19.) $\frac{1}{8}x^2 - y = 0$

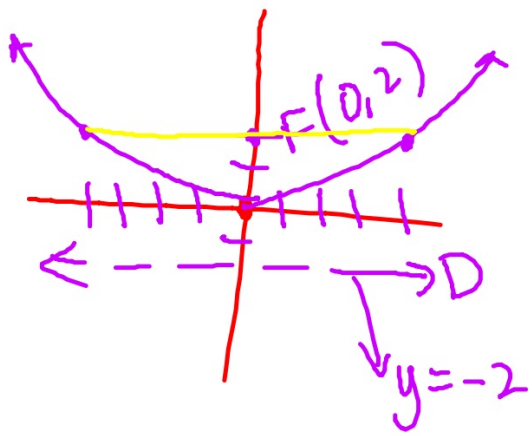
$8\left(\frac{1}{8}x^2 = y\right)$

$x^2 = 8y$

UP

$4p = 8$

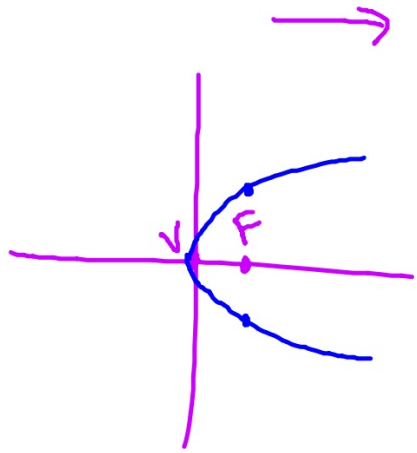
$p = 2$



13.) $x = 4y^2$

$$\frac{4y^2}{4} = \frac{x}{4}$$

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



Vertex: $(0,0)$

focus: $\left(\frac{1}{16}, 0\right)$

dir: $x = -\frac{1}{16}$

$4p = \frac{1}{4}$

$p = \frac{1}{16}$

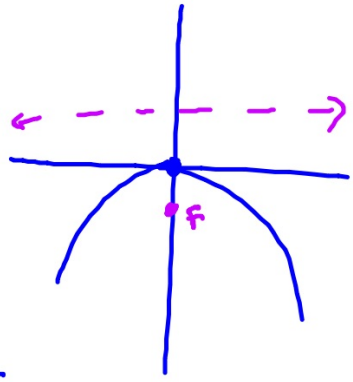
l.r. $= \frac{1}{4}$

a.o.s. $y = 0$

21.) $5x^2 + 12y = 0$

$5x^2 = -12y$

$x^2 = \frac{-12}{5}y$



vertex $(0,0)$

focus: $(0, -\frac{3}{5})$

dir: $y = \frac{3}{5}$

$4p = \frac{-12}{5}$

$p = \frac{-12}{20}$

$p = \frac{-3}{5}$

More Parabolas

$$(y-3)^2 = 4(x-5)$$

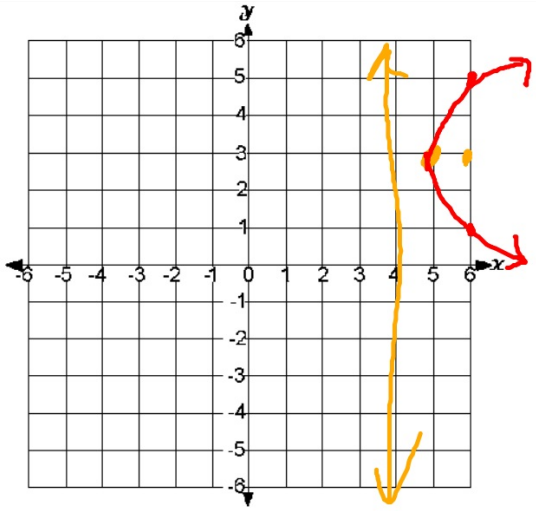
$4p = 4$

$p = 1$

vertex : $(5, 3)$

focus : $(6, 3)$

Directrix : $x = 4$



Completing the Square

1. $x^2 - 6x + 13$

$x^2 - 6x + 9 + 13 - 9$ $\left(\frac{6}{2}\right)^2$

$(x-3)^2 + 4$

2. $x^2 + 10x - 1$

$(x^2 + 10x + 25) - 1 - 25$

$(x+5)^2 - 26$

3 $x^2 - 5x + 3$ $\left(\frac{5}{2}\right)^2$

$x^2 - 5x + \frac{25}{4} + 3 - \frac{25}{4}$

$\left(x - \frac{5}{2}\right)^2 - \frac{13}{4}$

---

4 $2x^2 + 12x - 7$

$2(x^2 + 6x + 9) - 18 - 7$

$2(x+3)^2 - 25$

Rewrite from general form to standard form, then sketch.

5 $y^2 + 2x + 6y + 1 = 0$

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

$(y+3)^2 = -2x + 8$

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

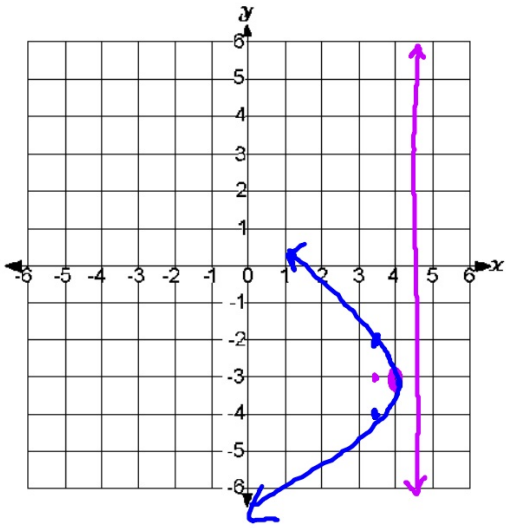
$4p = -2$

$p = -\frac{1}{2}$

Vertex $(4, -3)$

Focus $(3\frac{1}{2}, -3)$

Directrix $x = 4\frac{1}{2}$



$$l.r. = |4p|$$
$$= |-2|$$
$$= 2$$

6 $4x^2 + 8x - 5y - 6 = 0$

Change from general form to standard form.

$4(x^2+2x+1) - 4 = 5y + 6$

$4(x+1)^2 = 5y + 10$

$4(x+1)^2 = 5(y+2)$

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

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

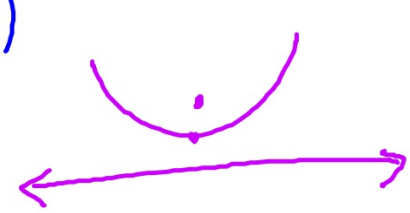
$4p = \frac{5}{4}$

$p = 5/16$

Vertex $(-1, -2)$

Focus $(-1, -1\frac{11}{16})$

Dir: $y = -2\frac{5}{16}$



7 $y^2 + 12x - 6y - 27 = 0$

Find the standard form of the parabola

$(y^2 - 6y + 9) - 9 = -12x + 27$

$(y-3)^2 = -12x + 36$

$\boxed{(y-3)^2 = -12(x-3)}$

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