Inscribed & Circumscribed Angles and Intercepted Arcs

| Name	Definition	Measure	Picture
Inscribed Angle	An angle whose vertex is on a circle and whose sides contain chords of the circle	The measure of an inscribed angle is half the measure of its intercepted arc.	50° 100°
Intercepted Arc	An arc whose endpoints lie on the sides of an inscribed angle and all the points of the circle between them.	The measure of an intercepted arc is double the measure of the inscribed angle.	30° 60°

Example: Find the measure of angle ABD.

$$\frac{196}{2} = 98°$$

98°   196°

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

$$7x = 140$$
$$x = 20$$
$$\overarc{AD} = 140°$$
$$\overarc{ABD} = 360 - 140$$
$$220°$$

70°   7x°   140°
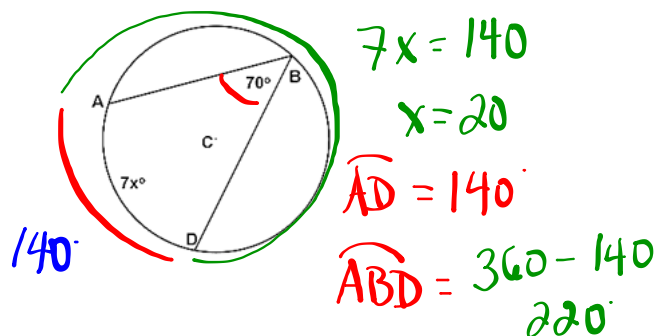
Example: Find the measure of arc AB and BC.

$$\overarc{BC} = 32°$$
$$\overarc{AB} = 148°$$
$$180 - 32$$

32°   16°

Example: Find the measure of angle BAC.

$$\angle BAC = 66°$$

48°   66°   132°
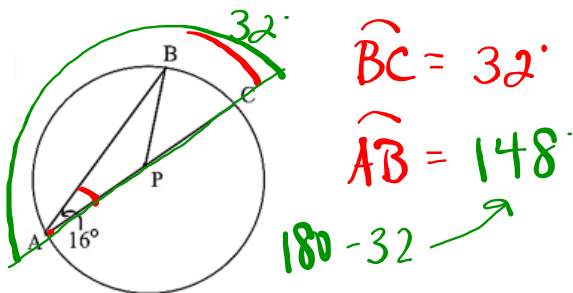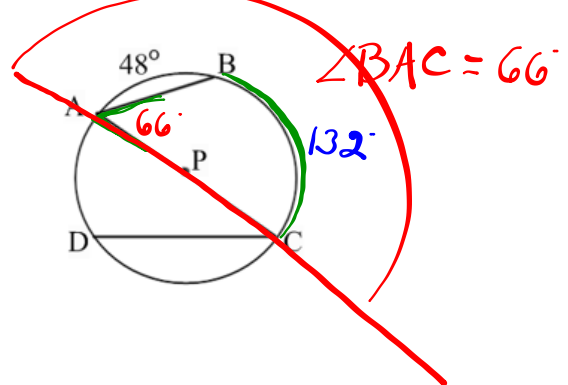
Example: Find the measure of angle JLM.

$$\angle JLM =$$
$$\frac{92}{2} = 46°$$

88°   92   88°   88°   88°

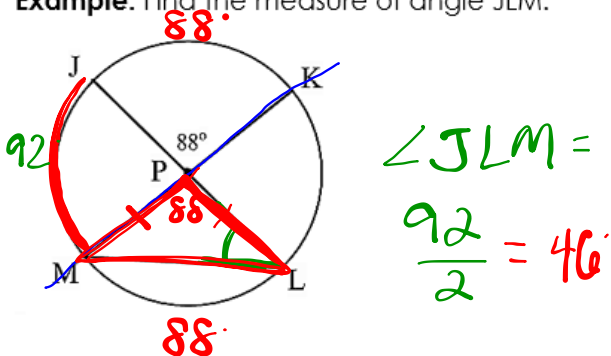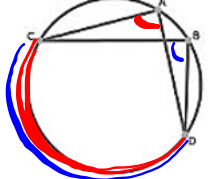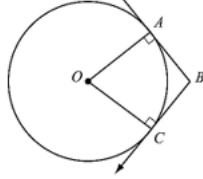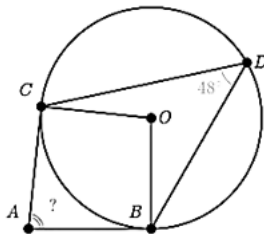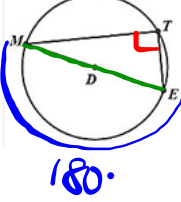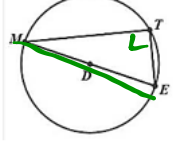| Name	Theorem	Hypothesis	Conclusion
Intercepted Arcs Corollary	If inscribed angles of a circle intercept the same arc, then the angles are congruent		$\angle A = \angle B$

Example: Find the measure of angle B.

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

$134°$

$67°$

$33°$

$66°$
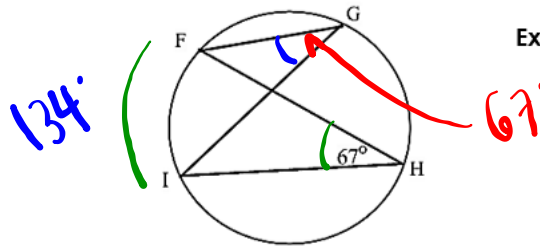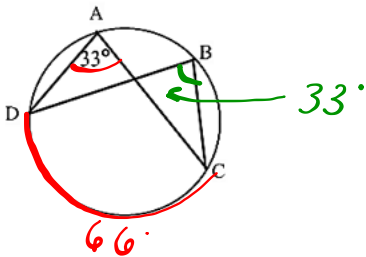
Example: Find the

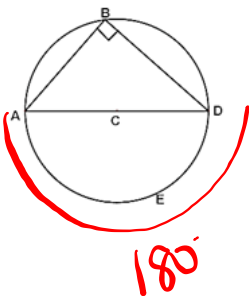| Name	Theorem	Hypothesis	Conclusion
Circumscribed Angle	Angle formed by two rays that are each tangent to a circle.	The measure of a circumscribed angle is equal to 180 degrees minus the measure of the central angle that forms the intercepted arc. The rays are perpendicular to the radii of the circle.	

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

Circumscribed and Inscribed Polygons

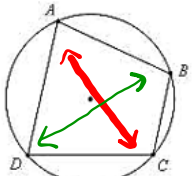| Name	Theorem	Hypothesis	Conclusion
Inscribed Right Triangle Diameter Theorem	If a triangle is inscribed in a circle such that one side of the triangle is a diameter of the circle, then the triangle is a right triangle.	180°	if $\overline{ME}$ is a diameter then $\angle T = 90°$
Converse of Right Triangle Diameter Theorem	If a right triangle is inscribed in a circle, then the hypotenuse is a diameter of the circle.		$\angle T = 90°$ then $\overline{ME}$ is a diameter

Example: Find the measure of arc AED.

180°

Example: Find the value of x.
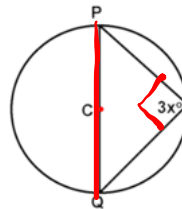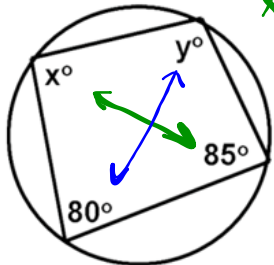

$3x = 90°$

$x = 30$

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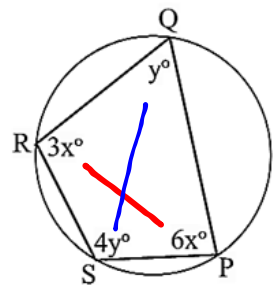
$\angle B + \angle D = 180$ $\angle A + \angle C = 180$

Example: Find the value of x and y.

$$x + 85 = 180$$
$$x = 95.$$

$$y + 80 = 180$$
$$y = 100.$$

Example: Find the value of x and y.

$$3x + 6x = 180$$
$$x = 20$$

$$4y + y = 180$$
$$5y = 180$$
$$y = 36$$

can the polygon
be inscribed
in a
circle?

NO.

50°   60°

120°

120°

$120 + 60 = 180$ ✓

$50 + 120 = 170$ ✗