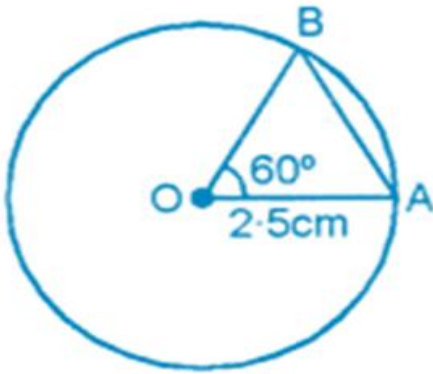


1. Draw a circle with centre O and radius 2.5 cm. Draw two radii OA and OB such that $\angle AOB = 60^\circ$. Measure the length of the chord AB.

Solution:

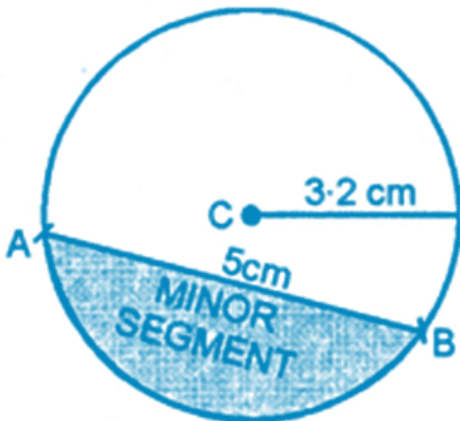
1. Draw a circle, taking centre as O and radius equal to 2.5 cm
2. Join OA, where A is any point on the circle
3. Draw $\angle AOB$ equal to 60°
4. Now, join AB and on measuring we get, $AB = 2.5$ cm



2. Draw a circle of radius 3.2 cm. Draw a chord AB of this circle such that $AB = 5$ cm. Shade the minor segment of the circle.

Solution:

1. Draw a circle, taking centre as O and radius = 3.2 cm
2. Take a point A on the circle
3. Taking A as centre and radius = 5 cm, draw an arc to meet the circle at point B
4. Now, join AB and shade the minor segment of the circle



3. Find the length of the tangent drawn to a circle of radius 3 cm, from a point at a distance 5 cm from the centre.

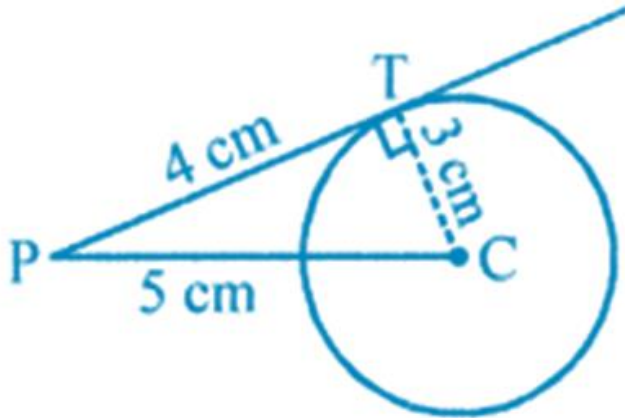
Solution:

Draw a circle, taking C as centre and radius $CT = 3$ cm

Let PT be the tangent, drawn from point P to a circle with centre C

Let $CP = 5$ cm

$CT = 3$ cm (given)



$\angle CTP = 90^\circ$ (since radius is perpendicular to tangent)

From $\triangle CPT$,

$CP^2 = PT^2 + CT^2$ (By Pythagoras theorem)

$$(5)^2 = PT^2 + (3)^2$$

We get,

$$PT^2 = 25 - 9$$

$$PT^2 = 16$$

$$PT = \sqrt{16}$$

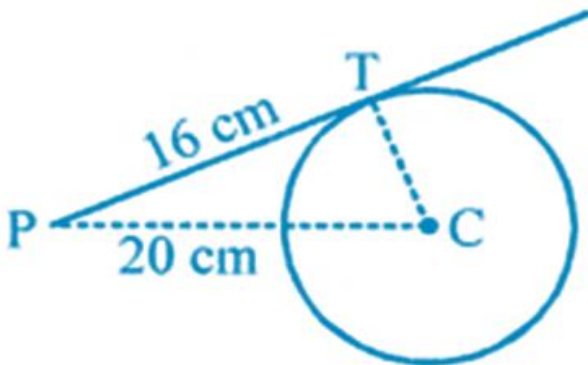
We get,

$$PT = 4$$

Therefore, length of tangent = 4 cm



4. In the adjoining figure, PT is a tangent to the circle with centre C . Given $CP = 20$ cm and $PT = 16$ cm, find the radius of the circle.



Solution:

We know that,

Radius is always perpendicular to tangent

i.e, $CT \perp PT$

Therefore,

$\triangle CPT$ is a right angled triangle, where $CP =$ hypotenuse

In right angled triangle,

By Pythagoras theorem, we get,

$$CP^2 = PT^2 + CT^2$$

$$CT^2 = CP^2 - PT^2$$

$$CT^2 = (20)^2 - (16)^2$$

We get,

$$CT^2 = 400 - 256$$

$$CT^2 = 144$$

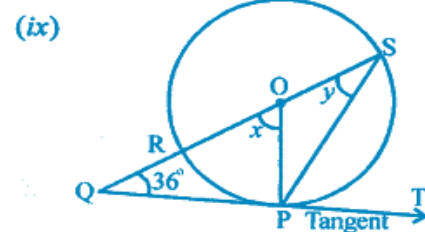
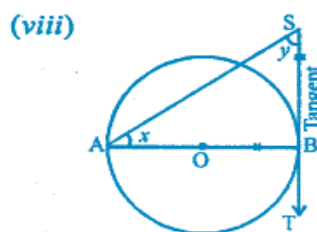
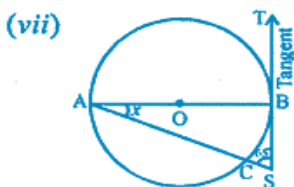
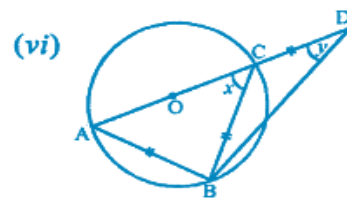
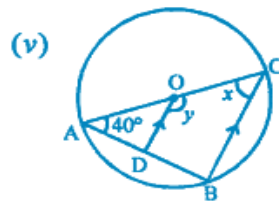
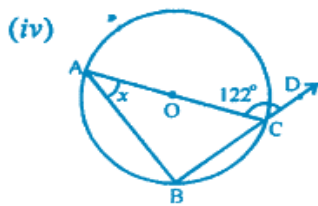
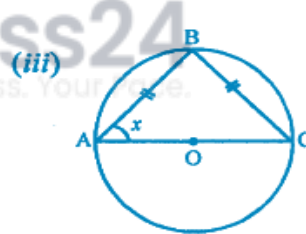
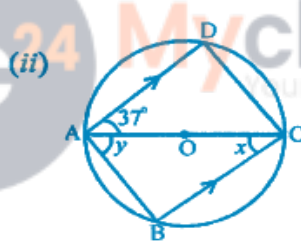
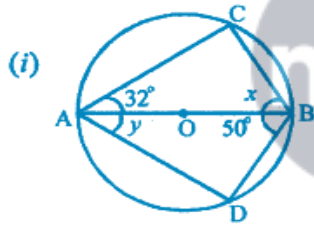
$$CT = \sqrt{144}$$

We get,

$$CT = 12 \text{ cm}$$

Therefore, radius of circle = 12 cm

5. In each of the following figure, O is the centre of the circle. Find the size of each lettered angle:



Solution:

(i) In the given figure,

AB is the diameter and O is the centre of the circle

$$\text{Given } \angle CAB = 32^\circ$$

$$\angle ABD = 50^\circ$$

$$\angle C = 90^\circ \quad (\text{angles in the semicircle})$$

By angle sum property of triangle, we get,

$$\angle C + \angle CAB + \angle ABC = 180^\circ$$

$$90^\circ + \angle CAB + \angle x = 180^\circ$$

$$90^\circ + 32^\circ + \angle x = 180^\circ$$

$$32^\circ + \angle x = 180^\circ - 90^\circ$$

We get,

$$\angle x = 180^\circ - 90^\circ - 32^\circ$$

$$\angle x = 58^\circ$$

Similarly,

In right angled triangle ADB,

By angle sum property of triangle, we get,

$$\angle ABD + \angle D + \angle BAD = 180^\circ$$

$$50^\circ + 90^\circ + \angle BAD = 180^\circ$$

$$50^\circ + 90^\circ + \angle y = 180^\circ$$

$$\angle y = 180^\circ - 140^\circ$$

We get,

$$\angle y = 40^\circ$$



(ii) In the figure,

AC is the diameter of circle with centre O

$$\angle DAC = 37^\circ$$

AD \parallel BC

$$\angle ACB = \angle DAC \quad (\text{Alternate angles})$$

Hence,

$$x = 37^\circ$$

In $\triangle ABC$,

$$\angle B = 90^\circ \quad (\text{Angle in a semicircle})$$

By angle sum property of triangle, we get,

$$\angle x + \angle y + \angle B = 180^\circ$$

$$37^\circ + \angle y + 90^\circ = 180^\circ$$

$$\angle y = 180^\circ - 127^\circ$$

We get,

$$\angle y = 53^\circ$$

(iii) In the figure,

AC is the diameter of the circle with center as O

$$BA = BC$$

Hence,

$$\angle BAC = \angle BCA \quad (\text{angles of isosceles triangle})$$

$$\text{But } \angle ABC = 90^\circ \quad (\text{angles in a semicircle})$$

In triangle ABC,

By angle sum property of triangle, we get,

$$\angle BAC + \angle ABC + \angle BCA = 180^\circ$$

$$\angle BAC + \angle BCA = 180^\circ - 90^\circ$$

$$\angle x + \angle x = 90^\circ$$

$$\angle 2x = 90^\circ$$

We get,

$$\angle x = 45^\circ$$

(iv) In the figure,

AC is the diameter of the circle, with centre as O,

$$\angle ACD = 122^\circ$$

$$\angle ACB + \angle ACD = 180^\circ \quad (\text{Linear pair})$$

$$\angle ACB + 122^\circ = 180^\circ$$

$$\angle ACB = 180^\circ - 122^\circ$$

We get,

$$\angle ACB = 58^\circ$$

In $\triangle ABC$,

$$\angle ABC = 90^\circ \quad (\text{Angles in a semicircle})$$

By angle sum property of triangle, we get,

$$\angle ABC + \angle BCA + \angle ACB = 180^\circ$$

$$90^\circ + x + 58^\circ = 180^\circ$$

$$x = 180^\circ - 148^\circ$$

We get,

$$x = 32^\circ$$

(v) In the figure,

AC is the diameter of the circle, with centre as O,

$$OD \parallel CB \text{ and } \angle CAB = 40^\circ$$

In $\triangle ABC$,

$$\angle B = 90^\circ \quad (\text{Angle in a semicircle})$$

By angle sum property of triangle, we get,

$$\angle BCA + \angle ABC + \angle BAC = 180^\circ$$

$$\angle BCA + \angle BAC + 90^\circ = 180^\circ$$

$$\angle BCA + \angle BAC = 180^\circ - 90^\circ$$

$$\angle BCA + \angle BAC = 90^\circ$$

$$x + 40^\circ = 90^\circ$$

$$x = 90^\circ - 40^\circ$$

We get,

$$x = 50^\circ$$

$\therefore OD \parallel CB$

Hence,

$$\angle AOD = \angle BCA \quad (\text{corresponding angles})$$

$$\angle AOD = 50^\circ$$

$$\text{But } \angle AOD + \angle DOC = 180^\circ \quad (\text{Linear pair})$$

$$50^\circ + y = 180^\circ$$

$$y = 180^\circ - 50^\circ$$

We get,

$$y = 130^\circ$$

Therefore, $x = 50^\circ$ and $y = 130^\circ$

(vi) In the figure,

AC is the diameter of the circle with centre as O

$$BA = BC = CD$$

In $\triangle ABC$,

$$\angle ABC = 90^\circ \quad (\text{Angle in a semicircle})$$

By angle sum property of triangle, we get,

$$\angle BAC + \angle BCA + \angle ABC = 180^\circ$$

$$\angle BAC + \angle BCA + 90^\circ = 180^\circ$$

$$\angle BAC + \angle BCA = 90^\circ$$

But given that, $BA = BC$

$$\text{Therefore, } \angle BAC = \angle BCA = x$$

$$x + x = 90^\circ$$

$$2x = 90^\circ$$

$$x = 45^\circ$$

In $\triangle BCD$,

$$BC = CD$$

Hence,

$$\angle CBD = \angle CDB = y \text{ and}$$

Exterior $\angle ACB = \text{Sum of interior opposite angles}$

$$\angle ACB = \angle CBD + \angle CDB$$

$$x = y + y$$

Therefore,

$$2y = x = 45^\circ$$

$$y = 45^\circ / 2$$

$$y = 22.5^\circ \text{ or}$$

$$y = \left(22\frac{1}{2}\right)^\circ$$

(vii) In the figure,

AB is the diameter of circle with centre O

ST is the tangent at point B

$$\angle ASB = 65^\circ$$

In $\triangle ABS$

\because TS is the tangent and OB is the radius

OB is perpendicular to ST or

$$\angle ABS = 90^\circ$$

But in $\triangle ASB$,

$$\angle BAS + \angle ASB + \angle ABS = 180^\circ$$

$$x + 65^\circ + 90^\circ = 180^\circ$$

$$x + 155^\circ = 180^\circ$$

$$x = 180^\circ - 155^\circ$$

We get,

$$x = 25^\circ$$

Therefore, $x = 25^\circ$



(viii) In the figure,

AB is the diameter of the circle with centre O

ST is the tangent to the circle at point B

$$AB = BS$$

Hence,

ST is the tangent and OB is the radius

$$OB \perp ST \text{ or } \angle OBS = 90^\circ$$

In $\triangle ABS$,

$$\angle BAS + \angle BSA + \angle ABS = 180^\circ$$

By angle sum property of triangle

$$\angle BAS + \angle BSA + 90^\circ = 180^\circ$$

$$\angle BAS + \angle BSA = 90^\circ$$

$$x + y = 90^\circ$$

\because AB = BS

Hence,

$$x = y$$

Therefore, $x = y = 90^\circ / 2 = 45^\circ$

(ix) In the figure,

RS is the diameter of the circle with centre as O

SR is produced to Q

QT is the tangent to the circle at point P

OP is joined

$$\angle Q = 36^\circ$$

QT is the tangent and OP is the radius of the circle

Hence,

OP is perpendicular to QT

$$\angle OPQ = 90^\circ$$

In $\triangle OPQ$,

By angle sum property of triangle, we get,

$$\angle OQP + \angle POQ + \angle OPQ = 180^\circ$$

$$\angle OQP + \angle POQ + 90^\circ = 180^\circ$$

Hence,

$$\angle OQP + \angle POQ = 90^\circ$$

$$36^\circ + x = 90^\circ$$

$$x = 90^\circ - 36^\circ$$

We get,

$$x = 54^\circ$$

In $\triangle OPS$,

$$OP = OS \quad (\text{Radii of the circle})$$

Hence,

$$\angle OPS = \angle OSP = y \text{ and}$$

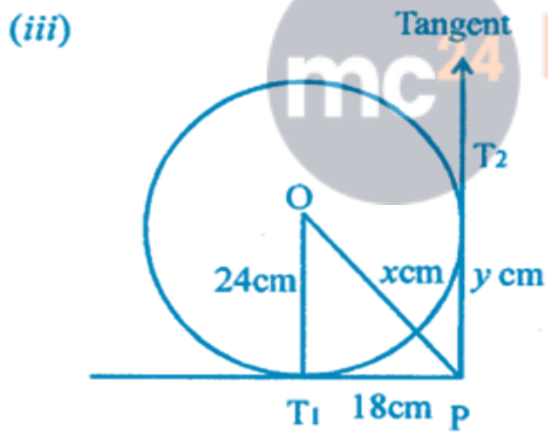
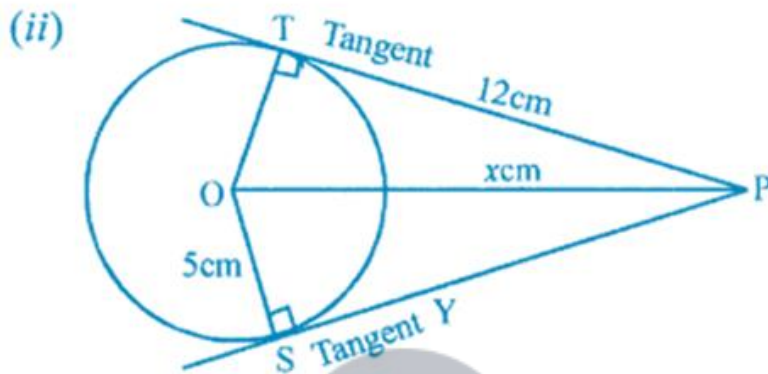
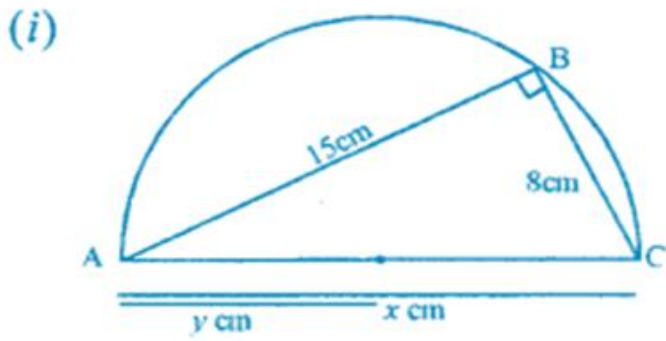
$$\text{Exterior angle } \angle POQ = \angle OPS + \angle OSP$$

$$x = y + y$$

$$x = 2y = 54^\circ$$



6. In each of the following figures, O is the centre of the circle. Find the values of x and y.



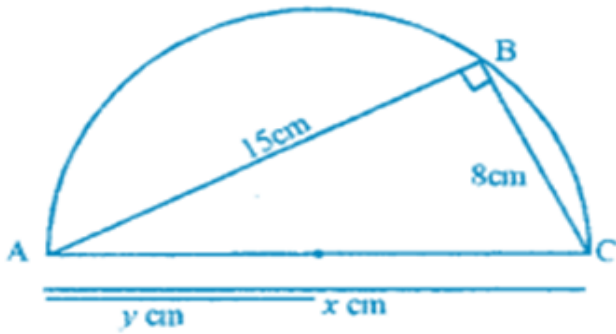
Solution:

(i) Given

O is the centre of the circle

$AB = 15 \text{ cm}$,

$BC = 8 \text{ cm}$



$\angle ABC = 90^\circ$ (Angles in a semicircle)

By Pythagoras Theorem,

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

$$AC^2 = (15)^2 + (8)^2$$

$$AC^2 = 225 + 64$$

$$AC^2 = 289$$

$$AC = (17)^2$$

$$AC = 17 \text{ cm}$$

$$x = 17 \text{ cm}$$

$$y = 1/2$$

(Since AC is the diameter and AO is the radius of the circle)

$$= 1/2 \times 17$$

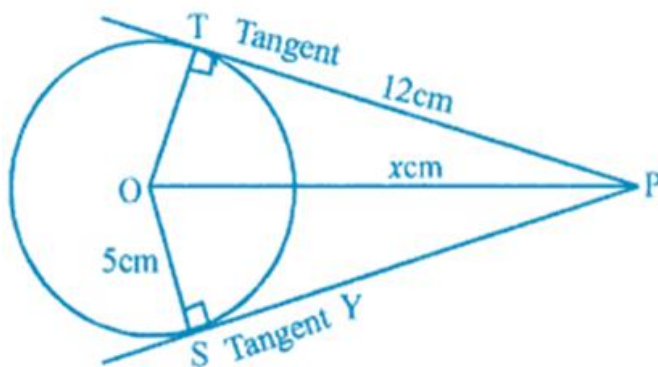
$$= 17/2 \text{ cm}$$

$$= 8.5 \text{ cm}$$

(ii) O is the centre of the circle

PT and PS are the tangents to the circle from point P

OS and OT are the radii of the circle



Hence, $\angle OSP = \angle OTP = 90^\circ$

OS = OT = 5 cm and

PT = PS = 12 cm

Now,

In right angled triangle OTP,

By Pythagoras Theorem

$$OP^2 = OT^2 + PT^2$$

$$= (5)^2 + (12)^2$$

$$= 25 + 144$$

$$= 169$$

We get,

$$OP^2 = (13)^2$$

Therefore, $OP = 13$ cm

i.e, $x = 13$ cm

Since $PS = PT = 12$ cm

Therefore,

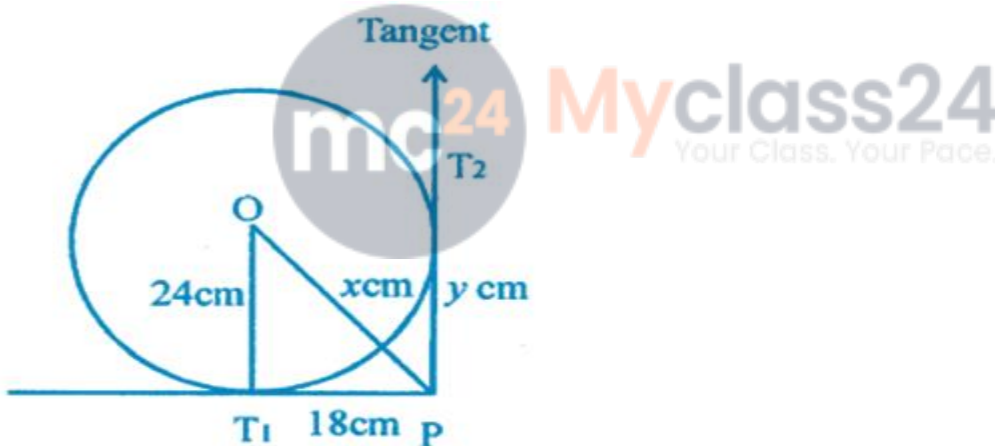
$$y = 12$$
 cm

(iii) O is the centre of the circle

OT_1 is the radius of the circle

PT_1 and PT_2 are the tangents of the circle from point P

$OT_1 = 24$ cm and $PT_1 = 18$ cm



Here,

OT_1 is the radius and PT_1 is the tangent,

Hence,

$$OT_1 \perp PT_1$$

Now,

In right angled triangle OPT,

By Pythagoras Theorem

$$OP^2 = OT_1^2 + PT_1^2$$

$$OP^2 = (24)^2 + (18)^2$$

$$OP^2 = 576 + 324$$

We get,

$$OP^2 = 900$$

$$OP^2 = (30)^2$$

$$OP = 30 \text{ cm}$$

$$x = 30 \text{ cm}$$

Since, PT_1 and PT_2 are the tangents from point P

Therefore,

$$PT_1 = PT_2 = 18 \text{ cm}$$

$$\text{i.e, } y = 18 \text{ cm}$$

