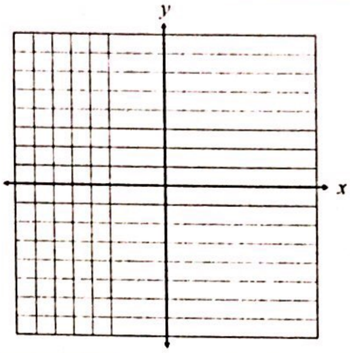
GRAPHING ELLIPSES

- ✓ Write the equation in **standard form**.
- ✓ Graph the **center**, (h, k).
- ✓ Graph the **vertices**, using the larger denominator, a.
- ✓ Graph the **co-vertices**, using the smaller denominator, b.
- ✓ Use the formula $c^2 = a^2 - b^2$ to find and graph the **foci**.

Directions: Graph each ellipse. Identify the center, vertices, co-vertices, and foci.

1. $\frac{x^2}{4} + \frac{y^2}{36} = 1$



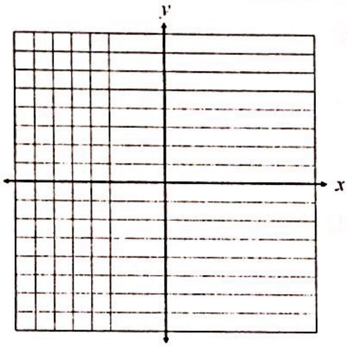
Center: ______

Vertices: ______

Co-Vertices: ______

Foci: ______

2. $\frac{x^2}{64} + \frac{y^2}{25} = 1$



Center: ______

Vertices: ______

Co-Vertices: ______

Foci: ______

3. $\frac{(x+1)^2}{49} + \frac{(y-2)^2}{9} = 1$

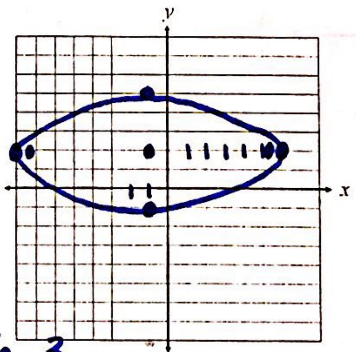
$\sqrt{a^2}=\sqrt{49}$ $a=\pm 7$

$\sqrt{b^2}=\sqrt{9}$ $b=\pm 3$

$c^2=a^2-b^2$

$c^2=49-9$

$\sqrt{c^2}=\sqrt{40}$ $c=\pm 6.3$



Center: (−1, 2)

a Vertices: (6, 2) (−8, 2)

b Co-Vertices: (−1, 5) (−1, −1)

c Foci: (5.3, 2) (−7.3, 2)

4. $\frac{(x-3)^2}{25} + \frac{(y-1)^2}{4} = 1$

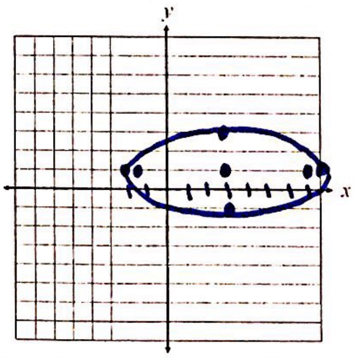
$\sqrt{a^2}=\sqrt{25}$ $a=\pm 5$

$\sqrt{b^2}=\sqrt{4}$ $b=\pm 2$

$c^2=25-4$

$\sqrt{c^2}=\sqrt{21}$

$c=\pm 4.6$



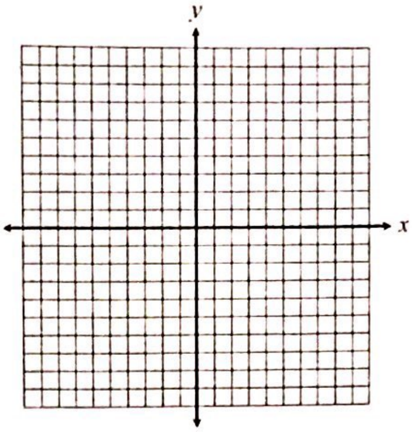
Center: (3, 1)

a Vertices: (8, 1) (−2, 1)

b Co-Vertices: (3, 3) (3, −1)

c Foci: (7.6, 1) (−1.6, 1)

5. $\frac{(x+4)^2}{20} + \frac{(y+2)^2}{36} = 1$



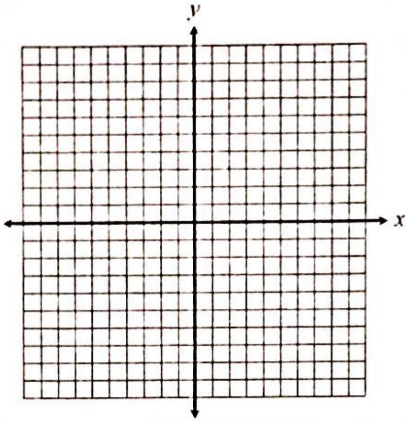
Center: ____________

Vertices: ____________

Co-Vertices: ____________

Foci: ____________

6. $9x^2 + 16y^2 = 144$



Center: ____________

Vertices: ____________

Co-Vertices: ____________

Foci: ____________

$\left(-\frac{10}{2}\right)^2$

$(-5)^2$

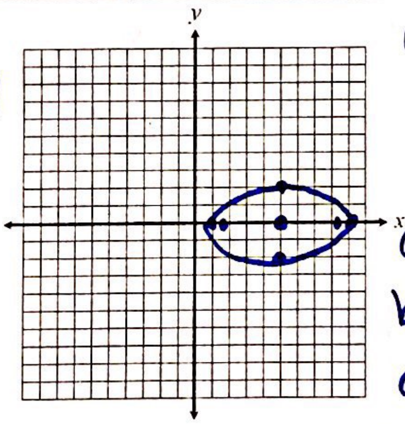
25

7. $x^2 + 4y^2 - 10x = -9$

$x^2 - 10x + 4y^2 = -9$

$(x^2 - 10x + 25) + 4y^2 = -9 + 25$

$\frac{(x-5)^2}{16} + \frac{4y^2}{16} = \frac{16}{16}$



$\frac{(x-5)^2}{16} + \frac{y^2}{4} = 1$

Center: $(5,0)$

a **Vertices:** $(9,0)\ (1,0)$

b **Co-Vertices:** $(5,2)\ (5,-2)$

c **Foci:** $(8.5,0)\ (1.5,0)$

$a^2 = 16$

$a = \pm 4$

$b^2 = 4$

$b = \pm 2$

$c^2 = 16 - 4$

$c^2 = 12$

$c = \pm 3.5$

8. $4x^2 + y^2 - 32x + 8y + 76 = 0$

$4x^2 - 32x + y^2 + 8y = -76$

$4(x^2 - 8x) + (y^2 + 8y) = -76$

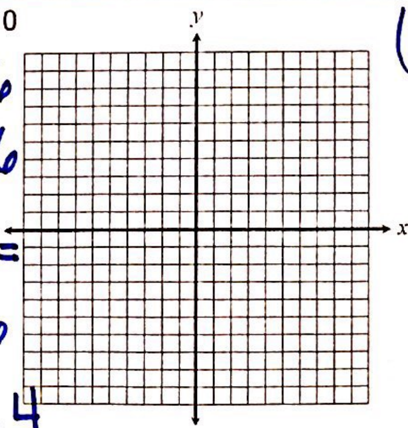
$4(x^2 - 8x + 16) + (y^2 + 8y + 16) = -76 + 64 + 16$

$\frac{\cancel{4}(x-4)^2}{\cancel{4}} + \frac{(y+4)^2}{4} = \frac{4}{4}$

$\left(-\frac{8}{2}\right)^2$

$(-4)^2$

16



Center: ____________

Vertices: ____________

Co-Vertices: ____________

Foci: ____________

$\frac{(x-4)^2}{1} + \frac{(y+4)^2}{4} = 1$

SET 2:

Given Vertices, Co-Vertices, & Foci

- ✓ Find the **center** (h, k). (Use the midpoint formula with the vert. or co-vert.)
- ✓ Use the **vertices** to find a; Use the **co-vertices** to find b.
  *If given the foci, use the formula $c^2 = a^2 - b^2$ to find the missing part.
- ✓ Determine the direction of the ellipse to write the equation.

Directions: Write an equation for each ellipse with the given information.

4. Vertices: (-5, 0) and (5, 0)
Co-Vertices: (0, -2) and (0, 2)

5. Vertices: (0, -8) and (0, 8)
Co-Vertices: (-6, 0) and (6, 0)

6. a Vertices: (-5, 1) and (1, 1)
b Co-Vertices: (-2, 3) and (-2, -1)

Center: $\left(\frac{-5+1}{2}, \frac{1+1}{2}\right) = (-2, 1)$

$a = \frac{-5-1}{2} = \frac{-6}{2} = -3 \quad a^2 = 9 \ (x^2)$

$b = \frac{3--1}{2} = \frac{4}{2} = 2 \quad b^2 = 4 \ (y^2)$

7. Vertices: (5, 8) and (5, -6)
Co-Vertices: (11, 1) and (-1, 1)

$$\boxed{\frac{(x+2)^2}{9} + \frac{(y-1)^2}{4} = 1}$$

8. a Vertices: (0, 6) and (-10, 6)
c Foci: (-2, 6) and (-8, 6)

Center: $\left(\frac{0+-10}{2}, \frac{6+6}{2}\right) = (-5, 6)$

$a = \frac{0--10}{2} = 5 \quad a^2 = 25 \ (x^2)$

$c = \frac{-2--8}{2} = 3 \quad c^2 = 9$

$c^2 = a^2 - b^2$

$9 = 25 - b^2$

$-16 = -b^2$

$16 = b^2 \ (y^2)$

9. Vertices: (-9, -2) and (-9, -12)
Foci: (-9, -3) and (-9, -11)

10. Co-Vertices: (5, 0) and (-5, 0)
Foci: (0, 12) and (0, -12)

11. Co-Vertices: (2, 7) and (2, -9)
Foci: (-4, -1) and (8, -1)

$$\boxed{\frac{(x+5)^2}{25} + \frac{(y-6)^2}{16} = 1}$$