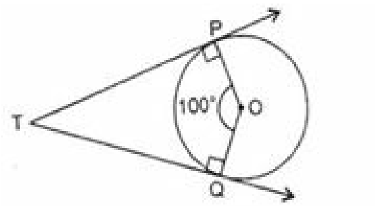
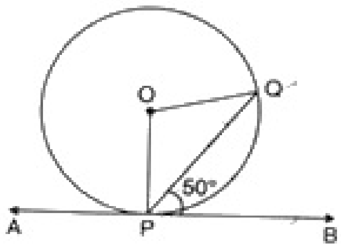
CBSE Test Paper 04
Chapter 10 Circle

1. In the adjacent figure, if TP and TQ are two tangents to a circle with centre O, so that $\angle POQ = 100^o$, then $\angle$PTQ is equal to **(1)**



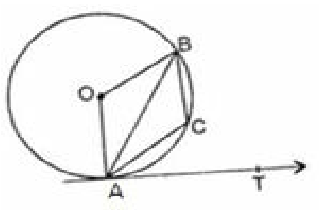
   a. 60°
   b. 40°
   c. 80°
   d. 90°

2. In the given figure, the measure of $\angle$OQP is **(1)**



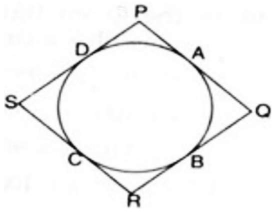
   a. 90°
   b. 40°
   c. 60°
   d. 35°

3. In figure, AB is a chord of a circle and AT is a tangent at A such that $\angle BAT = 60^o$, measure of $\angle ACB$ is : **(1)**

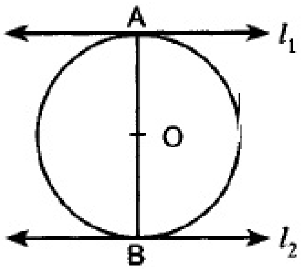


   a. 120°
   b. 150°
   c. 90°
   d. 110°

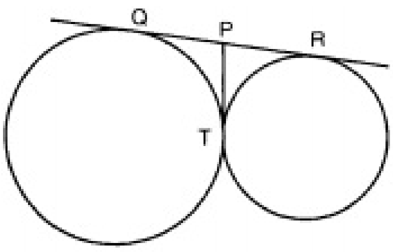
4. Quadrilateral PQRS circumscribes a circle as shown in the figure. The side of the quadrilateral which is equal to PD + QB is **(1)**



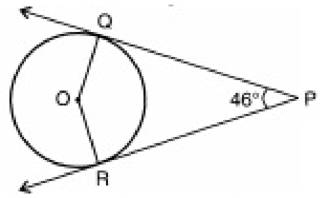
   a. PS
   b. PR
   c. QR
   d. PQ
5. The length of the tangent drawn from a point, whose distance from the centre of a circle is 17 cm and the radius is 8 cm is : **(1)**
   a. 15 cm
   b. 16 cm
   c. 18 cm
   d. 17 cm
6. What is the distance between two parallel tangents of a circle of radius 7 cm? **(1)**



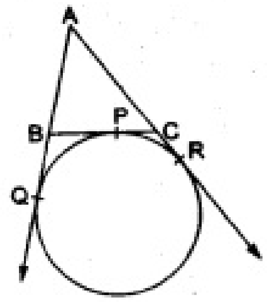
7. In the figure, QR is a common tangent to given circle which meet at T. Tangent at T meets QR at P. If QP = 3.8 cm, then find length of QR. **(1)**



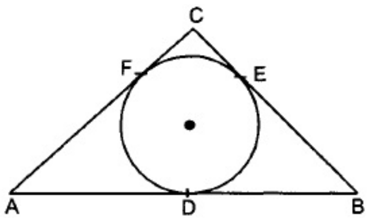
8. Write the number of tangents to a circle which are parallel to a secant. **(1)**
9. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle (in cm) which touches the smaller circle. **(1)**
10. If PQ and PR are two tangents to a circle with centre O. If $\angle$QPR = 46°, find $\angle QOR$ **(1)**



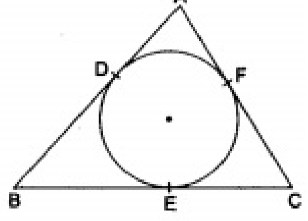
11. If $\triangle ABC$ is isosceles with AB = AC and C (O, r) is the incircle of the $\triangle ABC$ touching BC at L, prove that L bisects BC. **(2)**
12. A circle is touching the side BC of $\triangle ABC$ at P and touching AB and AC produced at Q and R respectively. Prove that $AQ = \frac{1}{2}(\text{perimeter of } \Delta ABC)$. **(2)**



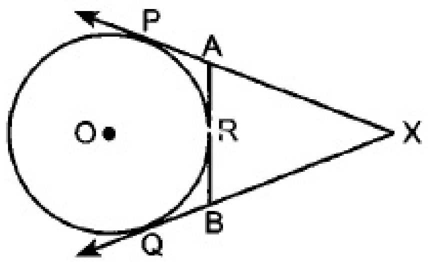
13. From a point Q, the length of the tangent to a circle is 24 cm and the distance of Q from the centre is 25 cm. Find the radius of the circle. **(2)**
14. Prove that the tangents drawn at the ends of a chord of a circle make equal angles with chord. **(3)**
15. In figure, a circle inscribed in triangle ABC touches its sides AB, BC and AC at points D, E and F respectively. If AB = 12 cm, BC = 8 cm and AC = 10 cm, then find the lengths of AD, BE and CF. **(3)**



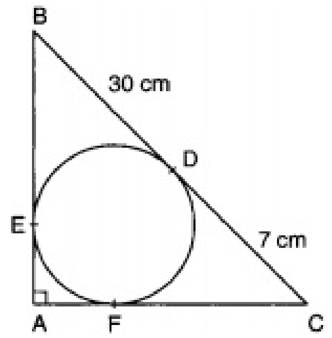
16. In the given figure, a circle inscribed a in a triangle ABC, touches the sides AB, BC and AC at points D, E and F respectively. If AB = 12 cm, BC = 8 cm and AC = 10 cm, find the lengths of AD, BE and CF . **(3)**



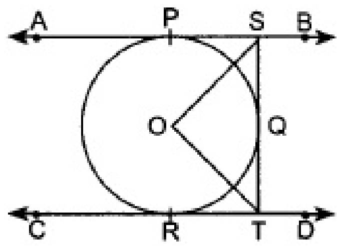
17. In figure, XP and XQ are two tangents to a circle with centre O from a point X outside the circle. ARB is tangent to circle at R. Prove that XA + AR = XB + BR. **(3)**



18. In fig, BDC is a tangent to the given circle at point D such that BD = 30 cm and CD = 7 cm. The other tangents BE and CF are drawn respectively from B and C to the circle and meet when produced at A making BA C a right angle triangle. Calculate
    i. AF
    ii. radius of the circle. **(4)**



19. A is a point at a distance 13 cm from the centre ‘O’ of a circle of radius 5 cm. AP and AQ are the tangents to circle at P and Q. If a tangent BC is drawn at point R lying on minor arc PQ to intersect AP at B AQ at C. Find the perimeter of ΔABC. **(4)**
20. In figure AB and CD are two parallel tangents to a circle with centre O. ST is tangent segment between the two parallel tangents touching the circle at Q. Show that $\angle SOT = 90^{0}$ **(4)**



CBSE Test Paper 04
Chapter 10 Circle

Solution

1. c. 80°

   Explanation: Since the angle between the two tangents drawn from an external point to a circle in supplementary of the angle between the radii of the circle through the points of contact.
   $\therefore \angle PTQ = 180° - 100° = 80°$

2. b. 40°

   Explanation: Here $\angle OPB = 90°$ [Angle between tangent and radius through the point of contact]
   $\Rightarrow \angle OPQ + \angle QPB = 90°$
   $\Rightarrow \angle OPQ + 50° = 90°$
   $\Rightarrow \angle OPQ = 40°$ But $\angle OPQ = \angle OQP$
   [Angle opposite to equal radii]
   $\therefore \angle OQP = 40°$

3. a. 120°

   Explanation: Since OA is perpendicular to AT, then $\angle OAT = 90°$
   $\Rightarrow \angle OAB + \angle BAT = 90°$
   $\Rightarrow \angle OAB + 60° = 90° \Rightarrow \angle OAB = 30°$
   $\therefore \angle OAB = \angle OBA = 30^\circ$ [Angles opposite to radii]
   $\therefore \angle AOB = 180° - (30° + 30°) = 120°$ [Angle sum property of a triangle]
   $\therefore$ Reflex$\angle AOB = 360° - 120° = 240°$
   Now, since the arc AB of a circle makes an angle which is equal to twice the angle ACB subtended by it at the circumference.
   $\therefore$ Reflex$\angle AOB = 2\angle ACB$
   $\Rightarrow 240° = 2\angle ACB$
   $\Rightarrow \angle ACB = 120°$

4. d. PQ

   Explanation: PD + QB = PA + QA [Tangents from an external point to a circle are equal]

$\Rightarrow$ PD + QB = PQ

5. a. 15 cm

   Explanation: Let PQ be the tangent.

   Since OP is perpendicular to PQ, then $\angle$OPQ =

   Now, in right angled triangle OPQ,

   $\mathrm{OQ}^2 = \mathrm{OP}^2 + \mathrm{PQ}^2$

   $\Rightarrow (17)^2 = (8)^2 + \mathrm{PQ}^2$

   $\Rightarrow \mathrm{PQ}^2 = 289 - 64$

   $\Rightarrow \mathrm{PQ}^2 = 225$

   $\Rightarrow$ PQ = 15 cm

6. Two parallel tangents of a circle can be drawn only at the end points of the diameter

   $\Rightarrow l_1 || l_2$

   $\Rightarrow$ Distance between l_1 $and\ l_2 = AB =$ Diameter of the circle

   = $2r = 2\times\ 7cm = 14cm$

7. QP = 3.8

   QP = PT (Length of tangents from the same external point are equal)

   Therefore, PT = 3.8 cm

   Also, PR = PT = 3.8 cm

   Now, QR = QP + PR

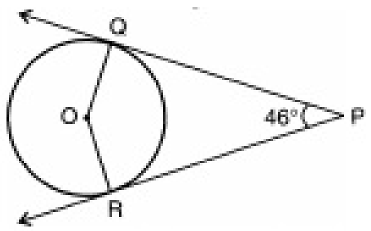
   QR = 3.8 + 3.8 = 7.6 cm.

8. A tangent is a line that intersects a circle at only one point on its circumference. On the other hand, a secant is a line that cuts through a circle such that it touches at two points of the circumference.

   Therefore, a circle can have a maximum o**f two tangents parallel to a secant.**

9. AP = $5^2 - 3^2$ = 4cm

   $\Rightarrow AB = 2 \times 4$ = 8cm

10. 

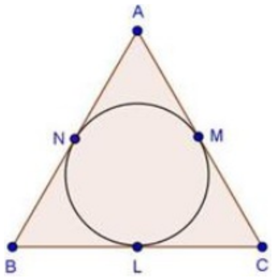
Since, $OQ \perp OP \ and \ OR \perp RP$

$\angle QOR + \angle QPR + \angle PRQ + \angle QOR = 360^0$

or, $\angle QOR + 46^\circ = 180^\circ$

or, $\angle QOR = 180^\circ - 46^\circ = 134^\circ$

11. Since tangents from an external point are equal in length.



Therefore,

AN = AM

BN = BL

And, CM = CL

Now,

AB = AC [Given]

$\Rightarrow$ AN + NB = AM + MC

$\Rightarrow$ NB = MC [$\because$ AN = AM]

$\Rightarrow$ BL = CL [$\because$ NB = BL and MC = CL]

Hence, L bisects BC.

12. We know that the lengths of tangents drawn from an external point to a circle are equal.

AQ = AR, ...(i) [tangents from A]

BP = BQ ...(ii) [tangents from B]

CP = CR ... (iii) [tangents from C]

Perimeter of $\triangle ABC$

= AB + BC + AC

= AB + BP + CP + AC

= AB + BQ + CR + AC [using (ii) and (iii)]

= AQ + AR

= 2AQ [using (i)

$\therefore \quad AQ = \frac{1}{2}(\text{ perimeter of } \triangle ABC)$

13. ∵ ∠OPQ = 90°

[The tangent at any point of a circle is ⊥to the radius through the point of contact]

∴ In right triangle OPQ,

$OQ^2 = OP^2 + PQ^2$ [By Pythagoras theorem]

⇒ $(25)^2 = (OP)^2 + (24)^2$

⇒ $625 = OP^2 + 576$

⇒ $OP^2 = 625 - 576 = 49$

⇒ OP = 7 cm

14. Let NM be chord of circle with centre C.

Let tangents at MN meet at the point O.

Since OM is a tangent

∴ MO ⊥ CM i.e. ∠OMC = 90°

∵ ON is a tangent

∴ ON ⊥ CN i.e. ∠ONC = 90°

Again in ΔCMN , CM = CN = r

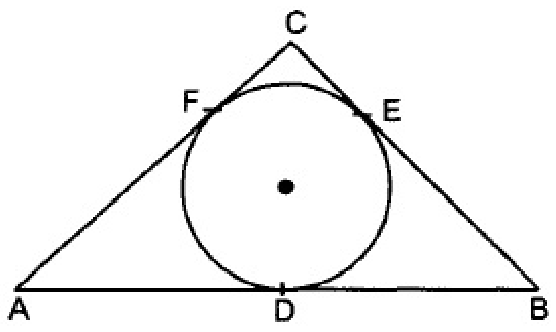
∴ ∠CMN = ∠CNM

∴ ∠OMC – ∠CMN = ∠ONC – ∠CNM

⇒ ∠OML = ∠ONL

Thus, tangents make equal angle with the chord.

15. Given,



Let ,

$AD = x\ cm, BD = AB - AD$

$= (12 - x)cm$

AD = AF [tangents from point A]

$AF = x\ cm$

Now, $CF = AC - AF = (10 - x)cm$

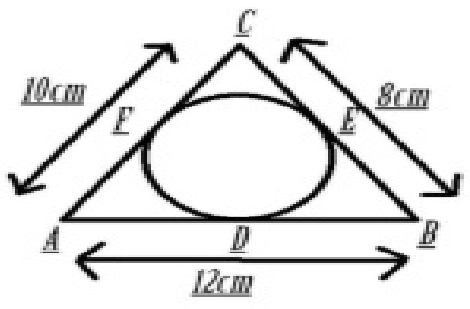
$CE = CF$
$CE = (10 - x)cm$
$BD = BE$
$BE = (12 - x)cm$
Now, $BC = CE + BE$
$\Rightarrow 8 = (10 - x) + (12 - x)$
$\Rightarrow 8 = 22 - 2x \Rightarrow 2x = 14$

$\Rightarrow$ x = 7 cm

$\Rightarrow$ AD = 7 cm.

BE = 12 - x = 12 - 7 = 5cm

$\Rightarrow$ CF = 10 - x = 10 - 7 = 3cm

16. 

Tangents drawn from an external point to a circle are equal.

$\Rightarrow$ AD = AF, BD = BE, CE = CF.

Let AD = AF = a

BD = BE =b

CE = CF = c

AB = AD + DB = a + b = 8 .... (1)

BC = BE + EC = b + c = 10 .... (2)

AC = AF + FC = a + b = 12 .... (3)

Adding (1), (2) and (3), we get

2 (a + b + c) = 30

$\Rightarrow$ (a + b + c) = 15 .... (4)

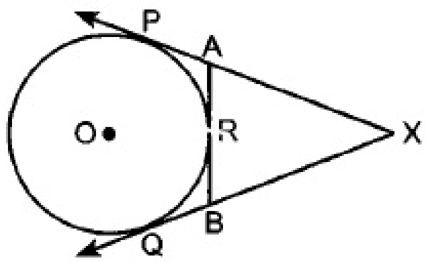
Subtracting (1) from (4), we get c = 7

Subtracting (2) from (4), we get a = 5

Subtracting (3) from (4), we get b = 3

Therefore, AD = a = 5 cm, BE = b = 3 cm, CF = c = 7 cm

17. Given,



$AP = AR$

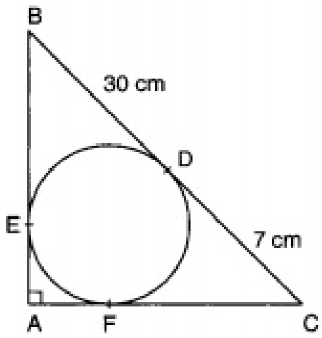
and BQ = BR ..(i)

Also XQ = XP ..(ii)[Tangents drawn from an external point]

$\therefore$ XA + AP = XB + BQ

$\therefore XA + AR = XB + BR$ [From (i) and (ii)]

18.



Since tangents drawn from an external point to circle are equal.

$\therefore$ AF = AE = x,

CD = FC = 7 cm

And, BD = BE = 30 cm

Now,

AB = AE + BE = (x + 30) cm

And, AC = AF + FC = (x + 7) cm

In $\triangle$ABC, we have

$AB^2 + AC^2 = BC^2$

$\Rightarrow (x + 30)^2 + (x + 7)^2 = (30 + 7)^2$

$\Rightarrow x^2 + 900 + 60x + x^2 + 49 + 14x = (37)^2$

$\Rightarrow 2x^2 + 74x + 949 = 1369$

$\Rightarrow 2x^2 + 74x + 949 - 1369 = 0$

$\Rightarrow 2x^2 + 74x - 420 = 0$

$\Rightarrow 2(x^2 + 37x - 210) = 0$

$\Rightarrow x^2 + 37x - 210 = 0$

$\Rightarrow x^2 + 42x - 5x - 210 = 0$

$\Rightarrow x(x + 42) - 5(x + 42) = 0$

$\Rightarrow (x + 42)(x - 5) = 0$

$\Rightarrow x - 5 = 0$ [$\because x \neq -42$]

$\Rightarrow x = 5$ cm

$\Rightarrow AF = 5$ cm

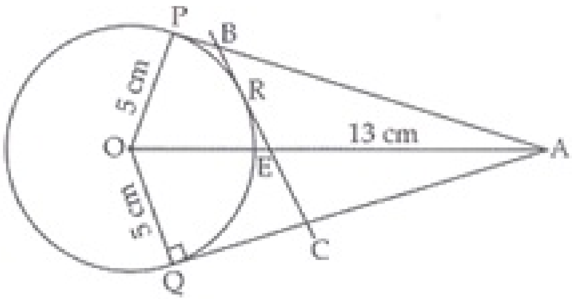
Radius of circle = OE = AF = 5 cm.

19. OA = 13 cm

OP = OQ = 5 cm

OP and PA are radius and tangent respectively at contact point P.

Therefore, $\angle OPA = 90°$



In right angled ΔOPA by Pythagoras theorem

$PA^2 = OA^2 - OP^2 = 13^2 - 5^2 = 169 - 25 = 144$

$\Rightarrow PA = 12$ cm

Points A, B and C are exterior to the circle and tangents drawn from an external point to a circle are equal so

PA = QA

BP = BR

CR = CQ

Perimeter of $\triangle ABC = AB + BC + AC$

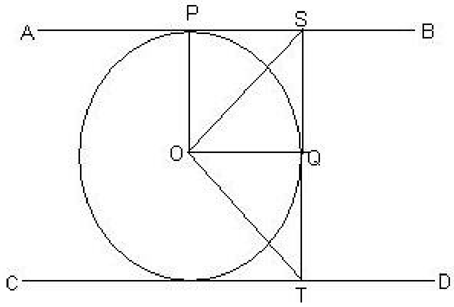
$= AB + BR + RC + AC$ [From figure]

$= AB + BP + CQ + AC = AP + AQ$

$= AP + AP = 2AP = 2 \times 12 = 24$ cm

So, the perimeter of $\triangle ABC = 24$ cm.

20. Given, AB and CD are two parallel tangents to a circle with centre O.



From the figure we get,

AB $\perp$ ST then $\angle$ASQ = 90° and

CD $\perp$ TS then $\angle$CTQ = 90°

$\angle$ASO = $\angle$QSO = $\frac{90^\circ}{2}$ = 45°

Similarly, $\angle$OTQ = 45°

Consider ΔSOT,

$\angle$OTS = 45° and $\angle$OST = 45°

$\angle$SOT + $\angle$OTS + $\angle$OST = 180° (angle sum property)

$\angle$SOT = 180° - ($\angle$OTS + $\angle$OST) = 180° - (45° +45°)

= 180° - 90° = 90°

$\therefore$ $\angle$SOT = 90^o