# RD Sharma Class 10 Solutions Chapter 10 Circles MCQS

**Mark the correct alternative in each of the following :**

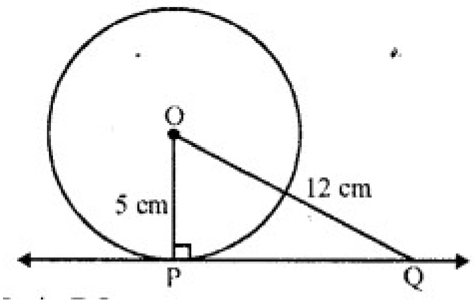
**Question 1.**

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 such that OQ = 12 cm. Length PQ is

(a) 12 cm
(b) 13 cm
(c) 8.5 cm
(d) $\sqrt{119}$ cm

**Solution:**

**(d)** Radius of a circle OP = 5 cm OQ = 12 cm, PQ is tangent




OP ⊥ PQ
In right ΔOPQ,
$OQ^2 = OP^2 + PQ^2$ (Pythagoras Theorem)
=> $(12)^2 = (5)2 + PQ^2$
=> $144 = 25 + PQ^2$
$PQ^2 = 144 - 25 = 119$
$PQ = \sqrt{119}$

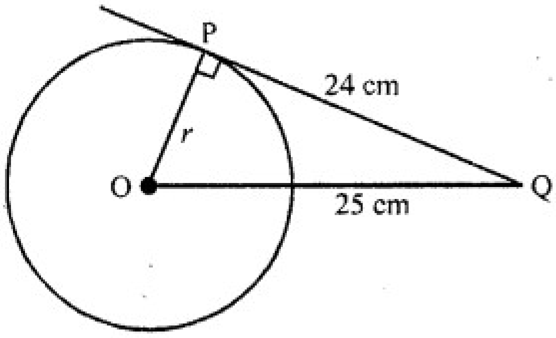
**Question 2.**

From a point Q, the length of the tangent to a circle is 24 cm and the distance of Q from the centre is 25 cm. The radius of the circle is

(a) 7 cm
(b) 12 cm
(c) 15 cm
(d) 24.5 cm

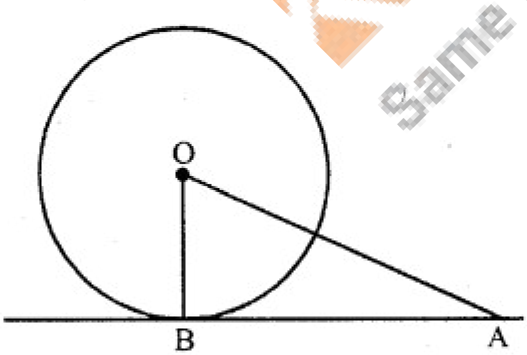
**Solution:**

**(a)** Let PQ be the tangent from Q to the circle with O as centre
PQ = 24 cm
OQ = 25 cm



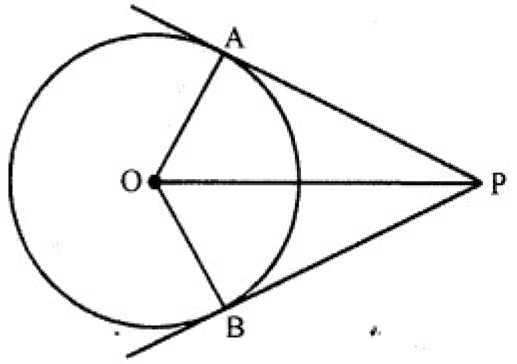

Let Radius OQ = r
OQ ⊥ PQ
Now in right ΔOPQ,
$OQ^2 = OP^2 + PQ^2$ (Pythagoras Theorem)
=> $(25)^2 = r^2 + (24)^2$
=> $625 = r^2 + 576$
=> $r^2 = 625 - 576 = 49 = (7)^2$
r = 7
Radius of the circle = 7 cm

**Question 3.**
The length of the tangent from a point A at a circle, of radius 3 cm, is 4 cm. The distance of A from the centre of the circle is
(a) √7 cm
(b) 7 cm
(c) 5 cm
(d) 25 cm
**Solution:**
**(c)** Let AB be the tangent from A to the circle of centre O, then
OB = 3 cm
BA = 4 cm

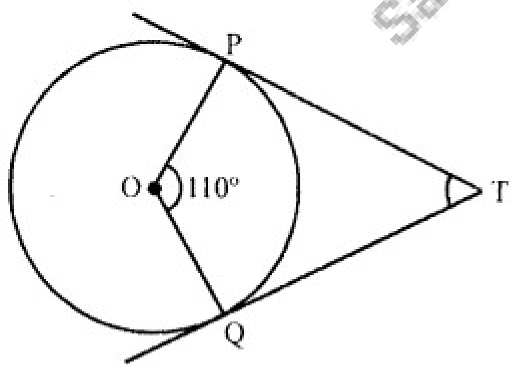



OB ⊥ BA
In right ΔOBA,
$OA^2 = OB^2 + BA^2$ (Pythagoras Theorem) $= (3)^2 + (4)^2 = 9 + 16 = 25 = (5)^2$
OA = 5
Distance of A from the centre O = 5 cm

**Question 4.**
If tangents PA and PB from a point P to a circle with centre O are inclined to each other at an angle of 80° then ∠POA is equal to
(a) 50°
(b) 60°
(c) 70°
(d) 80°
**Solution:**
**(a)** PA and PB are the tangents to the circle from P and ∠APB = 80°

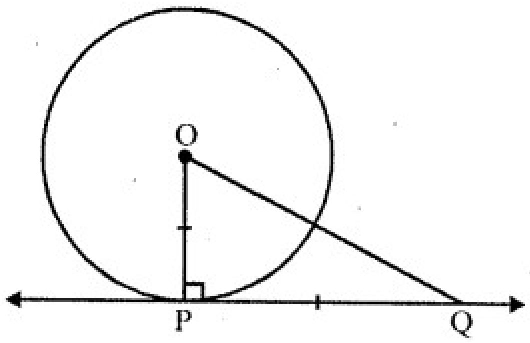



∠AOB = 180° – ∠APB = 180°- 80° = 100°
But OP is the bisector of ∠AOB
∠POA = ∠POB = 12 ∠AOB
=> ∠POA = 12 x 100° = 50°
**Question 5.**
If TP and TQ are two tangents to a circle with centre O so that ∠POQ = 110°, then, ∠PTQ is equal to
(a) 60°
(b) 70°
(c) 80°
(d) 90°
**Solution:**
**(b)** TP and TQ are the tangents from T to the circle with centre O and OP, OQ are joined and ∠POQ = 110°



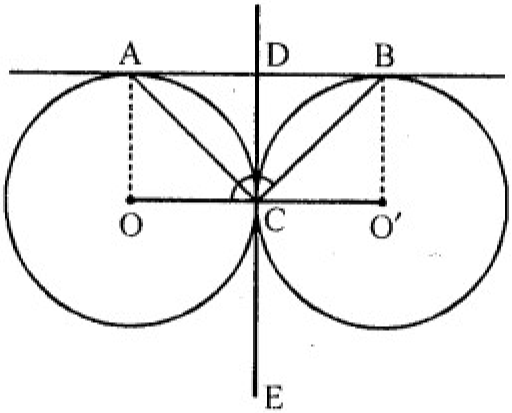

But ∠POQ + ∠PTQ = 180°
=> 110° + ∠PTQ = 180°
=> ∠PTQ = 180° – 110° = 70°

**Question 6.**
PQ is a tangent to a circle with centre O at the point P. If ΔOPQ is an isosceles triangle, then ∠OQP is equal to
(a) 30°
(b) 45°
(c) 60°
(d) 90°
**Solution:**
**(b)** In a circle with centre O, PQ is a tangent to the circle at P and ΔOPQ is an isosceles triangle such that OP = PQ



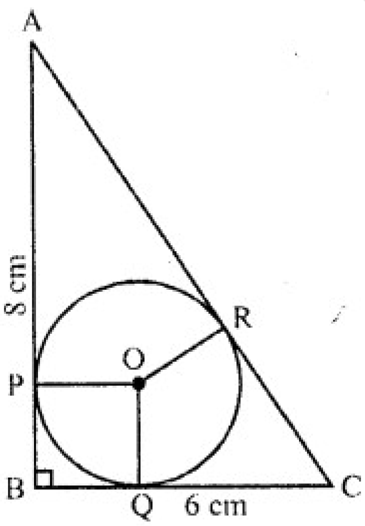

OP is radius of the circle
OP ⊥ PQ
OP = PQ
∠POQ = ∠OQP
But ∠POQ = ∠PQO = 90° (OP ⊥ PQ)
∠OQP = ∠POQ = 45°

**Question 7.**
Two equal circles touch each other externally at C and AB is a common tangent to the circles. Then, ∠ACB =
(a) 60°
(b) 45°
(c) 30°
(d) 90°
**Solution:**
**(d)** Two circles with centres O and O' touch each other at C externally
A common tangent is drawn which touches the circles at A and B respectively.
Join OA, O'B and O'O which passes through C



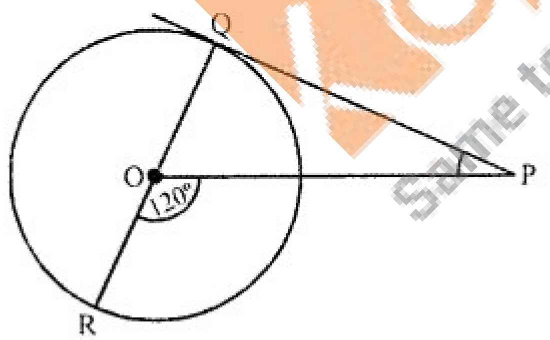

AO = BO’ (radii of the equal circle)
AB || OO’
=> AOO’B is a rectangle
Draw another common tangent through C which intersects AB at D, then DA = DC = DB
ADCO and BDCO’ are squares
AC and BC are the diagonals of equal square
AC = BC
∠DAC = ∠DBC = 45°
∠ACB = 90°

**Question 8.**
ABC is a right angled triangle, right angled at B such that BC = 6 cm and AB = 8 cm. A circle with centre O is inscribed in ΔABC. The radius of the circle is
(a) 1 cm
(b) 2 cm
(c) 3 cm
(d) 4 cm
**Solution:**
**(b)** In a right ΔABC, ∠B = 90°
BC = 6 cm, AB = 8 cm



$AC^2 = AB^2 + BC^2$ (Pythagoras Theorem) $= (8)^2 + (6)^2 = 64 + 36 = 100 = (10)^2$
AC = 10 cm
An incircle is drawn with centre 0 which touches the sides of the triangle ABC at P, Q and R
OP, OQ and OR are radii and AB, BC and CA are the tangents to the circle
OP ⊥ AB, OQ ⊥ BC and OR ⊥ CA
OPBQ is a square
Let r be the radius of the incircle
PB = BQ = r
AR = AP = 8 – r,
CQ = CR = 6 – r
AC = AR + CR
=> 10 = 8 – r + 6 – r
10 = 14 – 2r
=> 2r = 14 – 10 = 4
=> r = 2
Radius of the incircle = 2 cm

**Question 9.**
PQ is a tangent drawn from a point P to a circle with centre O and QOR is a diameter of the circle such that ∠POR = 120°, then ∠OPQ is
(a) 60°
(b) 45°
(c) 30°
(d) 90°
**Solution:**
**(c)** PQ is a tangent to the circle with centre O, from P, QOR is the diameter and ∠POR = 120°

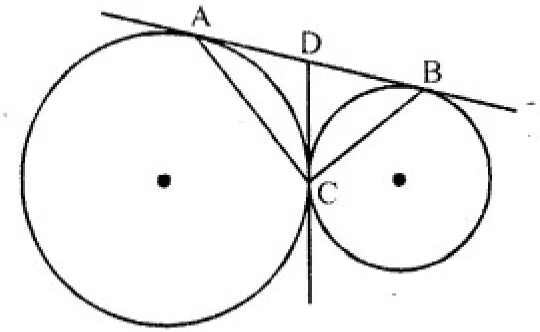



OQ is radius and PQ is tangent to the circle
OQ ⊥ QP or ∠OQP = 90°
But ∠QOP + ∠POR = 180° (Linear pair)
=> ∠QOP + 120° = 180°
∠QOP = 180° – 120° = 60°
Now in ΔPOQ
∠QOP + ∠OQP + ∠OPQ = 180° (Angles of a triangle)
=> 60° + 90° + ∠OPQ = 180°
=> 150° + ∠OPQ = 180°
=> ∠OPQ = 180° – 150° = 30°

**Question 10.**
If four sides of a quadrilateral ABCD are tangential to a circle, then
(a) AC + AD = BD + CD
(b) AB + CD = BC + AD
(c) AB + CD = AC + BC
(d) AC + AD = BC + DB
**Solution:**
**(b)** A circle is inscribed in a quadrilateral ABCD which touches the sides AB, BC, CD and DA at P, Q, R and S respectively then the sum of two opposite sides is equal to the sum of other two opposite sides
AB + CD = BC + AD

**Question 11.**
The length of the tangent drawn from a point 8 cm away from the centre of a circle of radius 6 cm is
(a) $\sqrt{7}$ cm
(b) $2\sqrt{7}$cm
(c) 10 cm
(d) 5 cm
**Solution:**
**(b)** Radius of the circle = 6 cm
and distance of the external point from the centre = 8 cm
Length of tangent = $\sqrt{(8)^2 - (6)^2}$
$= \sqrt{64 - 36} = \sqrt{28}$
$= \sqrt{4 \times 7} = 2\sqrt{7}$ cm

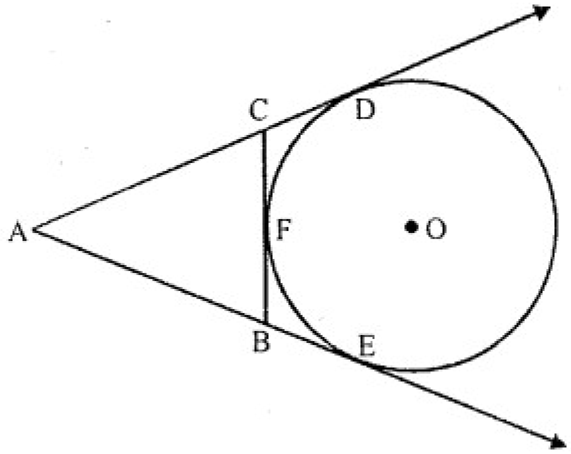
**Question 12.**
AB and CD are two common tangents to circles which touch each other at C. If D lies on AB such that CD = 4 cm, then AB is equal to
(a) 4 cm
(b) 6 cm
(c) 8 cm
(d) 12 cm
**Solution:**
**(c)** AB and CD are two common tangents to the two circles which touch each other externally at C and intersect AB in D




CD = 4 cm
DA and DC are tangents to the first circle from D

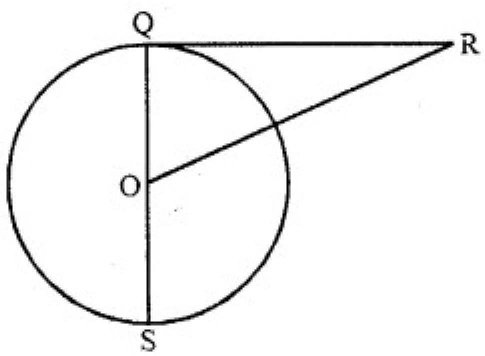
CD = AD = 4 cm
Similarly DC and DB are tangents to the second circle from D
CD = DB = 4 cm
AB = AD + DB = 4 + 4 = 8 cm

**Question 13.**
In the adjoining figure, if AD, AE and BC are tangents to the circle at D, E and F respectively. Then,

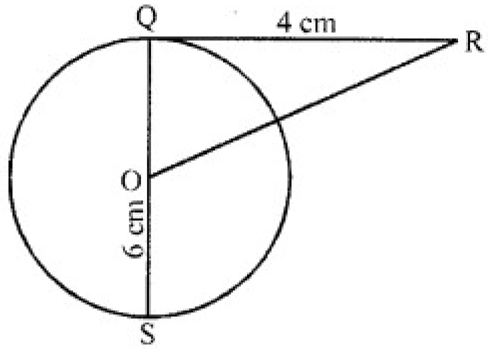



(a) AD = AB + BC + CA
(b) 2AD = AB + BC + CA
(c) 3AD = AB + BC + CA
(d) 4AD = AB + BC + CA
**Solution:**
**(b)** AD, AE and BC are the tangents to the circle at D, E and F respectively
D and AE are tangents to the circle from A
AD = AE ……(i)
Similarly, CD = CF and BE = BF ….(ii)
Now AB + AC + BC = AE – BE + AD – CD + CF + BF
= AD – BE + AD – CD + BE + BE
= 2AD [From (i) and (ii)]
or 2 AD = AB + BC + CA

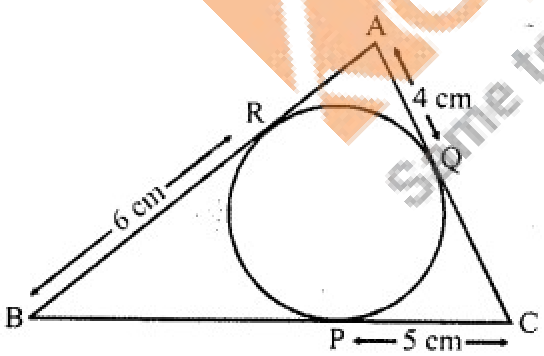
**Question 14.**
In the figure, RQ is a tangent to the circle with centre O. If SQ = 6 cm and QR = 4 cm, then OR =



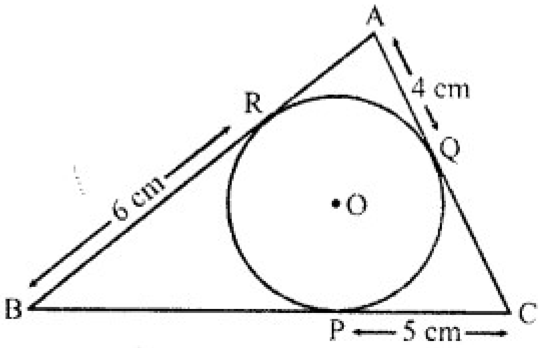
(a) 8 cm
(b) 3 cm
(c) 2.5 cm
(d) 5 cm
**Solution:**
**(d)** In the figure, 0 is the centre of the circle
QR is tangent to the circle and QOS is a diameter SQ = 6 cm, QR = 4 cm




OQ = 12 QS = 12 x 6 = 3 cm
OQ is radius
OQ ⊥ QR
Now in right ΔOQR
$OR^2 = QR^2 + QO^2 = (3)^2 + (4)^2 = 9 + 16 = 25 = (5)^2$
OR = 5 cm
**Question 15.**
In the figure, the perimeter of ΔABC is
(a) 30 cm
(b) 60 cm
(c) 45 cm
(d) 15 cm

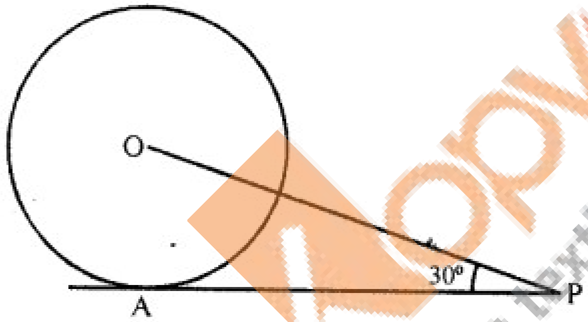



**Solution:**
**(a)** ΔABC is circumscribed of circle with centre O
AQ = 4 cm, CP = 5 cm and BR = 6 cm
AQ and AR the tangents to the circle AQ = AR = 4 cm
Similarly BP and BR are tangents,
BP = BR = 6 cm
and CP and CQ are the tangents
CQ = CP = 5 cm




AB = AR + BR = 4 + 6 = 10 cm
BC = BP + CP = 6 + 5 = 11 cm
AC = AQ + CQ = 4 + 5 = 9 cm
Perimeter of ΔABC = AB + BC + AC = 10 + 11 + 9 = 30 cm

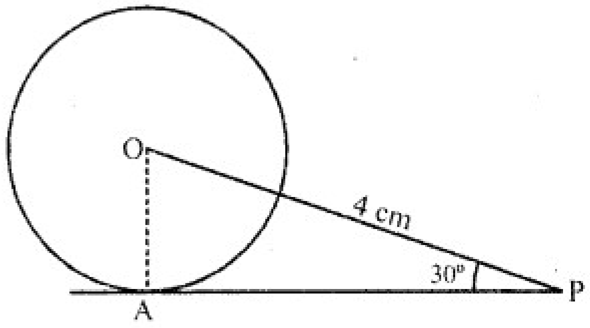
**Question 16.**
In the figure, AP is a tangent to the circle with centre O such that OP = 4 cm and ∠OPA = 30°. Then, AP =
(a) $2\sqrt{2}$ cm
(b) 2 cm
(c) $2\sqrt{3}$ cm
(d) $3\sqrt{2}$ cm






**Solution:**
**(c)** In the figure, AP is the tangent to the circle with centre O such that
OP = 4 cm, ∠OPA = 30°

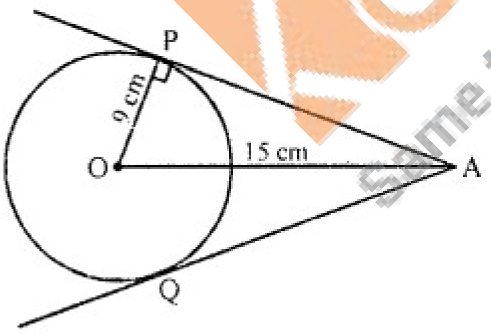
Join OA, let AP = x




$$\cos 30° = \frac{AP}{OP}$$

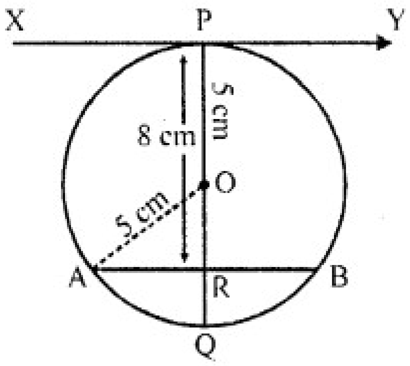
$$\Rightarrow \frac{\sqrt{3}}{2} = \frac{x}{4} \Rightarrow x = \frac{4 \times \sqrt{3}}{2} = 2\sqrt{3} \text{ cm}$$

**Question 17.**
AP and AQ are tangents drawn from a point A to a circle with centre O and radius 9 cm. If OA = 15 cm, then AP + AQ =
(a) 12 cm
(b) 18 cm
(c) 24 cm
(d) 36 cm
**Solution:**
**(c)** OP is radius, PA is the tangent
OP ⊥ AP



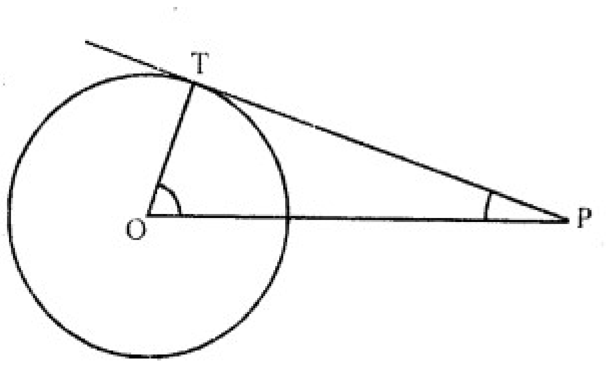

Now in right ΔOAP,
$OA^2 = OP^2 + AP^2$
$(15)^2 = (9)^2 + AP^2$
$225 = 81 + AP^2$
=> $AP^2 = 225 - 81 = 144 = (12)^2$
AP = 12 cm
But AP = AQ = 12 cm (tangents from A to the circle)
AP + AQ = 12+ 12 = 24 cm

**Question 18.**
At one end of a diameter PQ of a circle of radius 5 cm, tangent XPY is drawn to the circle. The length of chord AB parallel to XY and at a distance of 8 cm from P is
(a) 5 cm
(b) 6 cm
(c) 7 cm
(d) 8 cm
**Solution:**
**(d)** In the figure, PQ is diameter XPY is tangent to the circle with centre O and radius 5 cm
From P, at a distance of 8 cm AB is a chord drawn parallel to XY
To find the length of AB
Join OA



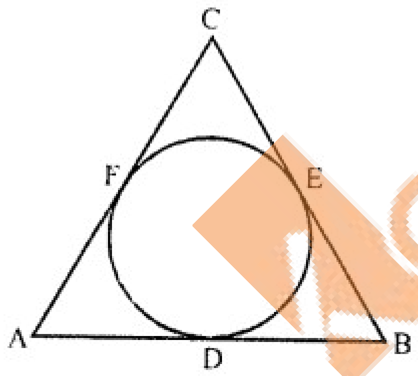

XY is tangent and OP is the radius
OP ⊥ XY or PQ ⊥ XY
AB || XY
OQ is ⊥ AB which meets AB at R
Now in right ΔOAR,
$OA^2 = OR^2 + AR^2$
$(5)^2 = (3)^2 + AR^2$
$25 = 9 + AR^2$
=> $AR^2 = 25 - 9 = 16 = (4)^2$
AR = 4 cm
But R is mid-point of AB
AB = 2 AR = 2 x 4 = 8 cm

**Question 19.**
If PT is tahgent drawn froth a point P to a circle touching it at T and O is the centre of the circle, then ∠OPT + ∠POT =
(a) 30°
(b) 60°
(c) 90°
(d) 180°
**Solution:**
**(c)** In the figure, PT is the tangent to the circle with centre O.
OP and OT are joined



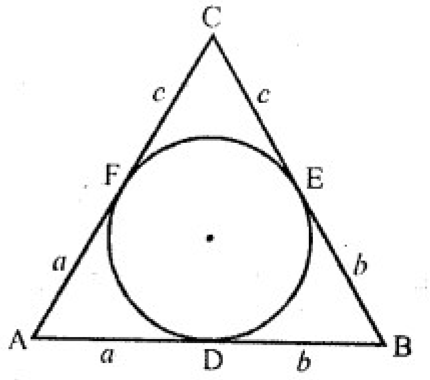

PT is tangent and OT is the radius
OT ⊥ PT
Now in right ΔOPT
∠OTP = 90°
∠OPT + ∠POT = 180° – 90° = 90°

**Question 20.**
In the adjacent figure, if AB = 12 cm, BC = 8 cm and AC = 10 cm, then AD =
(a) 5 cm
(b) 4 cm
(c) 6 cm
(d) 7 cm



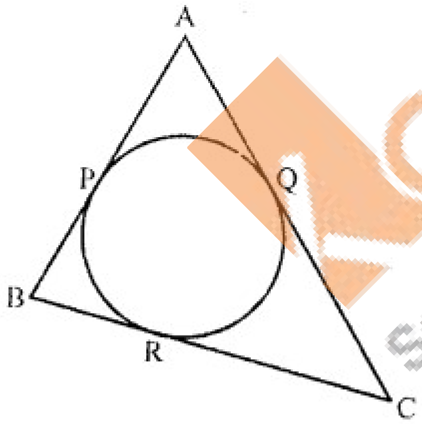



**Solution:**
**(d)** In the figure, ΔABC is the circumscribed a circle
AB = 12 cm, BC = 8 cm and AC = 10 cm
Let AD = a, DB = b and EC = c, then
AF = a, BE = b and FC = c



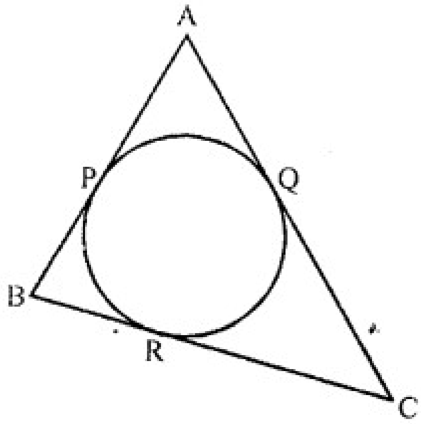

But AB + BC + AC = 12 + 8 + 10 = 30
a + b + b + c + c + a = 30
=> 2 (a + b + c) = 30
a + b + c = 15
Subtracting BC or b + c from this a = 15 – 8 = 7
AD = 7 cm

**Question 21.**
In the figure, if AP = PB, then
(a) AC = AB
(b) AC = BC
(c) AQ = QC
(d) AB = BC



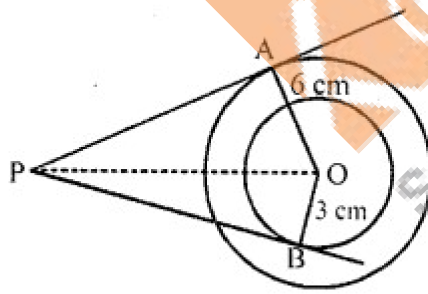



**Solution:**
**(b)** In the figure, AP = PB
But AP and AQ are the tangent from A to the circle

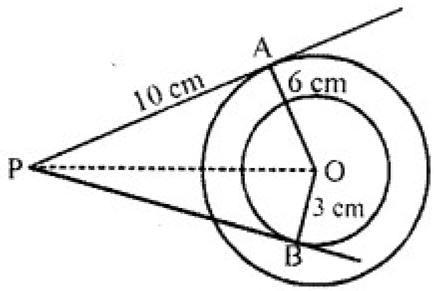



AP = AQ
Similarly PB = BR
But AP = PB (given)
AQ = BR ….(i)
But CQ and CR the tangents drawn from C to the circle
CQ = CR
Adding in (i)
AQ + CQ = BR + CR
AC = BC

**Question 22.**
In the figure, if AP = 10 cm, then BP =
(a) √91 cm
(b) √127 cm
(c) √119 cm
(d) √109 cm

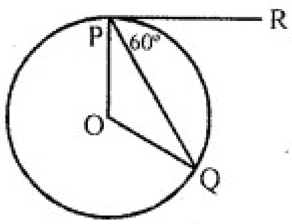



**Solution:**
**(b)** In the figure,
OA = 6 cm, OB = 3 cm and AP = 10 cm

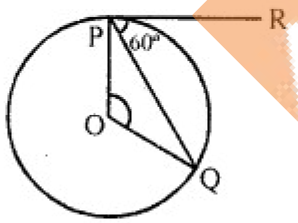


OA is radius and AP is the tangent
OA ⊥ AP
Now in right ΔOAP
$OP^2 = AP^2 + OA^2 = (10)^2 + (6)^2 = 100 + 36 = 136$
Similarly BP is tangent and OB is radius
$OP^2 = OB^2 + BP^2$
$136 = (3)^2 + BP2$
$\Rightarrow 136 = 9 + BP^2$
$\Rightarrow BP^2 = 136 - 9 = 127$
$BP = \sqrt{127}$ cm

**Question 23.**
In the figure, if PR is tangent to the circle at P and Q is the centre of the circle, then ∠POQ =
(a) 110°
(b) 100°
(c) 120°
(d) 90°

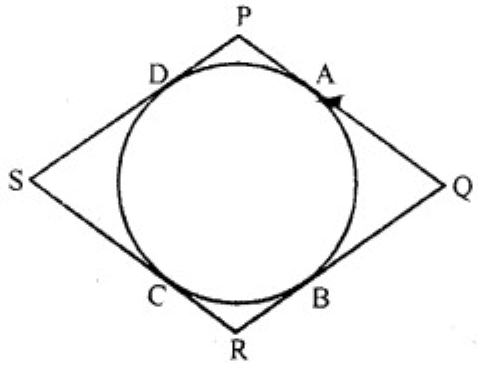



**Solution:**
**(c)** In the figure, PR is the tangent to the circle at P.
O is the centre of the circle ∠QPR = 60°

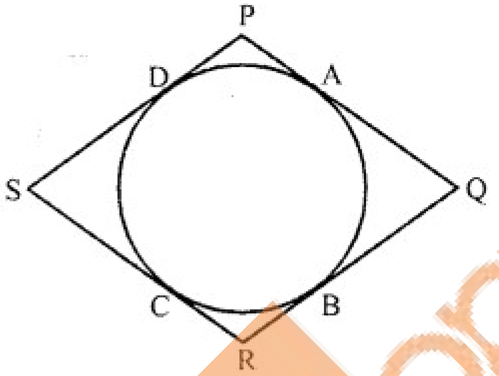



OP is the radius and PR is the tangent OPR = 90°
=> ∠OPQ + ∠QPR = 90°
=> ∠OPQ + 60° = 90°
=> ∠OPQ = 90° – 60° = 30°
OP = OQ (radii of the circle)
∠OQP = 30°
In ΔOPQ,
∠OPQ + ∠OQP + ∠POQ = 180°
=> 30° + 30° + ∠PQR = 180°
=> 60° + ∠POQ = 180°
∠POQ = 180° – 60° = 120°

**Question 24.**
In the figure, if quadrilateral PQRS circumscribes a circle, then PD + QB =
(a) PQ
(b) QR
(c) PR
(d) PS



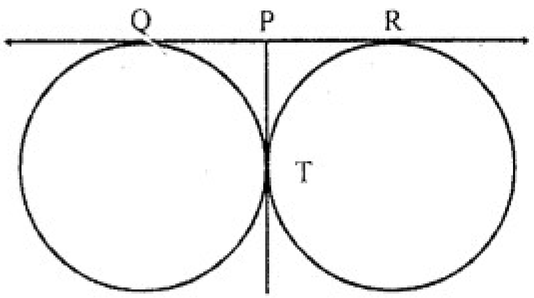

**Solution:**
**(a)** In the figure, quadrilateral PQRS is circumscribed a circle




PD = PA (tangents from P to the circle)
Similarly QA = QB
PD + QB = PA + QA = PQ

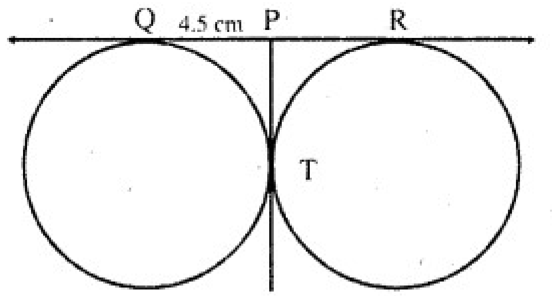


**Question 25.**
In the figure, two equal circles touch each other at T, if QP = 4.5 cm, then QR =
(a) 9 cm
(b) 18 cm
(c) 15 cm
(d) 13.5 cm



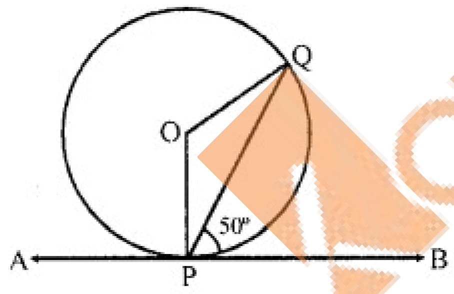

**Solution:**

**(a)** In the figure, two equal circles touch, each other externally at T
QR is the common tangent
QP = 4.5 cm

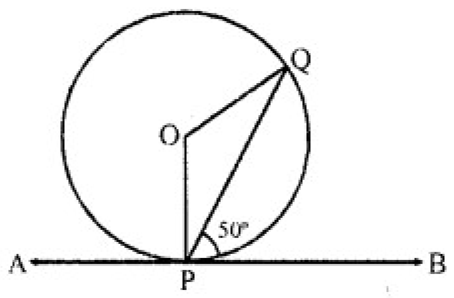



PQ = PT (tangents from P to the circle)
Similarly PT = PR
PQ = PT = PR
Now QR = PQ + PR = 4.5 + 4.5 = 9 cm

**Question 26.**
In the figure, APB is a tangent to a circle with centre O at point P. If ∠QPB = 50°, then the measure of ∠POQ is
(a) 100°
(b) 120°
(c) 140°
(d) 150°




**Solution:**
**(a)** In the figure, APB is a tangent to the circle with centre O

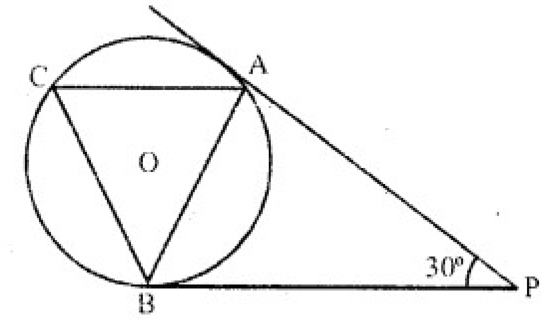



∠QPB = 50°
OP is radius and APB is a tangent
OP ⊥ AB
=> ∠OPB = 90°
=> ∠OPQ + ∠QPB = 90°

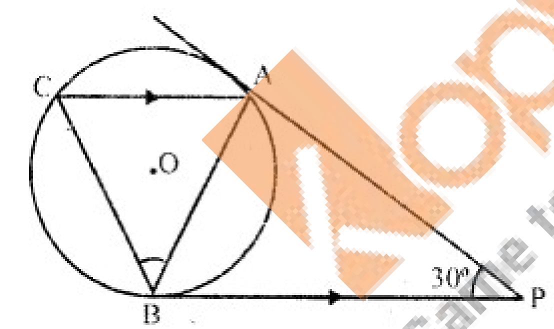
∠OPQ + 50° = 90°
=> ∠OPQ = 90° – 50° = 40°
But OP = OQ
∠OPQ = OQP = 40°
∠POQ = 180°- (40° + 40°) = 180° – 80° = 100°

## Question 27.

In the figure, if tangents PA and PB are drawn to a circle such that ∠APB = 30° and chord AC is drawn parallel to the tangent PB, then ∠ABC =
(a) 60°
(b) 90°
(c) 30°
(d) None of these

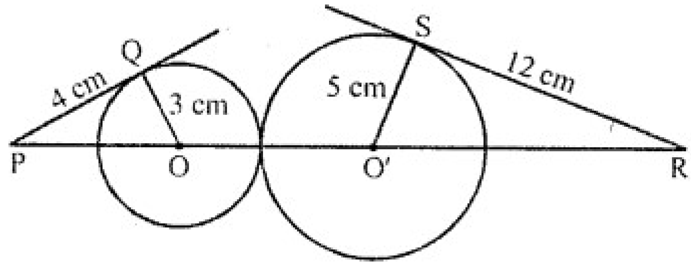



**Solution:**
**(c)** In the figure, PA and PB are the tangents to the circle with centre O

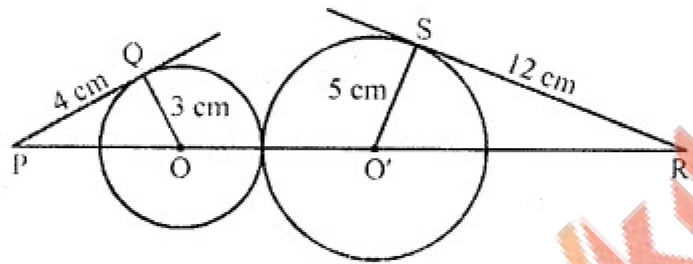



∠APB = 30°
Chord AC || BP,
AB is joined
PA = PB
∠PAB = ∠PBA
But ∠PAB + ∠PBA = 180° – 30° = 150°
=> ∠BPA + ∠PBA = 150°
=> 2 ∠PBA = 150°
=> ∠PBA = 75°
AC || BC
∠BAC = ∠PBA = 75°
But ∠PBA = ∠ACB = 75° (Angles in the alternate segment)
∠ABC = 180° – (75° + 75°) = 180° – 150° = 30°

**Question 28.**
In the figure, PR =
(a) 20 cm
(b) 26 cm
(c) 24 cm
(d) 28 cm

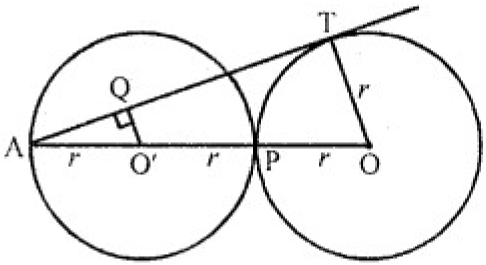



**Solution:**
**(b)** In the figure, two circles with centre O and O’ touch each other externally
PQ and RS are the tangents drawn to the circles

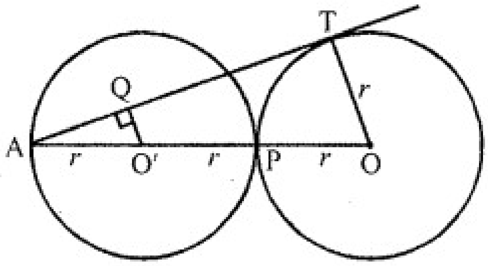



OQ and O’S are the radii of these circles and
OQ = 3 cm, PQ = 4 cm O’S = 5 cm and SR = 12 cm
Now in right ΔOQP
$OP^2 = (OQ)^2 + PQ^2 = (3)^2 + (4)^2 = 9 + 16 = 25 = (5)^2$
OP = 5 cm
Similarly in right ΔRSO’
$(O'R)^2 = (RS)^2 + (O'S)^2 = (12)^2 + (5)^2 = 144 + 25 = 169 = (13)^2$
O’R = 13 cm
Now PR = OP + OO’ + O’R = 5 + (3 + 5) + 13 = 26 cm

**Question 29.**
Two circles of same radii r and centres O and O’ touch each other at P as shown in figure. If OO’ is produced to meet the circle C (O’, r) at A and AT is a tangent to the circle C (O, r) such that O’Q ⊥ AT. Then AO : AO’ =
(a) 32
(b) 2
(c) 3
(d) 14

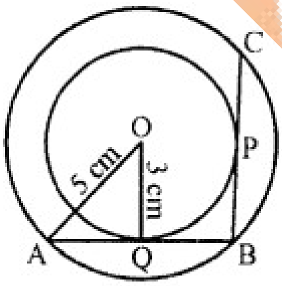



**Solution:**
**(c)** Two circles of equal radii touch each other externally at P. OO’ produced meets at A

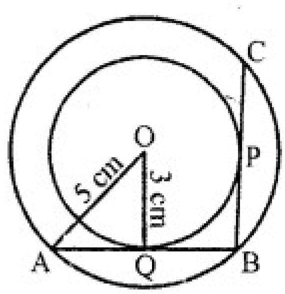



From A, AT is the tangent to the circle (O, r)
O’Q ⊥ AT
Now AO : AO’ = 3r : r
= 3 : 1 = 31

**Question 30.**
Two concentric circles of radii 3 cm and 5 cm are given. Then length of chord BC which touches the inner circle at P is equal to
(a) 4 cm
(b) 6 cm
(c) 8 cm
(d) 10 cm

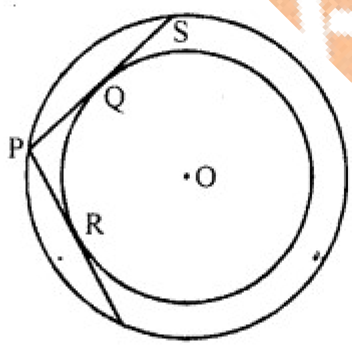



**Solution:**
**(c)** In the figure, two concentric circles of radii 3 cm and 5 cm with centre O
Chord BC touches the inner circle at P
Draw a tangent AB to the inner circle
Join OQ and OA

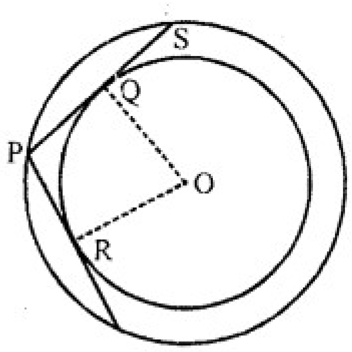



OQ is radius and AQB is the tangent
OQ ⊥ AB and OQ bisects AB
AQ = QB
Similarly, BP = PC or P is mid-point of BC
But BQ and BP are tangents from B
QB = BP = AQ
In right ΔOAQ,
$OA^2 = AQ^2 + OQ^2$
$(5)^2 = AQ^2 + (3)^2$
=> $AQ^2 = (5)^2 - (3)^2$
=> $AQ^2 = 25 - 9 = 16 = (4)^2$
AQ = 4 cm
BC = 2 BP = 2 BQ = 2 AQ = 2 x 4 = 8 cm

**Question 31.**
In the figure, there are two concentric, circles with centre O. PR and PQS are tangents to the inner circle from point plying on the outer circle. If PR = 7.5 cm, then PS is equal to
(a) 10 cm
(b) 12 cm
(c) 15 cm
(d) 18 cm

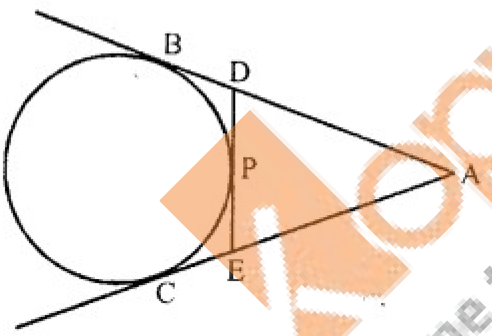



**Solution:**
**(c)** In the figure, two concentric circles with centre O
From a point P on the outer circle,
PRT and PQS are the tangents are drawn to the inner circle at R and Q respectively
PR = 7.5 cm
Join OR and OQ



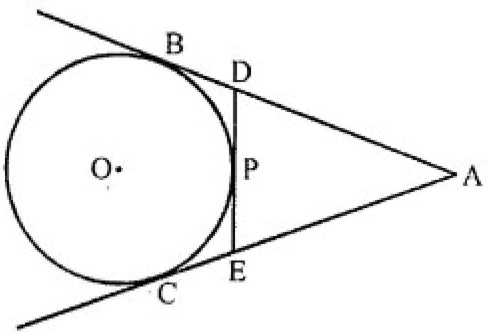

PT is chord and OR is radius
R is mid-point of PT
Similarly Q is mid-point of PS
But PR = PQ (tangents from P)
PT = 2 PR and PS = 2 PQ
PS = 2 PQ = 2 PR = 2 x 7.5 = 15 cm

**Question 32.**
In the figure, if AB = 8 cm and PE = 3 cm, then AE =
(a) 11 cm
(b) 7 cm
(c) 5 cm
(d) 3 cm





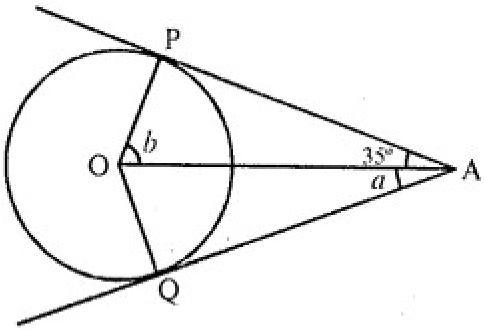

**Solution:**
**(c)** In the figure, AB and AC are the tangents to the circle from A
DE is another tangent drawn from P
AB = 8 cm, PE = 3 cm



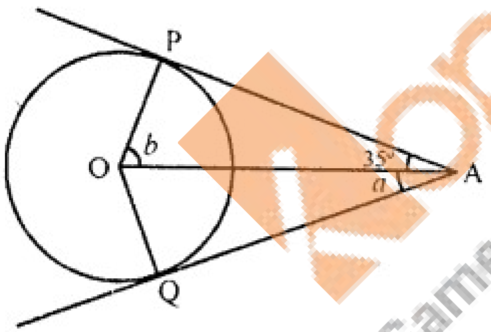

AB = AC (tangents drawn from A to the circle)

Similarly PE = EC and DP = DB
Now AE = AC – CE = AB – PE = 8 – 3 = 5 cm

**Question 33.**
In the figure, PQ and PR are tangents drawn from P to a circle with centre O. If ∠OPQ = 35°, then
(a) a = 30°, b = 60°
(b) a = 35°, b = 55°
(c) a = 40°, b = 50°
(d) a = 45°, b = 45°

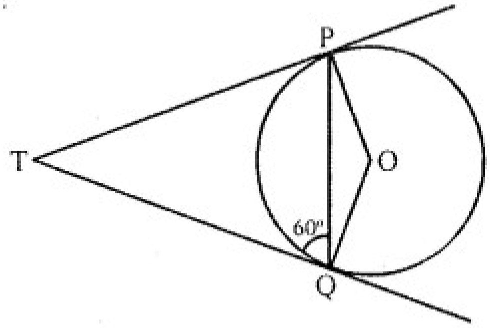



**Solution:**
**(b)** In the figure, PQ and PR are the tangents drawn from P to the circle with centre O
∠OPQ = 35°
PO is joined



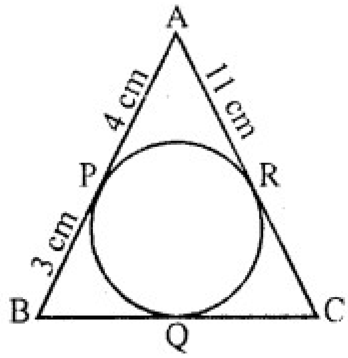

PQ = PR (tangents from P to the circle)
∠OPQ = ∠OPR
=> 35° = a
=> a = 35°
OQ is radius and PQ is tangent
OQ ⊥ PQ
=> ∠OQP = 90°
In ΔOQP,
∠POQ + ∠QPO = 90°
=> b + 35° = 90°
=> b = 90° – 35° = 55°
a = 35°, b = 55°

**Question 34.**
In the figure, if TP and TQ are tangents drawn from an external point T to a circle with centre O such that ∠TQP = 60°, then
(a) 25°
(b) 30°
(c) 40°
(d) 60°




**Solution:**
**(b)** In the figure, TP and TQ are the tangents drawn from T to the circle with centre O
OP, OQ and PQ are joined
∠TQP = 60°
TP = TQ (Tangents from T to the circle)
∠TQP = ∠TPQ = 60°
∠PTQ = 180° – (60° + 60°) = 180° – 120° = 60°
and ∠POQ = 180° – ∠PTQ = 180° – 60° = 120°
But OP = OQ (radii of the same circle)
∠OPQ = ∠OQP
But ∠OPQ + ∠OQP = 180° – 120° = 60°
But ∠OPQ = 30°

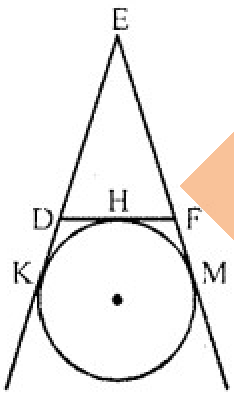
**Question 35.**
In the figure, the sides AB, BC and CA of triangle ABC, touch a circle at P, Q and R respectively. If PA = 4 cm, BP = 3 cm and AC = 11 cm, then length of BC is **[CBSE 2012]**




(a) 11 cm
(b) 10 cm
(c) 14 cm
(d) 15 cm
**Solution:**

**(b)** In the figure,
PA = 4 cm, BP = 3 cm, AC = 11 cm
AP and AR are the tangents from A to the circle
AP = AR
=> AR = 4 cm
Similarly BP and BQ are tangents
BQ = BP = 3 cm
AC =11 cm
AR + CR = 11 cm
4 + CR =11 cm
CR = 11 – 4 = 7 cm
CQ and CR are tangents to the circle
CQ = CR = 7 cm
Now, BC = BQ + CQ = 3 + 7 = 10 cm

**Question 36.**
In the figure, a circle touches the side DF of AEDF at H and touches ED and EF produced at K and M respectively. If EK = 9 cm, then the perimeter of ΔEDF is **[CBSE 2012]**
(a) 18 cm
(b) 13.5 cm
(c) 12 cm
(d) 9 cm

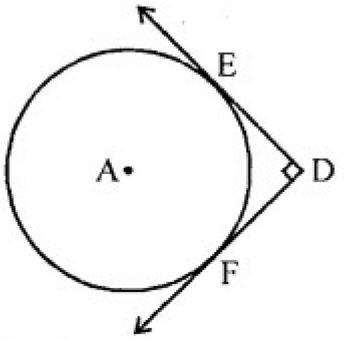





**Solution:**
**(a)** In ΔDEF
DF touches the circle at H
and circle touches ED and EF Produced at K and M respectively
EK = 9 cm
EK and EM are the tangents to the circle
EM = EK = 9 cm
Similarly DH and DK are the tangent
DH = DK and FH and FM are tangents
FH = FM
Now, perimeter of ΔDEF
= ED + DF + EF
= ED + DH + FH + EF
= ED + DK + EM + EF

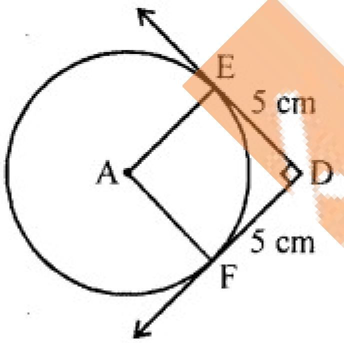
= EK + EM
= 9 + 9
= 18 cm

**Question 37.**
In the figure DE and DF are tangents from an external point D to a circle with centre A. If DE = 5 cm and DE ⊥ DF, then the radius of the circle is **[CBSE 2013]**




(a) 3 cm
(b) 5 cm
(c) 4 cm
(d) 6 cm

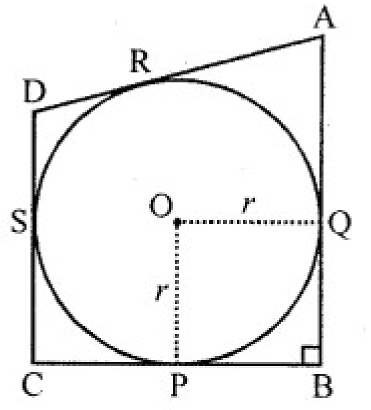
**Solution:**
**(b)** If figure, DE and DF are tangents to the circle drawn from D.
A is the centre of the circle.
DE = 5 cm and DE ⊥ DF
Join AE, AF




DE is the tangent and AE is radius
AE ⊥ DE
Similarly, AF ⊥ DF
But ∠D = 90° (given)
AFDE is a square
AE = DE (side of square)
But DE = 5 cm
AE = 5 cm
Radius of circle is 5 cm

**Question 38.**
In the figure, a circle with centre O is inscribed in a quadrilateral ABCD such that, it

touches sides BC, AB, AD and CD at points P, Q, R and S respectively. If AB = 29 cm, AD = 23 cm, ∠B = 90° and DS = 5 cm, then the radius of the circle (in cm) is **[CBSE 2013]**




(a) 11
(b) 18
(c) 6
(d) 15

**Solution:**
**(a)** In the figure, a circle touches the sides of a quadrilateral ABCD
∠B = 90°, OP = OQ = r
AB = 29 cm, AD = 23 cm, DS = 5 cm
∠B = 90°
BA is tangent and OQ is radius
∠OQB = 90°
Similarly OP is radius and BC is tangents
∠OPB = 90°
But ∠B = 90° (given)
PBQO is a square
DS = 5 cm
But DS and DR are tangents to the circles
DR = 5 cm
But AD = 23 cm
AR = 23 – 5= 18 cm
AR = AQ (tangents to the circle from A)
AQ = 18 cm
But AB = 29 cm
BQ = 29 – 18 = 11 cm
OPBQ is a square
OQ = BQ = 11 cm
Radius of the circle = 11 cm

**Question 39.**
In a right triangle ABC, right angled at B, BC = 12 cm and AB = 5 cm. The radius of the circle inscribed in the triangle (in cm) is
(a) 4
(b) 3

(c) 2
(d) 1
**Solution:**
**(c)**

$AC^2 = AB^2 + BC$ [Pythagoras theorem]

$AC^2 = 25 + 144 = 169$

$AC = 13$ cm

ar. of $\Delta ABC$ = ar. of $\Delta AOB$ + ar. of $\Delta BOC$ + ar. of $\Delta AOC$

$$\frac{5\times12}{2} = \frac{AB\times r}{2} + \frac{BC\times r}{2} + \frac{AC\times r}{2}$$

$60 = r(AB + BC + AC)$

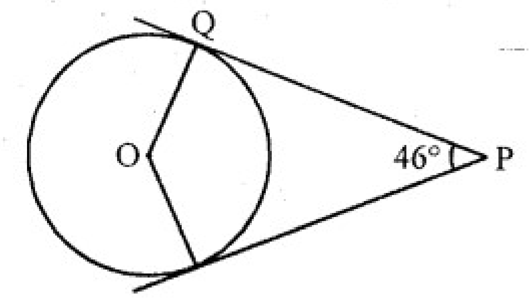
$$[\because \text{Area of } \Delta = \frac{\text{Base}\times\text{Corr.alt.}}{2}]$$

$60 = r(5 + 12 + 13)$

$60 = 30r \Rightarrow r = 2\text{cm}$

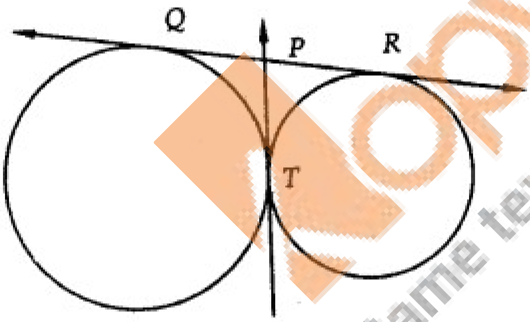
**Question 40.**
Two circles touch each other externally at P. AB is a common tangent to the circle touching them at A and B. The value of ∠APB is
(a) 30°
(b) 45°
(c) 60°
(d) 90°
**Solution:**
**(d)** We have, AT = TP and TB = TP (Lengths of the tangents from ext. point T to the circles)
∠TAP = ∠TPA = x (say)
and ∠TBP = ∠TPB = y (say)
Also, in triangle APB,
x + x + x + y + y = 180°
=> 2x + 2y = 180°
=> x + y = 90°
=> ∠APB = 90°

**Question 41.**
In the figure, PQ and PR are two tangents to a circle with centre O. If ∠QPR= 46, then ∠QOR equals
(a) 67°
(b) 134°
(c) 44°
(d) 46°




**Solution:**
**(b)** ∠OQP = 90°
[Tangent is ⊥ to the radius through the point of contact]
∠ORP = 90°
∠OQP + ∠QPR + ∠ORP + ∠QOR = 360° [Angle sum property of a quad.]
90° + 46° + 90° + ∠QOR = 360°
∠QOR = 360° – 90° – 46° – 90° = 134°

**Question 42.**
In the figure, QR is a common tangent to the given circles touching externally at the point T. The tangent at T meets QR at P. If PT = 3.8 cm, then the length of QR (in cm) is **[CBSE2014]**
(a) 3.8
(b) 7.6
(c) 5.7
(d) 1.9

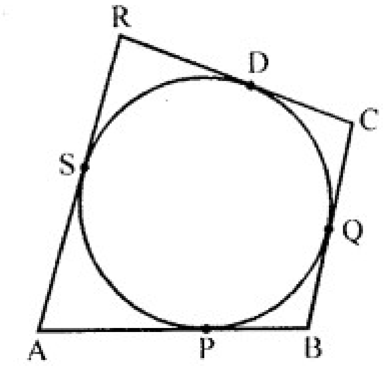





**Solution:**
**(b)** In the figure, QR is common tangent to the two circles touching each other externally at T
Tangent at T meets QR at P
PT = 3.8 cm
PT and PQ are tangents from P
PT = PQ = 3.8 cm
Similarly PT and PR are tangents
PT = PR = 3.8 cm
QR = 3.8 + 3.8 = 7.6 cm

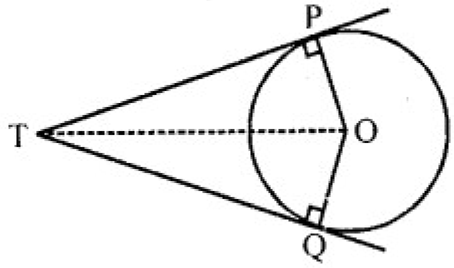
**Question 43.**
In the figure, a quadrilateral ABCD is drawn to circumscribe a circle such that its sides AB, BC, CD and AD touch the circle at P, Q, R and S respectively. If AB = x cm,

BC = 7 cm, CR = 3 cm and AS = 5 cm, then x =
(a) 10
(b) 9
(c) 8
(d) 7 **(CBSE 2014)**



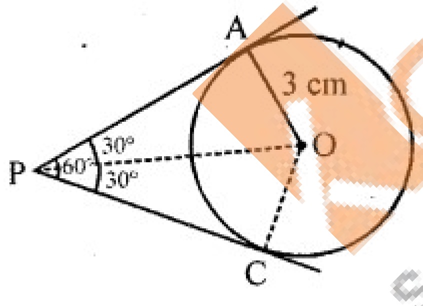

**Solution:**
**(b)** In the given figure,
ABCD is a quadrilateral circumscribe a circle and its sides AB, BC, CD and DA touch the circle at P, Q, R and S respectively
AB = x cm, BC = 7 cm, CR = 3 cm, AS = 5 cm
CR and CQ are tangents to the circle from C
CR = CQ = 3 cm
BQ = BC – CQ = 7 – 3 = 4 cm
BQ = and BP are tangents from B
BP = BQ = 4 cm
AS and AP are tangents from A
AP = AS = 5 cm
AB = AP + BP = 5 + 4 = 9 cm
x = 9 cm

**Question 44.**
If angle between two radii of a circle is 130°, the angle between the tangent at the ends of radii is **(NCERT Exemplar)**
(a) 90°
(b) 50°
(c) 70°
(d) 40°
**Solution:**
**(b)** O is the centre of the circle.
Given, ∠POQ = 130°
PT and QT are tangents drawn from external point T to the circle.




∠OPT = ∠OQT = 90° [Radius is perpendicular to the tangent at point of contact]
In quadrilateral OPTQ,
∠PTQ + ∠OPT + ∠OQT + ∠POQ = 360°
=> ∠PTQ + 90° + 90° + 130° = 360°
=> ∠PTQ = 360° – 310° = 50°
Thus, the angle between the tangents is 50°.

**Question 45.**
If two tangents inclined at a angle of 60° are drawn to a circle of radius 3 cm, then length of each tangent is equal to **[NCERT Exemplar]**
(a) 3√32 cm
(b) 6 cm
(c) 3 cm
(d) 3√3 cm
**Solution:**
**(d)** Let P be an external point and a pair of tangents is drawn from point P and angle between these two tangents is 60°.
Join OA and OP.




Also, OP is a bisector of line ∠APC
∠APO = ∠CPO = 30°
Also, OA ⊥ AP
Tangent at any point of a circle is perpendicular to the radius through the point of contact.

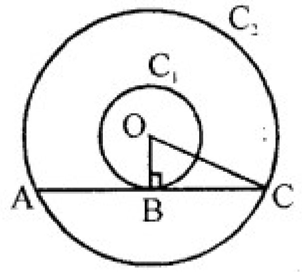
In right angled ΔOAP, $\tan 30° = \frac{OA}{AP} = \frac{3}{AP}$

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

$\Rightarrow AP = 3\sqrt{3}$ cm

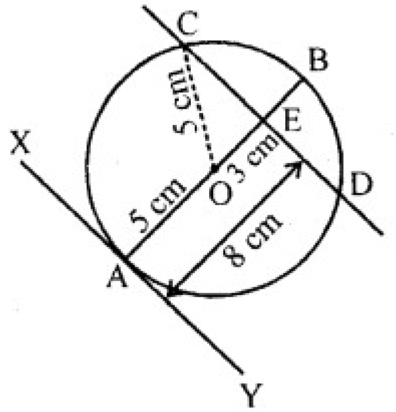
Hence, the length of each tangent is 3√3 cm

**Question 46.**
If radii of two concentric circles are 4 cm and 5 cm, then the length of each chord of one circle which is tangent to the other circle is **[NCERT Exemplar]**
(a) 3 cm
(b) 6 cm
(c) 9 cm
(d) 1 cm
**Solution:**
**(b)** Let O be the centre of two concentric circles $C_1$ and $C_2$, whose radii are $r_1$ = 4 cm and $r_2$ = 5 cm.
Now, we draw a chord AC of circle $C_2$, which touches the circle $C_1$ at B.
Also, join OB, which is perpendicular to AC. [Tangent at any point of circle is perpendicular to radius throughly the point of contact]



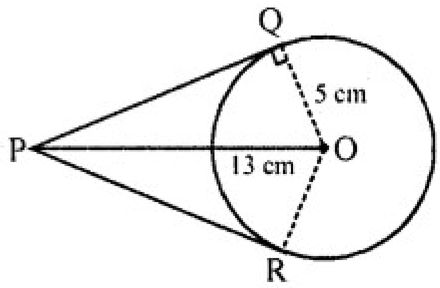

Now, in right angled ΔOBC, by using Pythagoras theorem,
$OC^2 = BC^2 + BO^2$ [(hypotenuse)² = (base)² + (perpendicular)²]
=> $5^2 = BC^2 + 4^2$
=> $BC^2 = 25 - 16 = 9$
=> BC = 3 cm
Length of chord AC = 2 BC = 2 x 3 = 6 cm

**Question 47.**
At one end A of a diameter AB of a circle of radius 5 cm, tangent XAY is drawn to the circle. The length of the chord CD parallel to XY and at a distance 8 cm from A is **[NCERT Exemplar]**
(a) 4 cm
(b) 5 cm
(b) 6 cm
(d) 8 cm
**Solution:**
**(d)** First, draw a circle of radius 5 cm having centre O.
A tangent XY is drawn at point A.




A chord CD is drawn which is parallel to XY and at a distance of 8 cm from A.
Now, ∠OAY = 90°
[Tangent and any point of a circle is perpendicular to the radius through the point of contact]
∠OAY + ∠OED = 180°
[sum of cointerior is 180°]
=> ΔOED = 180°
Also, AE = 8 cm, Join OC
Now, in right angled ΔOBC
$OC^2 = OE^2 + EC^2$
=> $EC^2 = OC^2 - OE^2$ [by Pythagoras theorem]
$EC^2 = 5^2 - 3^2$ [OC = radius = 5 cm, OE = AE – AO = 8 – 5 = 3 cm]
$EC^2 = 25 - 9 = 16$
=> EC = 4 cm
Hence, length of chord CD = 2 CE = 2 x 4 = 8 cm
[Since, perpendicular from centre to the chord bisects the chord]

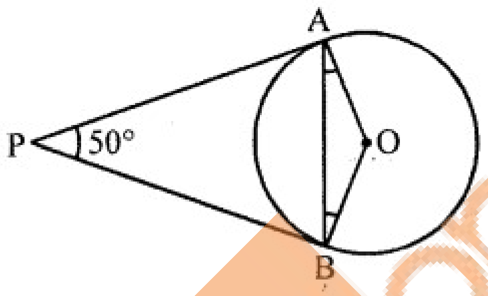
**Question 48.**
From a point P which is at a distance 13 cm from the centre O of a circle of radius 5 cm, the pair of tangent PQ and PR to the circle are drawn. Then the area of the quadrilateral PQOR is **[NCERT Exemplar]**
(a) 60 $cm^2$
(b) 65 $cm^2$
(c) 30 $cm^2$
(d) 32.5 $cm^2$
**Solution:**
**(a)** Firstly, draw a circle of radius 5 cm having centre O.
P is a point at a distance of 13 cm from O.
A pair of tangents PQ and PR are drawn.
Thus, quadrilateral PQOR is formed.
OQ ⊥ QP [since, AP is a tangent line]
In right angled ΔPQO,
$OP^2 = OQ^2 + QP^2$
=> $13^2 = 5^2 + QP^2$
=> $QP^2 = 169 - 25 = 144 = 12^2$
=> QP = 12 cm




Now, area of ΔOQP = 12 x QP x QO = 12 x 12 x 5 = 30 cm²
Area of quadrilateral QORP = 2 ΔOQP = 2 x 30 = 60 cm²

**Question 49.**
If PA and PB are tangents to the circle with centre O such that ∠APB = 50°, then ∠OAB is equal to
(a) 25°
(b) 30°
(c) 40°
(d) 50°

**Solution:**
**(a)** Given, PA and PB are tangent lines.
PA = PB [Since, the length of tangents drawn from an ∠PBA = ∠PAB = θ [say]




In ΔPAB,
∠P + ∠A + ∠B = 180°
[since, sum of angles of a triangle = 180°
50°+ θ + θ = 180°
2θ = 180° – 50° = 130°
θ = 65°
Also, OA ⊥ PA
[Since, tangent at any point of a circle is perpendicular to the radius through the point of contact]
∠PAO = 90°
=> ∠PAB + ∠BAO = 90°
=> 65° + ∠BAO = 90°
=> ∠BAO = 90° – 65° = 25°

**Question 50.**
The pair of tangents AP and AQ drawn from an external point to a circle with centre O are perpendicular to each other and length of each tangent is 5 cm. The radius of the circle is **[NCERT Exemplar]**
(a) 10 cm

(b) 7.5 cm
(c) 5 cm
(d) 2.5 cm

**Solution:**

**(c)**

AP = AQ = 5 cm

(tangent from external point are equal)

Radii makes right angle with tangent.

$\Delta APO \cong \Delta AQO$ (by R.H.S.)

As $\angle PAQ = 90°$, So $\angle PAO = 45°$

In $\Delta APO$,

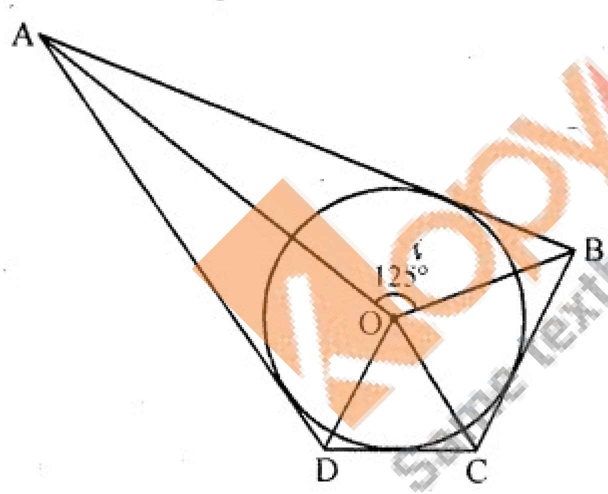
$$\tan 45° = \frac{OP}{AP} = \frac{OP}{5}$$

$\Rightarrow$ OP = 5 cm

Hence, the radii of circle = 5 cm

**Question 51.**

In the figure, if ∠AOB = 125°, then ∠COD is equal to **[NCERT Exemplar]**




(a) 45°
(b) 35°
(c) 55°
(d) 6212°

**Solution:**

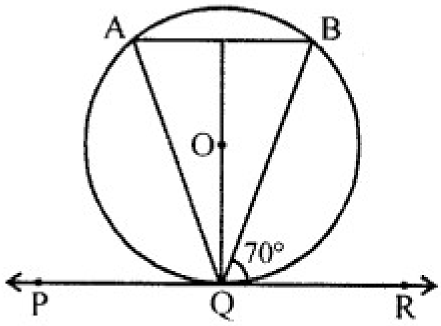
**(c)** We know that, the opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

∠AOB + ∠COD = 180°

=> ∠COD = 180° – ∠AOB = 180° – 125° = 55°

**Question 52.**

In the figure, if PQR is the tangent to a circle at Q whose centre is O, AB is a chord parallel to PR and ∠BQR = 70°, then ∠AQB is equal to **[NCERT Exemplar]**



(a) 20°
(b) 40°
(c) 35°
(d) 45°

**Solution:**

**(b)** Given, AB || PR
∠ABQ = ∠BQR = 70° [alternate angles]
Also QD is perpendicular to AB and QD bisects AB.
In ΔQDA and ΔQDB
∠QDA = ∠QDB [each 90°]
AD = BD
QD = QD [common side]
ΔADQ = ΔBDQ [by SAS similarity criterion]
Then, ∠QAD = ∠QBD …(i) [c.p,c.t.]
Also, ∠ABQ = ∠BQR [alternate interior angle]
∠ABQ = 70° [∠BQR = 70°]
Hence, ∠QAB = 70° [from Eq. (i)]
Now, in ΔABQ,
∠A + ∠B + ∠Q = 180°
=> ∠Q = 180° − (70° + 70°) = 40°