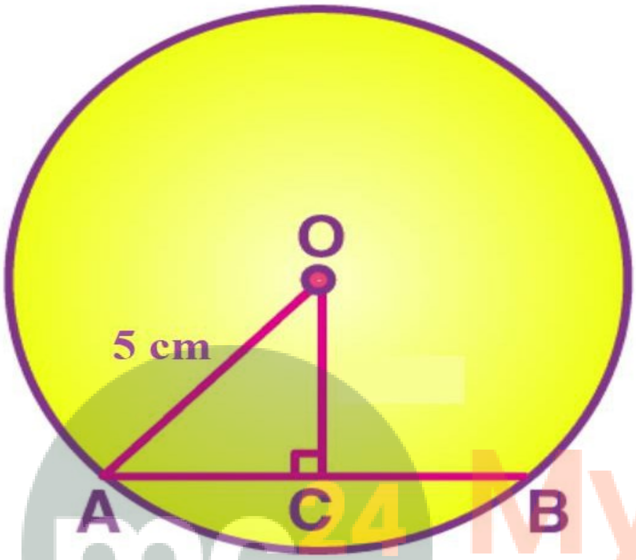
EXERCISE 17A

A chord of length 6 cm is drawn in a circle of radius 5 cm. Calculate its distance from the centre of the circle.

Solution:

Consider AB as the chord and O as the centre of the circle.
Take OC as the perpendicular drawn from the centre O to AB.



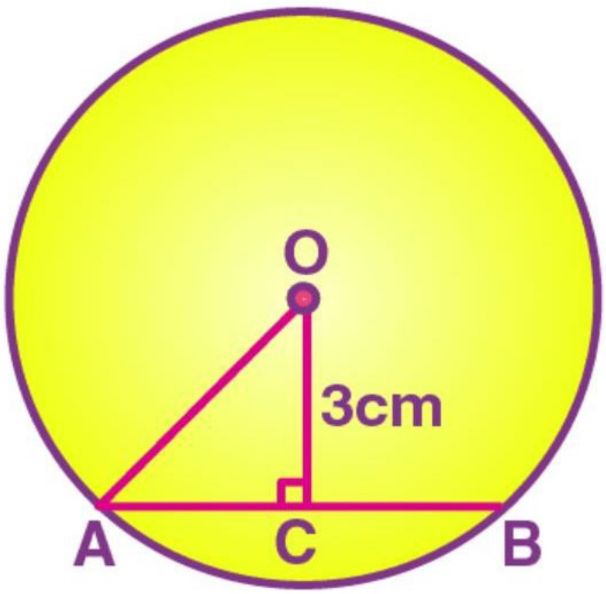
Here, the perpendicular to a chord, from the centre of a circle, bisects the chord.
So, AC = CB = 3 cm

In △ OCA,
$OA^2 = OC^2 + AC^2$ [Using Pythagoras Theorem]
Substituting the values
$OC^2 = 5^2 – 3^2$
$OC^2 = 16$
So we get
OC = 4 cm

1. A chord of length 8 cm is drawn at a distance of 3 cm from the centre of a circle. Calculate the radius of a circle.

Solution:

Consider AB as the chord and O as the centre of the circle.
Take OC as the perpendicular drawn from the centre O to AB.

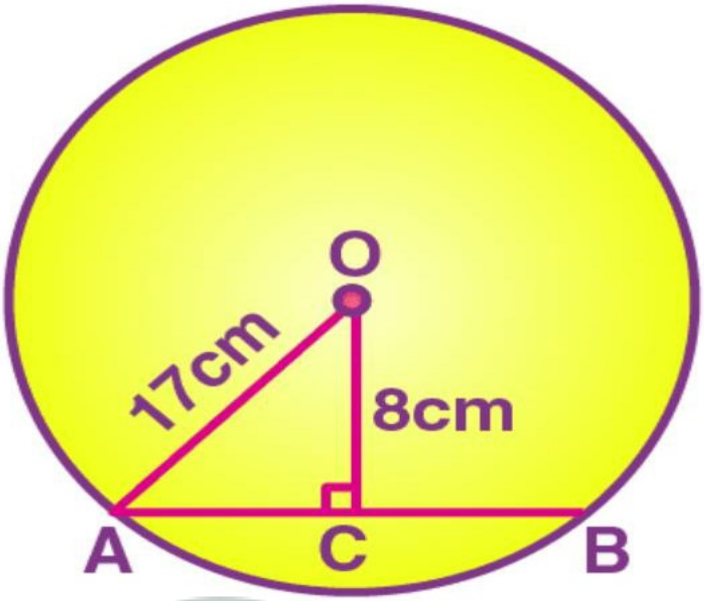


Here, the perpendicular to a chord, from the centre of a circle, bisects the chord.
So, AB = 8 cm
We know that
AC = CB = AB/2
Substituting the value of AB
AC = CB = 8/2
AC = CB = 4 cm

In △ OCA,
$OA^2 = OC^2 + AC^2$ [Using Pythagoras Theorem]
Substituting the values
$OA^2 = 4^2 + 3^2$
OA = 25
So we get
OA = 5 cm

Therefore, radius of the circle is 5 cm.

2. The radius of a circle is 17.0 cm and the length of perpendicular is drawn from its center to a chord is 8.0 cm. Calculate the length of the chord.
Solution:
Consider AB as the chord and O as the centre of the circle.
Take OC as the perpendicular drawn from the centre O to AB.



Here, the perpendicular to a chord, from the centre of a circle, bisects the chord.
So, AC = CB

In △ OCA,
$OA^2 = OC^2 + AC^2$ [Using Pythagoras Theorem]
Substituting the values
$AC^2 = 17^2 - 8^2$
AC = 225
So we get
AC = 15 cm

AB = 2 AC = 2 × 15 = 30 cm

3. A chord of length 24 cm is at a distance of 5 cm from the centre of the circle. Find the length of the chord of the same circle which is at a distance of 12 cm from the centre.
Solution:

Consider AB as the chord of length 24 cm and O as the centre of the circle.
Take OC as the perpendicular drawn from the centre O to AB.

Here, the perpendicular to a chord, from the centre of a circle, bisects the chord.
So, AC = CB = 12 cm

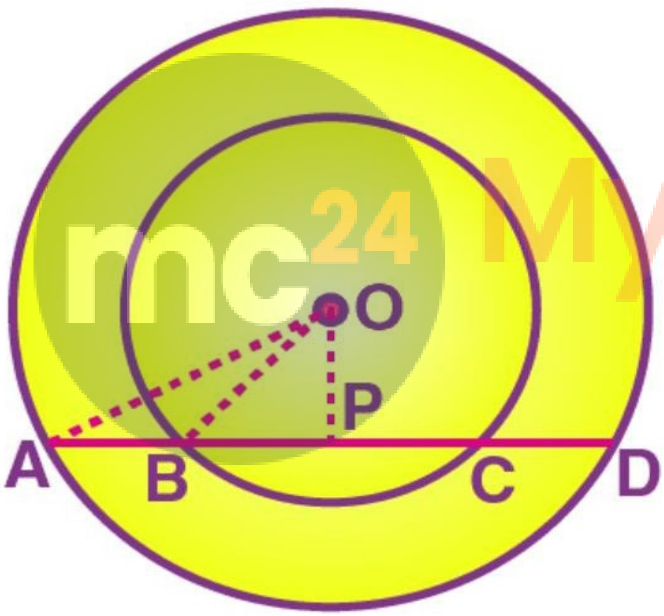
In △ OCA,
$OA^2 = OC^2 + AC^2$ [Using Pythagoras Theorem]
Substituting the values
$OA^2 = 5^2 + 12^2$
OA = 169

So we get
OA = 13 cm
Therefore, radius of the circle is 13 cm.

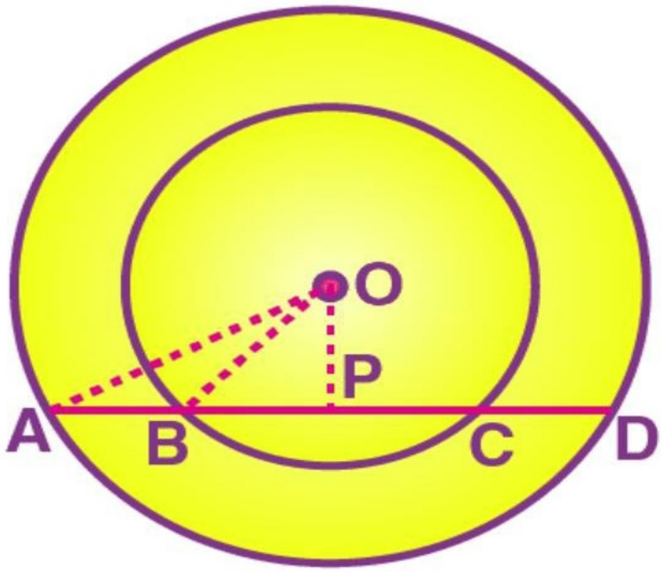
Consider A'B' as the new chord at a distance of 12 cm from the centre.
$(OA')^2 = (OC')^2 + (A'C')^2$
Substituting the values
$(A'C')^2 = 13^2 - 12^2$
$(A'C')^2 = 25$
A'C' = 5 cm

Length of the new chord = 2 × 5 = 10 cm

4. In the following figure, AD is a straight line. OP ⊥ AD and O is the centre of both circles. If OA = 34 cm, OB = 20 cm and OP = 16 cm; find the length of AB.



Solution:



In the inner circle, BC is the chord and OP ⊥ BC
Here, the perpendicular to a chord, from the centre of a circle, bisects the chord.
So, BP = PC

In △ OBP,
$OB^2 = OP^2 + BP^2$ [Using Pythagoras Theorem]
Substituting the values
$BP^2 = 20^2 - 16^2$
$BP^2 = 144$
So we get
BP = 12 cm

In the outer circle, AD is the chord and OP ⊥ AD
Here, the perpendicular to a chord, from the centre of a circle, bisects the chord.
So, AP = PD

In △ OAP,
$OA^2 = OP^2 + AP^2$ [Using Pythagoras Theorem]
Substituting the values
$AP^2 = 34^2 - 16^2$
$AP^2 = 900$
So we get
AP = 30 cm

Here, AB = AP – BP = 30 – 12 = 18 cm.