

Warm-Up:

Determine whether the graph of each equation would be a parabola, circle, ellipse, or hyperbola.

1) $x^2 - y^2 + 6x - 14y = 30$

Hyperbola

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

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

Circle

3) $y + x^2 = 9$

Parabola

14, 40

14) $V: (9, -3) \quad (-5, -3) \quad 49 + b^2 = 53$

Foci: $(2 \pm \sqrt{53}, -3) \quad \begin{matrix} b^2 = 4 \\ b = 2 \end{matrix}$

C: $(2, -3)$

$a = 7$

$b = 2$

$c = \sqrt{53}$

$\frac{(x-2)^2}{49} - \frac{(y+3)^2}{4} = 1$

40) horiz. transverse axis
contains $(4, 3)$

Asymptotes: $y - x = 1$
 $y + x = 5$

C: $(2, 3)$

$a = 2$

$b = 2$

$\frac{2y = 6}{y = 3} \quad x = 2$

$y = x + 1$

$m = 1 = \frac{b}{a}$

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

Examples:

1) Find the distance between $(-2, 5)$ and $(-6, -1)$.

$$\sqrt{(-2+6)^2 + (5+1)^2}$$
$$\sqrt{4^2 + 6^2} = \sqrt{16+36} = 2\sqrt{13}$$

2) Find the midpoint of $(3, -8)$ and $(11, -2)$.

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

Examples:

3) Identify the vertex, focus, axis of symmetry, directrix and direction of opening of the parabola. Then graph.

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

$$\frac{1}{4(1)} = \frac{1}{4}$$

$$\text{Vertex: } (3, -4)$$

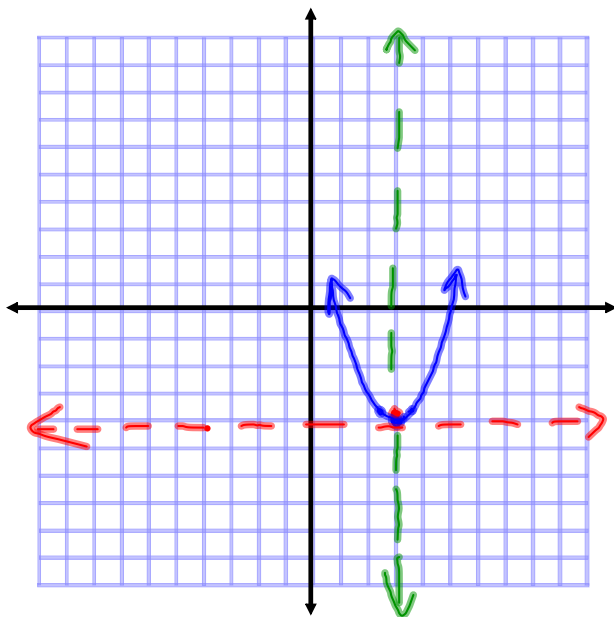
$$\text{Focus: } (3, -3\frac{3}{4})$$

$$\text{Directrix: } y = -4\frac{1}{4}$$

$$\text{Axis: } x = 3$$

Opens Up

$$\text{LR: } \left| \frac{1}{1} \right| = 1$$



Examples:

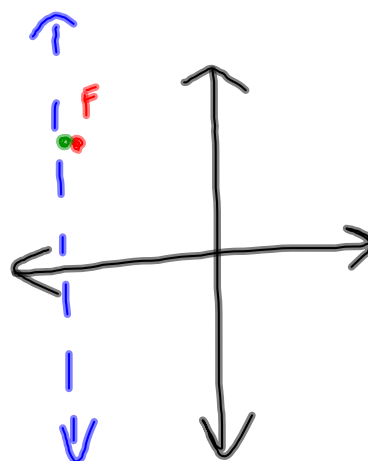
4) Write the equation of a parabola with focus $(-2, 3)$ and directrix $x = \frac{-25}{12}$

$$V: \left(-2\frac{1}{24}, 3\right)$$

$$\frac{1}{4a} = \frac{1}{24}$$

$$a = 6$$

$$x = 6(y - 3)^2 - 2\frac{1}{24}$$



Examples:

5) Write the equation of a circle with endpoints of a diameter at $(-2, -9)$ and $(0, -5)$.

$$C: \left(\frac{-2+0}{2}, \frac{-9+-5}{2}\right)$$

$$C: (-1, -7)$$

$$r = \sqrt{(-1-0)^2 + (-7+5)^2}$$

$$r = \sqrt{1+4} = \sqrt{5}$$

$$(x+1)^2 + (y+7)^2 = 5$$

Examples:

6) List the center and radius of the circle. Then graph.

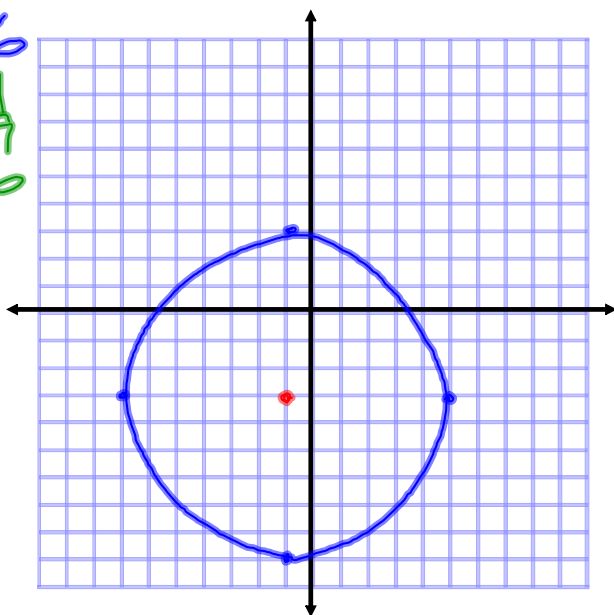
$$x^2 + y^2 + 2x + 6y = 26$$

$$x^2 + 2x + 1 + y^2 + 6y + 9 = 26$$

$$(x+1)^2 + (y+3)^2 = 36$$

$$C: (-1, -3)$$

$$r = 6$$



Examples:

7) Write the equation of an ellipse with endpoints of the minor axis at (0, 2) and (0, -2) and foci at (-4, 0) and (4, 0).

$$C: (0, 0)$$

$$b = 2$$

$$c = 4$$

$$a^2 - 4 = 16$$

$$a^2 = 20$$

$$a = 2\sqrt{5}$$

$$\frac{x^2}{20} + \frac{y^2}{4} = 1$$

Examples:

8) Find the center, foci, and lengths of the major and minor axes of the ellipse. Then graph.

$$\frac{(y-2)^2}{36} + \frac{(x+5)^2}{16} = 1$$

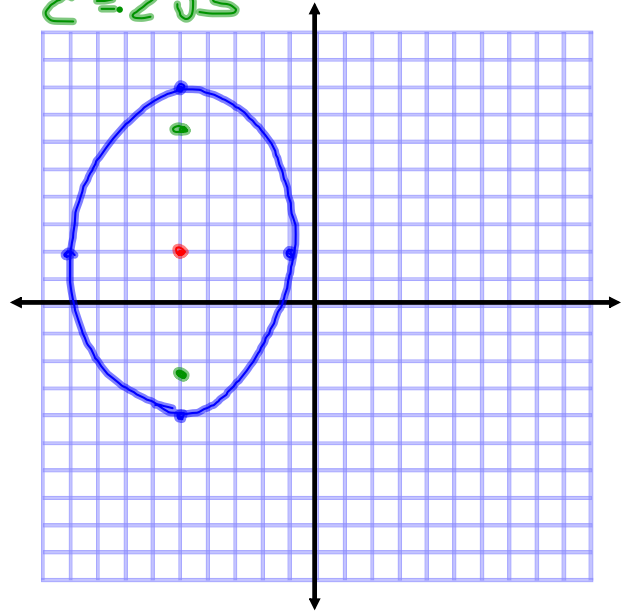
$$C: (-5, 2)$$

$$F: (-5, 2 \pm 2\sqrt{5})$$

$$\text{Major: } 12$$

$$\text{Minor: } 8$$

$$36 - 16 = c^2$$
$$20 = c^2$$
$$c = 2\sqrt{5}$$



Examples:

9) Write the equation of a hyperbola with vertices (0, 7) and (0, -7) and a conjugate axis length of 18 units.

$$C: (0, 0)$$

$$a = 7$$

$$b = 9$$

$$\frac{y^2}{49} - \frac{x^2}{81} = 1$$

Examples:

10) Find the center, vertices, lengths of the transverse and conjugate axes, and the equations of the asymptotes. Then graph.

$$\frac{(x-1)^2}{4} - \frac{(y+2)^2}{49} = 1$$

$$C: (1, -2)$$

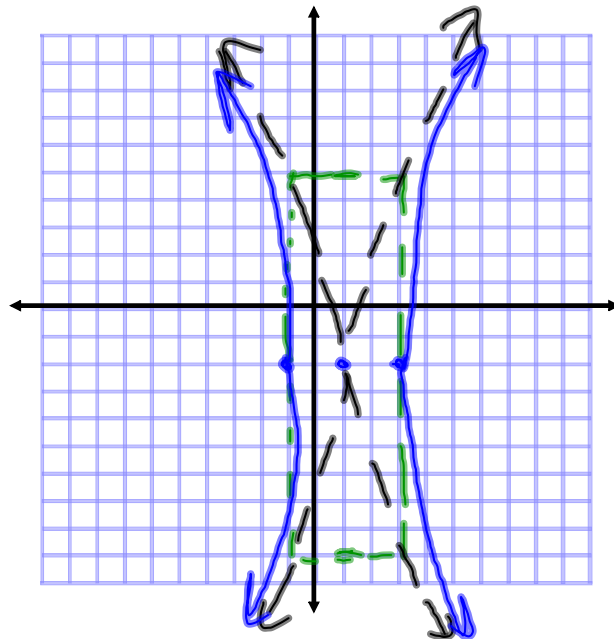
$$V: (-1, -2) (3, -2)$$

$$\text{Transverse: } 4$$

$$\text{Conjugate: } 14$$

Asymptotes:

$$y+2 = \pm \frac{7}{2}(x-1)$$



Ch. 10 Test Next Class

Q4 Test Friday/Monday May 20/23