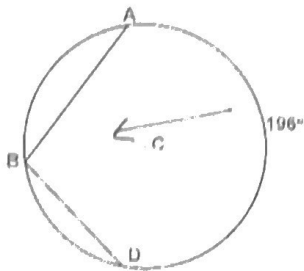


Inscribed & Circumscribed Angles and Intercepted Arcs

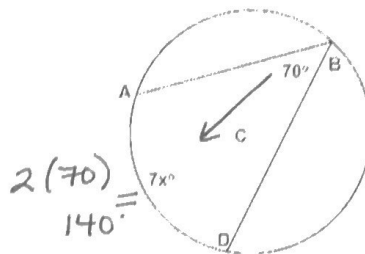
Name	Definition	Measure	Picture
Inscribed Angle	An angle whose vertex is <u>on</u> a circle and whose sides contain chords of the circle	The measure of an inscribed angle is <u>half</u> the measure of its intercepted arc. $m\angle ACB = \frac{1}{2} \widehat{AB}$	
Intercepted Arc	An arc whose endpoints lie on the sides of an <u>inscribed angle</u> and all the points of the circle between them.	The measure of an intercepted arc is <u>double</u> the measure of the inscribed angle. $\widehat{AB} = 2 \cdot m\angle ACB$	

Example: Find the measure of angle ABD.



$$\frac{196}{2} = 98^\circ$$

Example: Find the value of x and arc AD and arc ABD.



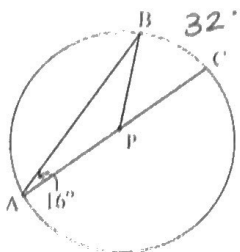
$$\frac{140}{7} = \frac{7x}{7}$$

$$x = 20$$

$$\widehat{AD} = 7(20) = 140^\circ$$

$$\widehat{ABD} = 360 - 140 = 220^\circ$$

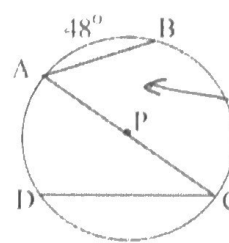
Example: Find the measure of arc AB and BC.



$$\widehat{BC} = 32^\circ$$

$$\widehat{AB} = 180 - 32 = 148^\circ$$

Example: Find the measure of angle BAC.

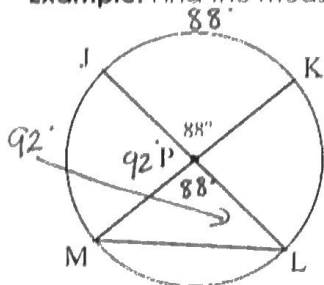


$$180 - 48 = 132$$

$$132/2 = 66^\circ$$

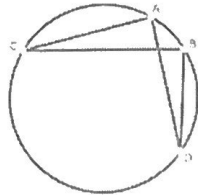
$$m\angle BAC = 66^\circ$$

Example: Find the measure of angle JLM.

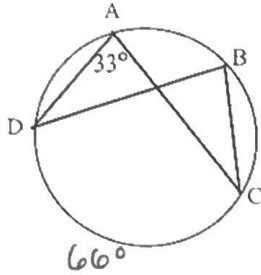


$$92/2 = 46^\circ$$

$$m\angle JLM = 46^\circ$$

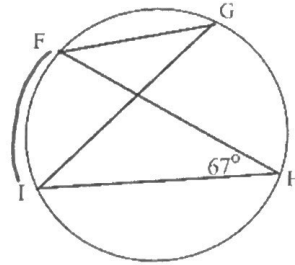
Name	Theorem	Hypothesis	Conclusion
Intercepted Arcs Corollary	If inscribed angles of a circle intercept the same arc, then the angles are congruent		$m\angle CAD = m\angle CBD$ b/c they both intercept arc CD.

Example: Find the measure of angle B.



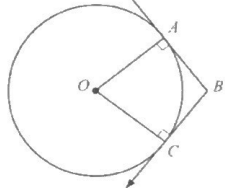
$$\angle B = 33^\circ$$

Example: Find the measure of angle G and arc IF.

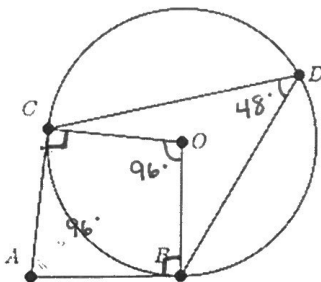


$$\angle G = 67^\circ$$

$$67 \times 2 = 134^\circ = \widehat{IF}$$

Name	Theorem	Hypothesis	Conclusion
Circumscribed Angle	Angle formed by two rays that are each tangent to a circle.	The measure of a circumscribed angle is equal to 180 degrees minus the measure of the central angle that forms the intercepted arc. The rays are perpendicular to the radii of the circle.	

Example: What is the measure of angle A if angle D is 48 degrees?



$$48 \times 2 = 96$$

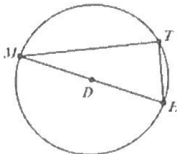
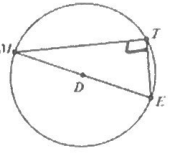
$$360 - (276) = 84^\circ$$

or

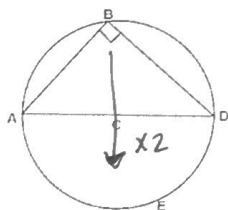
$$96 + x = 180$$

$$x = 84^\circ$$

Circumscribed and Inscribed Polygons

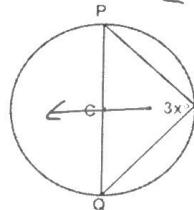
Name	Theorem	Hypothesis	Conclusion
Inscribed Right Triangle Diameter Theorem	If a triangle is inscribed in a circle such that one side of the triangle is a diameter of the circle, then the triangle is a <u>right triangle</u> .		$m\angle MTE = \frac{180}{2} = 90^\circ$
Converse of Right Triangle Diameter Theorem	If a right triangle is inscribed in a circle, then the hypotenuse is a diameter of the circle.		.

Example: Find the measure of arc AED.



$$180^\circ$$

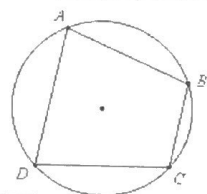
Example: Find the value of x.



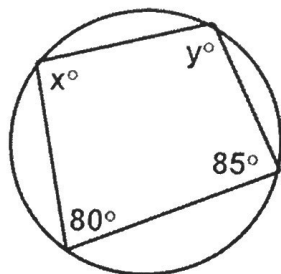
$$2(3x) = 180$$

$$3x = 90$$

$$x = 30$$

Name	Theorem	Hypothesis	Conclusion
Inscribed Polygons	A polygon whose vertices lie on the circle.	Opposite angles are <u>supplementary</u> . $\angle B + \angle D = 180^\circ$ $\angle A + \angle C = 180^\circ$	

Example: Find the value of x and y.



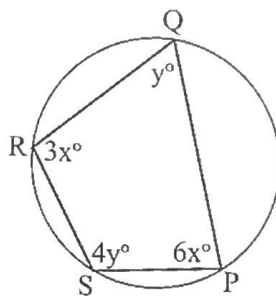
$$x + 85 = 180$$

$$x = 95^\circ$$

$$y + 80 = 180$$

$$y = 100^\circ$$

Example: Find the value of x and y.



$$3x + 6x = 180$$

$$9x = 180$$

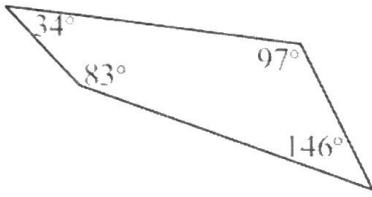
$$x = 20$$

$$y + 4y = 180$$

$$5y = 180$$

$$y = 36$$

Example: Can this quadrilateral be inscribed inside a circle?



$$34 + 146 = 180$$

$$83 + 97 = 180$$

yes! opposite \angle 's are supplementary

Name	Definition	Measure	Picture
Circumcenter	When a triangle is inscribed in a circle, the center is called the circumcenter (formed by perpendicular bisectors).	The circumcenter is <u>equidistant</u> from the <u>vertices</u> of the triangle.	<p>$QA = QB = QC$ (all Radii)</p>
Inscribed Circle Or Circumscribed Triangle	Circle enclosed in a polygon, where every side of the polygon is <u>tangent</u> to the circle.	NA	
Incenter	When a circle is inscribed in a triangle, the center is called the incenter (formed by angle bisectors).	The incenter is equidistant from the sides of the triangle.	