

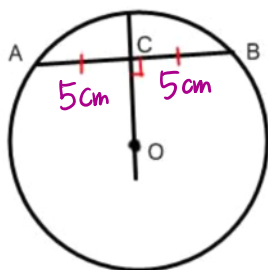
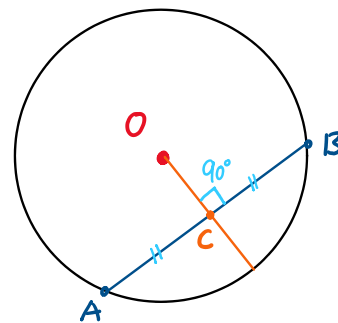
# Printout

June 14, 2023 9:56 AM

## 8.2 Properties of Chords in a Circle

In any circle with center O and chord AB:

- If OC bisects AB, then  $OC \perp AB$ .
- If  $OC \perp AB$ , then  $AC = CB$ .
- The perpendicular bisector of AB goes through the center O.



Remember:

**Perpendicular** means there is a  $90^\circ$  angle.

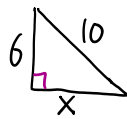
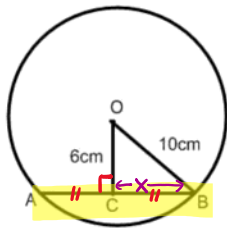
**Bisector** means it is divided into 2 equal parts

If  $AC = 5\text{cm}$ , then  $BC = 5\text{cm}$

### Example # 1

O is the center of the circle. Find the length of chord AB.

Solution: Use the Pythagorean Theorem to solve for BC



$$a^2 + b^2 = c^2$$

$$X^2 + 6^2 = 10^2$$

$$X^2 + 36 = 100 \quad \rightarrow -36$$

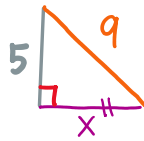
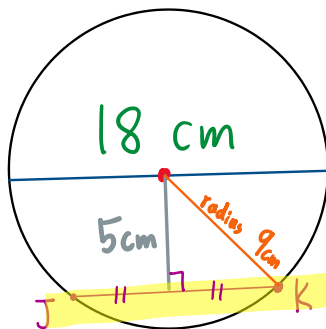
$$X^2 = 64$$

$$X = \sqrt{64} = 8 \text{ cm}$$

$$\therefore \overset{\text{Chord}}{AB} = 2 \times 8 \text{ cm} = \boxed{16 \text{ cm}}$$

### Example # 2

The diameter of a circle is 18 cm. A chord JK is 5 cm from the center. Find the length of the chord.



$$X^2 + 5^2 = 9^2$$

$$X^2 + 25 = 81 \quad \rightarrow -25$$

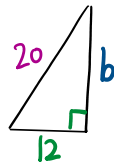
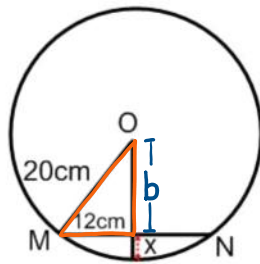
$$X^2 = 56$$

$$X = 7.5 \text{ cm}$$

$$\text{If } X = \underline{7.5 \text{ cm}}, \text{ then the chord JK is } 2 \times 7.5 = \boxed{15 \text{ cm}}$$

**Example # 3** A chord MN is 24cm. The radius of a circle is 20cm. Find the length of x.

Since the chord is 24cm, half it is 12 cm. Use the Pythagorean Theorem to find the missing side of the triangle.



$$12^2 + b^2 = 20^2$$

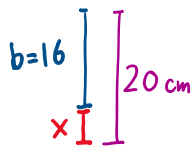
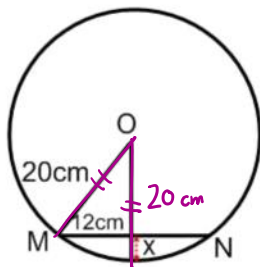
$$+144 + b^2 = 400 \quad \approx 144$$

$$b^2 = 256$$

$$b = 16 \text{ cm}$$

Radius is 20 cm ALL the way around the circle!

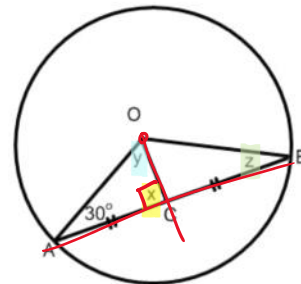
The length of x must be  $20 - 16 = 4 \text{ cm}$



**Example # 4:**

Finding Angle Measurements

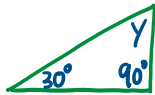
x, y and z.



**Solution**

Since OC bisect chord AB, OC is perpendicular to AB. Therefore,  $x = 90^\circ$

The 3 angles in a triangle must add up to  $180^\circ$ .



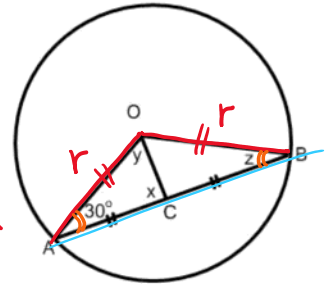
$$\angle y = 180^\circ - 30^\circ - 90^\circ$$

$$\angle y = 60^\circ$$

Since radii are equal ( $OA=OB$ ) and  $\Delta OAB$  is isosceles,

Remember that in an isosceles triangle the 2 base angles are equal.

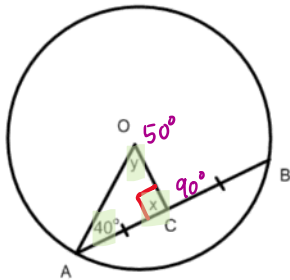
$$\therefore \angle z = 30^\circ$$



Try These

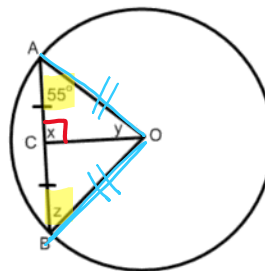
A).

B).



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

$$\angle y = 50^\circ$$



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

$$\angle y = 35^\circ$$

$$\angle z = 55^\circ$$

$$180^\circ - 55^\circ - 90^\circ$$

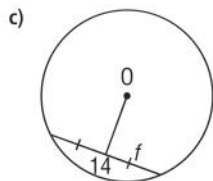
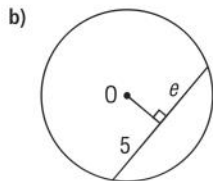
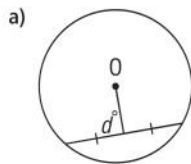
Homework Pg 397 (attached to this) #3-7, 10, 14, 17

## Practice

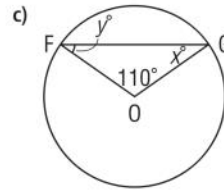
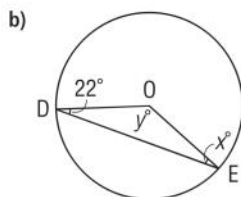
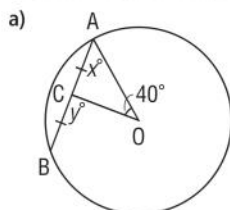
### Check

Give the answers to the nearest tenth where necessary.

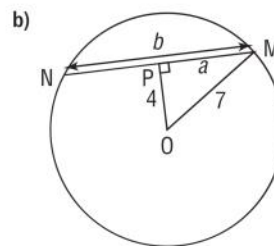
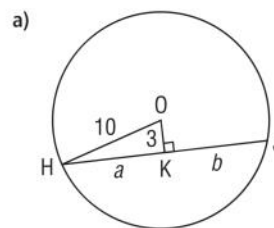
3. Point O is the centre of each circle. Determine the values of  $d^\circ$ ,  $e$ , and  $f$ .



4. Point O is the centre of each circle. Determine each value of  $x^\circ$  and  $y^\circ$ .

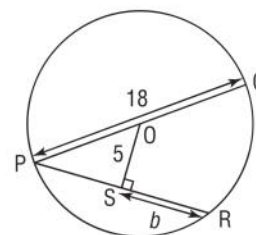


5. Point O is the centre of each circle. Determine each value of  $a$  and  $b$ .

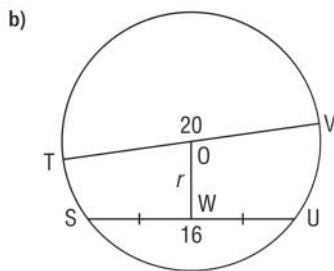
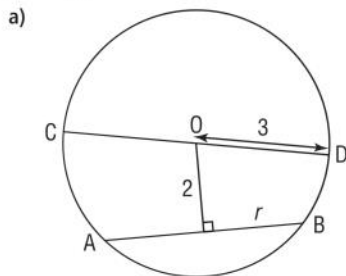


### Apply

6. Point O is the centre of the circle. Determine the value of  $b$ . Which circle properties did you use?

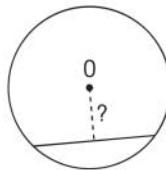


7. Point O is the centre of each circle.  
Determine each value of  $r$ . Which extra line segments do you need to draw first?  
Justify your solutions.



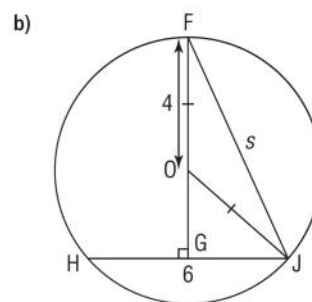
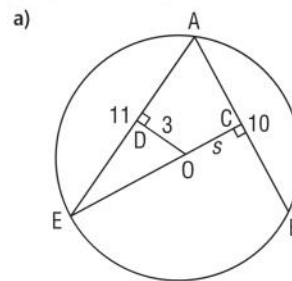
8. Construct a large circle, centre O.

- a) Draw, then measure a chord in the circle. How far is the chord from O?
- b) Draw other chords that are the same length as the chord you drew in part a. For each chord you draw, measure its distance from O. What do you notice?
- c) Compare your results with those of other students. What appears to be true about congruent chords in a circle?



9. Trace a circular object to draw a circle without marking its centre. Draw two chords in the circle. Use what you have learned in this lesson to locate the centre of the circle. Justify your strategy.

10. Point O is the centre of each circle.  
Determine each value of  $s$ . Which circle properties did you use?



13.

14. A chord is 6 cm long. It is 15 cm from the centre of a circle. What is the radius of the circle?

17. A radar station R tracks all ships in a circle with radius 50.0 km. A ship enters this radar zone and the station tracks it for 62.5 km until the ship passes out of range. What is the closest distance the ship comes to the radar station? Justify your answer.

