CIRCLES REVIEW   Name Key

Given: A(300, -12) B(-16, 107)

1. Find the equation of the circle.

NEED CENTER & RADIUS

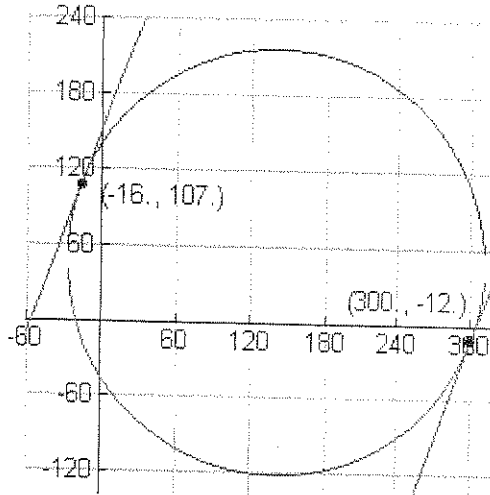$$(x_m, y_m) = \left(\frac{-16+300}{2}, \frac{107+(-12)}{2}\right)$$

$$= (142, 47.5)$$

$$r = \sqrt{\Delta x^2 + \Delta y^2}$$

$$r = \sqrt{(142-300)^2 + (47.5+12)^2}$$

$$= \sqrt{24,964 + 3540.25}$$

$$= \sqrt{28,504.25}$$

$$\boxed{(x-142)^2 + (y-47.5)^2 = 28,504.25}$$

2. Find the equation of the tangent line through (A) (300, -12)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{47.5+12}{142-300} = \frac{59.5}{-158}$$

$$\perp m = \frac{158}{59.5} \cdot \frac{\times 2}{\times 2} = \frac{316}{119}$$

$$y + 12 = \frac{316}{119}(x - 300)$$

3. Find the equation of the tangent line through (B) (-16, 107)

$$y - 107 = \frac{316}{119}(x + 16)$$

4. Find the x and y intercepts for the circle.

X INT:

$$(x-142)^2 + (0-47.5)^2 = 28,504.25$$

$$(x-142)^2 + 2256.25 = 28,504.25$$

$$(x-142)^2 = 26,248$$

$$x - 142 = \sqrt{26,248} \quad x = 142 \pm \sqrt{26,248}$$

$$x \approx 304.01 \text{ or } -20.01$$

Y INT:

$$(0-142)^2 + (y-47.5)^2 = 28,504.25$$

$$20164 + (y-47.5)^2 = 28,504.25$$
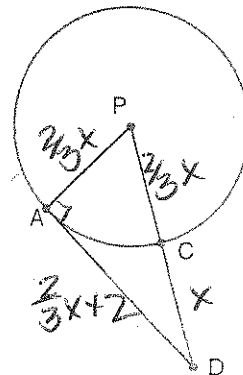
$$(y-47.5)^2 = 8340.25$$

$$y - 47.5 = \pm\sqrt{8340.25}$$

$$y = 47.5 \pm \sqrt{8340.25}$$

$$y \approx 138.82 \text{ or } -43.82$$

5. $\overline{AD}$ is tangent to circle with center P

$PC = \frac{2}{3}CD$

AD is 2 more than AP
Find AP and AD

$$\left(\frac{2}{3}x\right)^2 + \left(\frac{2}{3}x+2\right)^2 = \left(\frac{2}{3}x + x\right)^2$$

$$\left(\frac{2}{3}x\right)^2 + \left(\frac{2}{3}x+2\right)^2 = \left(\frac{5}{3}x\right)^2$$

$f_1(x) \quad\quad f_2(x)$

$$x \approx -0.9115 \quad\quad x \approx 2.3233\ldots$$

DNMS

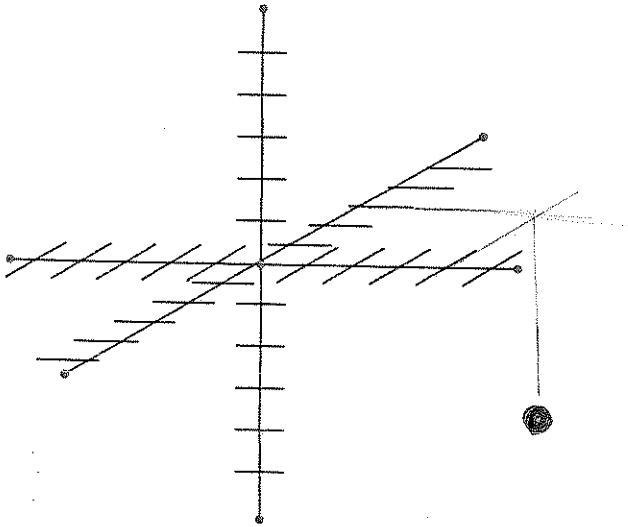$|\overline{AP}| \approx 1.54$ units

$|\overline{AD}| \approx 3.54$ units

6. Find the equation of a sphere, if one of its diameters, $\overline{AB}$, is at A(-4,5,8) and B(-1, -7, 2)

$x_m, y_m, z_m = \left(\dfrac{-1+(-4)}{2}, \dfrac{-7+5}{2}, \dfrac{2+8}{2} \right)$ $r = \sqrt{\Delta x^2 + \Delta y^2 + \Delta z^2}$

$= (-2.5, -1, 5)$ $= \sqrt{(-1+2.5)^2 + (-7+1)^2 + (2-5)^2}$

$= \sqrt{47.25}$

$\boxed{(x+2.5)^2 + (y+1)^2 + (z-5)^2 = 47.25}$

7. Graph the point (-3,4,-5)

Find the center and radius of these circles

8. $4x^2 + 48y = 40x - 4y^2 + 52$

$x^2 + 12y = 10x - y^2 + 13$

$\dfrac{-10}{2} \cdot 5^2$ $x^2 - 10x + \underline{+25} + y^2 + 12y \underline{+36} = 13$
25 $\qquad\qquad\qquad\qquad +25$
$\qquad\qquad\qquad\qquad\qquad\qquad +36$

$\dfrac{12}{2} \cdot 6^2$ $\boxed{(x-5)^2 + (y+6)^2 = 74}$
36

center $(5, -6)$
radius $\sqrt{74}$ units

9. $x^2 + 3y + y^2 - 7x + 2 = 0$

$x^2 - 7x \underline{+ \frac{49}{4}} + y^2 + 3y \underline{\frac{9}{4}} = -2$
$\qquad\qquad\qquad\qquad\qquad\qquad +\frac{49}{4}$
$\dfrac{-7}{2}(\frac{7}{2})$
$\frac{49}{4}$
$(\frac{3}{2})\frac{9}{4}$ $(x-\frac{7}{2})^2 + (y+\frac{3}{2})^2 = \frac{50}{4}$ $+\frac{9}{4}$

$(\frac{7}{2}, -\frac{3}{2})$

radius $\sqrt{\frac{50}{4}}$ units