HM3 Review - Circles

① center (4, 3) passes through (-4, 6)

*use distance formula to find r

$r = \sqrt{(-4-4)^2 + (6-3)^2}$

$r = \sqrt{64 + 9}$

$r = \sqrt{73}$

$(x-4)^2 + (y-3)^2 = 73$

② endpoints of diameter are (3, -5) and (7, -11)

* find center using Midpoint formula

center = $\left(\frac{3+7}{2}, \frac{-5+-11}{2}\right)$ $(5, -8)$

* find r using distance formula

$r = \sqrt{(5-3)^2 + (-8+(+5))^2}$

$r = \sqrt{4 + 9}$

$r = \sqrt{13}$

$(x-5)^2 + (y+8)^2 = 13$

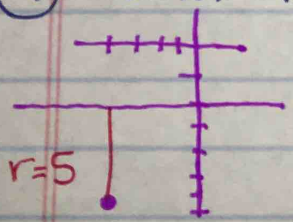
③ $x^2 + y^2 - 16x + 4y - 20 = 0$

$x^2 - 16x + \underline{64} + y^2 + 4y + \underline{4} = 20 + \underline{64} + \underline{4}$

$(x-8)^2 + (y+2)^2 = 88$

center: $(8, -2)$ radius: $\sqrt{88} \rightarrow 2\sqrt{22}$

④ center (-4, -7) tangent to $y = -2$



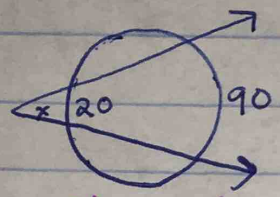
$(x+4)^2 + (y+7)^2 = 25$

⑤ $x^2 + y^2 + 20x + 8y - 44 = 0$

$x^2 + 20x + \underline{100} + y^2 + 8y + \underline{16} = 44 + \underline{100} + \underline{16}$

$(x+10)^2 + (y+4)^2 = 160$

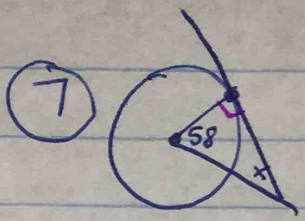
center: $(-10, -4)$ radius: $\sqrt{160} \rightarrow 4\sqrt{10}$

6) 

★outside angle★

$x = \frac{1}{2}(90-20)$

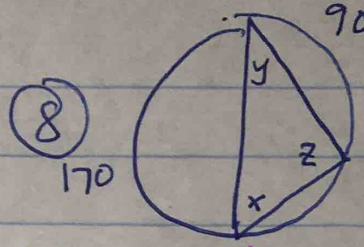
$x = 35°$

7) 

★a radius is ⊥ to a tangent line at the point of tangency★

$x = 180-58-90$

$x = 32°$

8) 

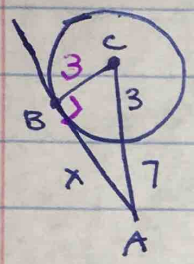
★inscribed angles★

$x = \frac{1}{2}(90)$ $x = 45°$

$z = \frac{1}{2}(170)$ $z = 85°$

$y = \frac{1}{2}(360-170-90)$

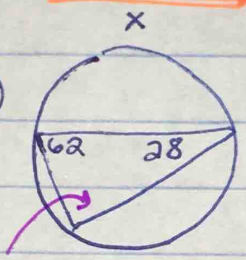
$y = 50°$

9) 

$x^2+3^2=10^2$

$x^2 = 91$

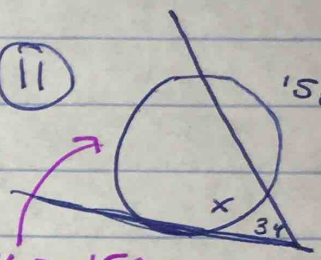
$x = \sqrt{91}$

10) 

$180-62-28 = 90°$

★inscribed angle★

$x = 180°$

11) 

★outside angle★

$360-150-x$

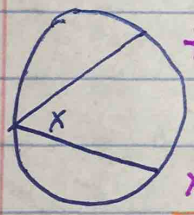
$= 210-x$

$34 = \frac{1}{2}(210-x-x)$

$68 = 210-2x$

$-142 = -2x$

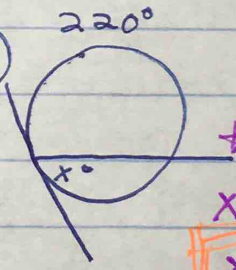
$71° = x$

12) 

★inscribed★

$x = \frac{1}{2}(110)$

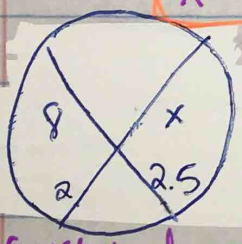
$x = 55°$

13) 

★inscribed angle★

$x = \frac{1}{2}(360-220)$

$x = 70°$

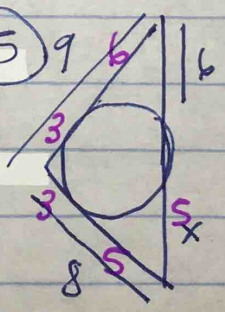
14) 

product of 1st chord = product of other chord

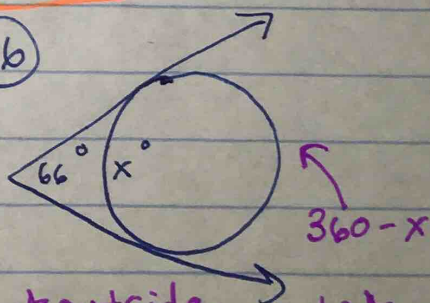
$8(2.5) = x(2)$

$20 = 2x$

$10 = x$

15) 

$x = 5in$

16) 

★outside angle★

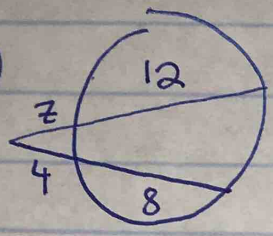
$66 = \frac{1}{2}(360-x-x)$

$132 = 360-2x$

$-228 = -2x$

$114° = x$

(17)



★outside · whole = outside · whole★

$z(z+12) = 4(4+8)$

$z^2 + 12z = 48$

$z^2 + 12z - 48 = 0$

★this is prime! complete the square ☺

$z^2 + 12z + 36 = 48 + 36$

$(z+6)^2 = 84$

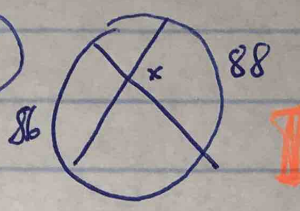
$z + 6 = \pm\sqrt{84}$

$z = -6 \pm 2\sqrt{21}$

★the negative won't work!

$\boxed{z = -6 + 2\sqrt{21}}$

(18)

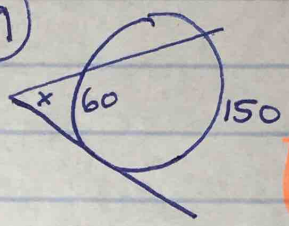


★inside angle★

$x = \frac{1}{2}(86 + 88)$

$\boxed{x = 87°}$

(19)

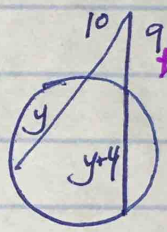


★outside angle★

$x = \frac{1}{2}(150 - 60)$

$\boxed{x = 45°}$

(20)



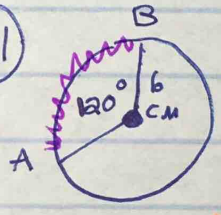
★outside · whole = outside · whole★

$10(y+10) = 9(y+4+9)$

$10y + 100 = 9y + 117$

$\boxed{y = 17}$

(21)

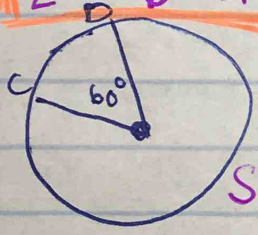


$S = \frac{120}{360} \cdot 2\pi(6)$

$S = \frac{1}{3} \cdot 12\pi$

$\boxed{S = 4\pi \text{ cm}}$

(22)



$d = 24$ cm

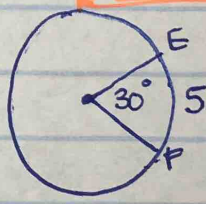
so $r = 12$ cm

$S = \frac{60}{360} \cdot 2\pi(12)$

$S = \frac{1}{6} \cdot 24\pi$

$S = 4\pi$ cm

(23)

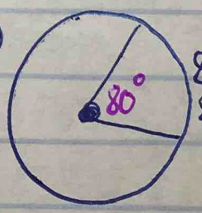


$5\pi = \frac{30}{360} \cdot 2\pi r$

$5 = \frac{1}{6} r$

$\boxed{30 \text{ in} = r}$

(24)



$88\pi = \frac{80}{360} \cdot 2\pi r$

$88 = \frac{4}{9} r$

$792 = 4r$

$198 = r$

$\boxed{\text{diameter} = 396 \text{ units}}$

(25) circumference $= 25\pi$, $\theta = 90°$

$25\pi = 2\pi r$

$25 = 2r$

$\frac{25}{2} = r$

$S = \frac{90}{360} \cdot 2\pi\left(\frac{25}{2}\right)$

$\boxed{S = \frac{25\pi}{4} \text{ units}}$

(26) $14\pi = \frac{\theta}{360} \cdot 2\pi(18)$

$14 = \frac{\theta}{360} \cdot 36$

$14 = \frac{\theta}{10}$

$140^\circ = \theta$

(27) Area $= 225\pi \text{ in}^2$

$225\pi = \pi r^2$

$225 = r^2$

$15 = r$

$A = \frac{45}{360} \cdot \pi(15)^2$

$A = \frac{225\pi}{8} \text{ units}^2$

(28) Area $= 144\pi$

$144\pi = \pi r^2$

$12 = r$

$A = \frac{60}{360} \cdot \pi(12)^2$

$A = 24\pi \text{ units}^2$

(29) $r = 12 \quad \theta = 120^\circ$

$A = \frac{120}{360} \cdot \pi(12)^2$

$A = 48\pi \text{ units}^2$

(30) Sector area $= 9\pi \quad \theta = 90^\circ$

$9\pi = \frac{90}{360} \cdot \pi r^2$

$9 = \frac{1}{4} \cdot r^2$

$36 = r^2$

$6 \text{ units} = r$

(31) $\theta = 72^\circ$ sector area $= 5\pi$

$5\pi = \frac{72}{360} \cdot \pi r^2$

$5 = \frac{1}{5} r^2$

$25 = r^2$

$5 \text{ units} = r$

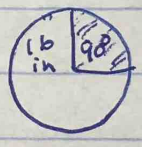
(32) sector area $= 5\pi \quad r = 6$

$5\pi = \frac{\theta}{360} \cdot \pi(6)^2$

$5 = \frac{\theta}{360} \cdot 36$

$5 = \frac{\theta}{10}$

$50^\circ = \theta$

(33) 

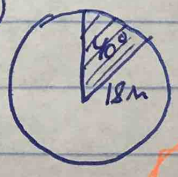
Area $= \frac{90}{360} \cdot \pi(16)^2$

$A = 64\pi \text{ in}^2$

(34) 

Area $= \frac{135}{360} \cdot \pi(8)^2$

$A = 24\pi \text{ m}^2$

(35) 

Area $= \frac{40}{360} \cdot \pi(18)^2$

$A = 36\pi \text{ m}^2$

(36) 

* first find sector area for $r=6$, then subtract out sector area for $r=4$ *

$r=6$: $A = \frac{120}{360} \cdot \pi(6)^2$

$A = 12\pi$

$r=4$: $A = \frac{120}{360} \cdot \pi(4)^2$

$A = 16\pi/3$

Area $= 12\pi - 16\pi/3$

$A = \frac{20\pi}{3} \text{ in}^2$