Chapter 8 Circle Geometry

What You'll Learn:

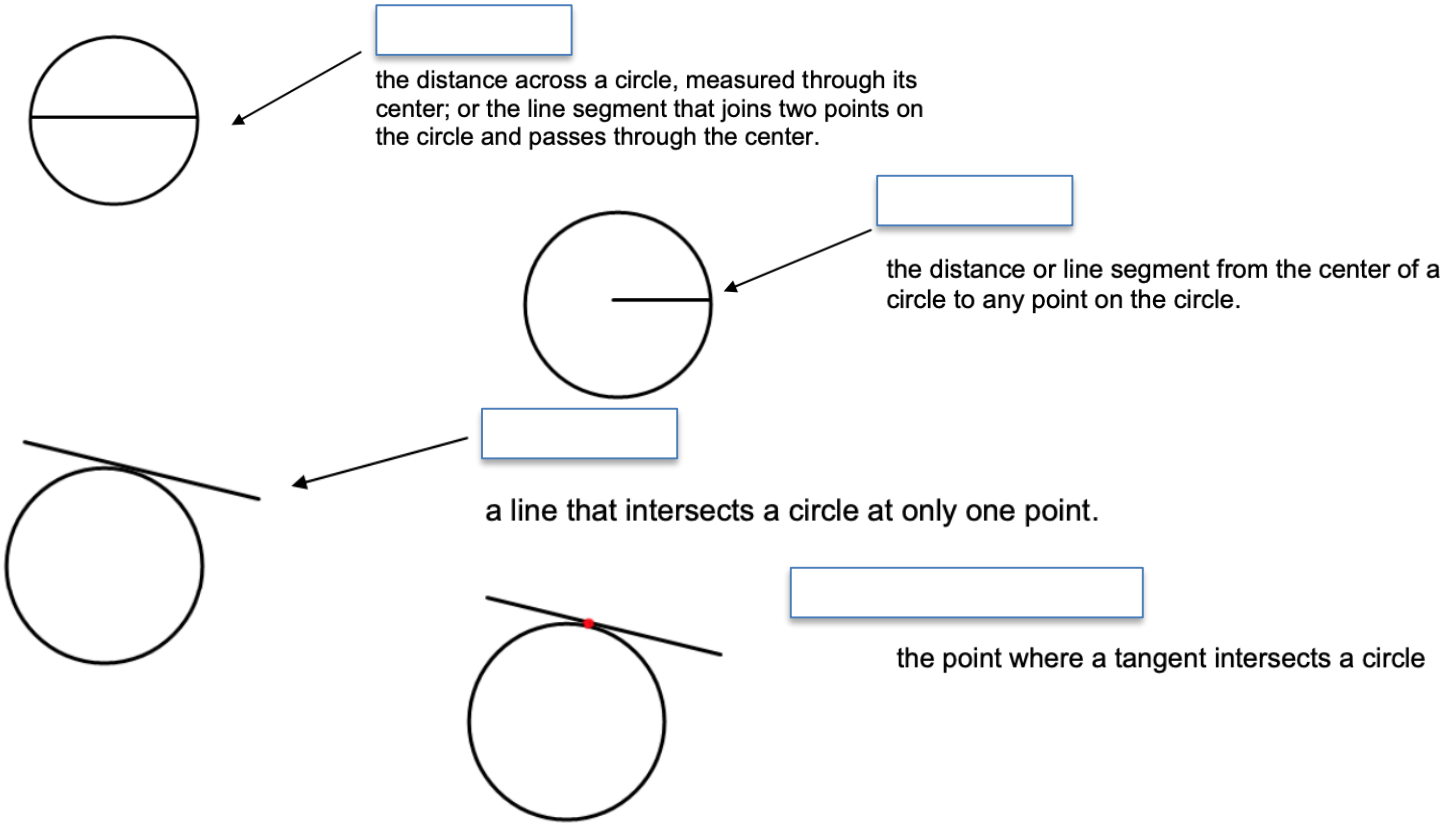
Circle Properties that Relate:

- ☐ A tangent to a circle and the radius of the circle.
- ☐ A chord in a circle, its perpendicular bisector, and the centre of the circle.
- ☐ The measure of angles in circles.

Key Vocabulary:

- Tangent:
- Point of Tangency:
- Chord:
- Arc:
- Minor Arc:
- Major Arc:
- Central Angle:
- Inscribed Angle:
- Subtended:
- Inscribed Polygon:
- Supplementary Angles:

Introduction: Definitions



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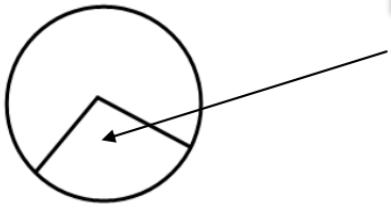
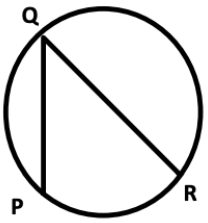
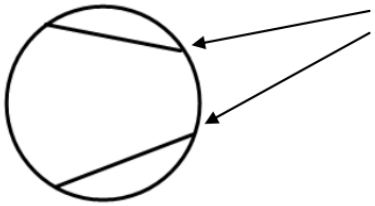


An angle whose arms are radii of a circle.

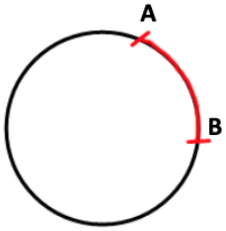


An angle in a circle with its vertex and endpoints of its arms on the circle.

For example, ∠ PQR



a line segment that joins two points on a circle.



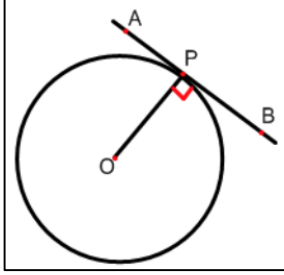
A segment of the circumference of a circle.

The shorter of two arcs between two points on a circle.
For example: $\overset{\frown}{AB}$

8.1 Properties of Tangents to a Circle

Section Focus:

- Discover the relationship between a _____ and a _____, then solve related problems.

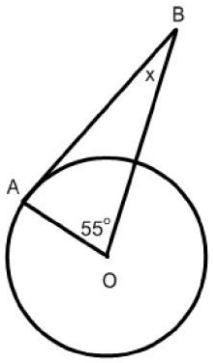


Tangent-Radius Property

A tangent to a circle is _____ at the point of tangency.

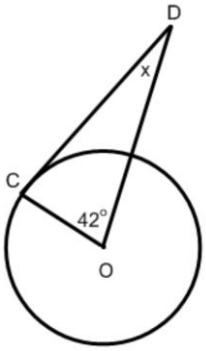
∠APO = ∠BPO = 90^0

Ex 1) Point O is the centre of a circle and AB is tangent to the circle. In ΔOAB, ∠AOB = 55°. Determine the measure of ∠OBA.

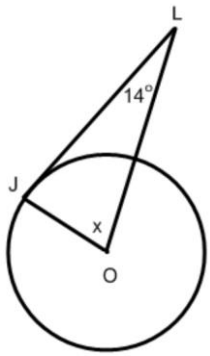


Ex 2) Find the missing angles in the following diagrams.

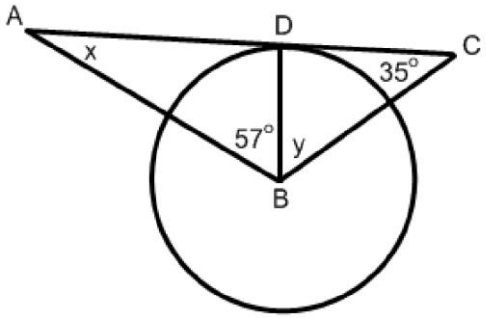
a)



b)



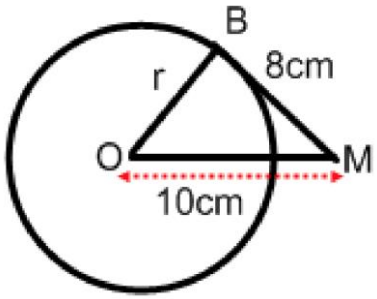
Ex 3) Since AC is a tangent, ∠BDA = ∠BDC = 90°. Find x and y.



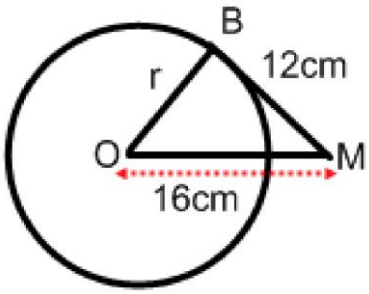
<u>Using the Pythagorean Theorem in a Circle</u>

Pythagorean Theorem: $a^2 + b^2 = c^2$

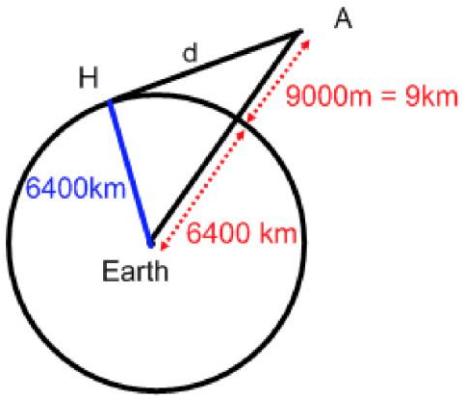
Ex 4) Since BM is a tangent, we know that ∠OBM = 90°. Since we have a right triangle, use the Pythagorean Theorem to find side r.



Ex 5) Since BM is a tangent, we know that ∠OBM = 90°. Find side r.



Ex 6) An airplane is cruising at an altitude of 9000 m. A cross section of the earth is a circle with a radius approximately 6400 km. A passenger wonders how far she is from a point, H, on the horizon she sees outside the window. Calculate the distance to the nearest kilometer.



8.1 Assignment: Pg 388 #_____

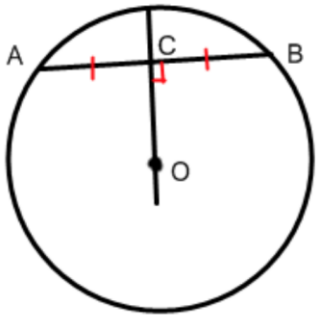
8.2 Properties of Chords in a Circle

Section Focus:

- Relate a chord, its perpendicular bisector, and the centre of the circle, then solve problems.

In any circle with center O and chord AB:

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



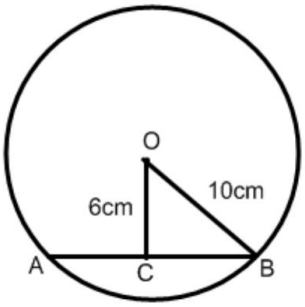
Remember:

Perpendicular means there is a

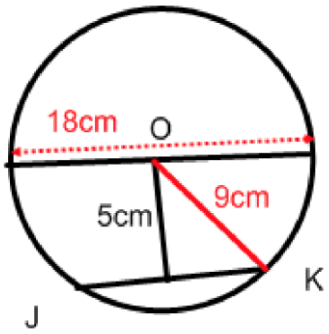
Bisector means it is divided into

If AC = 10cm, then BC =10cm

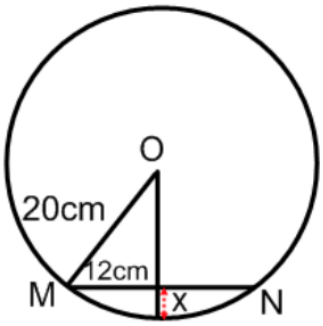
Ex 1) O is the centre of the circle. Find the length of chord AB.



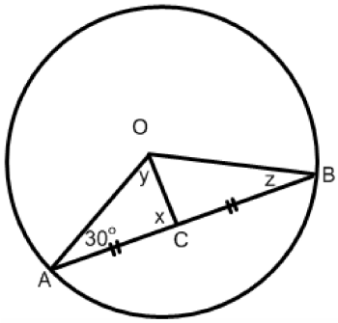
Ex 2) The diameter of a circle is 18 cm. A chord JK is 5 cm from the centre. Find the length of the chord.



Ex 3) A chord MN is 24 cm. The radius of a circle is 20 cm. Find the length of x.

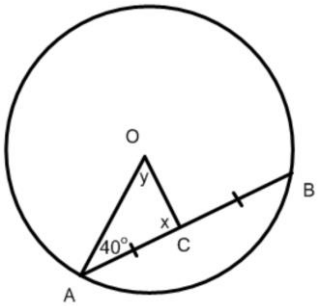


Ex 4) Find angle measurements x, y, and z.

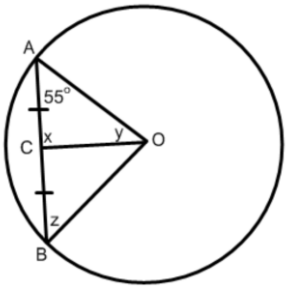


Try These!

a) Find angles x and y.



b) Find angles x, y, and z



8.2 Assignment: Pg 396 #_____

8.3 Properties of Angles in a Circle

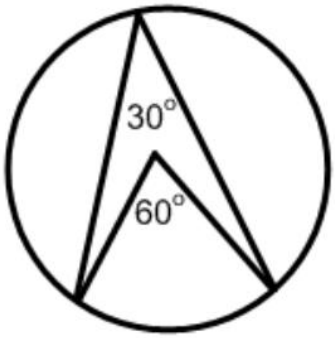
Section Focus:

- Discover the properties of inscribed angles and central angles, then solve related problems.

Central Angle and Inscribed Angle Property

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

#1



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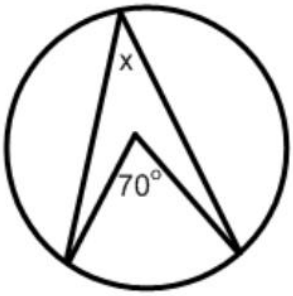

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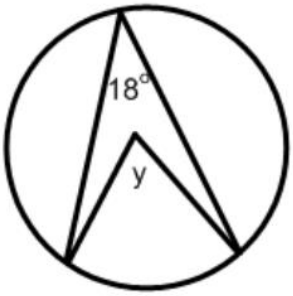
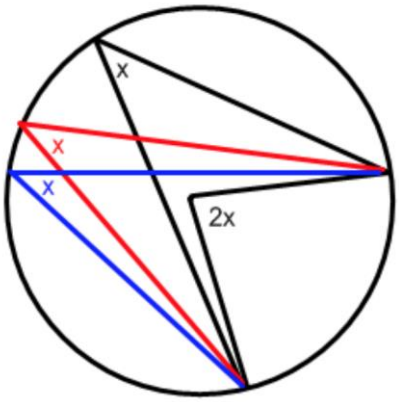
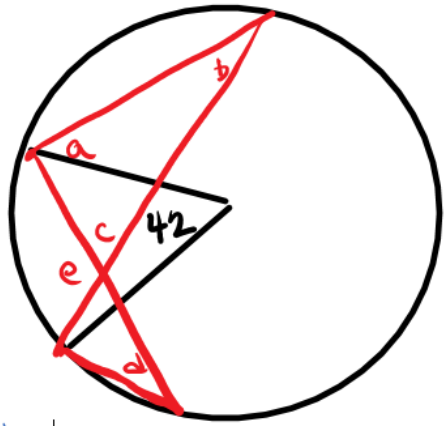


Inscribed Angles Property

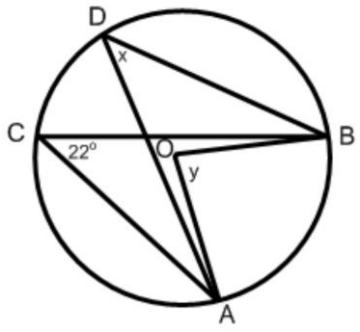
Inscribed angles subtended by the same arc are _____





Which angles are 21degrees? .

Ex 1) Find the measures of angles x and y.



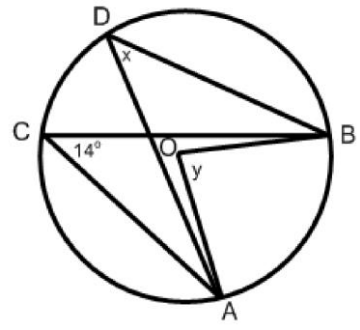
Find angle x

∠ACB and ∠ADB are inscribed angles subtended by the same arc AB.
So, ∠ACB = ∠ADB.

Find angle y

Central angle ∠AOB and inscribed angle ∠ACB are both subtended by arc AB.
So, ∠AOB = 2(∠ACB).

Ex 2) Find angles x and y.



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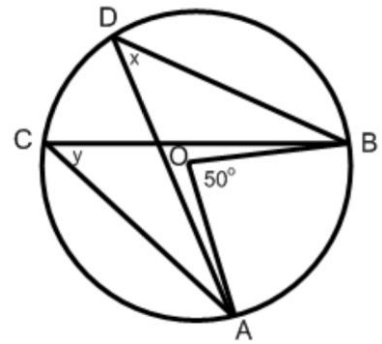
Find angle y

Central angle ∠AOB and inscribed angle ∠ACB are both subtended by arc AB.
So, ∠AOB = 2(∠ACB).

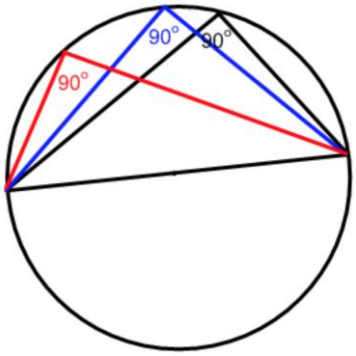
Ex 3) Find angles x and y.

Since both inscribed angles are subtended by the same arc as the central angle, ∠ACD = ∠ADB = $\frac{1}{2}$∠AOB

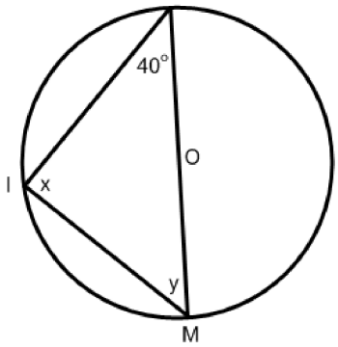


Angles in a Semicircle Property

Inscribed angles subtended by a semicircle (half the circle) are _____ angles.
This means that these angles are subtended by the diameter.



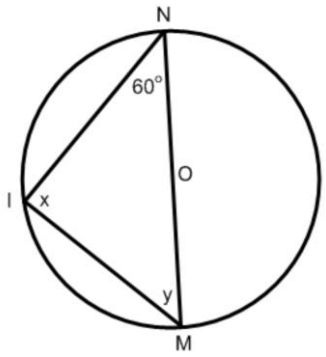
Ex 4) Find the missing angle measures.



Find x
Since ∠MIN is an inscribed angle subtended by a semicircle…

Find y
Since the three interior angles of a triangle add to 180°…

Ex 5) Find the missing angle measures.



Find x

Since ∠MIN is an inscribed angle subtended by a semicircle…

Find y

Since the three interior angles of a triangle add to 180°…

8.3 Assignment: Pg 410 #_____ Optional Challenge Question: _____

Notes and Extra Questions: