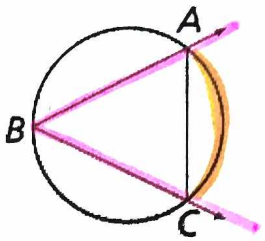
Name: Date: Period:

vertex on the ⊙

Inscribed Angles and Polygons in Circles

Lesson Objective INBAT use inscribed ∠s in ⊙s to find arc measures; prove & apply theorems about quads. in ⊙s.

Inscribed Angle: an inscribed angle is an angle whose vertex is on a circle and whose sides are chords of the circle (∠ABC)

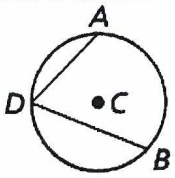


Intercepted arc: An arc on a circle that lies between two lines, rays, or segments "∠B intercepts $\overset{\frown}{AC}$"

If the endpoints of a chord or arc lie on the sides of the inscribed angle, then the chord or arc is said to "subtend" the angle

Measure of an Inscribed Angle Theorem

The measure of an inscribed angle is $\frac{1}{2}$ the measure of its intercepted arc

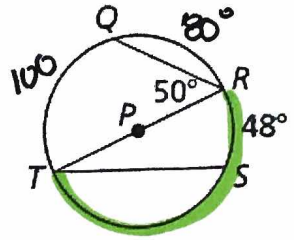


$m\angle D = \frac{1}{2} m\overset{\frown}{AB}$

$m\overset{\frown}{AB} = 2 \cdot m\angle D$

Examples:

1. Given the diagram…

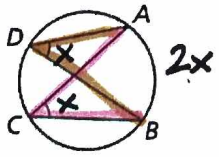


a. Find $m\angle T$ 24°

b. Find $m\overset{\frown}{QR}$ 80°

Inscribed Angles of a Circle Theorem

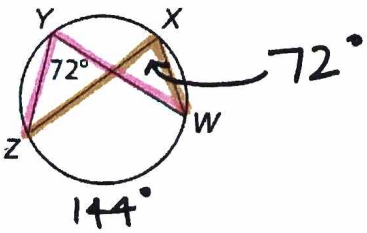
If two inscribed angles of a circle intercept the same arc, then the angles are congruent.



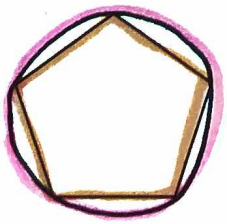
inscribed ∠s that intercept same arc are ≅

Example:

2. Find $m\angle ZXW$



Inscribed Polygons: A polygon is an inscribed polygon when all of its vertices lie on a circle.



Circumscribed Circle: The circle that contains the vertices of an inscribed polygon is called the circumscribed circle.

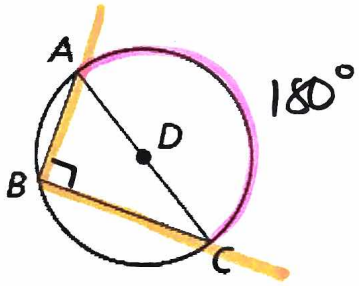
"inscribed" = inside "circumscribed" = outside

→ all vertices of △ are on ⊙

Inscribed Right Triangle Theorem

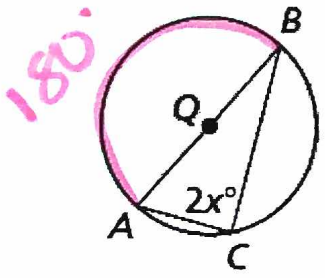
If a right triangle is inscribed in a circle, then the hypotenuse is a diameter of the circle.

Conversely, if one side of an inscribed triangle is a diameter of the circle, then the triangle is a right triangle and the angle opposite the diameter is the right angle.



Examples:

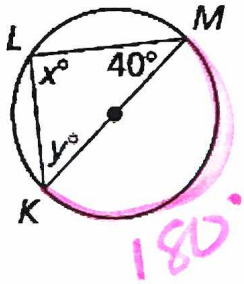
3. Find the value of x in the diagram.



$2x = 90$

$\boxed{x = 45}$

5. Find the values of x and y in the diagram.



$\boxed{x = 90}$

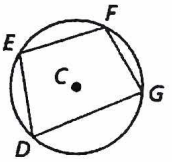
$\boxed{y = 50}$

↳ △ sum thm

→ all vertices of quad. are on the ⊙

Inscribed Quadrtilateral Theorem

A quadrilateral can be inscribed in a circle if and only if its opposite angles are supplementary.

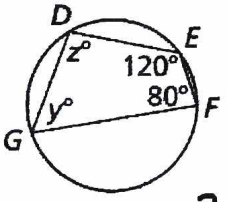


∠D supp ∠F

∠E supp ∠G

Example:

6. Find the values of y and z in the diagram.



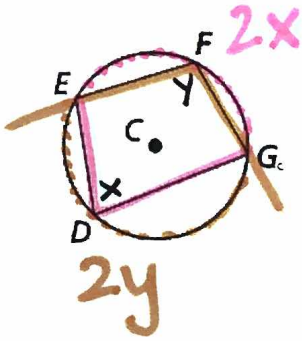
$y + 120 = 180$

$\boxed{y = 60}$

$z + 80 = 180$

$\boxed{z = 100}$

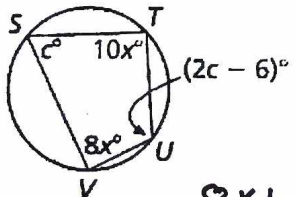
"Kind of proof…"



$\frac{2x + 2y}{2} = \frac{360}{2}$

$x + y = 180$

7. Find the values of x and c in the diagram.



$c + 2c - 6 = 180$

$3c = 186$

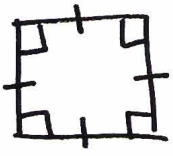
$\boxed{c = 62}$

$8x + 10x = 180 \rightarrow 18x = 180 \rightarrow \boxed{x = 10}$

8. Can the following quadrilateral be inscribed in a circle? Justify your answer.

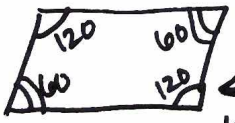
opp. ∠s supp

a. Square



yes

b. Parallelogram



NO

* counterexample

c. Rhombus

NO