CONIC SECTIONS CIRCLES!

Name Key

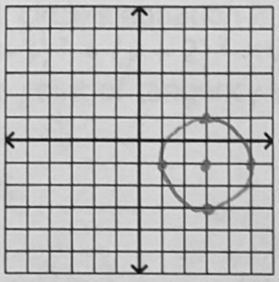
Period ____ Date ________________

Use simplest radical form where appropriate (no decimals!)

1. Find the center and radius of each circle, then graph the circle.

a. $(x-3)^2 + (y+1)^2 = 4$

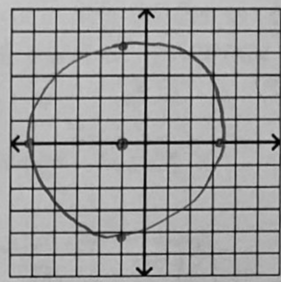
center: $(3,-1)$ radius: 2



b. $(x+1)^2 + y^2 = 18$

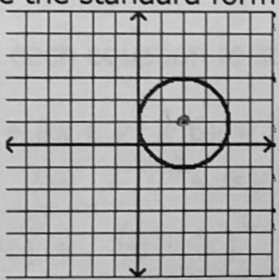
center: $(-1,0)$ radius: $3\sqrt{2}$

$= 4.24$



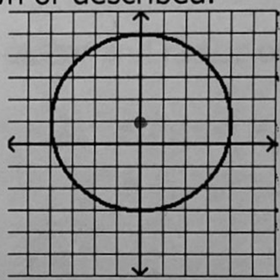
2. Write the standard form equation of the circle shown or described.

a.



$(x-2) + (y-1) = 4$

b.



$x^2 + (y-1) = 16$

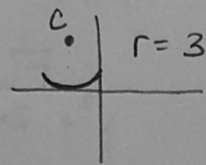
c. center: (0, -7) radius: $2\sqrt{5}$

$(2\sqrt{5})^2 = 2^2 \cdot \sqrt{5}^2$

$= 4 \cdot 5 = 20$

$x^2 + (y+7)^2 = 20$

d. A circle that is tangent to the *x*-axis has a center at (-2, 3).



$(x+2)^2 + (y-3)^2 = 9$

e. A circle's center is at (4, 2), and the point (1, 6) is on the circle.

$d = \sqrt{(1-4)^2 + (6-2)^2} = \sqrt{9+16} = 5$

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

f. A circle has a diameter with endpoints (4, 3) and (10, -7)

Midpoint $= \frac{4+10}{2}, \frac{3+(-7)}{2} = (7,-2)$

radius $= \sqrt{(4-7)^2 + (3-(-2))^2} = \sqrt{9+25} = \sqrt{34}$

$(x-7)^2 + (y+2)^2 = 34$

3. Write the equation of the line tangent to the given circle at the given point.

a. The circle's equation is $x^2 + y^2 = 25$.
The point of tangency is (3, -4). (0,0)

slope $= \frac{0-(-4)}{0-3} = -\frac{4}{3}$

$\perp$ slope $= 3/4$

$-4 = 3/4(3) + b$

$-4 = 9/4 + b$

$-4 - \frac{9}{4} = b$

$-25/4 = b$

$\boxed{y = 3/4x - 25/4}$

b. The circle's equation is $x^2 + y^2 = 8$.
The point of tangency is (-2, -2). (0,0)

slope $= \frac{0-(-2)}{0-(-2)} = 1$

$\perp$ slope $= -1$

$-2 = (-1)(-2) + b$

$-2 = 2 + b$

$-4 = b$

$\boxed{y = -x - 4}$

c. The circle's equation is
$(x-3)^2 + (y+2)^2 = 20$ (3,-2)
The point of tangency is (5, 2)

slope $= \frac{2-(-2)}{5-3} = \frac{4}{2} = 2$

$\perp$ slope $= -1/2$

$2 = -1/2(5) + b$

$2 = -5/2 + b$

$2 + 5/2 = b$

$9/2 = b$

$\boxed{y = -1/2x + 9/2}$

d. The circle's center is (6, 1).
The point of tangency is (8, -2).

slope $= \frac{-2-1}{8-6} = \frac{-3}{2}$

$\perp$ slope $= 2/3$

$-2 = 2/3(8) + b$

$-2 = 16/3 + b$

$-2 - 16/3 = b$

$-22/3 = b$

$\boxed{y = 2/3x - 22/3}$

4. Convert each equation to standard form, then find the center and radius of each circle.

a. $x^2 + 8x + y^2 + 6y = 20$

$x^2 + 8x + \underline{16} + y^2 + 6y + \underline{9} = 20 + 16 + 9$

$\boxed{(x+4)^2 + (y+3)^2 = 45}$

standard form:

center: $(-4, -3)$ radius: $\sqrt{45}$
$= 3\sqrt{5}$

b. $2x^2 + 2y^2 + 8y - 6 = 0$

$x^2 + y^2 + 4y + \underline{4} = 3 + \underline{4}$

$\boxed{x^2 + (y+2)^2 = 7}$

standard form:

center: $(0, -2)$ radius: $\sqrt{7}$

c. $4x^2 + 8x + 4y^2 + 20y - 135 = 5$

$4x^2 + 8x + 4y^2 + 20y = 140$

$x^2 + 2x + \underline{1} + y^2 + 5y + \underline{25/4} = 35 + \underline{1} + \underline{25/4}$

$\boxed{(x+1)^2 + (y + 5/2)^2 = \frac{169}{4}}$

standard form:

center: $(-1, -5/2)$ radius: $13/2$

d. $3x^2 + 6x + 3y^2 + 12y + 1 = 0$

$x^2 + 2x + \underline{1} + y^2 + 4y + \underline{4} = -1/3 + \underline{1} + \underline{4}$

$\boxed{(x+1)^2 + (y+2)^2 = 14/3}$

standard form:

center: $(-1, -2)$ radius: $\sqrt{14/3}$