Lesson 11-9 Segment Relationships in Circles

AGENDA:

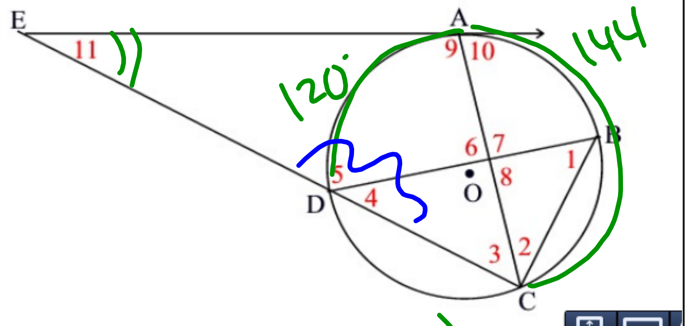
- Check & Review Homework 11-8
- Notes and Guided Practice

HOMEWORK:

- p. 796 # 12, 13, 22, 23, 25

Circle O with no diameters shown. $\overrightarrow{EA}$ is tangent at point A.

$$m\overset{\frown}{AB} : m\overset{\frown}{BC} : m\overset{\frown}{CD} : m\overset{\frown}{DA} = 3:3:4:5$$



$3x + 3x + 4x + 5x = 360$

$15x = 360$

$x = 24$

$m\angle 1$ 48	$m\angle 6$ 96
$m\angle 2$ 36	$m\angle 7$ 84
$m\angle 3$ 60	$m\angle 8$ 96
$m\angle 4$ 36	$m\angle 9$ 108
$m\angle 5$ 144	$m\angle 10$ 72
	$m\angle 11$ 12

$\frac{1}{2}(144 - 120)$

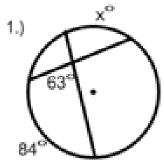
$\frac{1}{2}(24)$

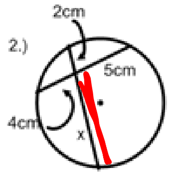
11-9 Notes: Segment Relationships in Circles: Chord-Chord Product

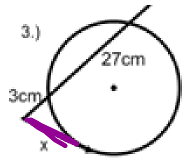
MEASUREMENTS

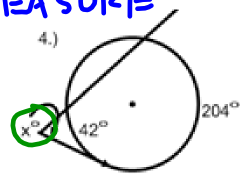
- Arc-angle relationships are measured in DEGREES. ARC LENGTH
- Segments and chords are measured in LINEAR UNITS such as inches or centimeters.
- In each problem, identify whether you are asked to find an angle measure, an arc length, or a segment length:

ARC MEASURE









ARC MEASURE (°)

$63° = \frac{1}{2}(\overset{\frown}{84} + \overset{\frown}{x})°$

SEGMENT LENGTH (cm)

SEGMENT LENGTH (cm)

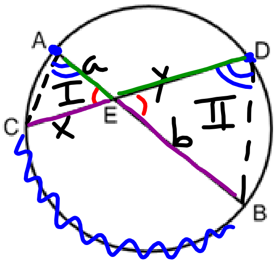
ANGLE MEASURE (°)

$m\angle = \frac{1}{2}(\frown - \frown)°$

$x = \frac{1}{2}(204 - 42)$

TYPES OF SEGMENT RELATIONSHIPS

1) **CHORD-CHORD PRODUCT THEOREM**



$\triangle I \sim \triangle II$

BY A A ~

~~SSS~~~

~~SAS~~~

★ AA ~

VERTICAL ∡'s ≅

INSCRIBED ∡'S FROM SAME ARC IN A ⊙ ARE ≅

$\frac{\triangle I}{\triangle II}: \frac{a}{y} = \frac{x}{b}$

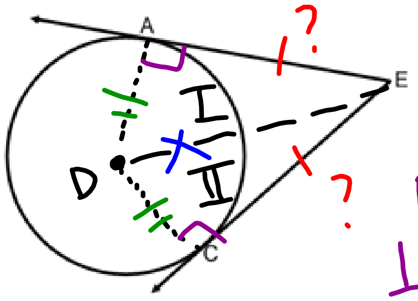
~△'s → PROPORTIONAL CORRESPOND SIDES

CROSS PRODUCTS PROPERTY

$a \cdot b = y \cdot x$

PART · PART = PART · PART

2) TANGENT-TANGENT SEGMENT CONGRUENCY
(Review)



$\Delta I \cong \Delta II$ BY

R H L $\cong$

RADIUS
⊥ TANGENT
@ PT TANGENCY
→ RT ∡'S →
RT Δ'S

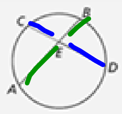
REFLEXIVE

IN A ⊙,
ALL RADII ≅

$\overline{AE} \cong \overline{CE}$ BY CPCTC

<u>CHORD-CHORD PRODUCT</u>

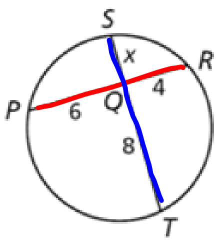
If 2 chords intersect in a circle, then the products of the segments of the chords are equal.



Chords $\overline{AB}$ and $\overline{CD}$ intersect at E.

$AE \cdot EB = CE \cdot ED$

EXAMPLE: Find each chord length



P·P = P·P

PART·PART = PART·PART

$PQ \cdot QR = SQ \cdot QT$

$(6)(4) = (x)(8)$

$24 = 8x$

$3 = x$

$PR = 6+4$

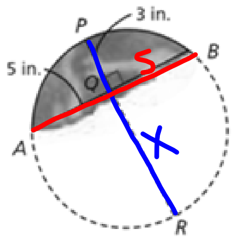
$\boxed{PR = 10 \text{ units}}$

$ST = SQ + QT$
$= 3 + 8$

$\boxed{ST = 11 \text{ UNITS}}$

PRACTICE:

1) Archaeologists discovered a fragment of an ancient disk. To calculate the original diameter, they drew the chord $\overline{AB}$ and its perpendicular bisector $\overline{PQ}$. Find the diameter of the disk. → $PR = 3 + x$



$P \cdot P = P \cdot P$

$PQ \cdot QR = AQ \cdot QB$

$(3)(x) = (5)(5)$

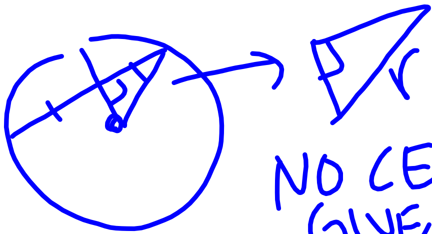
$3x = 25 \rightarrow x = \frac{25}{3}$

$= 3 + \frac{25}{3}$

$= \frac{9}{3} + \frac{25}{3}$

$\boxed{= \frac{34}{3} \approx 11.3 \text{ IN}}$

Why couldn't you use the perpendicular bisector of a chord with a right triangle here?



NO CENTER GIVEN – YOU DON'T KNOW RADIUS

2) In the accompanying diagram, $\overline{AFB}$, $\overline{AEC}$, and $\overline{BGC}$ are tangent to circle O at F, E, and G, respectively. If $AB = 32$, $AE = 20$, and $EC = 24$, find BC.

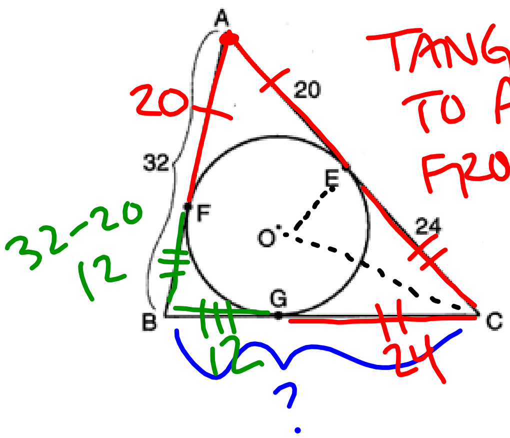
O IN INCENTER

⊙O INSCRIBED IN △ABC

$BC = BG + GC$

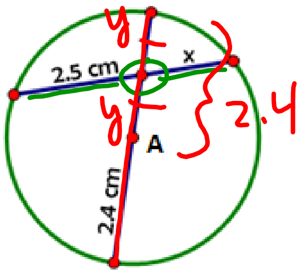
$= 12 + 24$

$\boxed{BC = 36 \text{ UNITS}}$



TANGENTS TO A ⊙ FROM SAME EXTERNAL POINT ≅

3) Find the value of x in circle A.



$2y = 2.4$

$y = 1.2$

LOOK @ POINT OF INTERSECTION

DIAM $\not\perp$ CHORD → NO BISECTING

$P \cdot P = P \cdot P$

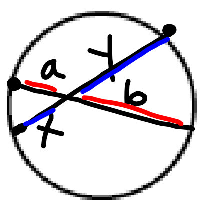
$(2.5)(x) = (2.4 + y)(y)$

$2.5x = (3.6)(1.2)$

$2.5x = 4.32$

$x = \dfrac{4.32}{2.5}$

$x = \boxed{1.728 \text{ cm}}$

Segment-Segment Relationships	Same Internal Pt: Chord-Chord
Example	
Algebraic Equation	PART · PART = PART · PART $a \cdot b = x \cdot y$
Derived from	~△'S FROM AA~

DON'T JUMP CHORDS

LINEAR UNITS. WHERE ARE THE SEGMENTS?