

CIRCLES

I. AREA: $A = \pi r^2$

$\pi \approx 3.14$ if answers ^{needs} decimal

if it says "in terms of pi" leave π (DO NOT use 3.14)

A. Sector Area



$$A = \left(\frac{\text{fraction used}}{\text{angle}} \right) \pi r^2$$



$$A = \left(\frac{100}{360} \right) \pi (8)^2$$

$$A = \left(\frac{1}{2} \right) (64\pi)$$

in terms of pi $\rightarrow A = 32\pi$

as decimal $\rightarrow A = 100.48$

3.14
32

625
9428

100.48

B. Shaded Area

(using radius)



Area - Area
 $\pi r^2 - \frac{bh}{2}$

$$36\pi - \frac{(6)(6)}{2} = 36\pi - 18$$



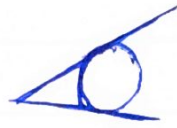
$\square - \circ$

$bh = \pi r^2$

$$100 - 25\pi$$

II. Angle Relationships

A Types



circumscribed angle (exterior)



inscribed angle



central angle



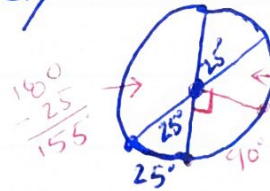
B. Central Angles

Total Sum = 360°



Central = arc

ex/



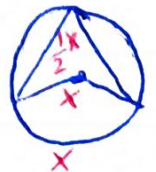
$$\begin{aligned} 25 + 155 + 25 + 40 + ? &= 360 \\ 180 + 115 + ? &= 360 \\ 295 + ? &= 360 \\ ? &= 65 \end{aligned}$$

C. Angle Formulas

1. $2(\text{inscribed}) = \text{central} = \text{arc}$



$$\begin{aligned} 2(\text{ins}) &= \text{central} = \text{arc} \\ 2(62) &= 124 \\ \text{ins.} &= 62 \end{aligned}$$



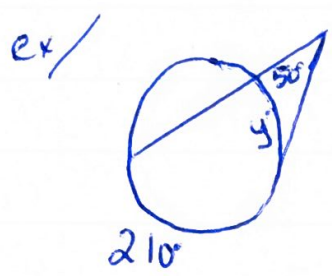
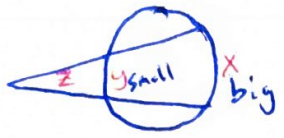
ex/y



$$\begin{aligned} 2(\text{ins}) &= \text{central} = \text{arc} \\ 2(x) &= 180 = y \\ 2x &= 180 & 180 = y \\ x &= 90 & y &= 180 \end{aligned}$$

2. $2(\text{exterior}) = \text{arc}_{\text{big}} - \text{arc}_{\text{small}}$

$2(z) = x - y$

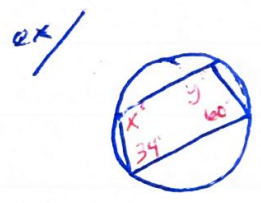


$2(\text{ext}) = \text{arc}_{\text{big}} - \text{arc}_{\text{small}}$
 $2(50) = 210 - y$
 $100 = 210 - y$
 $-210 = -210 - y$
 $-110 = -y$
 $110 = y$

3. Quadrilateral in Circle



$x + \text{opp } x = 180$
 $y + \text{opp } y = 180$



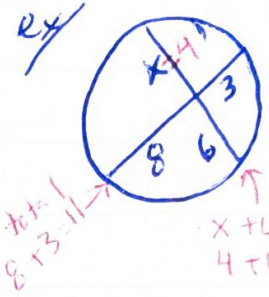
$x + 60 = 180$
 $x = 120$
 $y + 34 = 180$
 $y = 146$

B. Segment Formulas

1. Chord-Chord



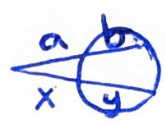
Ch 1
 $(\text{part})(\text{part}) = (\text{part})(\text{part})$
 $(a)(b) = (x)(y)$



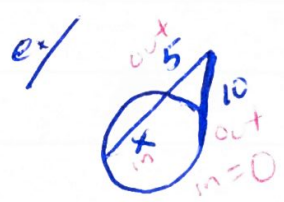
$(\text{part})(\text{part})$
 $(8)(3) = (x)(6)$
 SAME OTHER
 CHORD!
 CHORD!

$24 = 6x$
 $\div 6 \quad \div 6$
 $4 = x$

2. Secant-Secant (or Secant-Tangent)



$(\text{out})(\text{out} + \text{in}) = (\text{out})(\text{out} + \text{in})$
 $(a)(a + b) = (x)(x + y)$



$(\text{out})(\text{out} + \text{in}) = (\text{out})(\text{out} + \text{in})$
 $(5)(5 + x) = (10)(10 + 0)$
 $25 + 5x = 100 + 0$
 $25 + 5x = 100$
 $5x = 75$
 $\div 5 \quad \div 5$
 $x = 15$

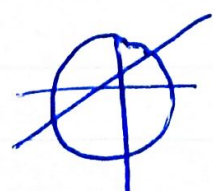
III. Segments in Circles

A. Types
 Chords



ALL IN

Secants



PART IN
 PART OUT

Tangents



ALL OUT

FACT Always @ 90° to a Radius

IV. Circle Equation for xy axis

$(x - h)^2 + (y - k)^2 = r^2$

$(x_{\text{opp. to center}} \text{ sign } x)^2 + (y_{\text{opp. to center}} \text{ sign } y)^2 = \text{radius}^2$

ex/



Center (5, -4) radius r=3
 $(x - 5)^2 + (y + 4)^2 = 9$