C.Prove that the common tangents to the circles at C, bisect the common

tangents at P and Q.



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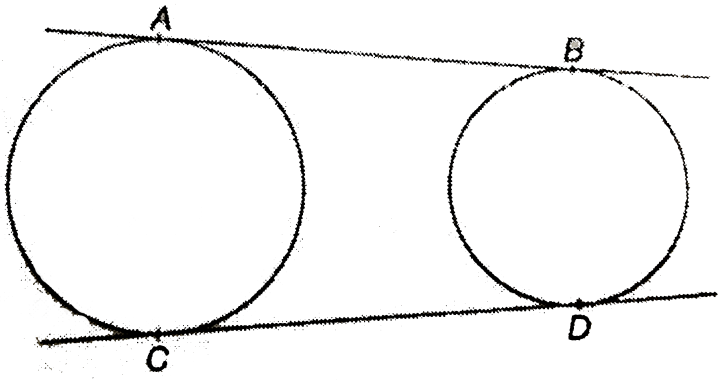
6. Two circles of unequal radil neither touch nor intersect each other. Whether the common tangents AB and CD are always equal? If no, then give explanation of it and if

your answer is yes, then prove it.



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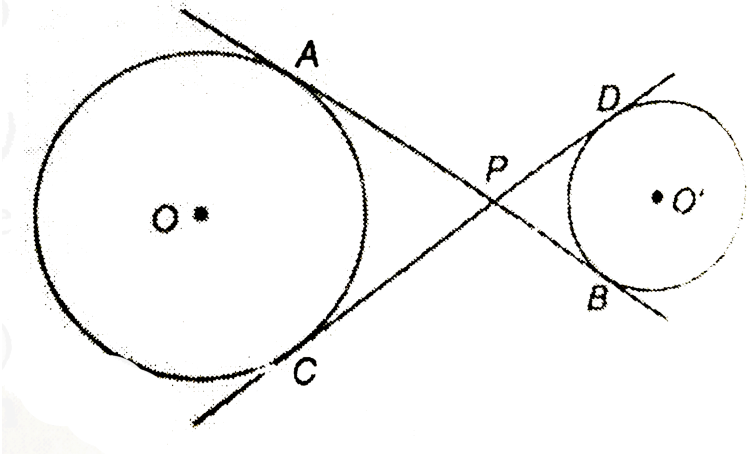
7. In the adjoining figure, common tangents AB and CD to two circles intersect at P.

Prove that AB=CD.



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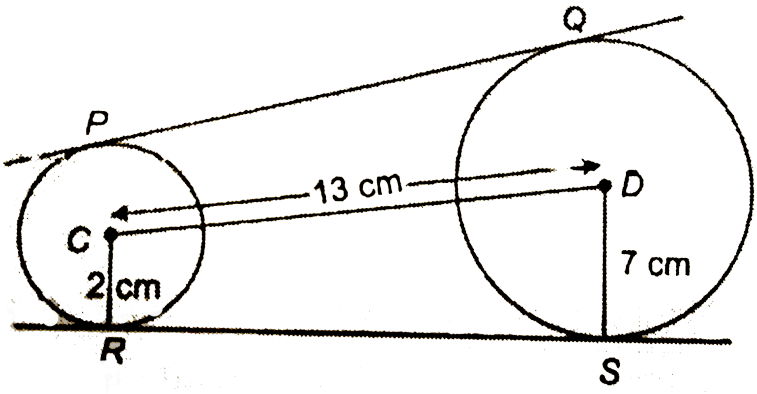
8. In the given diagram, PQ and RS are common tangents to the two circles with centres C and D. Find the length of PQ and

hence area of trapexium RSDC.



A. $54cm^2$

B. $64cm^2$

C. $50cm^2$

D. None

Answer: A

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9. AB is a diameter of a circle. AH and BK are perpendiculars from A and B respectively to the tangent at P Prove that $AH + BK = AB$.

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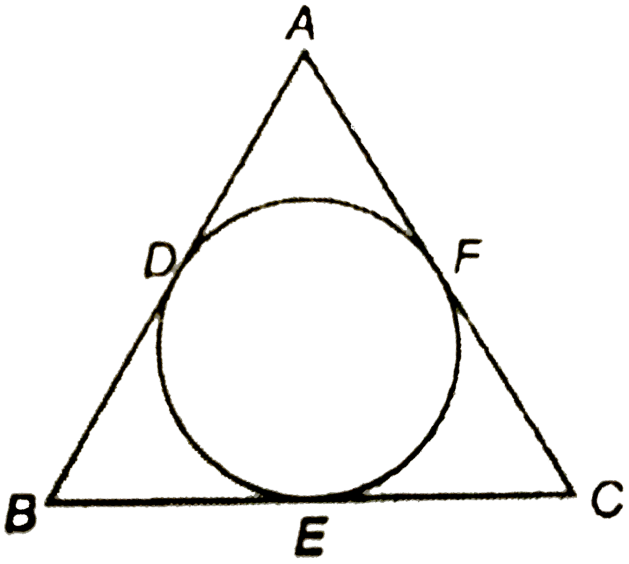
10. In the given figure, if AB=AC, rove that BE=EC.



[from (1) and (3)]

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11. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that

AB+CD=AD+BC.

or

A circle touches all the four sides of a quadrilateral ABCD. Prove that AB+CD=BC+DA.

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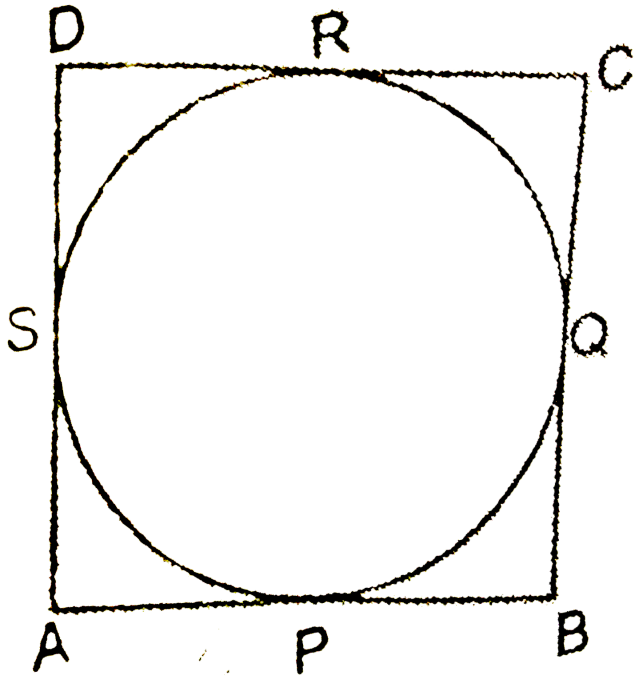
12. If a parallelogram circumscribes a circle then prove that it must be a rhombus.



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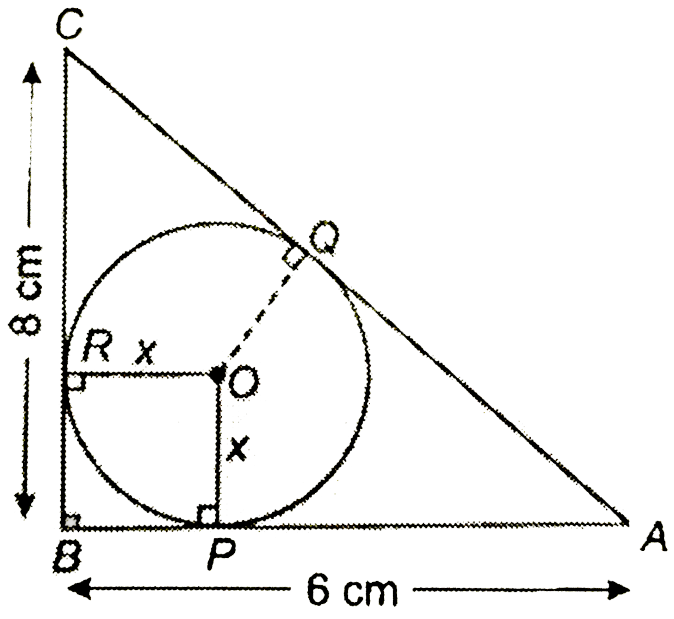
13. In the given figure ABC is a right angled triangle with AB=6 cm, and BC=8 cm. A circle with centre O has been inscribed inside the triangle. Find the radius of the circle.



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14. A circle is touching the side BC of a $\triangle$ ABC at point P and touching AB and AC produced at Q and R respectively. Prove that $AQ = \frac{1}{2}(\text{perimeter of } \triangle ABC)$.

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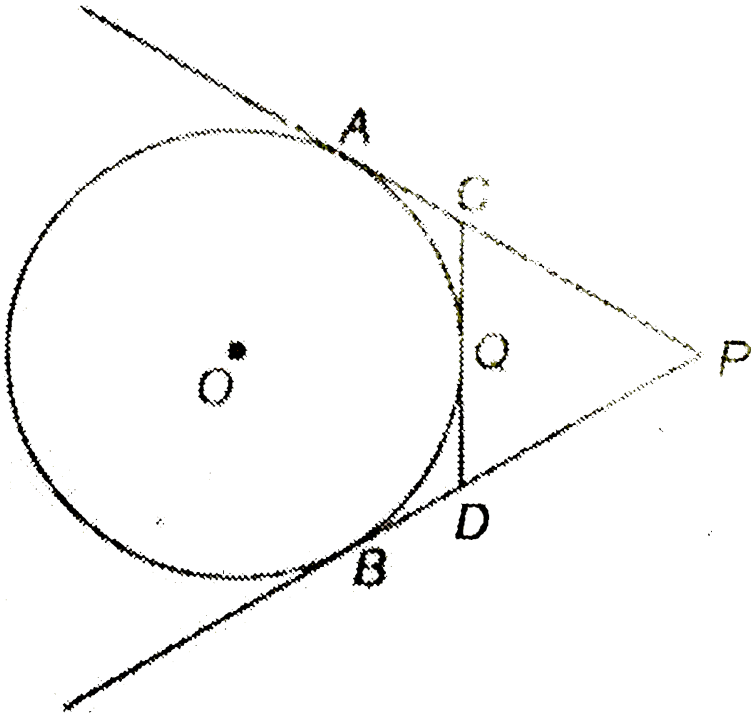
15. In the given figure, PA and PB are tangents to the circle from an external point P. CD is another tangent touching the circle at Q. If PA

=12 cm, QC=3cm, then find PC+PD.



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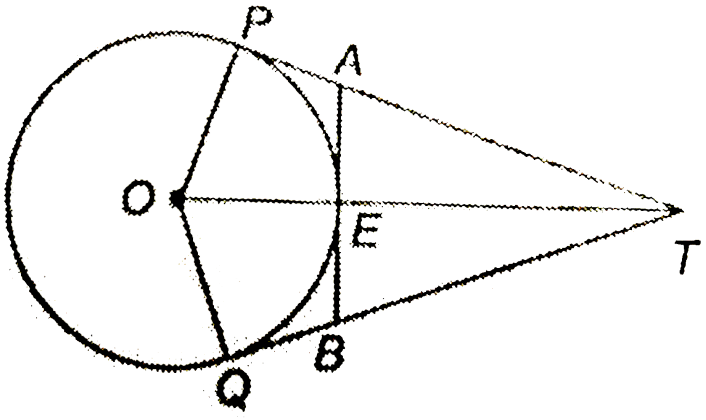
16. O is the centre of a circle of radius 5cm. T is a point such that OT=13cm and OT intersects the circle at E, find the length AB.



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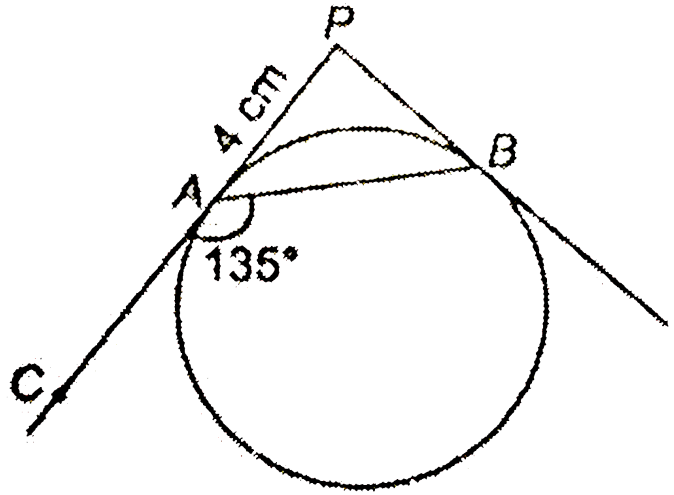
17. In the given figure, PA and PB are tangents to a circle from an external point P such that PA=4 cm and $\angle BAC = 135^\circ$. Find the length of dhord AB.



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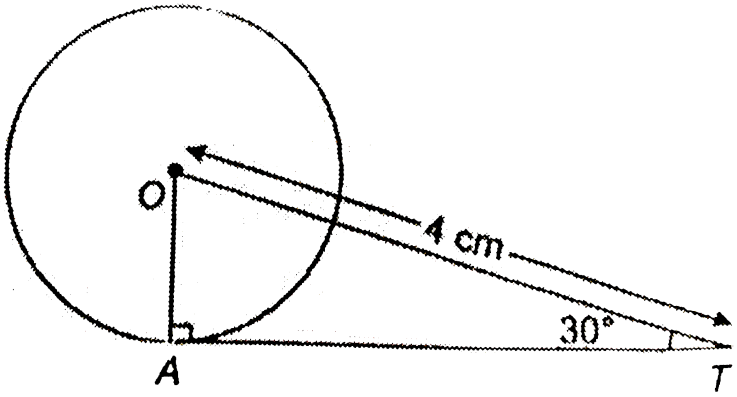
18. In the giben figure, AT is a tangent to the circle with centre O such that OT = 4 cm and $\angle PTA = 30^\circ$. Find the length of segment AT.



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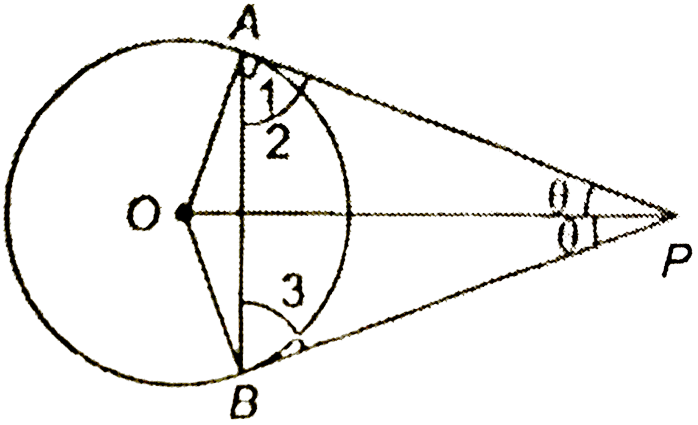
19. In the given figure, OP is equal to the diameter of the circle. Prove that $\triangle ABP$ is an equilateral triangle.



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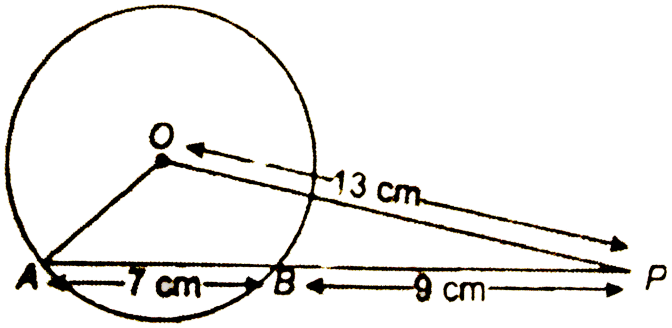
20. In the given figure, OP=13 cm, AB=7 cm and BP=9 cm. Find the radius of the circle.



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21. If from an external point B of a circle with centre O, two tangents BC and BD are drawn

such that $\angle DBC = 120^\circ$, prove that $BC + BD = BO$.

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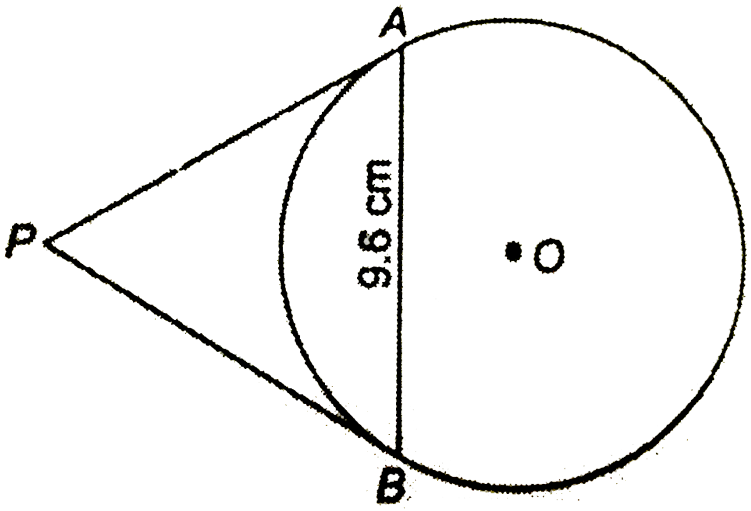
22. In the adjoining figure, AB is a chord of length 9.6 cm of a circle with centre O and radius 6 cm. The tangents at A and B intersect

at P. Find the length of PA.



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23. The radii of two concentric circles are 13 cm and 8 cm. AB is a diameter of the bigger circle.

BD is a tangent to the smallest circle touching it at D. Find the length AD.

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Problems From Ncert Exemplar

1. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle.

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2. If a,b,c are the sides of a right triangle , where c is the hypotenuse. Prove that the radius r of the circle which touches the sides of the triangle is given by:$r = \frac{a + b - c}{2}$

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3. XY and $X'Y'$ are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and $X'Y'$ at B. Prove that $\angle AOB = 90^0$

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4. A triangle ABC is drawn to circumscribe a circle of radius 4 cm such that the segments BD and DC into which BC is divided by the point of contact D are of lengths 8 cm and 6 cm respectively. Find the sides AB and AC.

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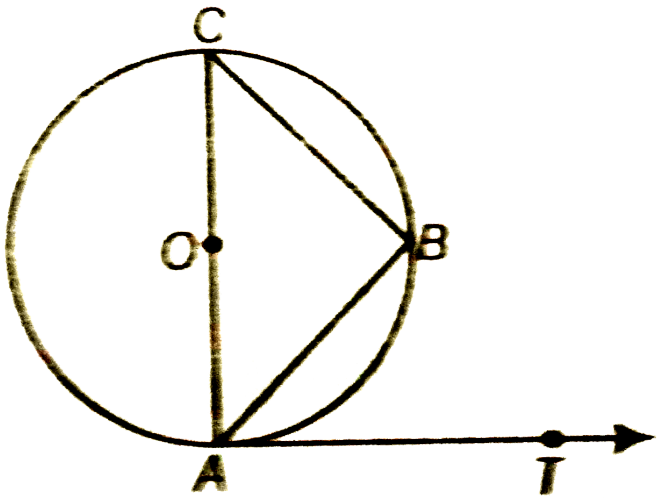
5. If AB is chord of a circle with centre O, AOC is a diameter and AT is the tangent at A as

shown in figure. Prove that $\angle BAT = \angle ACB$.



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6. Two circles with centres O and O' of radii 3 cm and 4 cm, respectively intersect at two points P and Q such that OP and O'P are

tangents to the two circles. Find the length of common chord PQ.

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7. AB is a diameter and AC is a chord of a circle with centre with centre O such that $\angle BAC = 30^\circ$. The tangent at C intersects extended AB at a point D. Prove that BC=BD.

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8. In figure, AB is a chord of the circle and AOC is the diameter such that $\angle ACB = 50^\circ$. If AT is the tangent to the circle at the point A, then angleBAT is equal to : (a) 45° , (b) 60° , (c) 50° , (d) 55°

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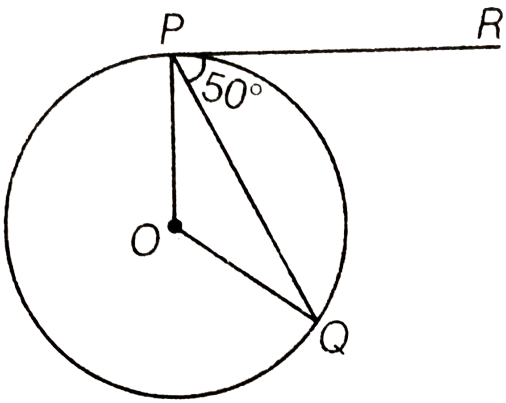
9. In figure, if O is the centre of a circle, PQ is a chord and the tangent PR at P makes an

angle of 50° with PQ, then $\angle POQ$ is equal to



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10. If a hexagon ABCDEF circumscribe a circle, prove that

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

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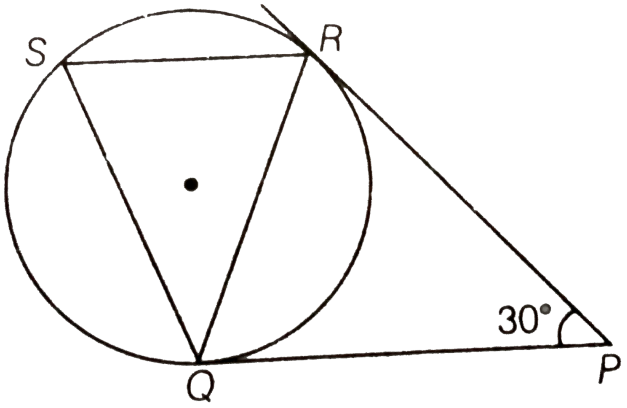
11. In figure, tangents PQ and PR are drawn to a circle such that $\angle RPQ = 30^\circ$. A chord RS is drawn parallel to the tangent PQ. Find the $\angle RQS$.



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Exercise

1. The radius of a circle is 8 cm. Calculate the length of a tangent drawn to this circle from a point oat a distance of 10 cm from its centre.

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2. From a point P which is at a distance of 13 cm from the center O of a circle of radius 5 cm, the pair of tangents PQ and PR to the

circle is drawn. Then, the area of the quadrilateral $PQOR$ is

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3. Two circles touch each other internally. Show that the tangents drawn to the two circles from any point on the common tangent, are equal in length.

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4. Two concentric circles are of radii 13 cm and 5 cm. Find the length of the chord of the larger circle which touches the inner circle.

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5. If the sides of a quadrilateral ABCD touch a circle prove that

$AB + CD = BC + AD.$

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6. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

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7. From a point P outside a circle, with centre O, tangents PA and PB are drawn. Prove that

(i) $\angle AOP = \angle BOP$

(ii) OP is the $\perp$ bisector of chord AB.

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8. $\triangle ABC$ is an isosceles triangle in which AB=AC, circumscribed about a circle. Prove that the base is bisccted by the point of contact.

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9. Tangents AP and AQ are drawn to a circle, with centre O, from an exterior point A.

Porve that :

$\angle PAQ = 2\angle OPQ$

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10. PQR is a right angled triangle at Q with QR =12 a=cm and PQ=5cm. A circle with centre O is inscribed in $\triangle PQR$. Find the radius of the circle.

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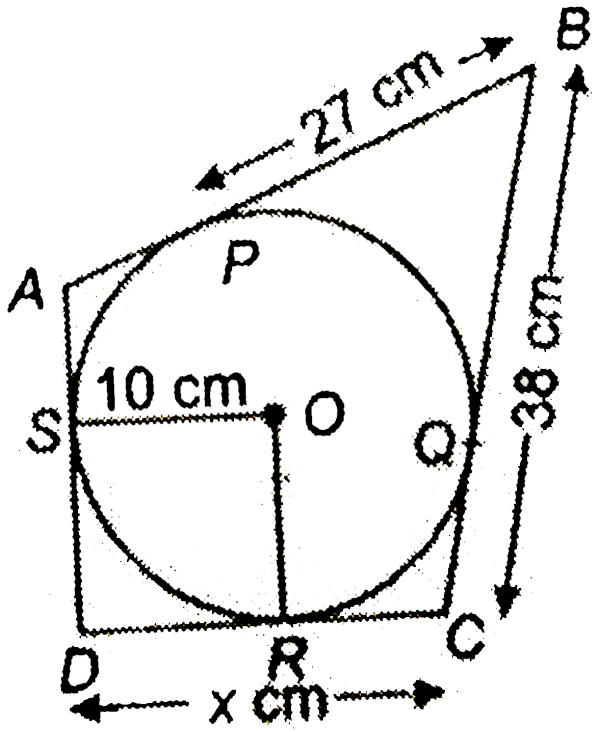
11. In the given figure quadrilateral ABCD is circumscribed and $AD \perp DC$. Find x if radius

of circle is 10 cm.



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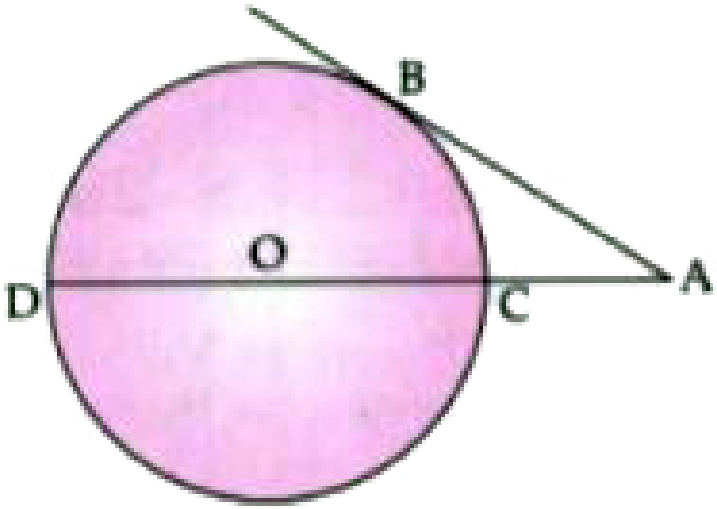
12. In the given figure O is the centre of the circle and AB is a tangents at B. If AB = 15 cm and AC = 7.5 cm. Calculate the radius of the circle.



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13. From a point P, two tangents PA and PB are drawn such that PA=10 cm and $\angle APB = 60^\circ$. Find the length of chord AB.

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14. From an external point P, tangents PA and PB are drawn to a circle. CE is a tangent to the circle at D which intersect PA and PB at point E and C respectvely. If AP=15 cm, find the permeter of the $\triangle PEC$.

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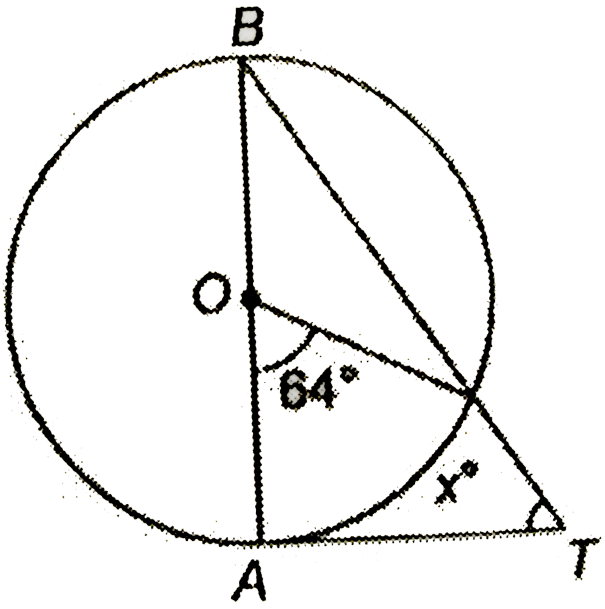
15. In the giben figure, AB is the diameter of the circle, with centre O and AT is the tangent. Calculate the calue of x.



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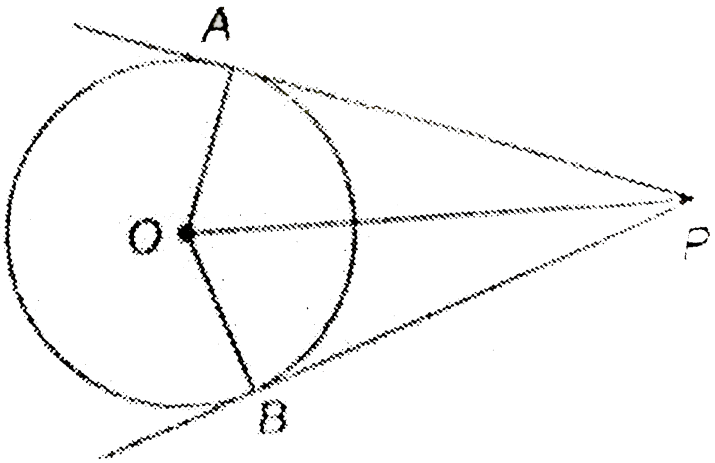
16. In the given figure, PA and PB are tangents to a circle with centre O. Prove that $\angle APB$ and $\angle AOB$ are supplementary.



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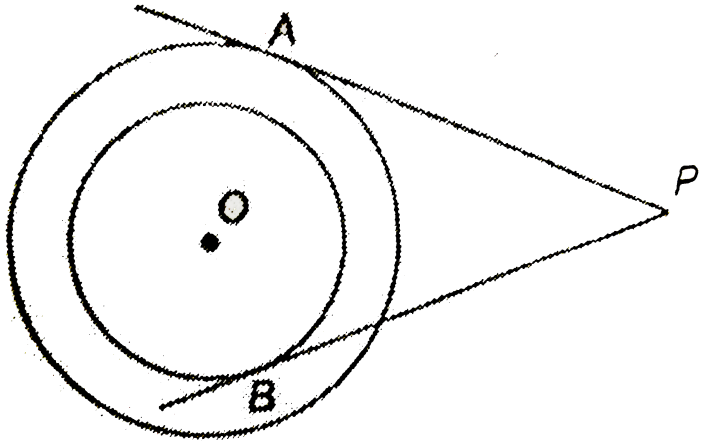
17. In the given figure two concentric circles with centre O are of radii 5 cm and 3 cm. From an external point P, tangents PA and PB are drawn to these circles. If AP =12 cm find BP.



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18. In quadrilateral ABCD angled $D = 90^\circ$, BC=38cm and DC=25cm. A circle is inscribed in this quadrilateral which touches AB at point Q such that QB=27cm. Find the radius of the circle.

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19. Two tangent segments BC and BD are drawn to a circle with centre O and radius r

such that $\angle DBC = 120^\circ$. Prove that $BO = 2BC$.

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20. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

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21. Prove that in two concentric circles, the chord of the larger circle, which touches the

smaller circle, is bisected at the point of contact.

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22. Prove that the line segment joining the points of contact of two parallel tangents passes through the centre.

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23. Prove that the opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centres of the circle.

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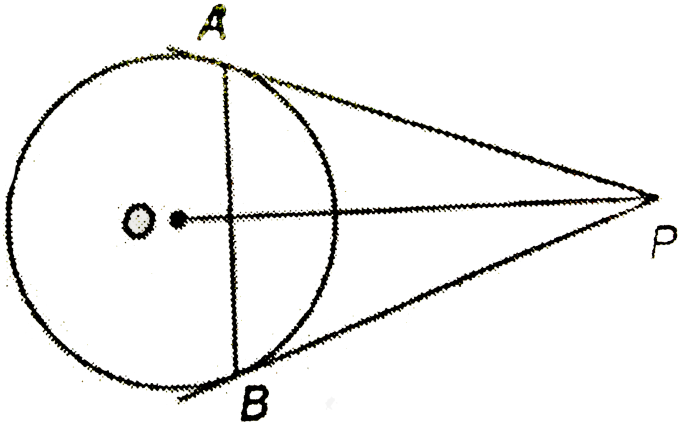
24. From a point P, two tangents PA and PB are drawn to a circle with centre O and radius r. If

OP=2r, show that $\triangle APB$ is equilateral.



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25. The incircle of an isoceles triangle ABC, with AB=AC, touches the sides AB,BC and CA at D,E and F respecrively. Prove that E bisects BC.

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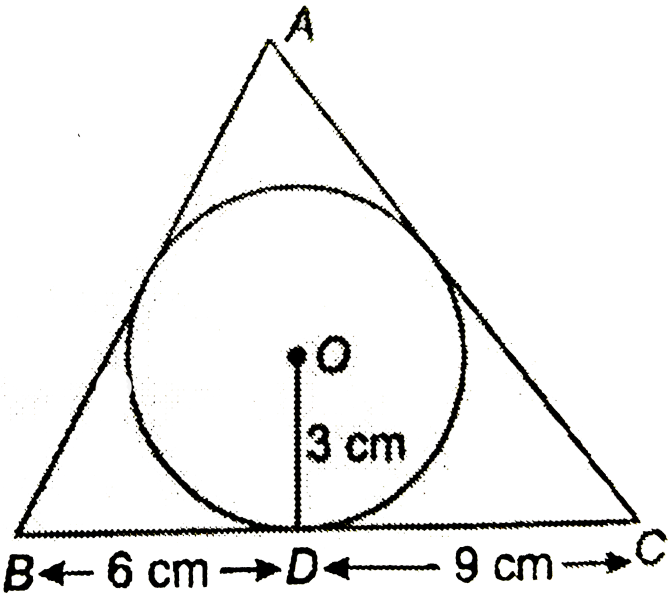
26. In the given figure, a triangle ABC is drawn to circumscribe a circle of radius 3 cm such that the segments BD and DC are of lengths 6 cm and 9 cm respectively. If the area of $\triangle ABC = 54cm^2$, then find the lengths of

sides AB and AC. ltBRgt



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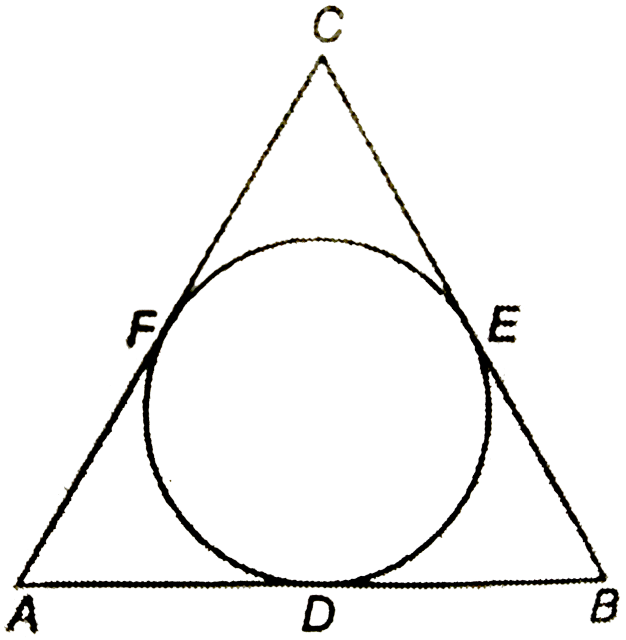
27. A circle is inscribed in a $\triangle ABC$ having sides 8 cm, 10 cm and 12 cm as shown in figure.

Find AD, BE and CF.



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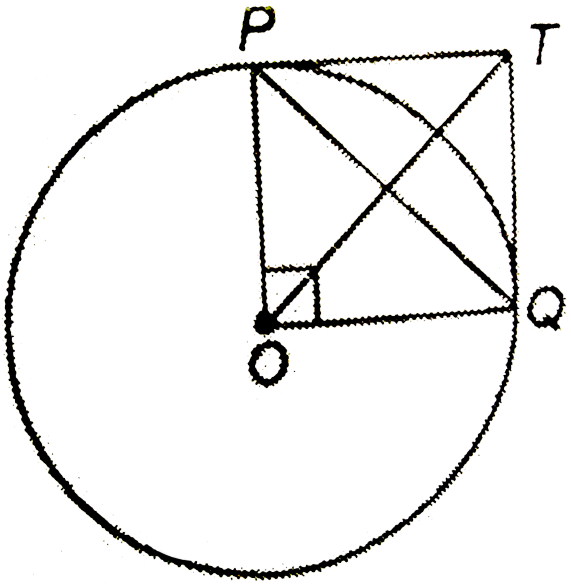
28. In the figure, $PO \perp QO$. The tangents to the circle with centre O at P and Q intersect at

a point T. Prove that PQ and OT are right bisectors of each other.



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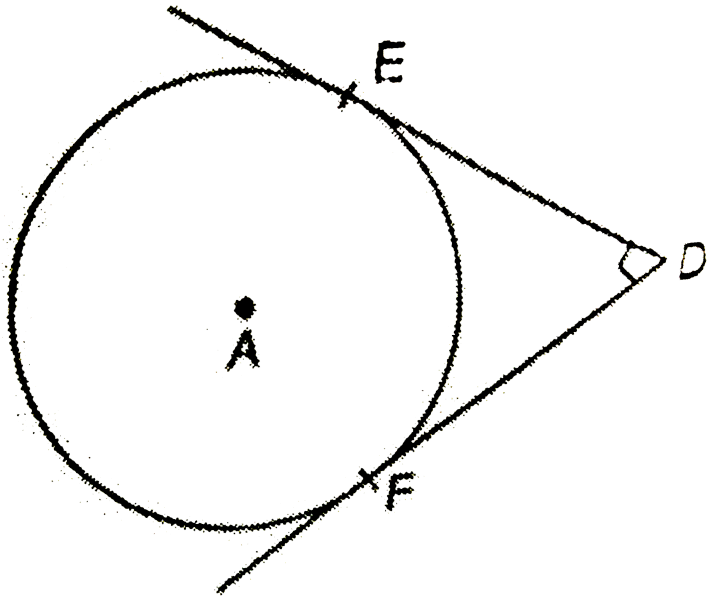
29. In figure, DE and DF are tangents from an external point D to a circle with centre A. If DE = 5 cm and $DE \perp DF$, then find the radius of the circle.



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30. In a hexagon ABCDEF circumscribe a circle, prove that $AB + CD + EF = BC + DE + FA.$

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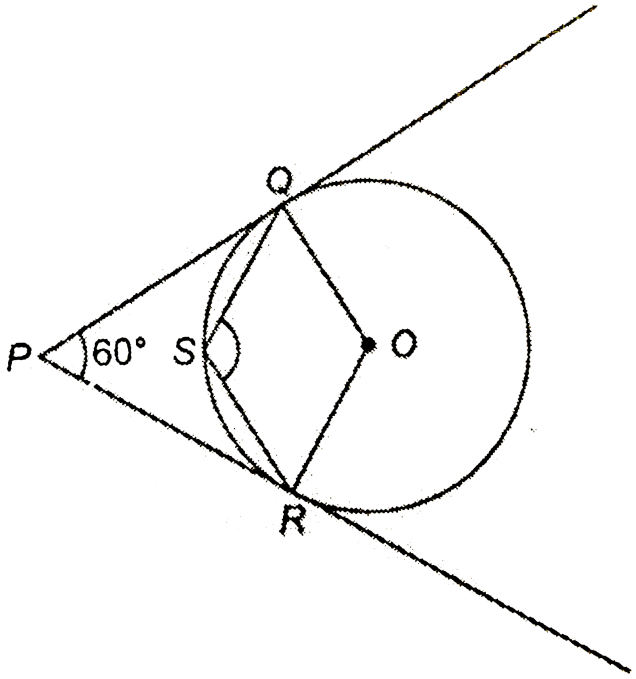
31. In figure, determine the measure of $\angle QSR,$ where O I the centre of the circle.



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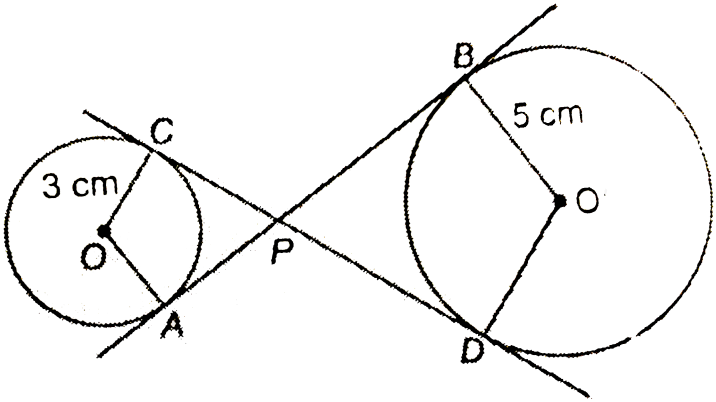
32. In figure, CPD and APB are common tangents to the two circles with centres O and O'. The radii of the two circles are 3 cm and 5

cm respectively. If $AP:PB=1:3$ and $CP=4cm$. Find the length of PB and OO'.



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Revision Exercise Very Short Answer Question

1. In a circle of radius 7 cm, tangent PT is drawn from a point P such tht PT= 24 cm. If O is the centre of circle, then find the length of OP.

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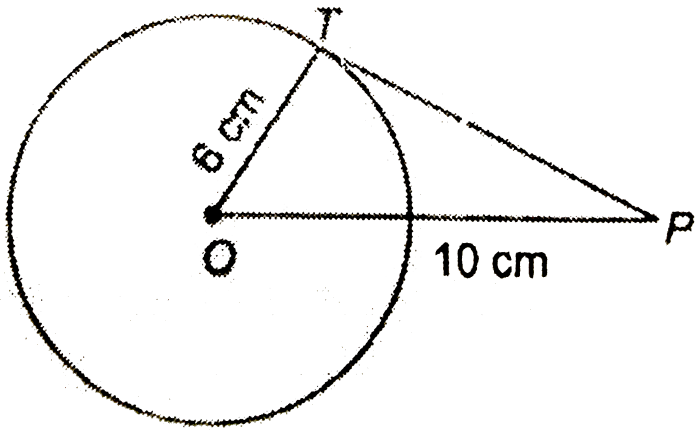
2. In the given figure, PT is a tangent to the circle with centre O. If OT=6cm and OP=10cm,

thcn find the length of tangent PT.



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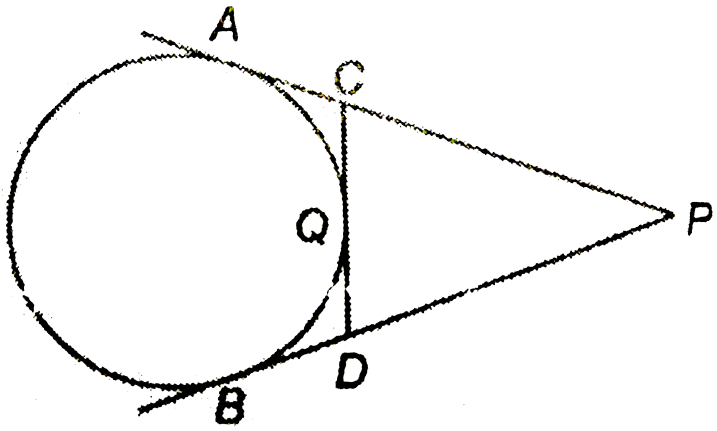
3. In the given figure PA and PB are tangents to the circle drawn from an external point P. CD is a third tangent touching the circle at Q. If PB=10cm and CQ=2cm. What is the length of

PC?



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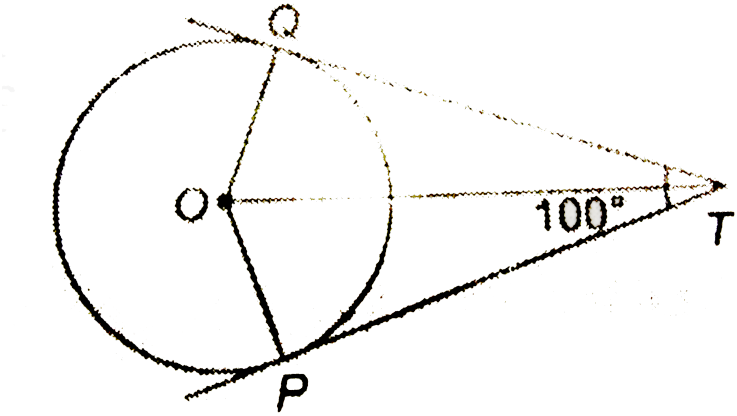
4. Two tangents TP and TQ are drawn from an external point T to a circle with centre O as shown in figure. If they are inclined to each other at an angle of 100°, then what is the

value of $\angle POQ$?



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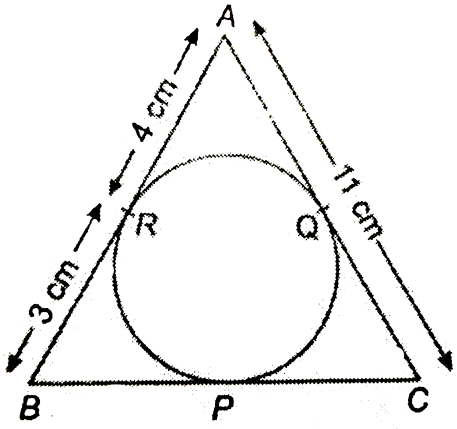
5. In the given figure $\triangle ABC$ is circumscribing a circle. Find the length of BC.

Given AR=4cm, RB=3cm and AC=11cm.



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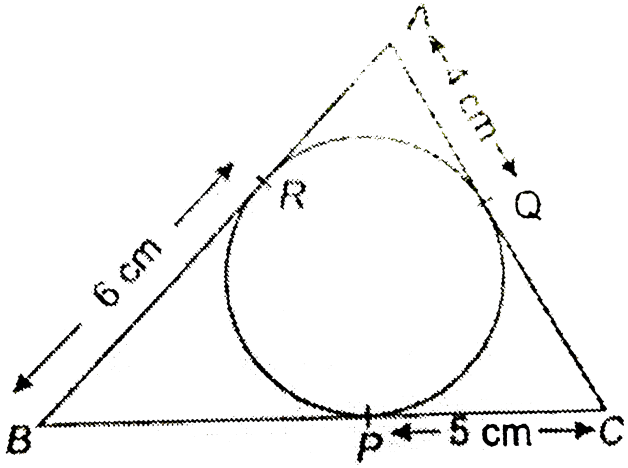
6. In the given figure find the perimeter of $\triangle ABC$.



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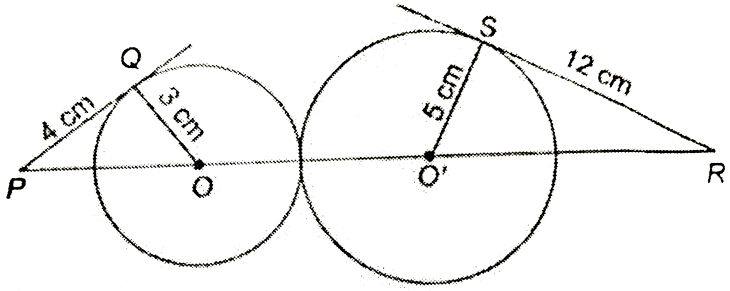
7. In the given figure find the length of PR.

Given $PQ = 4cm, O3cm, O'S = 5cm$ and

$SR = 12cm.$



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Revision Exercise Short Answer Questions

1. Two concentric circles are of radii 5 cm. and 3 c. Find the length of the chord of the larger circle which touches the cmaller circle.

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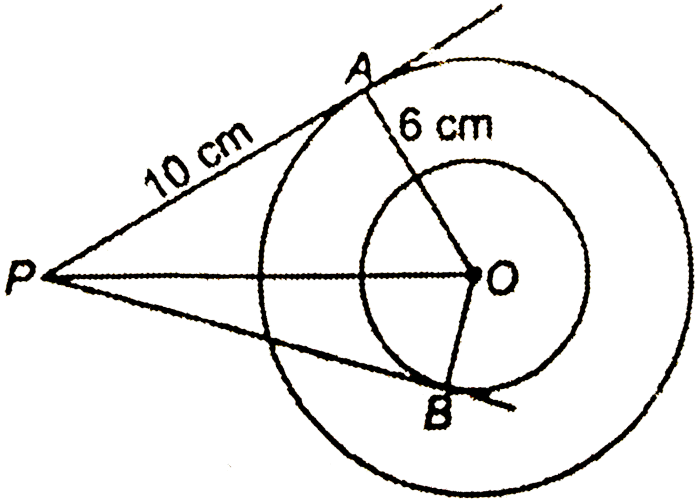
2. In the given figure if $AP = 10cm$. Find BP.

Given $OA = 6cm$ and $OB = 3cm$.



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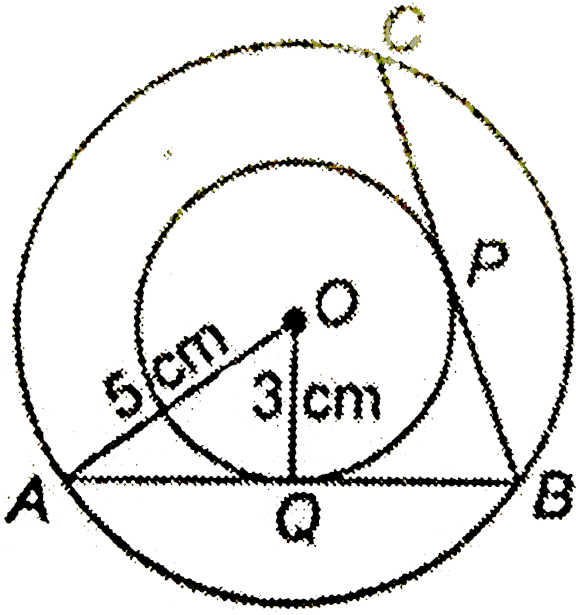
3. Two concentric circle of radii $3cm$ and $5cm$ are given. Find the chord BC which touches the inner circle at P.



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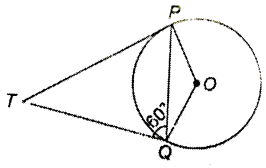
4. In the given figure, TP and TQ are tangents drawn from an external point T to a circle with centre O such that $\angle TQP = 60^\circ$. Find `angelOPQ.



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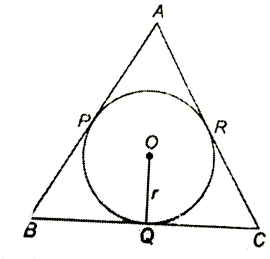
Revision Exercise Long Answer Questions

1. In the given figure the sides AB, BE and CA of triangle ABC touch a circle with centre O and radius r at P,Q and R respectively.

Prove that : $(i) AB + CQ = AC + BQ$



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2. Prove that the tangents at the extremities of any chord make equal angles with the chord.

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

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Long Answer Questions

1. The radii of two concentric circles are 13 cm and 8 cm. AB is a diameter of the bigger circle. BD is a tangent to the smallest circle touching it at D. Find the length AD.

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2. Two circles with centres $AandB$ of radii $3cmand4cm$ respectively intersect at two points $CandD$ such that $ACandBC$ are

tangents to the two circles. Find the length of the common chord CD.

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