

# Printout

June 15, 2023 9:57 AM

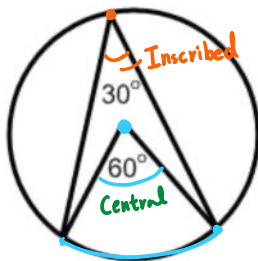
## Section 8.3 Properties of Angles in a Circle

### I) Central Angle and Inscribed Angle Property

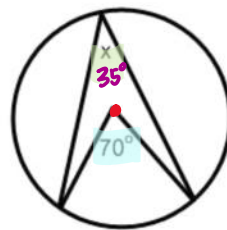
The measure of a **central angle** is **twice the** measure of an **inscribed angle** subtended by the same arc.

Examples

#1



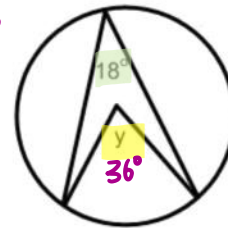
#2



$$\angle x = 35^\circ$$

#3

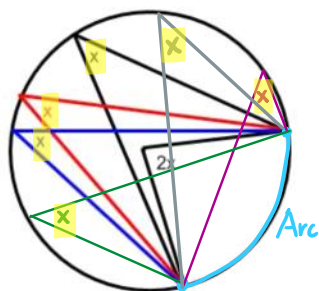
$$2 \times 18^\circ$$



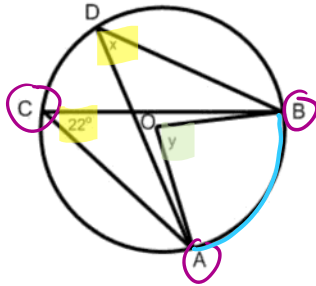
$$\angle y = 36^\circ$$

### II) Inscribed Angles Property

Inscribed angles subtended by the same arc are equal.



Examples #1



$\angle ACB$  and  $\angle x$  are inscribed angles subtended by the same arc AB. So,

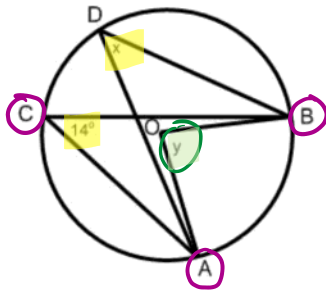
$$\angle x = \angle ACB = \boxed{22^\circ}$$

Central angle  $\angle y$  and inscribed angle are both subtended by arc AB.

$$\angle y = \text{twice}^{2 \times} (22^\circ)$$

$$\angle y = \boxed{44^\circ}$$

#2



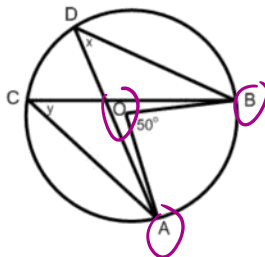
$\angle ACB$  and  $\angle x$  are inscribed angles subtended by the same arc AB. So,

$$\angle x = \boxed{14^\circ}$$

Central angle  $\angle y$  and inscribed angle  $\angle x$  are both subtended by arc AB.

$$\angle y = 2 \times 14 = \boxed{28^\circ}$$

#3



Since both inscribed angles are subtended from the same arc as the central angle

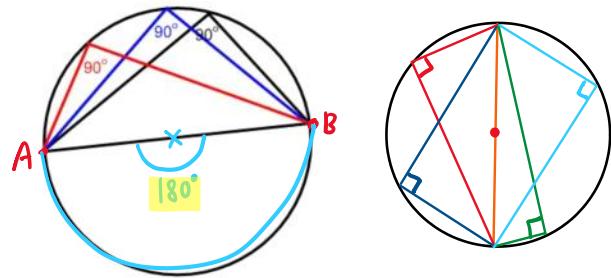
$\angle AOB = 50^\circ$  central angle.

$$\angle x = \frac{50}{2} = \boxed{25^\circ}$$

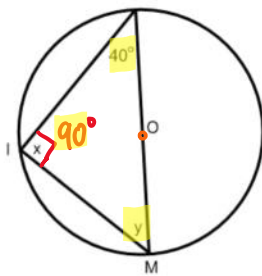
$$\angle y = \angle x = \boxed{25^\circ}$$

### III) Angles in a Semicircle Property

Inscribed angles subtended by a Semicircle (half the circle) are right angle. This means these angles use the diameter as base.



**Example #1** Find the missing angle measures.



$\angle MIN$  is an inscribed angle subtended by a semicircle.

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

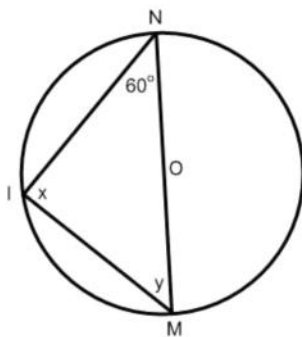
Since three angles in a triangle add to 180

$$\angle y + 90^\circ + 40^\circ = 180^\circ$$

$$\angle y = 180 - 90 - 40$$

$$\boxed{\angle y = 50^\circ}$$

**Example #2** - Try this one!



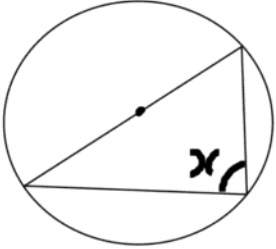
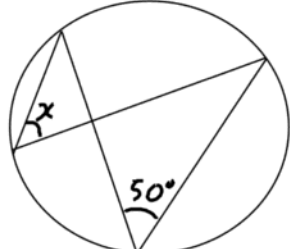
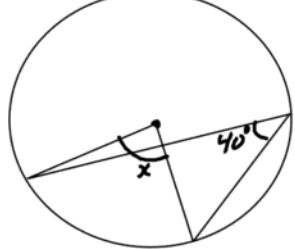
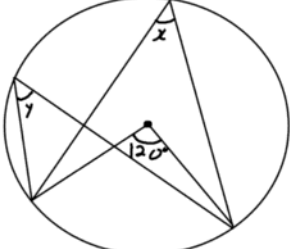
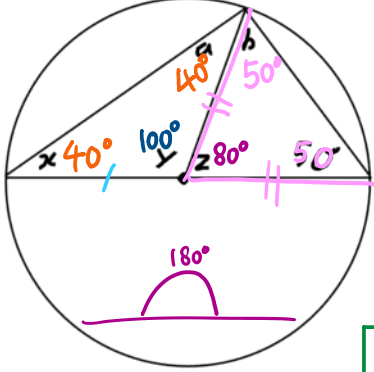
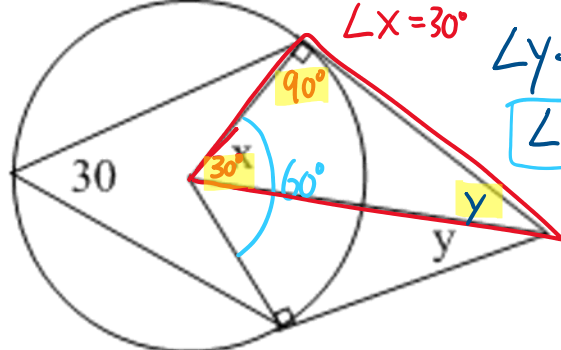
$\angle MIN$  is an inscribed angle subtended by a semicircle.

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

$$\angle y = 30^\circ \leftarrow (180 - 60 - 90)$$

Homework Pg 410 (attached to this) #4-6, 9, 11

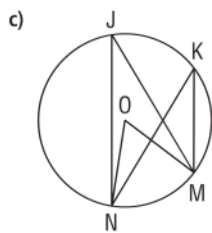
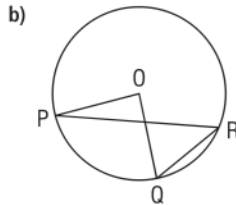
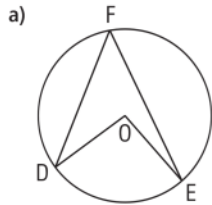
Now you Try

	
	
<p>☆</p> <p>☆</p>  <p><math>\angle x = 40^\circ</math></p> <p><math>\angle a = 40^\circ</math></p> <p><math>\angle y = 180 - 40 - 40</math></p> <p><math>\angle y = 100^\circ</math></p> <p><math>\angle z = 80^\circ</math></p> <p><math>\angle b = 50^\circ</math></p>	<p><math>\angle x = 40^\circ</math></p> <p><math>\angle z = 80^\circ</math></p> <p><math>\angle b = 50^\circ</math></p>
<p>☆</p>  <p><math>\angle x = 30^\circ</math></p> <p><math>\angle y = 180 - 90 - 30</math></p> <p><math>\angle y = 60^\circ</math></p>	<p><math>\angle y = 180 - 90 - 30</math></p> <p><math>\angle y = 60^\circ</math></p>

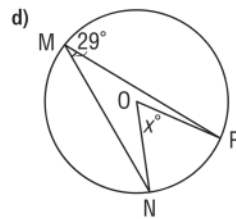
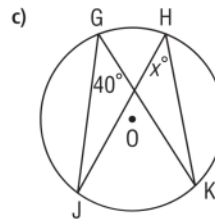
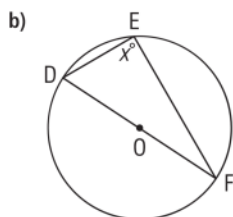
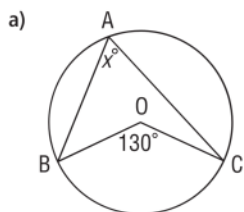
## Practice

### Check

3. In each circle, identify an inscribed angle and the central angle subtended by the same arc.

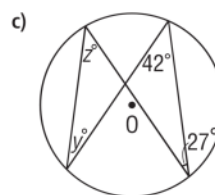
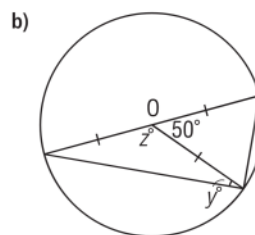
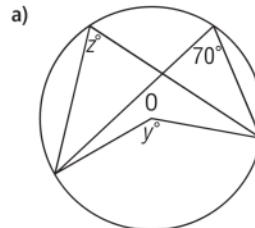


4. Point O is the centre of each circle. Determine each value of  $x^\circ$ .



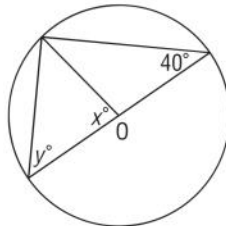
### Apply

5. Point O is the centre of each circle. Label each vertex. Determine each value of  $y^\circ$  and  $z^\circ$ . Which circle properties did you use?

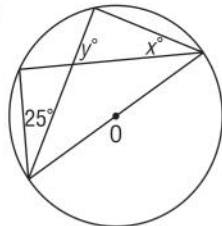


6. Point O is the centre of each circle. Label each vertex. Determine each value of  $x^\circ$  and  $y^\circ$ . Which circle properties did you use?

a)



b)



7. Construct a circle and two diameters PR and QS. Join the endpoints of the diameters to form quadrilateral PQRS.

a) What type of quadrilateral is PQRS?

Use what you have learned in this lesson to justify your answer.

b) What type of quadrilateral is PQRS when the diagonals are perpendicular?

Construct a diagram to check your answer.

8. Draw and label a diagram to illustrate:

a) the measure of the central angle in a circle is equal to twice the measure of an inscribed angle subtended by the same arc

b) the inscribed angles subtended by the same arc of a circle are equal

9. Rectangle PQRS is inscribed in a circle with radius 7 cm. The length of the rectangle is 12 cm.

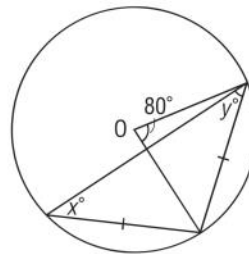
a) Sketch a diagram.

- b) What is the width of the rectangle?  
Give the answer to the nearest tenth.  
Justify your solution.

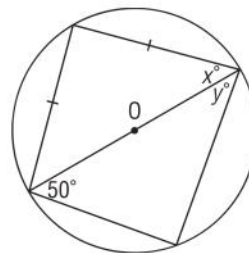
10. **Assessment Focus** Geometry sets often include *set squares*. A set square is a plastic right triangle. Trace around a circular object. Explain how you can use a set square and what you know about the angle in a semicircle to locate the centre of the circle. Justify your solution.

11. Point O is the centre of each circle. Label each vertex. Determine each value of  $x^\circ$  and  $y^\circ$ . Which circle properties does each question illustrate?

a)



b)



c)

