BE - Geometry I MONDAY 1-31-11

ACT PRACTICE

① Football team spends 36 minutes of a 3 hour practice on punt returns. To show this in a circle graph, how many degrees should the central angle measure for the sector representing the punt return practice?

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② $r \neq 0$, s is a real number, $r^3 = 2s$ and $r^5 = 18s$. What is one possible value of r?

Ⓐ 3 Ⓑ 5 Ⓒ 9 Ⓓ s^2 Ⓔ cannot be determined

ANS

① $$\frac{36 \text{ min}}{180 \text{ min}} = \frac{x \text{ degrees}}{360 \text{ degrees}}$$

180 min ↑ 3 hours

$$x = \frac{360 \cdot 36}{180} = 2 \cdot 36 = \boxed{72^\circ}$$

② $r^3 = 2s$ $\quad r^5 = 18s = r^3 r^2$

$\therefore r^3 = \frac{18s}{r^2}$

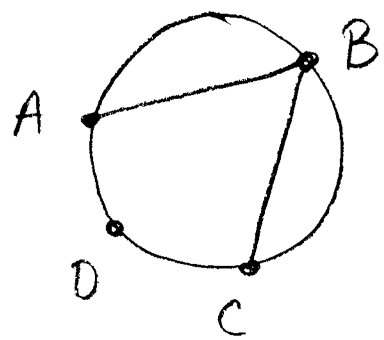
$\frac{18s}{r^2} = 2s$

$\therefore \frac{18s}{2s} = r^2$ $\boxed{r = 3}$

10-4 Inscribed Angles (in a ⊙)

inscribed angle An angle in a circle that has its vertex on the circle and its sides are chords of the circle.

Ex



$\angle ABC$ is an inscribed angle

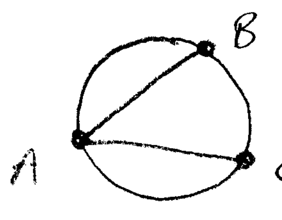
$\overline{AB}$, $\overline{BC}$ are chords

Arc $\overset{\frown}{ADC}$ is the arc intercepted by $\angle ABC$

Theorem 10.5

An inscribled angle's measure is $\frac{1}{2}$ its intercepted arc's measure.

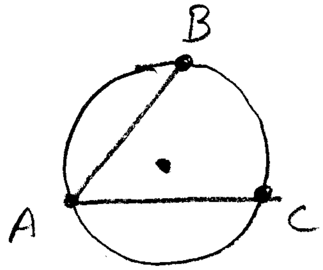
Ex



$m\angle ABC = 25^\circ$

$m\overset{\frown}{BC} = 50^\circ$

Ex

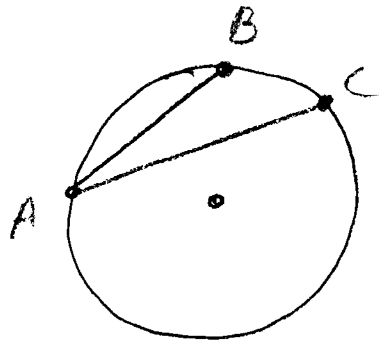


$\angle BAC = 40^\circ$

Center is "outside"

$\widehat{BC} = 80^\circ$

Ex

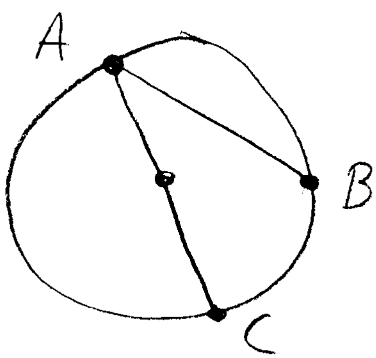


$\angle BAC = 15^\circ$

Center is "inside"

$\widehat{BC} = 30^\circ$

Ex

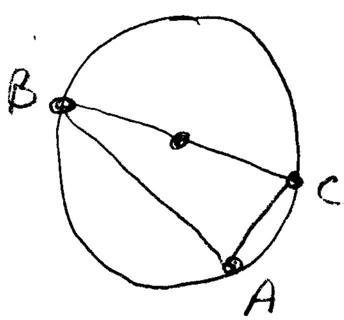


One side is a diameter

$\angle BAC = 35^\circ$

$\widehat{BC} = 70^\circ$

What is the measure of an angle that has sides that <u>end</u> on a diameter?



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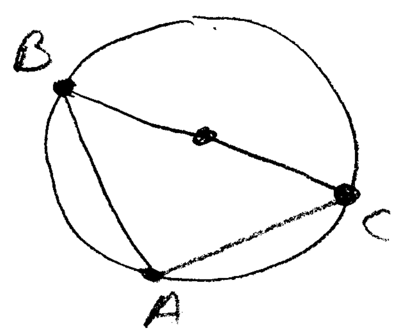

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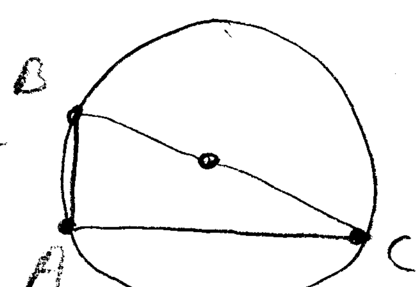
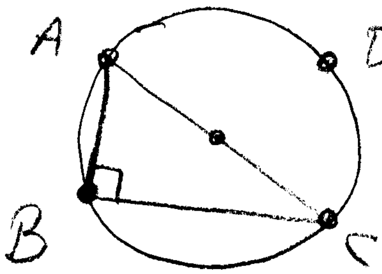


Since $\widehat{BC}$ is 180°, $m\angle BAC = 90^\circ$!!!

Theorem 10.7

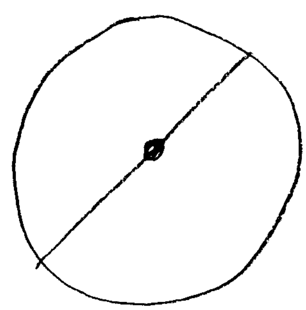
If an inscribed angle intercepts a semicircle, the angle is a right angle

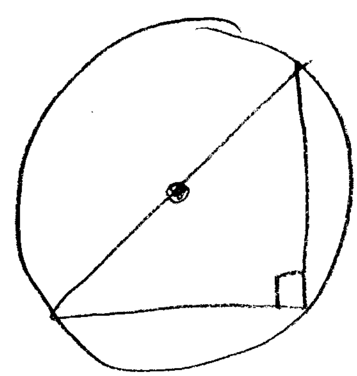


$\overset{\frown}{ADC}$ is a semicircle

$\therefore m\angle ABC = 90°$

To make a 90° angle, inscribe a triangle with a diameter as the hypotenuse:



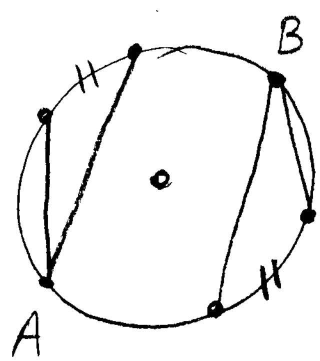


Finally, a "common sense" theorem ⇒

Theorem 10.6

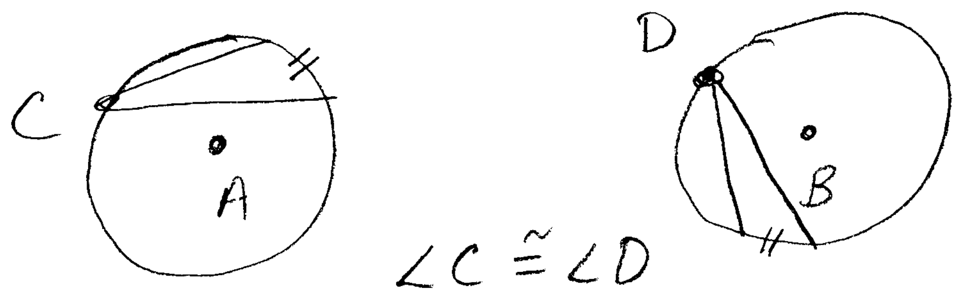
If 2 inscribed $\angle$s of a circle intercept $\cong$ arcs, the $\angle$s are $\cong$.

Ex



$\angle A \cong \angle B$

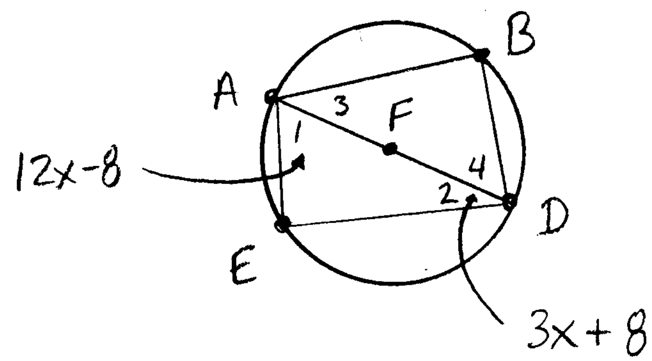
Ex Circle A $\cong$ Circle B



$\angle C \cong \angle D$

Ex 4 Pg 547 $\overset{\frown}{AB} \cong \overset{\frown}{BD}$ Find $m\angle 1, m\angle 2, m\angle 3, m\angle 4$

If $m\angle 1 = 12x - 8$ $m\angle 2 = 3x + 8$



Since $\angle AED$ is inscribed in a semicircle

$m\angle AED = 90^\circ$

$\therefore$ $\triangle AED$ is a right $\triangle$

$\therefore$ $\angle 1 + \angle 2 = 90^\circ$

$12x - 8 + 3x + 8 = 90$

$15x = 90$ $\therefore$ $x = 6$

$\therefore$ $\boxed{m\angle 1 = 64^\circ}$, $\boxed{m\angle 2 = 26^\circ}$

Since $\overset{\frown}{AB} \cong \overset{\frown}{BD}$, $\overline{AB} \cong \overline{BD}$, $\angle 3 \cong \angle 4$

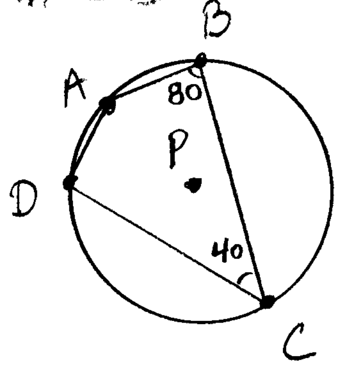
$m\angle ABD = 90^\circ$ $\therefore$ $\boxed{m\angle 3 = m\angle 4 = 45^\circ}$

Ex5
Pg 547

Quadrilateral ABCD inscribed in ⊙P.

$m\angle B = 80^\circ \quad m\angle C = 40^\circ$

Find $m\angle A$, $m\angle D$



$m\angle C = 40$, $m\overset{\frown}{DAB} = 80^\circ$

$\therefore m\overset{\frown}{DCB} = 360 - 80 = 280^\circ$

$\therefore m\angle BAD = m\angle A = \frac{280}{2} = \boxed{140^\circ}\, m\angle A$

$m\overset{\frown}{ADC} = 2(80) = 160^\circ$

$m\overset{\frown}{ABC} = 360 - 160 = 200^\circ$

$\therefore m\angle ADC = \frac{200}{2} = \boxed{100^\circ = m\angle D}$

NOTE: Theorem 10.8 In an inscribed quadrilateral, The opposite ∠s are supplementary. (ADD to 180°)

Homework: Pg 549 # 8, 9, 13.