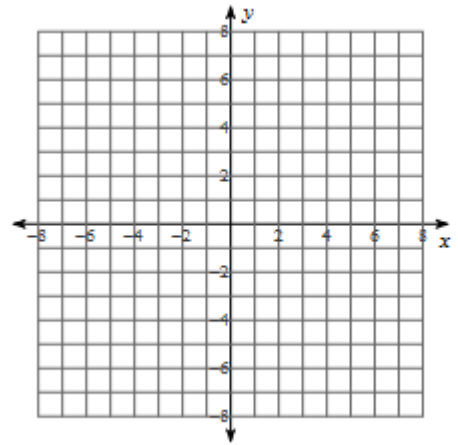# Conic Sections Review Worksheet 1

1. Find the required information and graph the conic section:
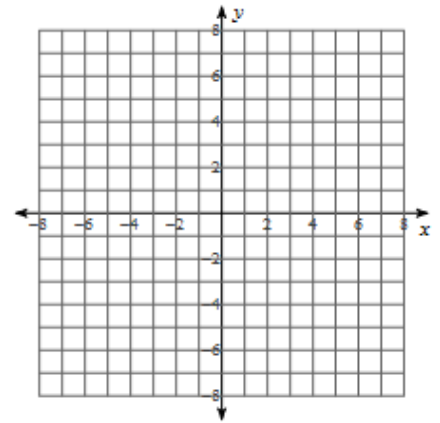
$$\frac{(x+2)^2}{25} + \frac{(y-4)^2}{4} = 1$$

Classify the conic section: _____ **Center:** _____

Vertices: _____ **Foci:** _____

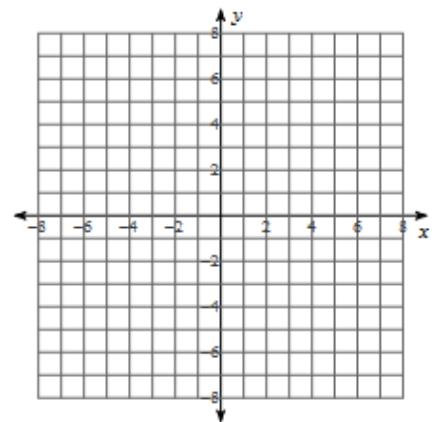2. Find the required information and graph the conic section: $y = 2x^2 - 8x + 4$

Classify the conic section: _____ **Vertex:** _____

Focus: _____ **Directrix:** _____

3. Find the required information. Then graph the conic section.
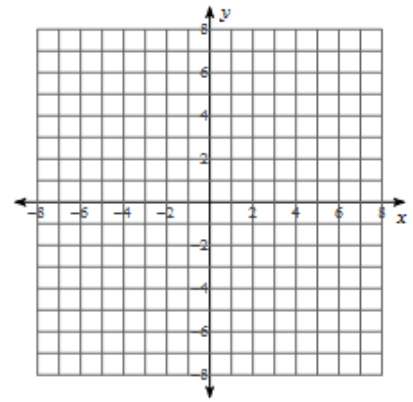
$$\frac{(x-2)^2}{9} - \frac{(y-1)^2}{16} = 1$$

Classify the conic section: _____ **Foci:** _____

Vertices: _____ **Asymptotes:** _____ **Center:** _____

4. Find the equation of the circle that is tangent to the line x = 8 that has a center at (-5, 10).

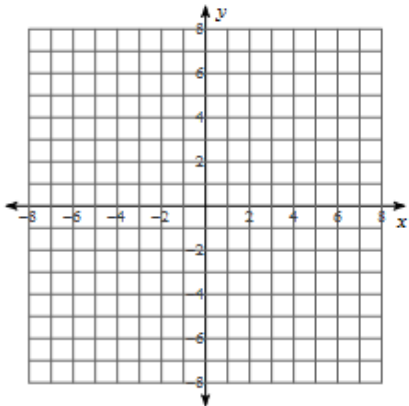5. Find the required information and graph: $(x+3)^2 + (y-1)^2 = 9$

Classify the conic section: _____ **Center:** _____ **Radius:** _____

6. Write the equation of the parabola in vertex form that has a the following information:
   Vertex: (2, -8)   **Directrix:** $x = 3$

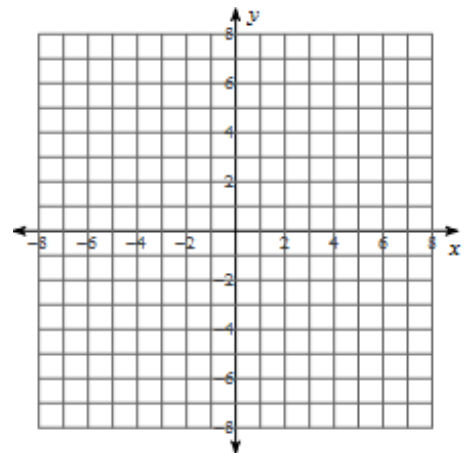7. Find the required information and graph: $7x^2 + 3y^2 - 42x + 6y - 39 = 0$

Classify the conic section: _____ **Center:** _____

Vertices: _____ **Foci:** _____

8. Find the required information and graph the conic section:
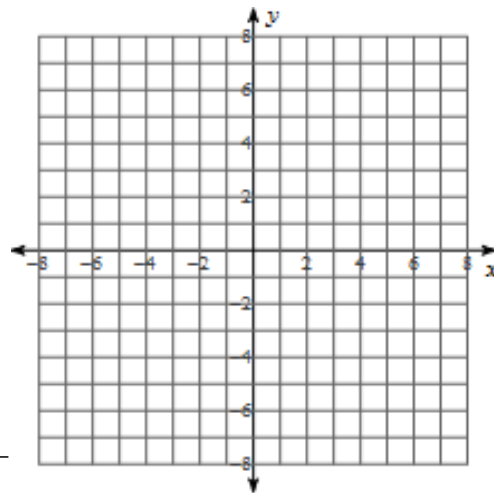$$4y^2 + x - 32y + 68 = 0$$

Classify the conic section: _____ **Vertex:** _____

Focus: _____ **Directrix:** _____

9. Find the equation of the circle that is tangent to equation y = (-2) that has a center at (-6, 12).
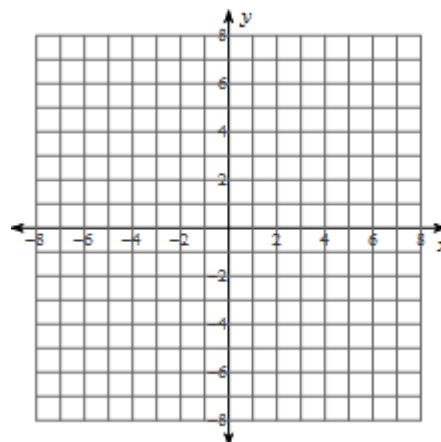
10. Find the required information and graph:

$$2x^2 + 2y^2 + 2x + 14y + 17 = 0$$

Classify the conic section: _____ **Center:** _____

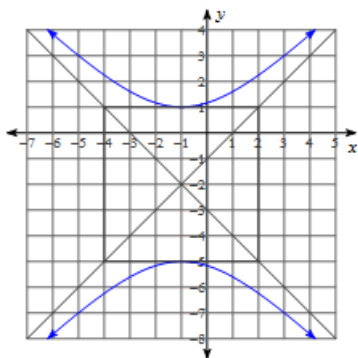11. Find the required information. Then graph the conic section.

$$-9x^2 + 4y^2 - 18x + 16y - 29 = 0$$

Classify the conic section: _____ **Foci:** _____

Vertices: _____ **Asymptotes:** _____ **Center:** _____

12. Write the equation of the hyperbola shown.

13. Write the equation of the hyperbola in vertex form that has a the following information:

Vertices: (9, 12) and (9, -18)
Foci: $\left(9, -3 + \sqrt{229}\right)$ and $\left(9, -3 - \sqrt{229}\right)$

14. Write the equation of the circle in standard form given the endpoints of the diameter: (-12, 10) and (-18, 12).
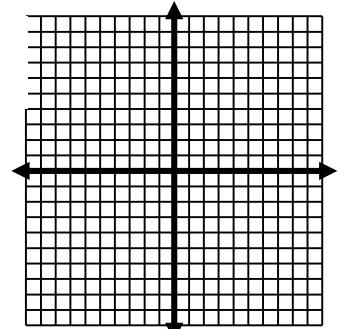
15. Use the information provided to write the equation of the ellipse in standard form.

Center: (-9, -5)   **Vertex:** (-9, -16)   **Focus:** $(-9, -5 + 6\sqrt{2})$

Part III: Find the equation for 16-20: { Hint: Graph to help find the equation }

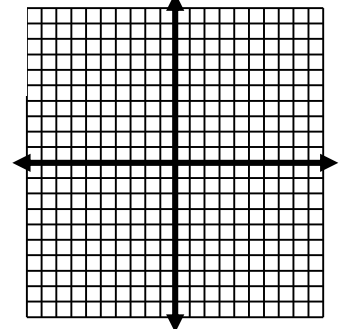16) Center (7, 3)   Vertex (7, 9)   Focus (7, -2)   16)
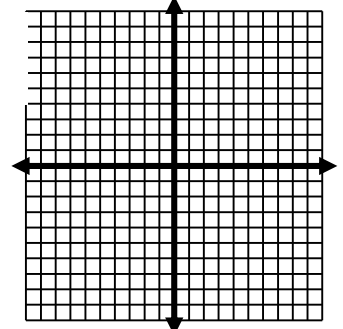
17) Asymptotes: $y = -\dfrac{5}{4}x + 1 \quad y = \dfrac{5}{4}x - 9$ Focus (4, $-4 + \sqrt{41}$ 20)

17)
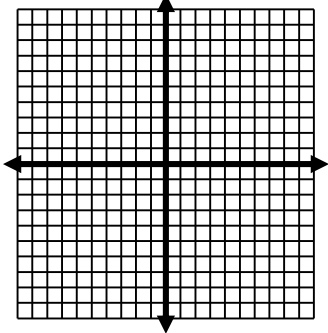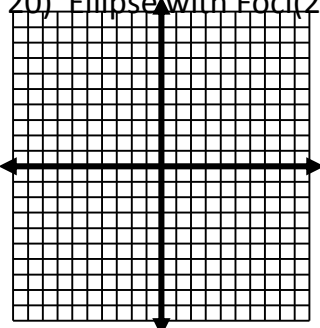
18) Focus (12, 8)   Directrix: x = -2

18)

19) Ellipse with Center(1,2), vertex at (4,2) and contains the point (1,3)

20) Ellipse with Foci(2,7) and (-2,7) and the length of the major axis is 6.

21) The cables of a suspension bridge are in the shape of a parabola. The towers supporting the cables are 400ft apart and 100ft tall. If the supporting cable that runs from tower to tower is only 30 feet from the road at its closest point. Find the length of one of the vertical support cables that is 60 feet from the towers.
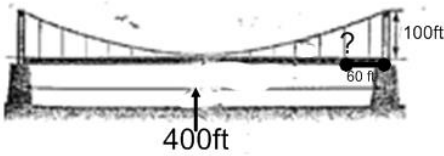
22) Whispering Gallery: The figure below shows the specifications for an elliptical ceiling in a hall designed to be a whispering gallery. In an whispering gallery, a person standing at one focus of the ellipse can whisper and be heard by another person standing at the other focus, because all the sound waves that reach the ceiling from one focus are reflected to the other focus. If the hall below is 140 feet in length with 30 feet tall ceiling at its highest point. How far from the end walls will the foci point be?
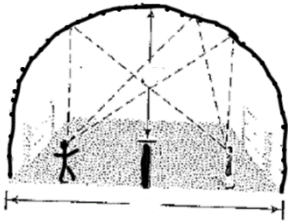
Determine how many places the following 2 conic intersect at and if they intersect find the point or points of intersection. Solve the system over the real numbers for 19 and 20.

23)
$$x^2 + y^2 = 34$$
$$3x - 3y = 6$$

24)
$$4x^2 + 5y^2 = 445$$
$$5x^2 - 3y^2 = 473$$

Solutions:

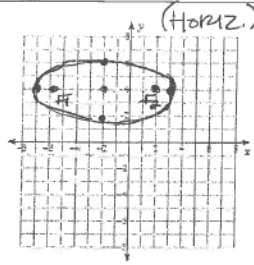**1.** Find the required information and graph the conic section:

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

$c^2 = a^2 - b^2$
$c = 25 - 4 = \sqrt{21}$

(HORIZ.)

$a = 5$ (MAJOR) $b = 2$ (MINOR)

Classify the conic section: **ELLIPSE**   Center: $(-2, 4)$

Vertices: $(-7, 4)$ $(3, 4)$ Foci: $(-2+\sqrt{21}, 4)$ $(-2-\sqrt{21}, 4)$

2. Find the required information and graph the conic section: $y = 2x^2 - 8x + 4$

VERTICAL

$\frac{-(-8)}{2(2)} = \frac{8}{4} = 2$ $2(4) - 16 + 4$ $8 - 16 + 4 = -4$

$y = k - \frac{1}{4a} = -4 - \frac{1}{4(2)} = -4 - \frac{1}{8} = -4\frac{1}{8}$
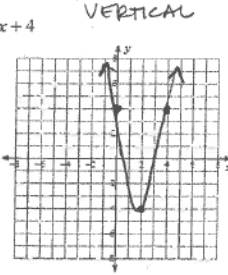
Classify the conic section: **PARABOLA**   Vertex: $(2, -4)$

Focus: $\left(2, -\frac{31}{8}\right)$ Directrix: $y = -4\frac{1}{8}$ $\left(-\frac{33}{8}\right)$

3. Find the required information. Then graph the conic section.   HYPERBOLA (HORIZONTAL)

$$\frac{(x-2)^2}{9} - \frac{(y-1)^2}{16} = 1$$

$c^2 = 9 + 16 = \sqrt{25} = 5$

$a = 3$ $b = 4$
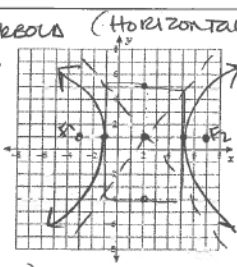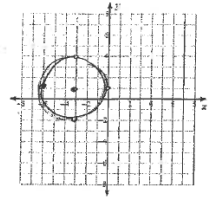
Classify the conic section: **HYPERBOLA**   Foci: $(-3, 1)$ $(7, 1)$

Vertices: $(2, 5)$ $(2, -4)$ Asymptotes: $\pm 4/3$ (Slopes)   Center: $(2, 1)$

4. Find the equation of the circle that is tangent to the line x = 8 that has a center at (-5, 10).
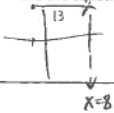
$(x+5)^2 + (y-10)^2 = 169$

$x = 8$

5. Find the required information and graph: $(x+3)^2 + (y-1)^2 = 9$

Classify the conic section: **CIRCLE**   Center: $(-3, 1)$ Radius: 3

6. Write the equation of the parabola in vertex form that has a the following information:
Vertex: (2, -8)   Directrix: x = 3

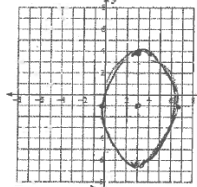$\left[x = h - \frac{1}{4a}\right] \longrightarrow$ $3 = 2 - \frac{1}{4a}$ $1 = -\frac{1}{4a}$ $-4a = 1 \longrightarrow a = -\frac{1}{4}$

$x = -\frac{1}{4}(y+8)^2 + 2$

7. Find the required information and graph: $7x^2 + 3y^2 - 42x + 6y - 39 = 0$ (VERTICAL)

$(7x^2 - 42x + \_\_) + (3y^2 + 6y + \_\_) = 39$
$7(x^2 - 6x + 9) + 3(y^2 + 2y + 1) = 39 + 63 + 3$
$7(x-3)^2 + 3(y+1)^2 = 105$

$$\frac{(x-3)^2}{15} + \frac{(y+1)^2}{35} = 1$$ $c^2 = 35 - 15 = \sqrt{20}$

$a = \sqrt{15}$ $(3, 7)$ $b = \sqrt{35}$ $(5, 8)$

Classify the conic section: **ELLIPSE**   Center: $(3, 1)$

Vertices: $(3, -1+\sqrt{35})$ $(3, -1-\sqrt{35})$ Foci: $(-3, -1+\sqrt{20})$ $(-3, -1-\sqrt{20})$

8. Find the required information and graph the conic section: HORIZONTAL
$4y^2 + x - 32y + 68 = 0$

$-x = 4y^2 - 32y + 68$
$-x = 4(y^2 - 8y + 16) + 68 - 64$
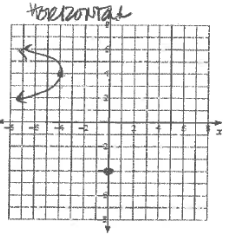$-x = 4(y-4)^2 + 4$
$x = -4(y-4)^2 - 4$
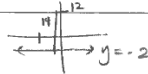
$x = h - \frac{1}{4a}$
$x = -4 + \frac{1}{16}$
$x = -\frac{64}{16} + \frac{1}{16}$
$= -\frac{63}{16}$

Classify the conic section: **PARABOLA**   Vertex: $(-4, 4)$

Focus: $\left(-\frac{65}{16}, 4\right)$ Directrix: $x = -\frac{63}{16}$

9. Find the equation of the circle that is tangent to equation y = (-2) that has a center at (-6, 12).

$y = -2$

$(x+6)^2 + (y-12)^2 = 196$

 # 10. Find the required information and graph:

$2x^2 + 2y^2 + 2x + 14y + 17 = 0$
$(2x^2 + 2x + \_\_) + (2y^2 + 14y + \frac{12.25}{}) = -17 + 0.5 + \frac{12.25}{}$
$2(x^2 + 1x + 0.25) + 2(y^2 + 7y + 12.25) = $
$2(x + \frac{1}{2})^2 + 2(y + 3.5)^2 = 8$
$(x + \frac{1}{2})^2 + (y + 3.5)^2 = 4$

Classify the conic section: **CIRCLE**   Center: $(-\frac{1}{2}, -\frac{7}{2})$ RADIUS = 2

11. Find the required information. Then graph the conic section.

$-9x^2 + 4y^2 - 18x + 16y - 29 = 0$
$(-9x^2 - 18x + \_\_) + (4y^2 + 16y + \_\_) = 29$
$-9(x^2 + 2x + 1) + 4(y^2 + 4y + 4) = 29 + \frac{16}{} + \frac{-9}{}$
$-9(x+1)^2 + 4(y+2)^2 = 36$
$\frac{(y+2)^2}{9} - \frac{(x+1)^2}{4} = 4$
$\frac{(y+2)^2}{9} - \frac{(x+1)^2}{4} = 1$

Classify the conic section: **HYPERBOLA**   Foci: $(-1, -2+\sqrt{13})$ $(-1, -2-\sqrt{13})$

Vertices: $(-1, 1)$ $(-1, -5)$ Asymptotes: $\pm 3/2$ (Slopes)   Center: $(-1, -2)$

$c^2 = 9 + 4 = \sqrt{13}$

12. Write the equation of the hyperbola shown.
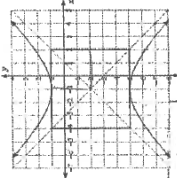
A: $(-1, -2)$ $a = 3, b = 3$ VERTICAL

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

13. Write the equation of the hyperbola in vertex that has a the following information: VERTICAL
Vertices: (9, 12) and (9, -18)
Foci: $(9, -3 + \sqrt{229})$ and $(9, -3 - \sqrt{229})$

$a = 15$ $b = 2$ $c = \sqrt{229}$
Center: $(9, -3)$
$229 = 15^2 + b^2$
$4 = b^2$
$2 = b$

$\frac{(y+3)^2}{225} - \frac{(x-9)^2}{4}$

14. Write the equation of the circle in standard form given the endpoints of the diameter: (-12, 10) and (-18, 12).

Radius: $3\sqrt{2}\cdot\frac{1}{2} = \sqrt{10}$ $(x+15)^2 + (y-11)^2 = 10$

$\left(\frac{-12 + -18}{2}\right) = (-15, 11)$ Center

15. Use the information provided to write the equation of the ellipse in standard form.   (VERTICAL)

Center: (-9, -5)   Vertex: (-9, -16)   Focus: $(-9, -5 + 6\sqrt{2})$

$6\sqrt{2} = \sqrt{121 - b^2}$
$72 = 121 - b^2$
$49 = b^2$
$7 = b$

$\frac{(x+9)^2}{49} + \frac{(y+5)^2}{121} = 1$

16) $\frac{(y-9)^2}{11} - \frac{(y-9)^2}{56} = 1$

17) $\frac{(y+4)^2}{25} - \frac{(x-4)^2}{16} = 1$

18) $x - 5 = \frac{1}{56}(y-2)^2$

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

20) $\frac{(x)^2}{9} + \frac{(y-7)^2}{5} = 1$

21) 64.3ft

22) $70 - 20\sqrt{10}$ or 6.75ft

23) (5,3), (-3,-5)

24) (10,3), (10,-3) (-10,3) (-10,-3)