$$49x^2 + y^2 - 49 = 0$$

$$49x^2 + y^2 = 49 \qquad \text{Ellipse}$$

$$\underline{20}x^2 + \underline{20}y^2 = 100 \qquad \text{Circle}$$

$$x^2 + y^2 = 5$$

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$

$$\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$$

#8, Conics Rev. WS.

$$-4x^2+9y^2+8x-18y-31=0$$

$$-4x^2+8x+9y^2-18y=31$$

$$-4(x^2-2x+\underline{1})+9(y^2-2y+\underline{1})=31+\underline{-4}+\underline{9}$$

$$\left[\tfrac{1}{2}(-2)\right]^2=(-1)^2$$

$$\left(\frac{-2}{2}\right)^2=(-1)^2=1$$

$$-4(x-1)^2+9(y-1)^2=36$$

$$\frac{\cancel{9}(y-1)^2}{\cancel{36}}-\frac{4(x-1)^2}{\cancel{36}}=\frac{36}{36}$$

Hyperbola

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

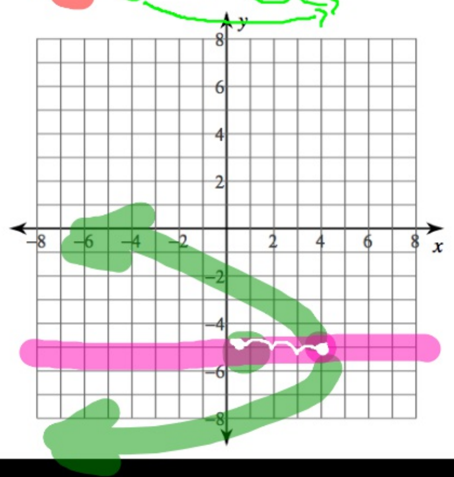
$a^2=4$

$a=2$

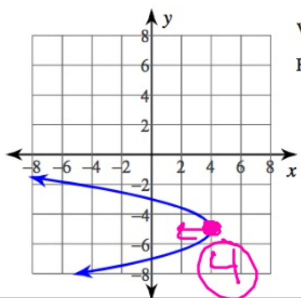
$b^2=9$

$b=3$

16) $y^2 + x + 10y + 21 = 0$



16)



Vertex: $(4, -5)$

Focus: $\left(\frac{15}{4}, -5\right)$

$y^2 + 10y = -x - 21$

$\left(\frac{1}{2} \cdot 10\right)^2 = (5)^2 = 25$

$(\quad)^2 =$

$y^2 + 10y + 25 = -x - 21 + 25$

$(y+5)^2 = -x + 4$ $\quad (h, k)$

$(y+5)^2 - 4 = -x$

$-(y+5)^2 + 4 = x$

$\Rightarrow$ K $\quad$ h

$(y-k)^2 = -4a(x-h)$

$(y+5)^2 = -x + 4$

$(y+5)^2 = -1(x-4)$ $\quad -(x-h)$

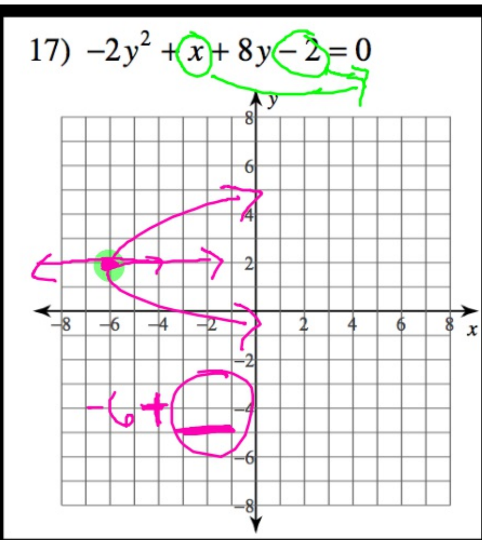
$4a = -1$

$a = -1/4$

X-COORD: $4 - \frac{1}{4}$

$\frac{16}{4} - \frac{1}{4}$

$\frac{15}{4}$ $\Rightarrow$ gives x-coord. of focus $\Rightarrow$ y-coord is same as vertex



$-2y^2 + 8y = -x + 2$

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

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

$-2(y-2)^2 = -x - 6$

$\to 2(y-2)^2 - 6 = x$

$(h, k) = (6, 2)$

k h

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

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

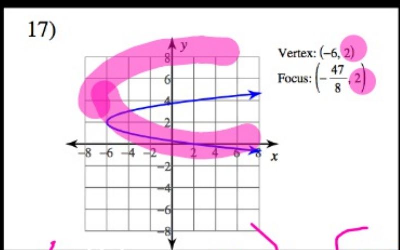
$(y-2)^2 = \frac{1}{2}(x + 6)$

$\frac{1}{2} \cdot \frac{1}{6} = \frac{1}{12}$

$\overline{}$ 2

$-4a = \frac{1}{2}$

$a = -\frac{1}{8}$



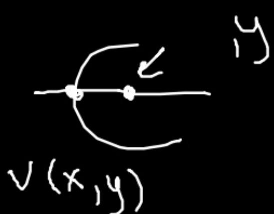
$\left(-\frac{47}{8}, 2\right)$ Focus

$\to$

$-6 + \frac{1}{8}$

$-\frac{48}{8} + \frac{1}{8}$

$-\frac{47}{8}$



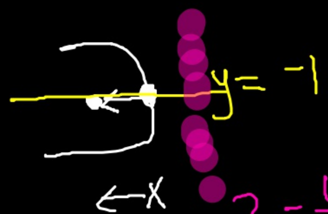
1) $y^2 + x + 2y - 1 = 0$

1) Parabola

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

Vertex: $(2, -1)$

Focus: $\left(\frac{7}{4}, -1\right)$



$$y^2 + 2y = -x + 1$$

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

$$\left(\frac{2}{2}\right)^2 = (1)^2 = 1$$

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

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

$$-1 = 4a$$

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

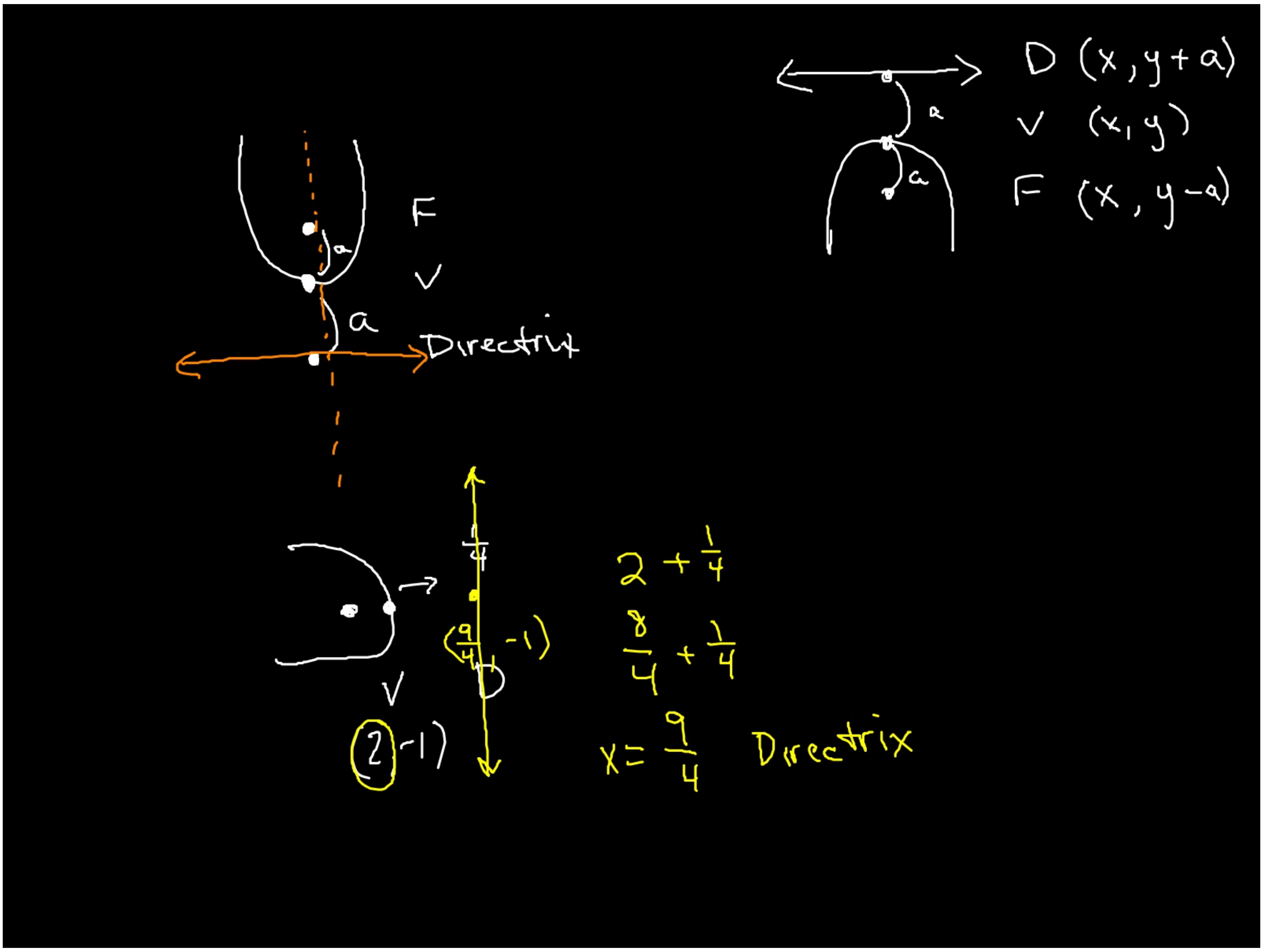
$$2 - \frac{1}{4}$$

$$\frac{8}{4} - \frac{1}{4}$$

$$\left(\frac{7}{4}, -1\right)$$

$$y = 2x + 3$$

$$\frac{y-3}{2} = x$$


F
V
a
a
Directrix
D (x, y+a)
V (x, y)
F (x, y−a)
a
a
1/4
(9/4, -1)
V
(2, -1)
2 + 1/4
8/4 + 1/4
x = 9/4 Directrix

10) $y^2 + x - 6y + 6 = 0$

10) Parabola

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

Vertex: $(3, 3)$

Focus: $\left(\frac{11}{4}, 3\right)$

Latus Rectum: 1 unit

$$y^2 - 6y = -x - 6$$

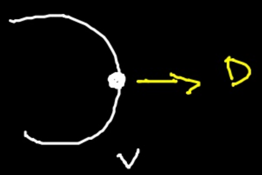
$$y^2 - 6y + 9 = -x - 6 + 9$$

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

$$(y-3) = -1(x-3)$$

$$-1 = 4a$$

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



$F \leftarrow (x, y)$

$$3 - \frac{1}{4}$$

$$\frac{12}{4} - \frac{1}{4}$$

$$F\left(\frac{11}{4}, 3\right)$$

Directrix

$$3 + \frac{1}{4}$$

$$\frac{12}{4} + \frac{1}{4}$$

$$x = \frac{13}{4}$$

8) $-4x^2 + 9y^2 + 8x - 18y - 31 = 0$

Hyperbola

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

Center: $(1, 1)$

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

Foci: $(1, 1+\sqrt{13})$, $(1, 1-\sqrt{13})$

Latus Rectum: 9 units

$$-4x^2 + 8x + 9y^2 - 18y = 31$$

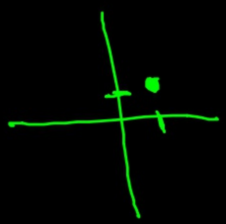
$$-4(x^2 - 2x + 1) + 9(y^2 - 2y + 1) = 31 - 4 + 9$$

$$\left(\frac{-2}{2}\right)^2 = (-1)^2 = 1 \qquad \left(\frac{-2}{2}\right)^2 = (-1)^2 = 1$$

$$-4(x-1)^2 + 9(y-1)^2 = 36$$

$$\frac{\cancel{9}(y-1)^2}{\cancel{36}} - \frac{\cancel{4}(x-1)^2}{36} = \frac{36}{36}$$

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



~~36~~ 36 36

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

$a^2 = 4$ $\quad$ $b^2 = 9$ $\quad$ JC

$a = 2$ $\quad$ $b = 3$

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

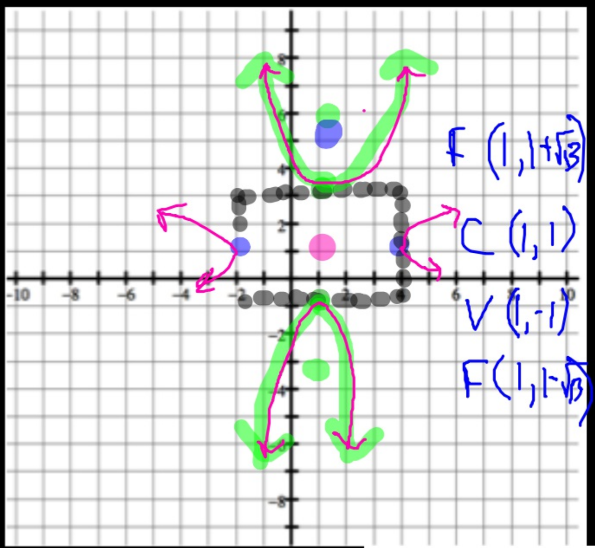
$a^2 + b^2 = c^2$

$4 + 9 = c^2$

$\pm\sqrt{13} = c$

$c^2 = 16$ $\quad$ $c^2 = 9$

$c = 4$ $\quad$ $c = 3$



Hyperbola

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

Center: (1, 1)

Vertices: (1, 3), (1, −1)

Foci: $(1, 1+\sqrt{13})$, (1, 1 -

Latus Rectum: 9 units

15) $x^2 - y^2 + 2x - 2y - 15 = 0$

15) Hyperbola

$$\frac{(x+1)^2}{\cancel{15}\ 17} - \frac{(y+1)^2}{\cancel{15}\ 17} = 1$$

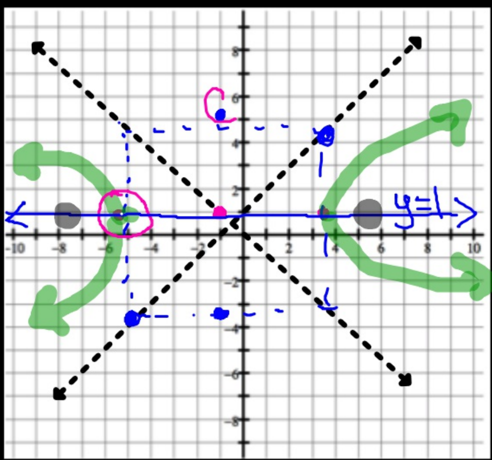
Center: $(-1, \cancel{-1})$

$1 - \sqrt{17},$

Vertices: $(-1 + \sqrt{\cancel{15}}, -1), (-1 - \sqrt{\cancel{15}}, -1)$

Foci: $(-1 + \sqrt{30}, \cancel{-}1), (-1 - \sqrt{30}, \cancel{-}1)$

C: $(-1, 1)$



c

$x^2 + 2x + \underline{1} - y^2 - 2y \underline{+1} = 15 + \underline{1} + \underline{1}$

$(x+1)^2 - (y-1)^2 = 17$

$$\boxed{\frac{(x+1)^2}{17} - \frac{(y-1)^2}{17} = 1} \quad > C$$

$a = b = \sqrt{17}$

$c^2 = a^2 + b^2$

$c^2 = 17 + 17$

$c = \sqrt{34}$

Foci $(-1 - \sqrt{34}, 1)$ $(-1 + \sqrt{34}, 1)$