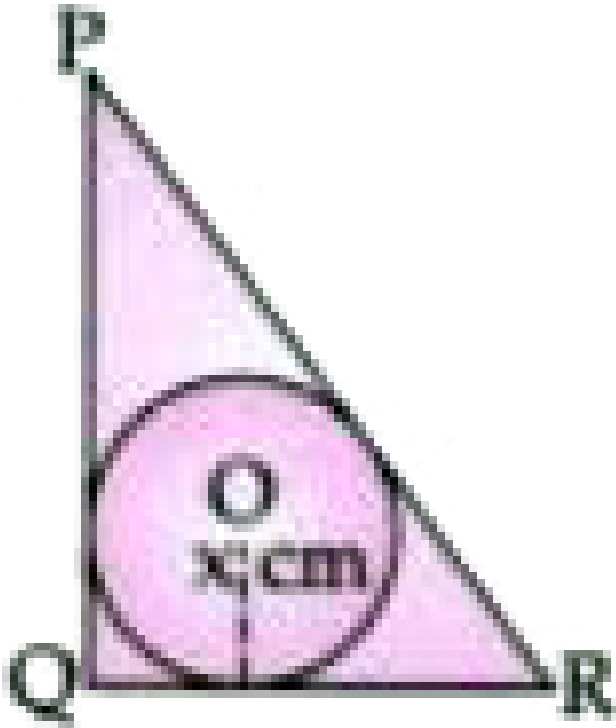# MATHS

BOOKS - SELINA MATHS (ENGLISH)

TANGENTS AND INTERSECTING CHORDS

Questions

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1. In triangle PQR, PQ = 24 cm, QR = 7 cm and $\angle PQR = 90°$. Find the radius of the

inscribed circle.
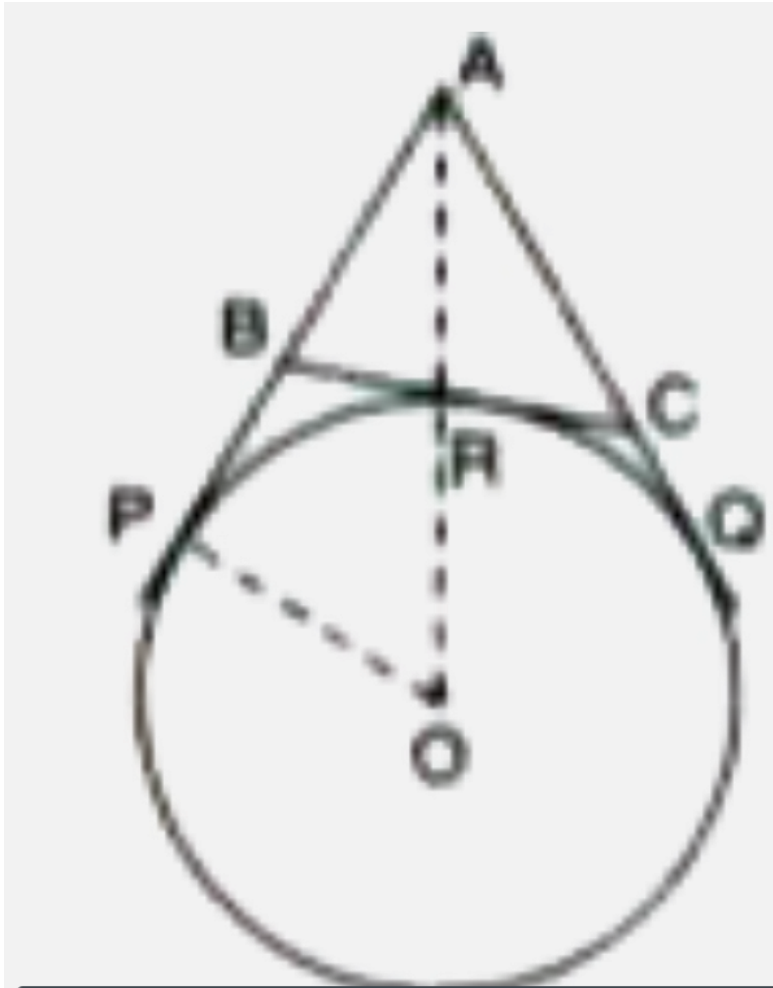

A. 3 cm

B. 5 cm

C. 6 cm

D. 8 cm

Answer: A

2. In the given figure AP and AQ are tangents to the circle with centre O. BC is tangent at point R on it.

If OA=17 cm and radius of the circle =8cm, find

the perimeter of the triangle ABC.

A. 20 cm

B. 35 cm

C. 30 cm

D. 40 cm

Answer: C

3. A,B and C are three points on a circle. The tagent at C meets BA produced at T. Given thate $/ + ATC = 36°$ and that $\angle ACT = 48°$, calculate the angle subtended

by AB at the centre of the circle.

4. P and Q are centres of circles of radii 9 cm and 2 cm respectively. PQ = 17 cm. R is the centre of a circle of radius x cm which touches the above circles externally. Given that $\angle PRQ = 90°$, write an equation in x and solve it.

A. x=6

B. x=7

C. x=8

D. x=9

Answer: A

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5. Two circles with radii 25 cm and 9 cm touch each other externally. Find the length of the direct common tangent.

A. 32 cm

B. 50 cm

C. 40 cm

D. 30 cm

Answer: D

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6. The centres of two circles with radii 6 cm and 2 cm are 10 cm apart. Calculate the length of the transverse common tangent.

A. 5cm

B. 6cm
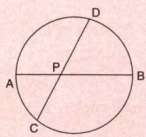
C. 7cm

D. 2cm

Answer: B

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7. In the figure given alongside PQ=QR, $\angle RQP = 68°$, PC and QC are tangents to the circle with centre O. Calculate the values of (i)

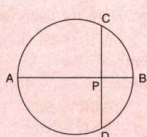$\angle QOP$ (ii) $\angle QCP$.

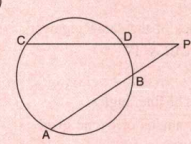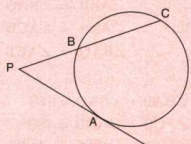> ▶ **Watch Video Solution**

8. From each of the folloiwng figures, find the value of x.

(i)

PA = 4 cm, PB = 6 cm,
PC = 5 cm and PD = x cm

and

(ii)

PA = 2PB = 12 cm
PC = PD = x cm

(iii)

AB = 10 cm, PB = 6 cm,
CD = x cm and PD = 4 cm

(iv)

PA = 20 cm, PB = 16 cm
and BC = x cm.

A. 5 cm, $6\sqrt{3}cm$, $21cm$, $9cm$

B. 4.8 cm, $6\sqrt{2}cm$, $20cm$, $9cm$

C. 7.8 cm, $5\sqrt{2}cm$, $20cm$, $9cm$
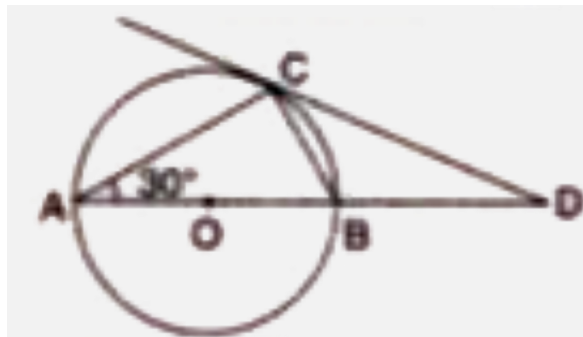
D. 4.8 cm, $6\sqrt{2}cm$, $19cm$, $10cm$

Answer: B

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9. In the given figure AB is the diameter and AC is the chord of a circle such that $\angle BAC = 30°$. The tangent at C intersects AB
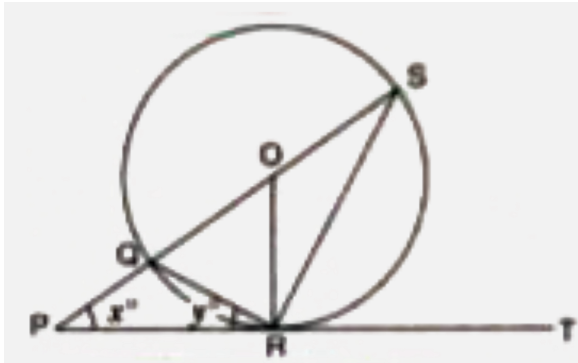
produced at D. Prove that :BC=BD.

10. In the given figure PT touches a circle with centre O at R. Diameter SQ when produced meets PT at P. If $\angle SPR = x°$ and
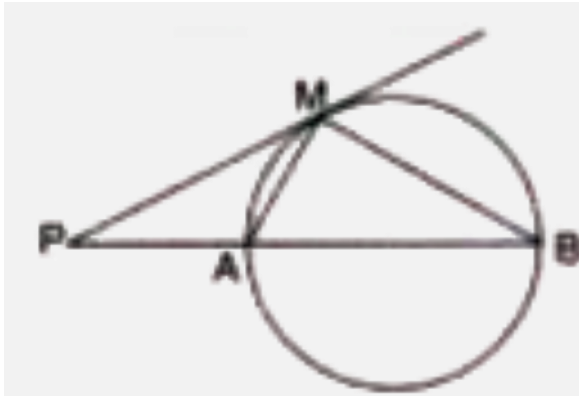
$\angle QRP = y°$, show what $x° + 2y° = 90°$

11. In the given figure PM is a tangent to the circle and PA =AM.

Prove that

(i) ΔPMB is isosceles
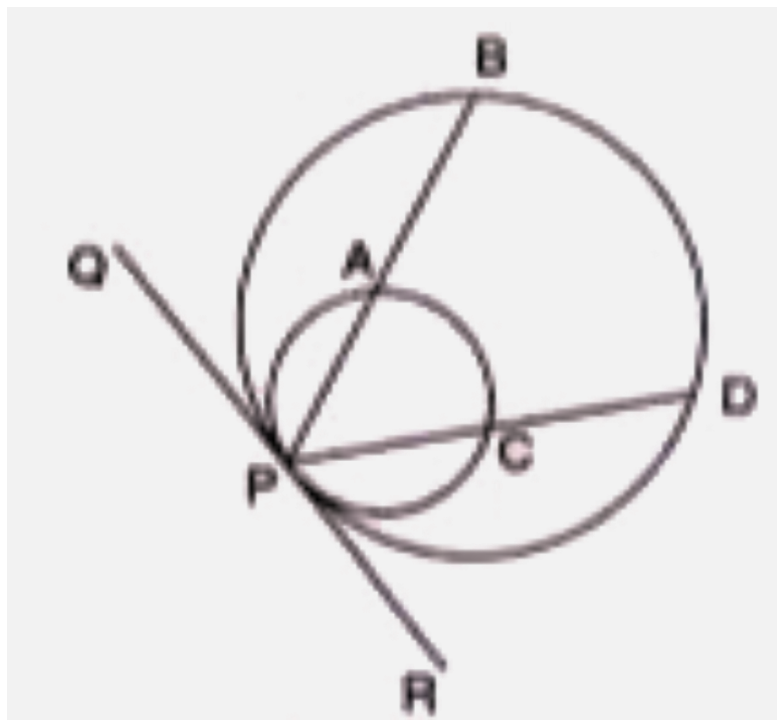
(ii) $PAX x PB = MB^2$

12. Two circles touch each other internally at point P. QPR is the tangent at P, segments PAB and PCD meet circles at points, A,B,C and D as shown in the figure.

Show that chord AC is parallel to chord BD.

13. In a right triangle ABC, a circle with AB as

diameter is drawn to intersect the hypotenuse
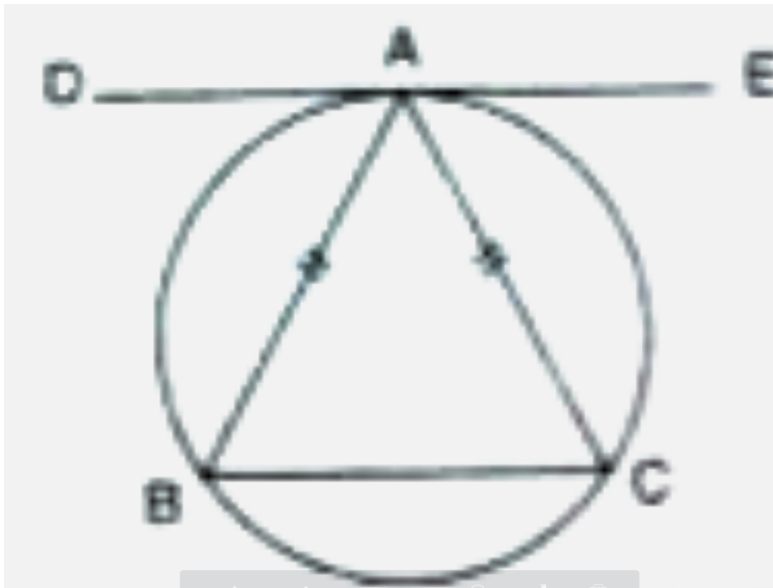
AC in P. Prove that the tangent at P, bisects the side BC.

14. ABC is an isosceles trianlge with AB=AC. A circle through B touches side AC at its middle point D and intersects side AB in point P. Show that $AB = 4 \times AP$.

15. The given figure shows an isosceles triangle ABC inscribed in a circle such that AB=AC. If DAE is a tangent to the circle at point A, prove that DE is parallel to BC.

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16. AB is the diameter of a circle with centre O. A line PQ touches the given circle at point R and cuts the tangents to the circle through A and B at points P and Q respectively. Prove that $\angle POQ = 90°$

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Exercise 18 A

1. The radius of a circle is 8 cm. Calculate the length of a tangent drawn to this circle from a

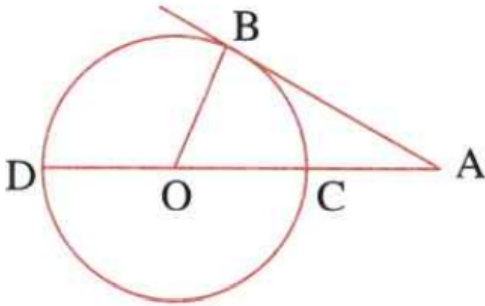point oat a distance of 10 cm from its centre.

A. 7cm

B. 5cm

C. 6cm

D. 4cm

Answer: C

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2. In the given figure, O is the centre of the

circle ans AB is a tangent at B. If AB=15 cm and

AC=7.5cm, calculate the radius of the circle.
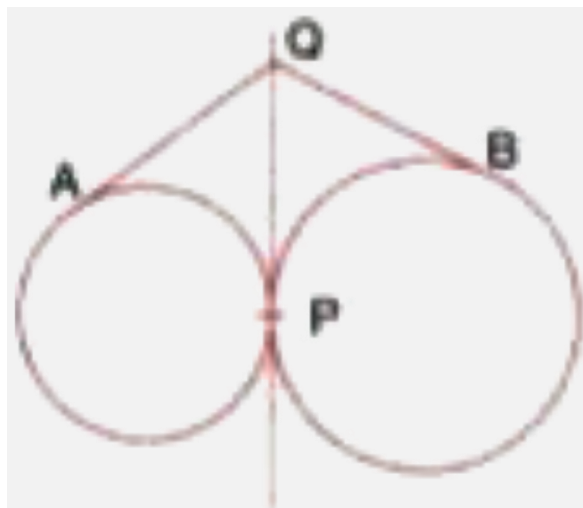
A. 14.5cm

B. 8.55cm

C. 9.5cm

D. 11.25cm

Answer: D

3. Two circles touch each other externally at point P. Q is a point on the common tangent through P. Prove that the tangents QA and QB

are equal.

4. 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.

5. 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.

A. 8cm

B. 5cm

C. 7cm

D. 9cm

Answer: A

6. Three circles touch each other externally. A triangle is formed when the centres of these circles are joined together. Find the radii of the circles, if the sides of the triangle formed are 6 cm, 8 cm and 9 cm.

A. 4.2cm,2.5cm and 5.8 cm

B. 4.5cm,2.5cm and 7.5 cm
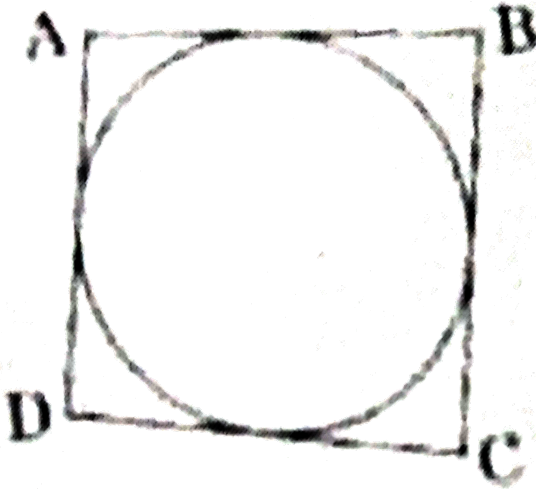
C. 3.5cm,2.5cm and 5.5 cm

D. 3.5cm,12.5cm and 7.5 cm

Answer: C

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

$$AB + CD = BC + AD$$

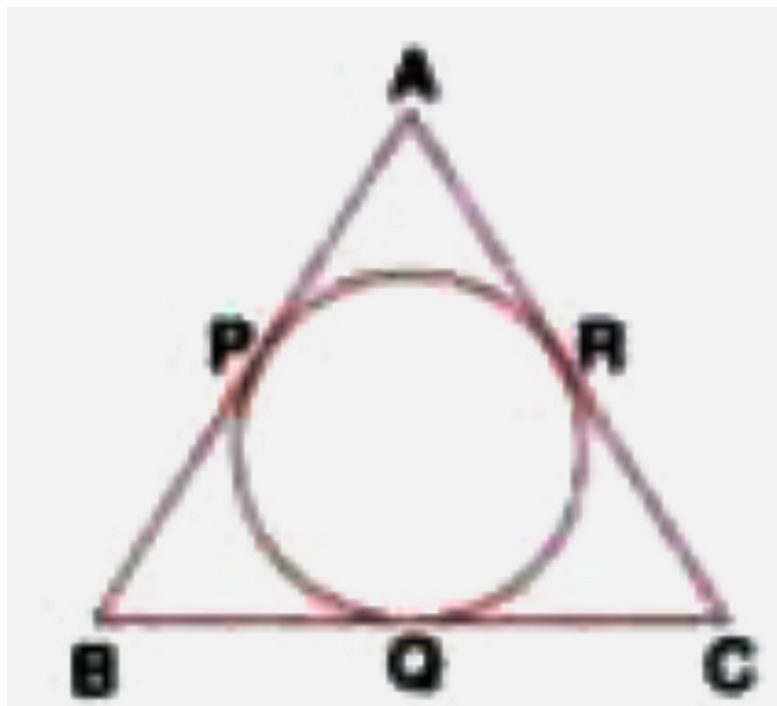**8.** If the sides of a parallelogram touch a circle prove that the parallelogram is a rhombus.

9. From the given figure, prove that :

$$AP + BQ + CR = BP + CQ + AR$$

Also show that

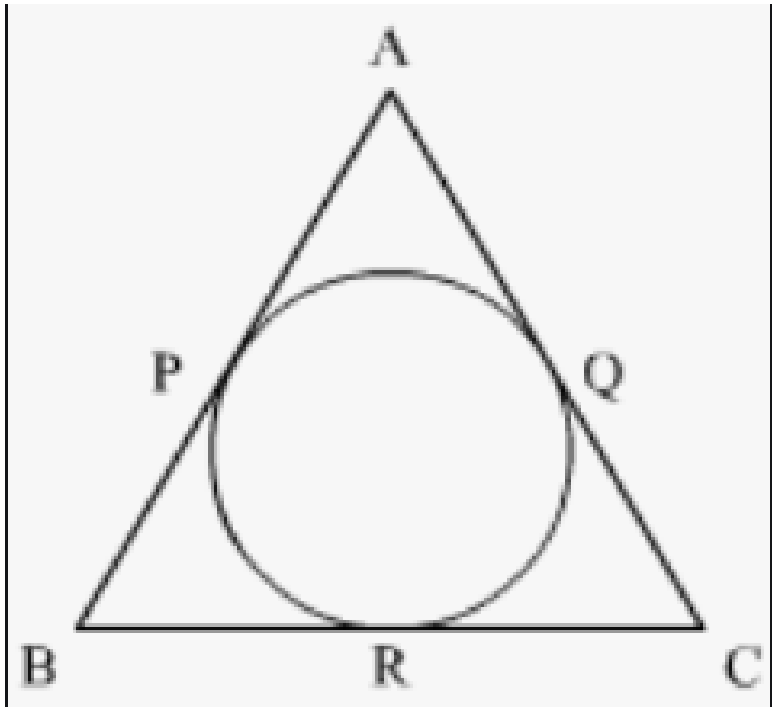$$AP + BQ + CR = \frac{1}{2} \times \text{Perimeter of } \triangle ABC$$

.

10. In the figure if AB=AC then prove that

$$BR = CR$$

11. Radii of two circles are 6.3 cm and 3.6 cm. State the distance between their centres if

(i) they touch each other externally,

(ii) They touch each other internally.

    A. (i) 19.9 cm (ii) 6.7 cm

    B. (i) 9.9 cm (ii) 2.7 cm

    C. (i) 9.5 cm (ii) 8.7 cm

    D. (i) 9.5 cm (ii) 27 cm

Answer: B

12. From a point P outside a circle, with centre O, tangents PA and PB are drawn. Prove that
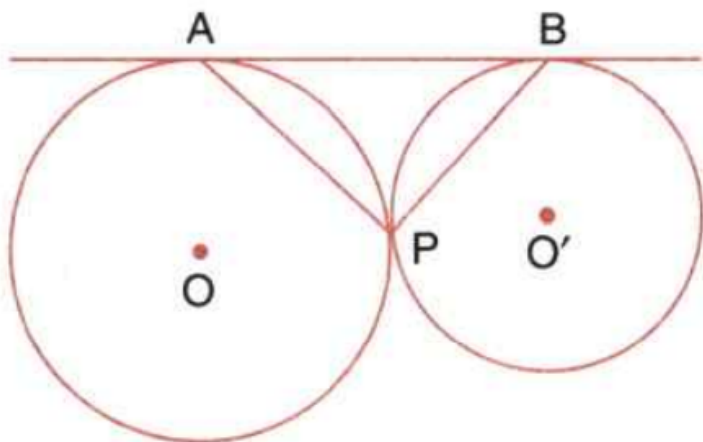
(i) $\angle AOP = \angle BOP$

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

13. In the given figure, two circles touch each other externally at point P. AB is the direct

common tangent of these circles. Prove that:

(i) tangent at point P bisects AB

(ii) angle $APB = 90°$

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

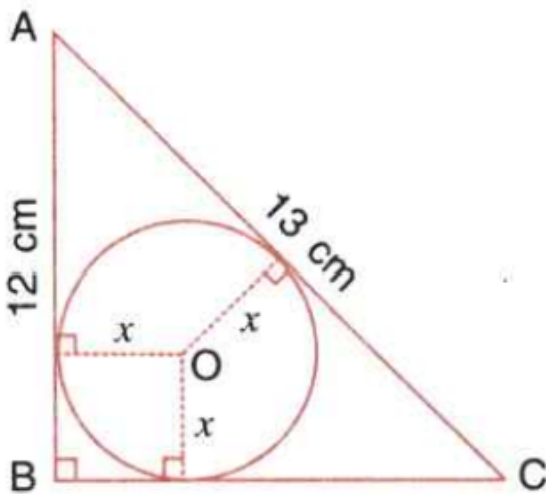Porve that :

$$\angle PAQ = 2\angle OPQ$$

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15. Two parallel tangents of a circle meet a third tangent at points P and Q. Prove that PQ subtends a right angle at the centre.

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16. ABC is a right angled triangle with AB=12 cm and AC=13 cm. A circle, with centre O has been inscribed inside the triangle. Calculate the value of x, the radius of the inscribed circle.

A. 6 cm

B. 5 cm

C. 2 cm

D. 8 cm

Answer: C

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17. In a triangle ABC, the incircle (centre O) touches BC , CA and AB at points P,Q and R respectively. Calculate:

(i) $\angle QOR$ (ii) $\angle QPR$

given that $\angle A = 60°$

A. (i) $120°$ (ii) $60°$

B. (i) $110°$ (ii) $50°$

C. (i) $145°$ (ii) $80°$

D. (i) $90°$ (ii) $40°$

Answer: A

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18. In the following figure PQ and PR are tangents to the circle with the centre O. If $\angle QPR = 60°$ calculate

(i) $\angle QOR$

(ii) $\angle OQR$

(iii) $\angle QSR$
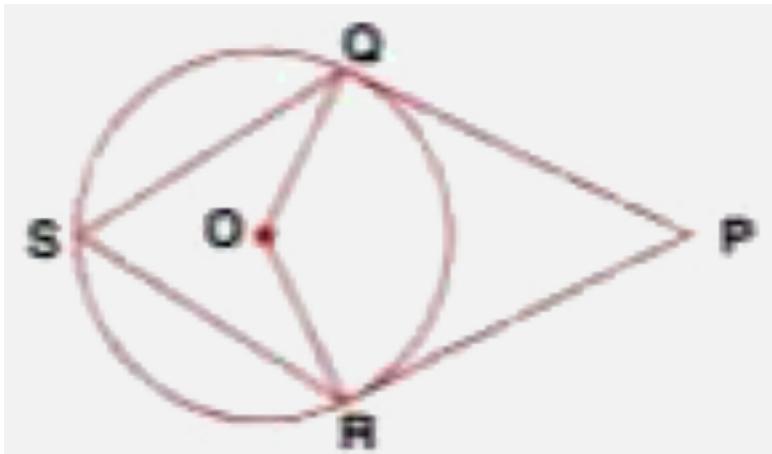
A. (i) $110°$ (ii) $35°$ (iii) $60°$

B. (i) $150°$ (ii) $30°$ (iii) $65°$

C. (i) $120°$ (ii) $30°$ (iii) $60°$

D. None of the above

Answer: C

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19. In the giben figure, AB is the diameter of the circle, with centre O and AT is the tangent.

Calculate the calue of x.
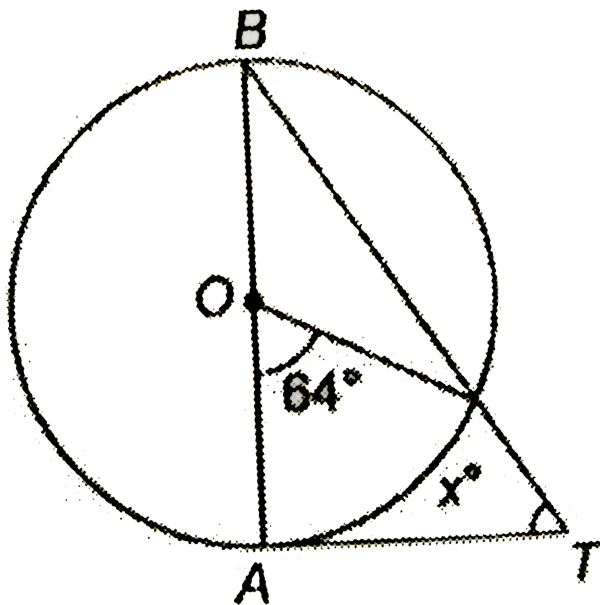
A. 58°

B. 65°

C. 75°

D. 80°

Answer: A

20. In quadrilateral ABCD angled $D = 90°$, 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.

A. 28cm

B. 14cm

C. 35cm

D. 19cm

Answer: B

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21. In the given figure, PT touches the circle with centre O at point R. Diameter SQ is produced to meet the tangent TR at P. Given $\angle SPR = x^{\circ}$ and $\angle QRP = y^{\circ}$, prove that

(i) $\angle ORS = y°$

ii. Write an expression connecting x and y.

22. PT is a tangent to the circle at T.

If $\angle ABC = 70°$ and $\angle ACB = 50°$, calculate:

(i) $\angle CBT$

(ii) $\angle BAT$

(iii) $\angle APT$
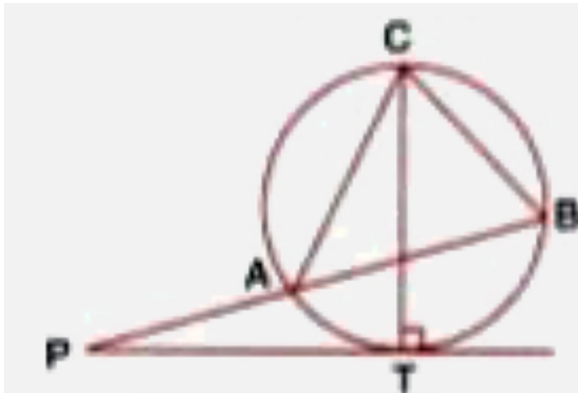
A. (i) $95°$ (ii) $35°$ (iii) $10°$

B. (i) $90°$ (ii) $30°$ (iii) $10°$

C. (i) $105°$ (ii) $35°$ (iii) $10°$

D. (i) $90°$ (ii) $130°$ (iii) $110°$

Answer: B

23. In the given figure, O is the centre of the circumcircle of $\triangle\,ABC$. Tangents at A and C intersect at P. Given angle $AOB = 140°$ and angle $APC = 80°$ find the angle BAC.
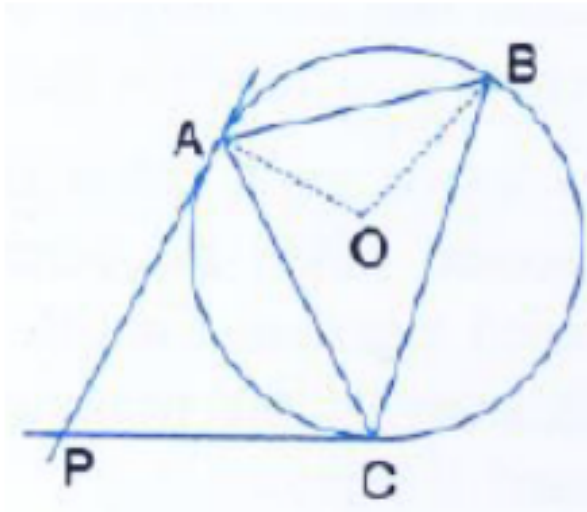
24. In the given PQ is a tangent to the circle at A. AB and AD are bisectors of $\angle CAQ$ and $\angle PAC$. If $\angle BAQ = 30°$, prove that: BD is diameter of the circle.
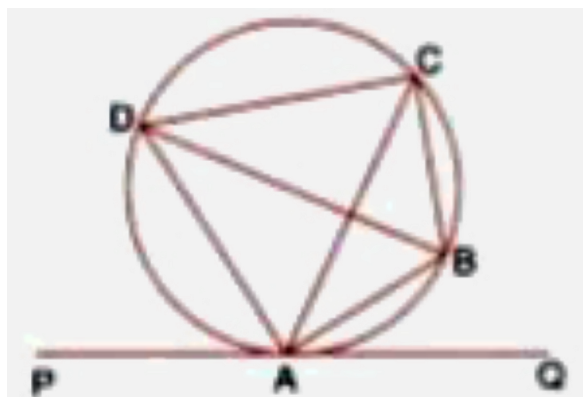
1. In the given figure

$$3 \times CP = PD = 9cm$$

and AP=4.5 cm.

Find BP.
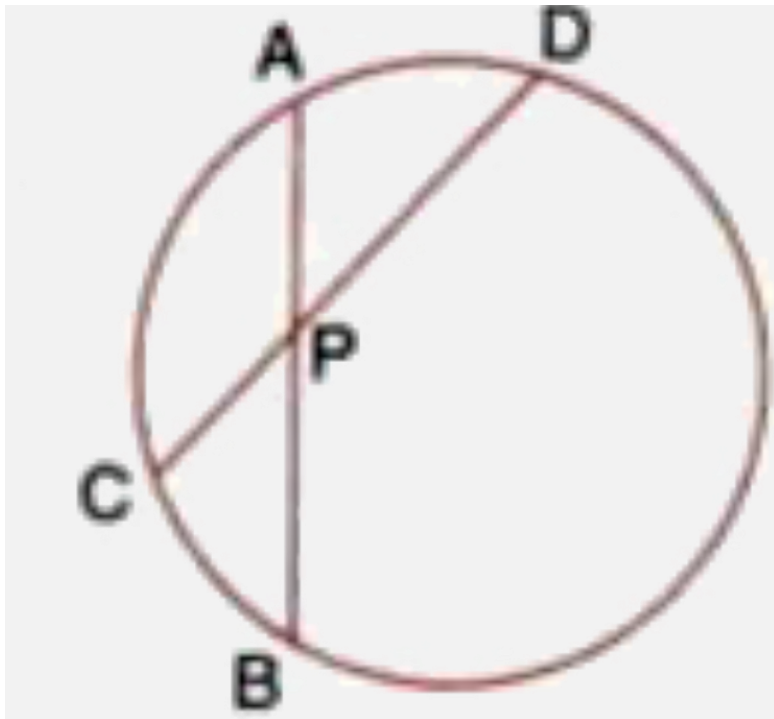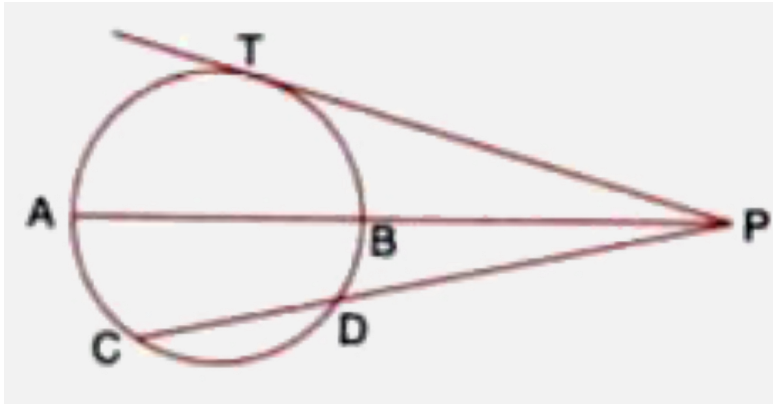
2. In the given figure

$$5XPA = 3XAB = 30cm$$

and PC=4 cm

Find CD.
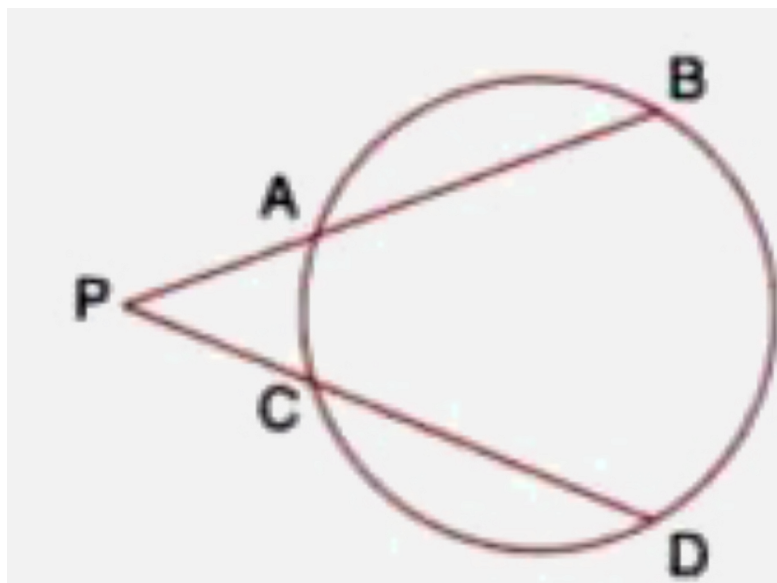
3. In the given figure

tangent PT=12.5 cm and PA=10cm, find AB.
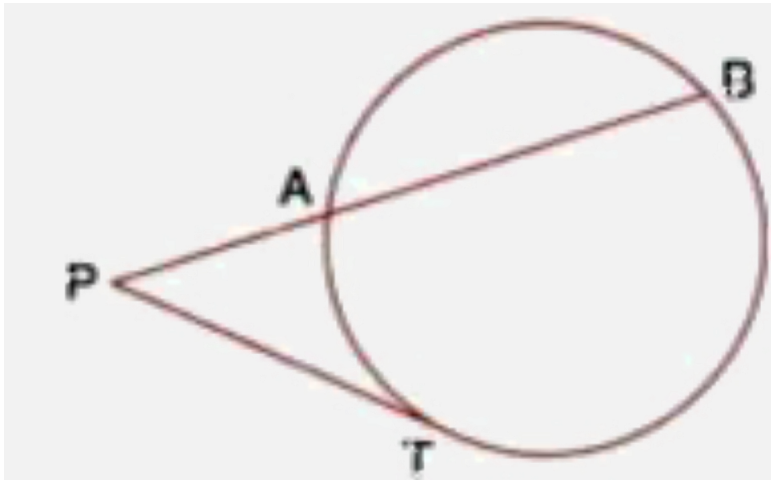
4. In the given figure diameter AB and chord

CD of a circle meet at P.PT is a tangent to

the circle at T.CD=7.8 cm, PD=5 cm, PB=4 cm.

Find :

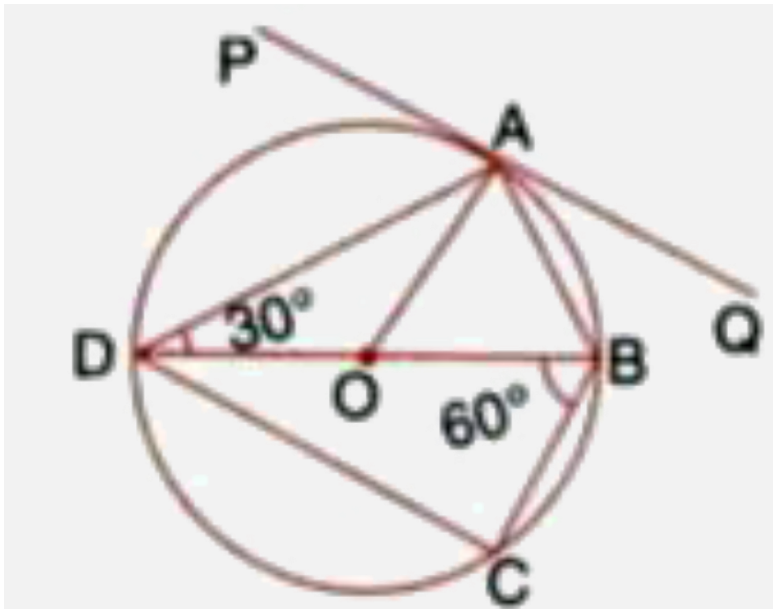(i) AB (ii) the length of tangent PT.

5. In the following figure PQ is the tangent to the circle at A, DB is the diameter and O is the centre of the circle. If $\angle ADB = 30°$ and $\angle CBD = 60°$. Calculate :

(i) $\angle QAB$

(ii) $\angle PAD$

(iii) $\angle CDB$

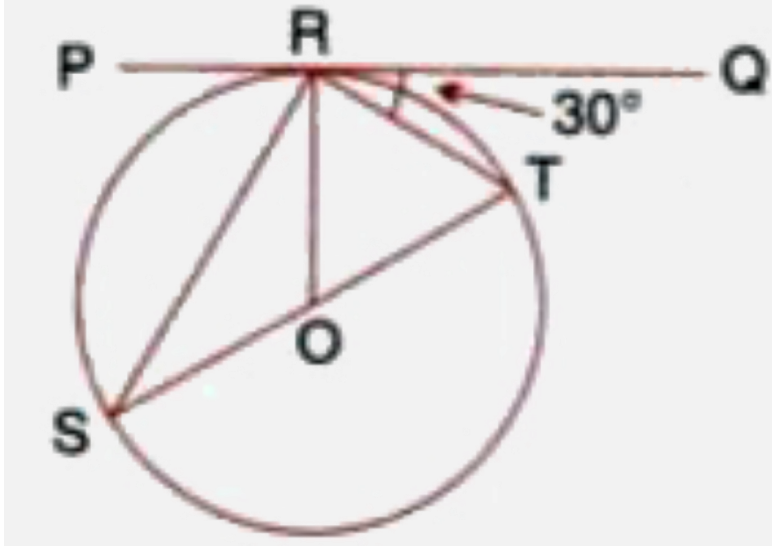**6.** If PQ is a tangent to the circle at R calculate

(i) $\angle PRS$

(i) $\angle ROT$

Given O is the centre of the circle and angle

$TRQ = 30°$

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7. AB is the diameter and AC is a chord of a

circle with centre O such that angle

$BAC = 30°$. The tangent to the circle at C intersects AB produced in D. Show that BC=BD.

8. Tangent at P to the circumcircle of triangle PQR is drawn. If this tangent is parallel to side QR show that $\triangle PQR$ is isosceles.

9. Two circles with centres O and O' are drawn to intersect each other at points A and B. Centre O of one circle lies on the circumference of the other circle and CD is drawn tangent to the circle with centre O' at A. prove that OA bisects angle BAC.
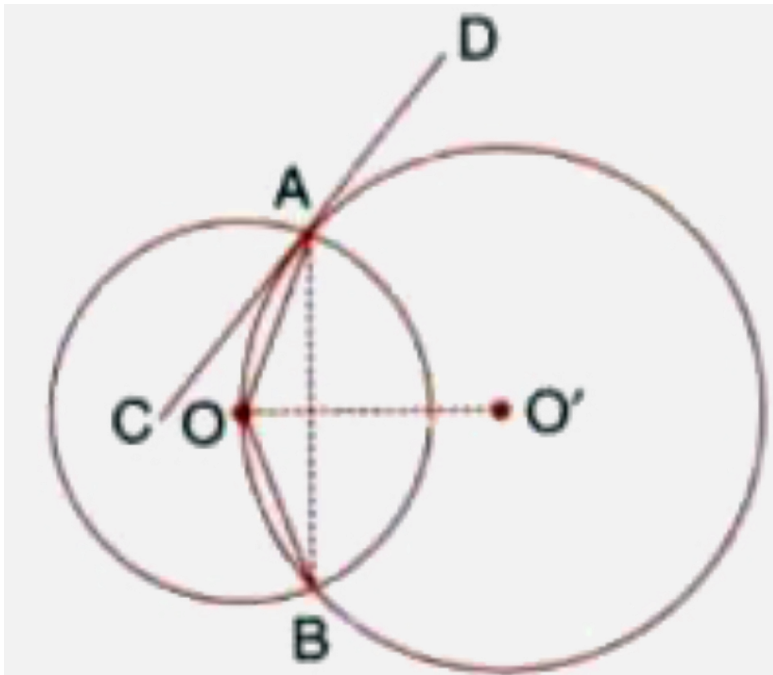
10. In the figure, two circles touch internally at point P. chord AB of the larger circle intersects the smaller circle in C and D. Prove $\angle CPA \cong \angle DPB$.
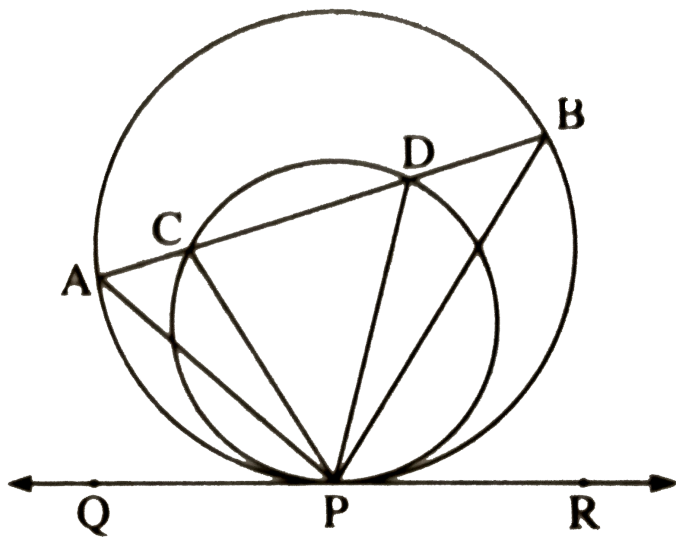
11. In a cyclic quadrilateral ABCD the diagonal AC bisects the angle BCD. Prove that the diagonal BD is parallel to the tangent to the circle at point A.
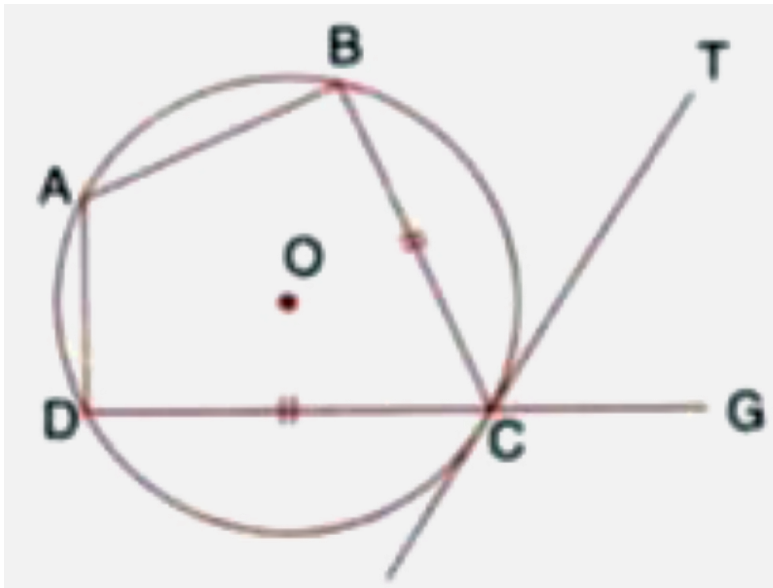
12. In the figure ABCD is a cyclic quadrilateral with BC=CD. TC is tangent to the circle at point

C and DC is produced to point G. If $\angle BCG = 108°$ and O is the centre of the circle find

(i) angle BCT

(ii) angle DOC

13. Two circles intersect each other at points A and B. A straight line PAQ cuts the circles at P and Q. If the tangents at P and Q intersect at point T, show that the points P, B, Q and T are concylic.
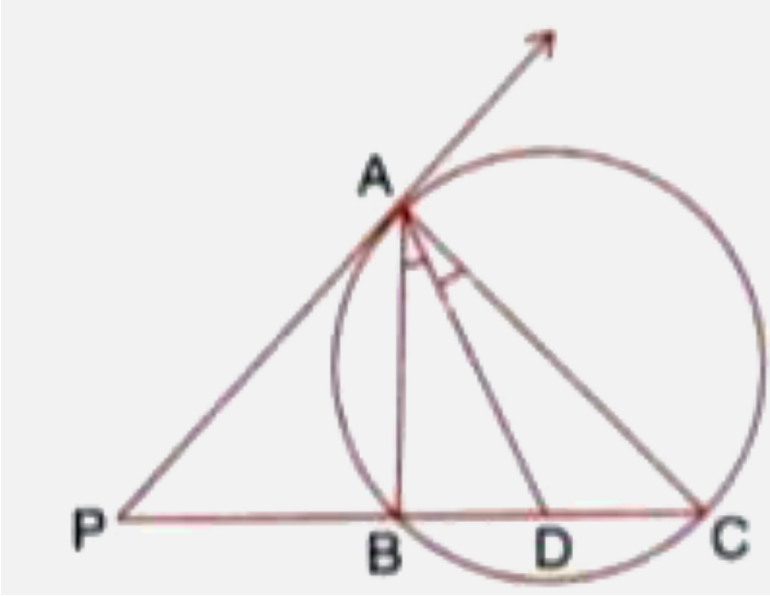
14. In the figure PA is a tangent to the circle, PBC is secant and AD bisects angle BAC.

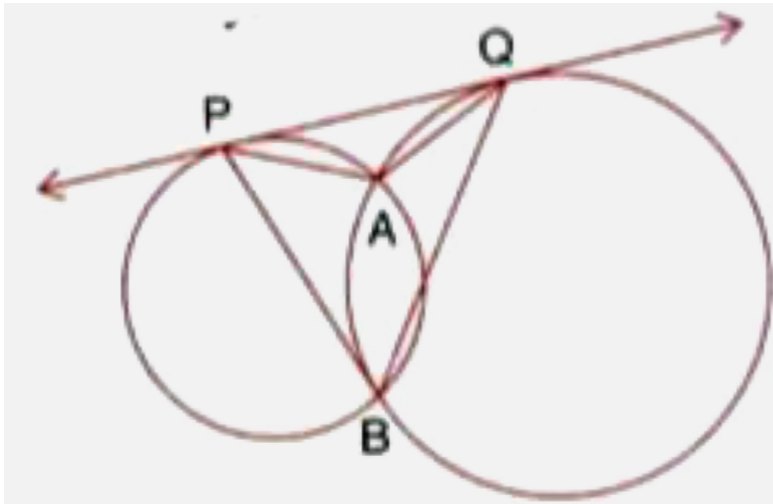Show that triangle PAD is an isosceles triangle. Also, show that:

$$\angle CAD = \frac{1}{2}[\angle PBA - \angle PAB]$$

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15. Two circles intersect each other at point A and B. Their common tangent touches the circles at points P and Q as shown in the

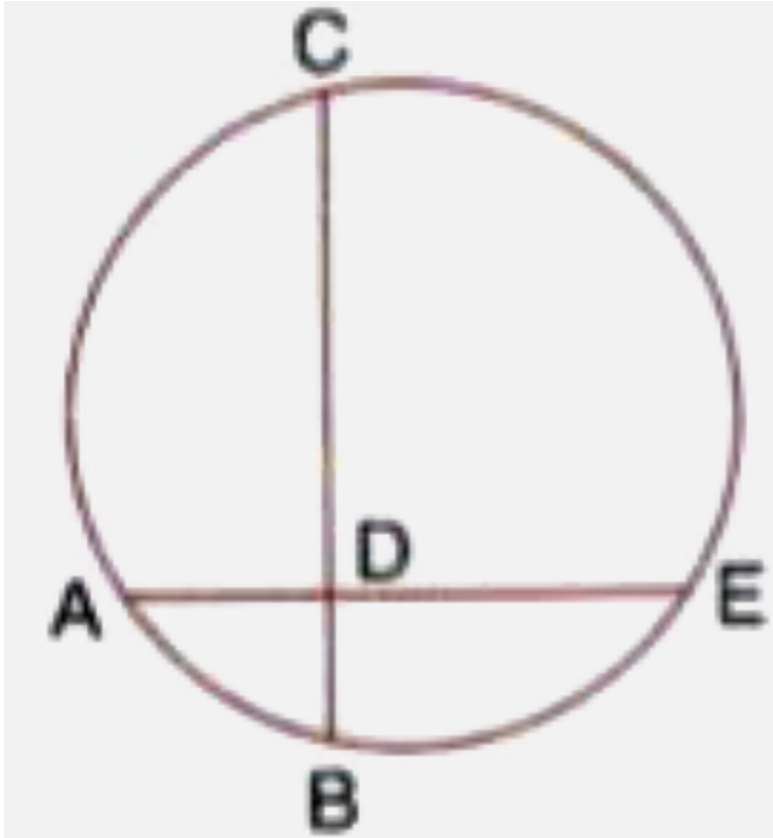figure. Show that the angles PAQ and PBQ are supplementary.

16. In the figure chords AE and BC intersect each other at point D
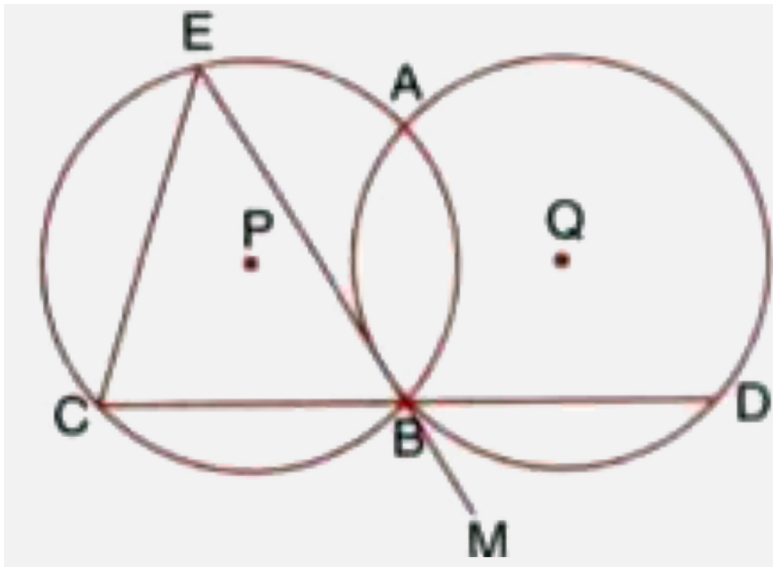
(i) If $\angle CDE = 90°$

AB=5cm

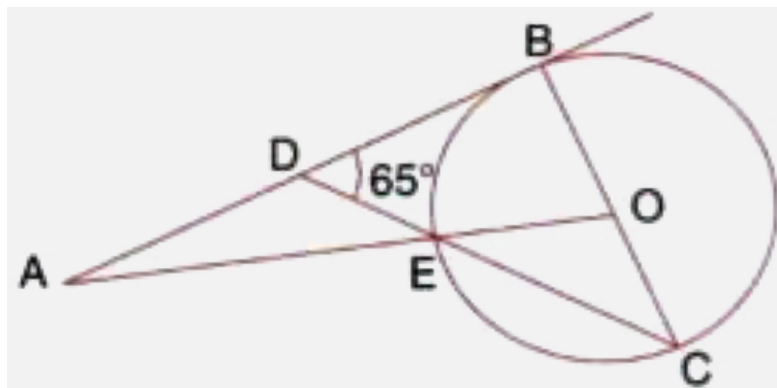BD=4cm and CD=9 cm

find DE

(ii) If AD=BD, show that AE=BC

17. Circles with centres P and Q intersects at points A and B as shown in the figure. CBD is a line segment and EBM is tangent to the circle, with centre Q, at point B. If the circles are congruent, show that : CE = BD.

18. In the adjoining figvure O is the centre of the circle and AB is a tangent to it at point B. $\angle BDC = 65°$. Find $\angle BAO$

Exercise 18 C

1. Prove that , Of any two chords of a circle, show that the one which is nearer to the centre is larger.

2. OABC is a rhombus whose three vertices. A, B and C lie on a circle with centre O.

(i) If the radiusof the circle is 10 cm, find the area of the rhombus.

(ii) If the area of the rhombus is $32\sqrt{3}cm^2$ find the radius of the circle.

3. Two circles with centres A and B and radii 5 cm and 3 cm, touch each other internally. If the perpendicular bisector of the segment AB meets the bigger circle in P and Q, find the length of PQ.

4. Two chords AB and AC of a circle are equal. Prove that the centre of the circle lies on the angle bisector of $\angle BAC$.

5. The diameter and a chord of a circle have a common end point. If the lengt of the diameter is 20 cm and the length of the chord is 12 cm, how far is the chrod from the centre of the circle?
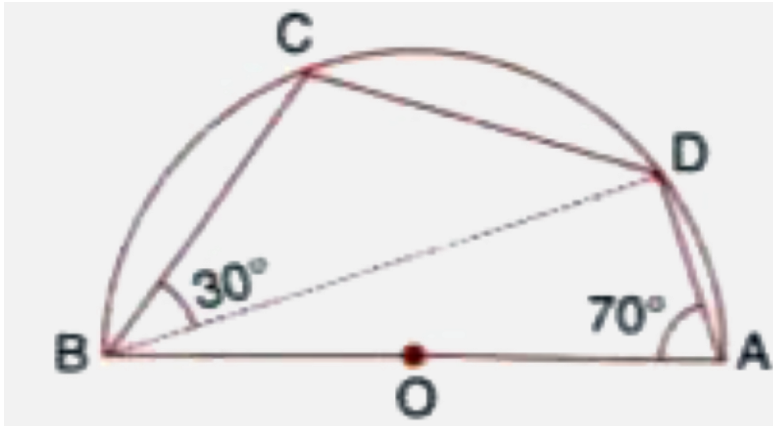
6. ABCD is a cyclic quadrilateral in which BC is paralleld to AD, angle $ADC = 110°$ and angle $BAC = 50°$. Find angle DAC and angle DCA.

7. In the given figure, C and D are points on the semi circle described on AB as diameter. Given angle $BAD = 70°$ and angle $DBC = 30°$,

calculate angle BDC

8. In cyclic quadrilateral $ABCD$, $\angle A = 3\angle C$ and $\angle D = 5\angle B$. Find the measure of each angle of the quadrilateral.

9. Prove that the circle drawn on any one of the equal sides of an isosceles triangle as diameter bisects the base.
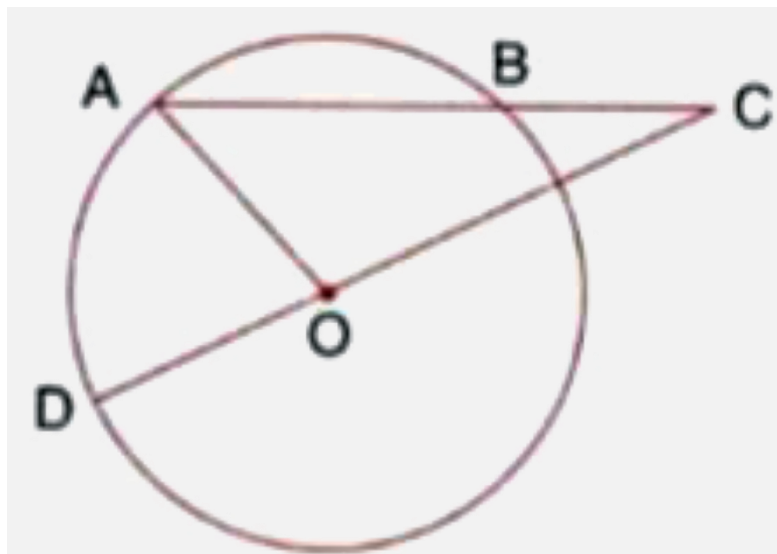
10. Bisectors of vertex angles A, B and C of a triangle ABC intersect its circumcircle at the points D,E and F respectively. Prove that angle

$$EDF = 90° - \frac{1}{2}\angle A$$

11. In the figure AB is the chord of a circle with centre O and DOC is a line segment such that $BC = DO$. If $\angle C = 20°$, find angle AOD.

12. Prove that the perimeter of a right triangle is equal to the sum of the diameter of its incircle and twice the diameter of its circumcircle.
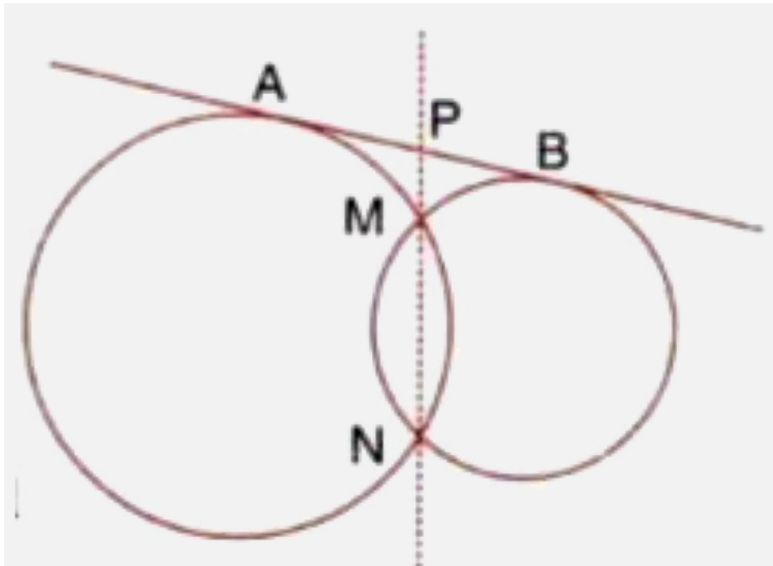
13. . Prove that the tangent drawn at the mid-point of an arc of a circle is parallel to the chord joining the end points of the arc.

14. In the given figure, MN is the common chord of two intersecting circles and AB is their common tangent.
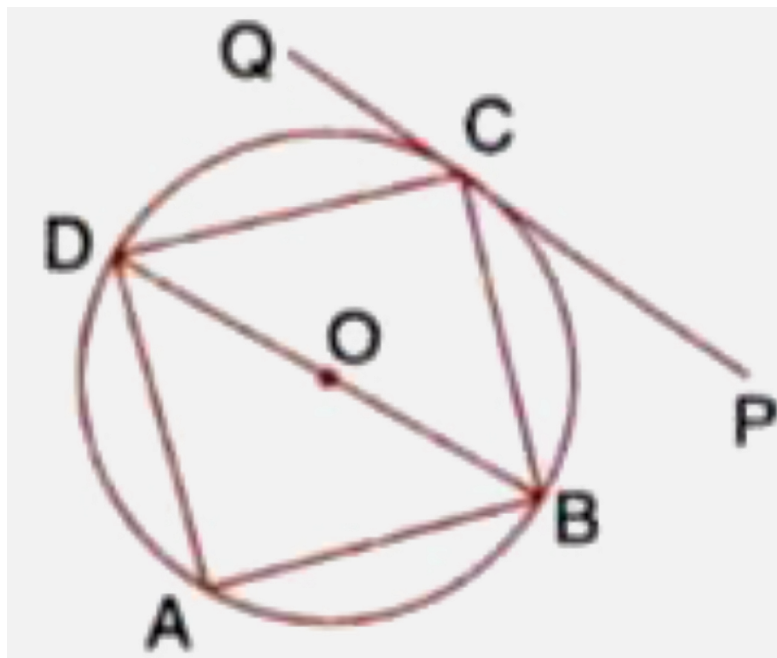

Prove that the line NM produced bisects AB at P.

15. In the given figure, ABCD is a cyclicquadrilateral, PQ is tangent to the circle at point C and BD is its diameter.

If $\angle DCQ = 40°$ and $\angle ABD = 60°$ find
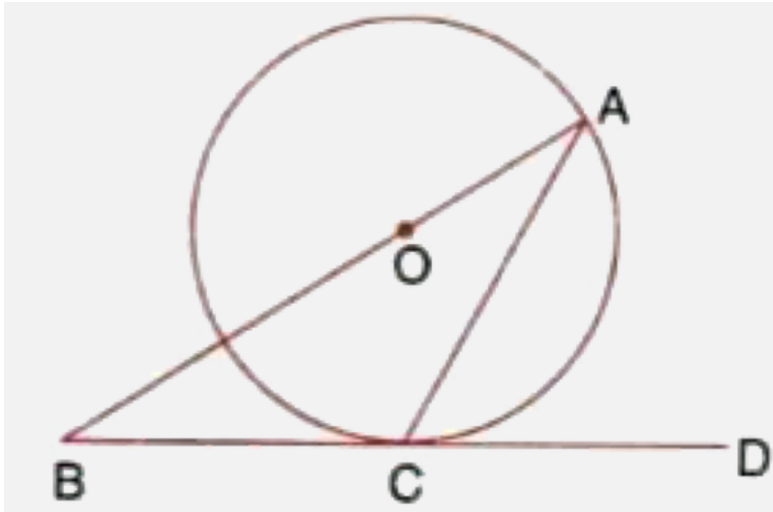
(i) $\angle DBC$

(ii) $\angle BCP$

(iii) $\angle ADB$

16. The given figure shows a circle with centre O and BCD is tangent to it at C. Show that

$$\angle ACD + \angle BAC = 90°$$

17. ABC is a right triagle with angle $B = 90°$.

A circle with BC as diameter meets hypotenuse

AC and point D. Prove that
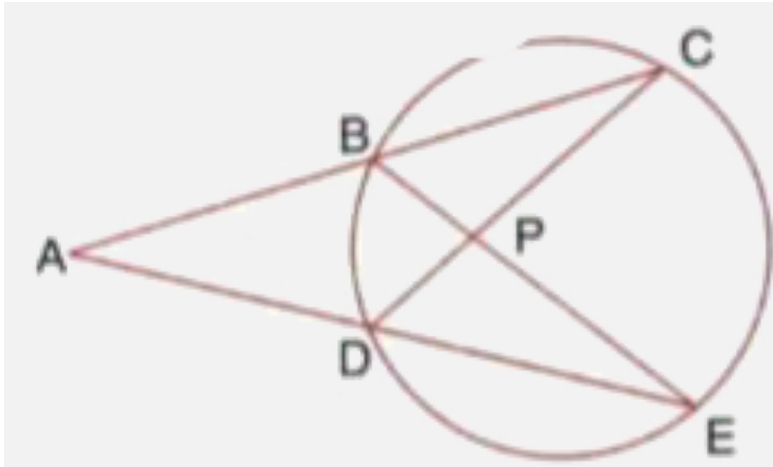
(i) $AC \times AD = AB^2$

(ii) $BD^2 = AD \times DC$

18. In the given figure $AC = AE$

Show that

(i) CP=EP

(ii) BP=DP

19. ABCDE is a cyclic pentagon with centre of its circumcircle alt point O such that AB=BC=CD and angle $ABC = 120°$

Calculate

(i) $\angle BEC$ (ii) $\angle BED$

20. In the given figure O is the centre of the circle. Tangents at A and B meet at C. If $\angle ACO = 30°$ find
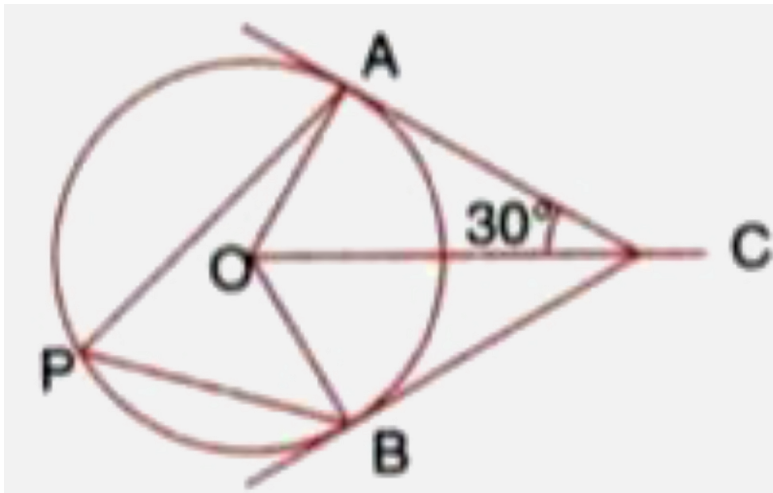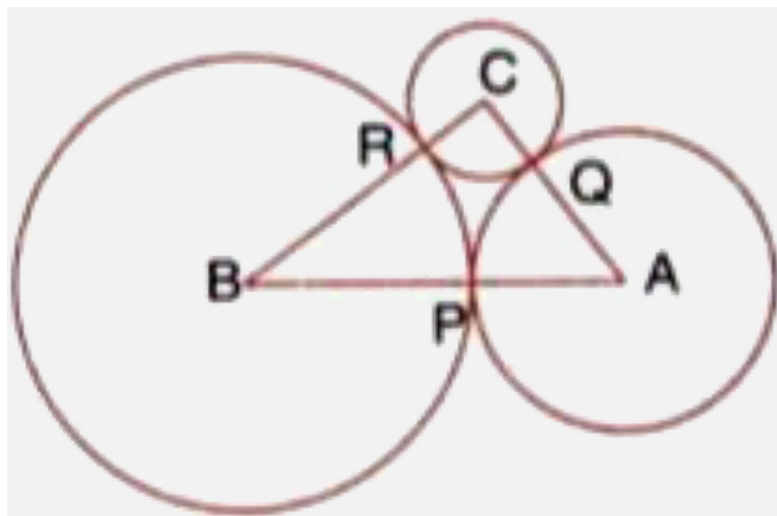
(i) $\angle BCO$

(ii) $\angle AOB$

(iii) $\angle APB$

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21. ABC is a triangle with AB=10cm, BC=8cm and AC=6cm (not drawn to scale). Three circles are drawn touching each other with the vertices as their centres Find the radii of the three
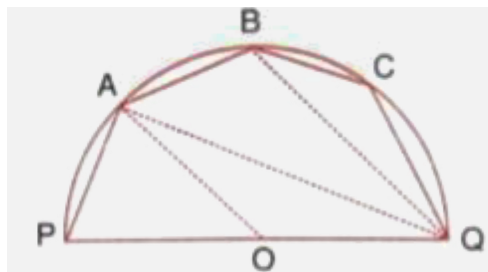
circles.

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22. The given figure shows a semi circle with centre O ane diameter PQ. If PA=AB and $\angle BCQ = 140°$ find measures of angles PAB

and AQB. Also, show that AO is parallel to BQ.

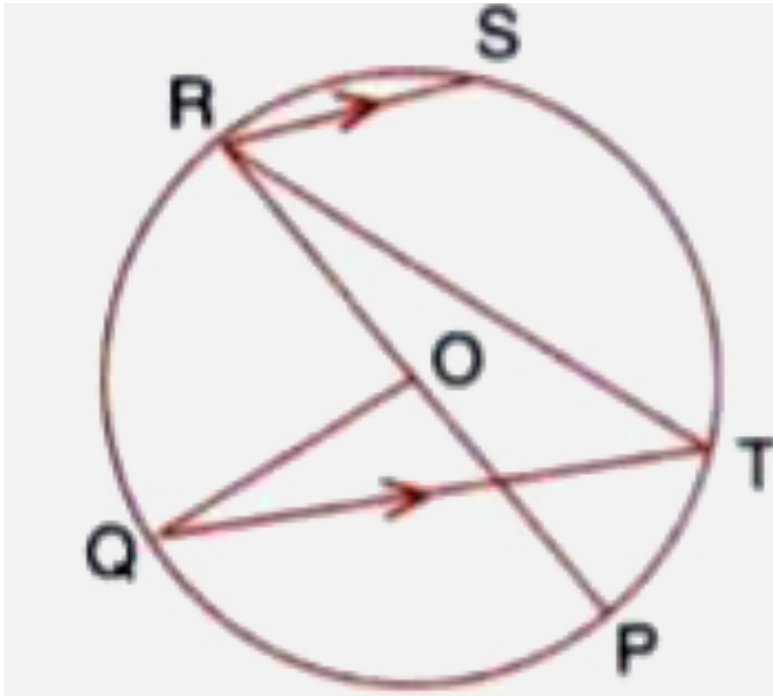**23.** The given figure shows a circle with centre O such that chord RS is parallel to chord QT, angle $PRT = 20°$ and angle $POQ = 100°$ calculate

(i) angle QTR

(ii) angle QRP
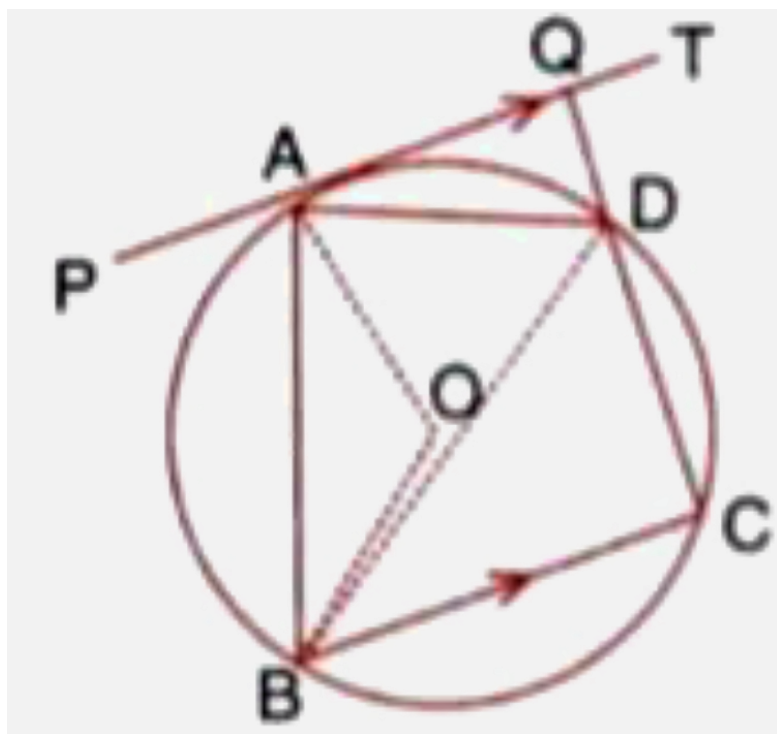
(iii) angle QRS

(iv) angle STR

24. In the given figure PAT is tangent to the circle with centre O, at point A on its circumference and is parallel to chord BC. If CDQ is a line segment show that

(i) $\angle BAP = \angle ADQ$

(ii) $\angle AOB = 2\angle ADQ$

(iii) $\angle ADQ = \angle ADB$

25. AB is a line segment and M is its mid point. Three semi circles are drawn with AM, MB and AB as diameters on the same side of the line AB. A circle with radius r unit is drawn so that it touches all thethree semi- circles. Show that $AB = 6 \times r$

26. TA and TB are tangents to a circle with centre O from an external point T. OT intersects the circle at point P. Prove that AP bisects the angle TAB.

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27. Two circles intersects in points P and Q. A secant passing through P intersects the circles in A and B respectively. Tangents to the circles

at A and B intersect at T. Prove that the A,Q,B and T lie on a circle.

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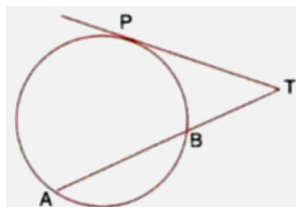**28.** Prove that the any four vertices of a regular pentagon are concyclic (lie on the same circle).

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29. Chords AB and CD of a circle when extended meet at point X. Given AB =4 cm, BX=6 cm and XD=6cm, calculate the length of CD.
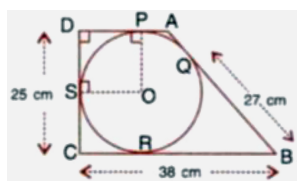
30. In the given figure find TP if AT=16 cm and AB=12 cm.

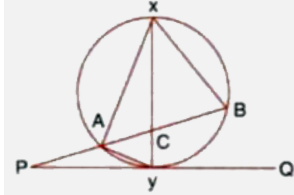**31.** In the following figure, a circle is inscribed in th equadrilaterial ABCD.

width="80%">

If BC=38 cm, QB=27cm, DC=25 cm and that AD is perpendicular to DC, find the radius of the circle.

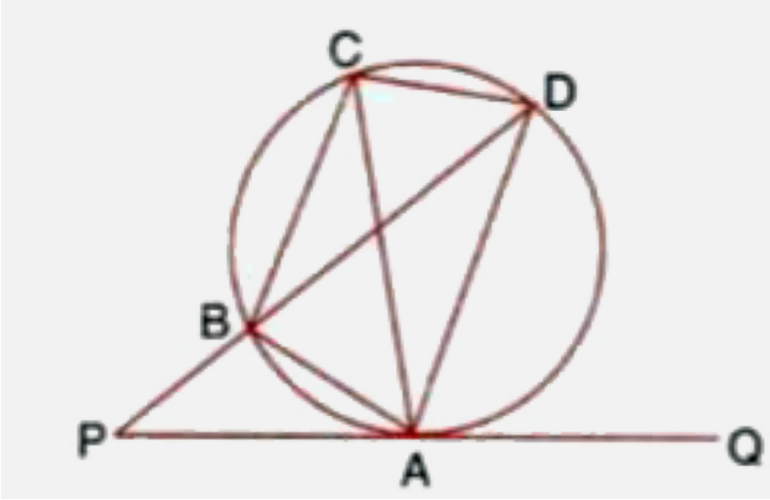**32.** In the given figure, XY is the diameter of the circle and PQ is a tangent to the circle at Y.

If $\angle AXB = 50°$ and $\angle ABX = 70°$ find $\angle BAY$ and $\angle APY$

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33. In the given figure QAP is the tangent at point A and PBD is a straight line.

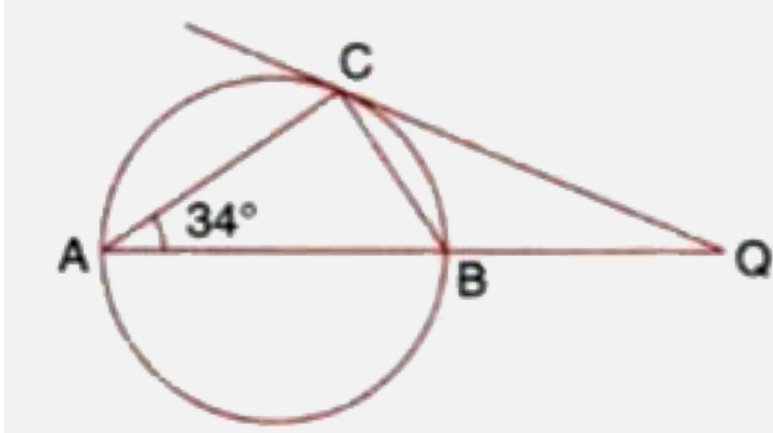If $\angle ACB = 36°$ and $\angle APB = 42°$, find

(i) $\angle BAP$ (ii) $\angle ABD$

(iii) $\angle QAD$ (iv) $\angle BCD$

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34. In the given figure AB is the diameter. The

tangent at C meets AB produced at Q.

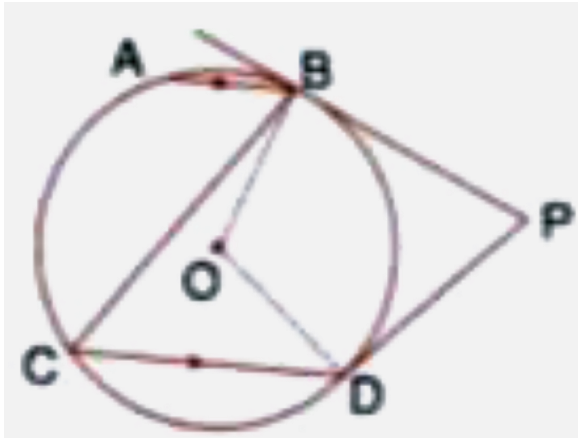If $\angle CAB = 34^\circ$ find

(i) $\angle CBA$ (ii)$\angle CQB$

35. In the given figure O is the centre of the circle. The tangents at B and D intersect each other at point P. If AB is parallel to CD and

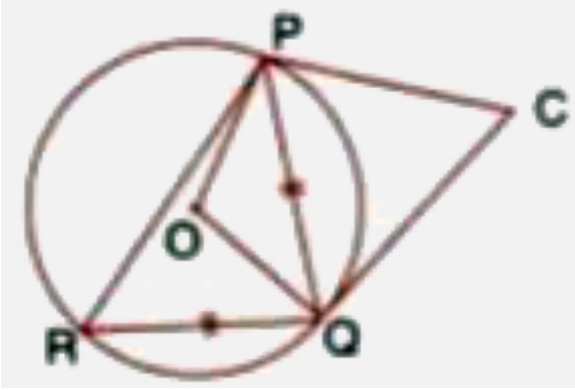$\angle ABC = 55°$, find :

(i) $\angle BOD$ (ii) $\angle BPD$

36. In the following figure PQ=QR , $\angle RQP = 68°$, PC and CQ are tangents to the circle with centre O.
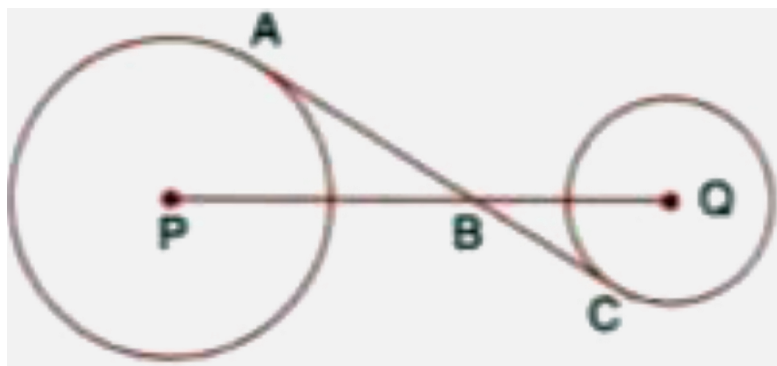
Calculate the values of (i) $\angle QOP$ (ii) $\angle QCP$

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37. about to only mathematics

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38. In the figure given below, AC is a transverse common tangent to two circles with centres P and Q and of radii 6 cm and 3 cm respectively.
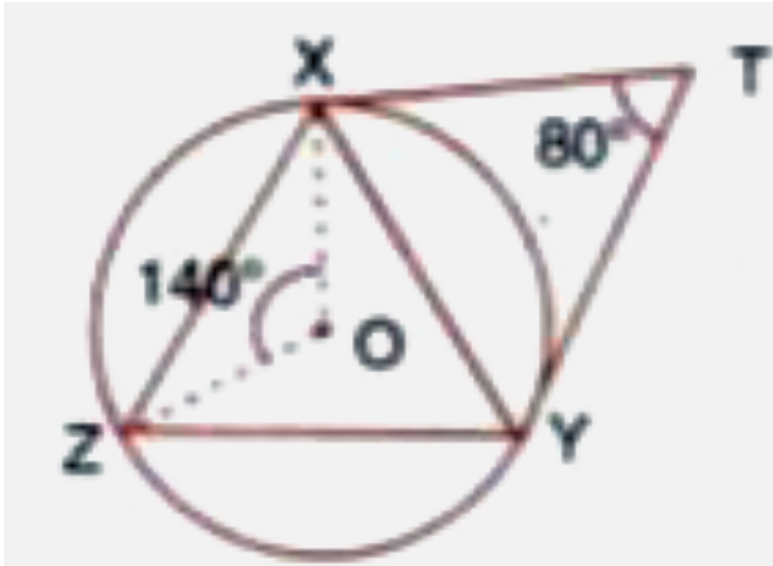

Given that AB=8 cm calculate PQ.

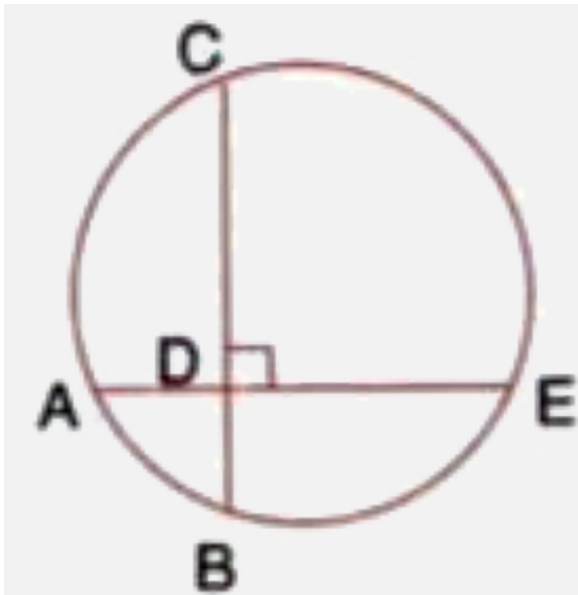**39.** In the figure given below O is the centre of the circumcircle of triangle XYZ.

Tangents at X and Y intersect at point T. Given $\angle XTY = 80°$ and $\angle XOZ = 140°$, calculate the value of $\angle ZXY$.

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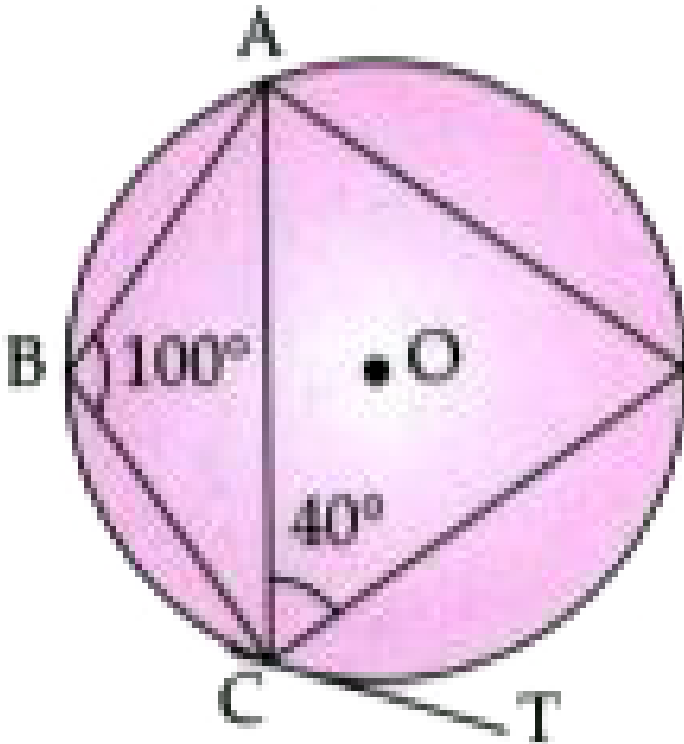**40.** In the given figure, AE and BC intersect each other at point D.

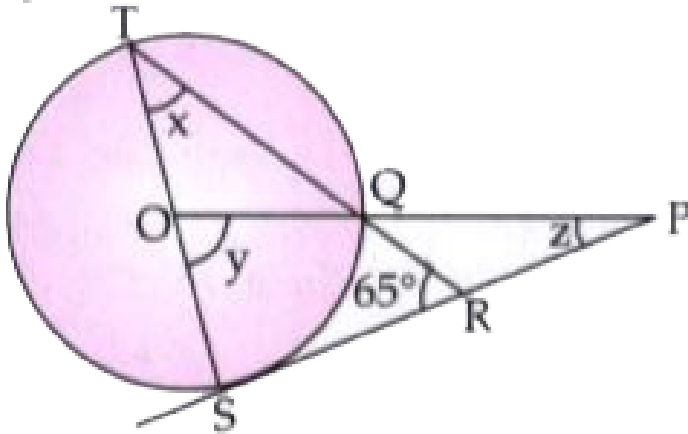If $\angle CDE = 90°$, $AB = 5cm$, $BD = 4$ and

$CD = 9$ find AE

41. In the given circle with centre O, $\angle ABC = 100°$, $\angle ACD = 40°$ and CT is a tangent to the circle at C. Find the $\angle ADC$ and $\angle DCT$.

42. In the figure given below, O is the centre of the cirlce and SP is a tangent. If $\angle SRT = 65°$, find the value of x, y and z.