

12.5 #18 - 36m3, 37

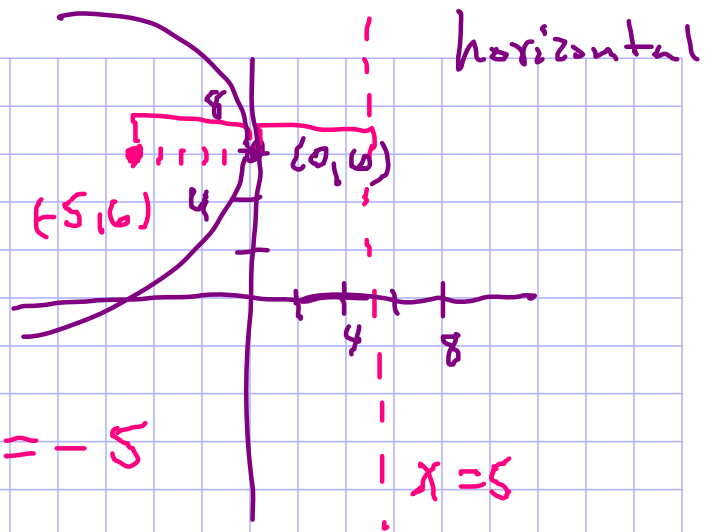
18. vertex $(0, 6)$

directrix: $x = 5$

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

$$(y-6)^2 = 4(-5)(x-0)$$

$$(y-6)^2 = -20x$$



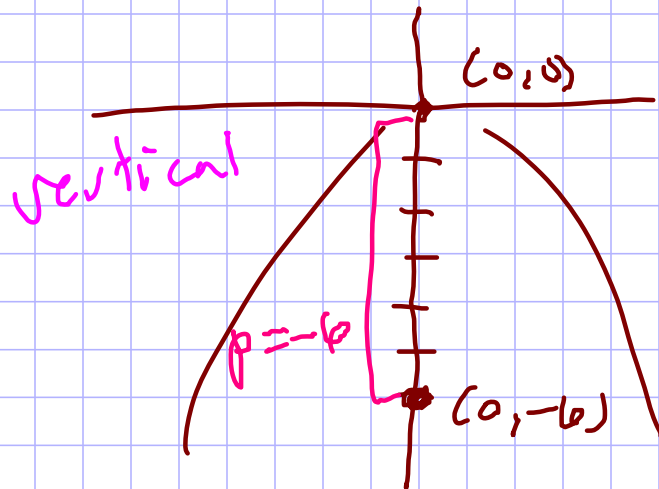
21. vertex $(0, 0)$

focus $(0, -6)$

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

$$x^2 = 4(-6)y$$

$$x^2 = -24y$$



$$24. \quad x-2 = \frac{1}{2} (y+1)^2$$

horizontal
(focus on "x")

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

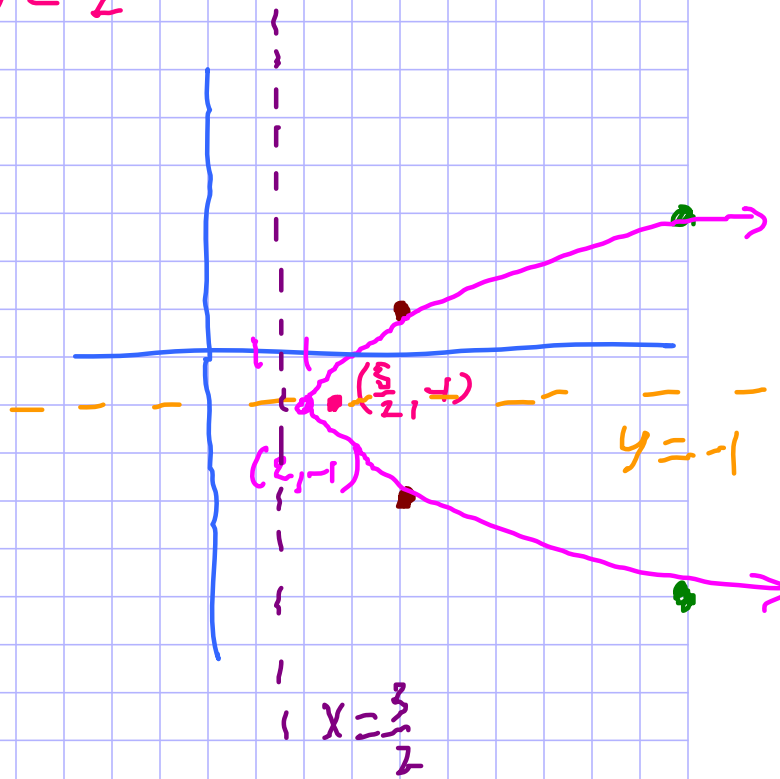
$4p=2$
 $p=\frac{1}{2}$

vertex $(2, -1)$

focus $(h+p, k) = (\frac{5}{2}, -1)$

directrix: $x = h-p = \frac{3}{2}$

a.o.s. $y = -1$



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

$$4 = 2(x-2)$$

$$2 = x-2$$

$$4 = x$$

x	y
10	3
4	1
2	-1
4	-3
10	-5

$$(3+1)^2 = 2(x-2)$$

$$16 = 2(x-2)$$

$$8 = x-2$$

$$10 = x$$

27. vertex $(2, -6)$

directrix $y = -3$

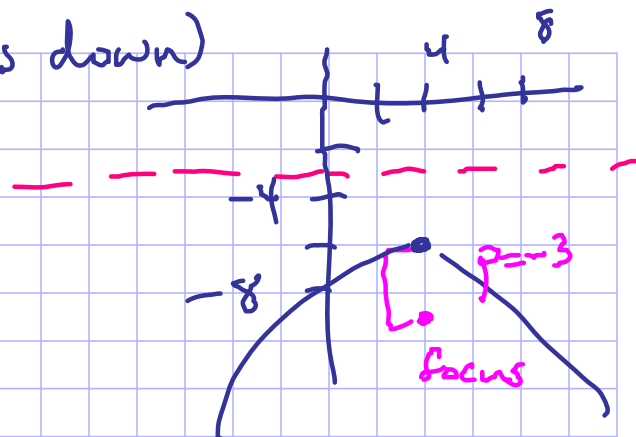
vertical

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

$$(x-2)^2 = 4(-3)(y - (-6))$$

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

(opens down)



Domain: all \mathbb{R}

Range: all \mathbb{R} $y \leq -6$

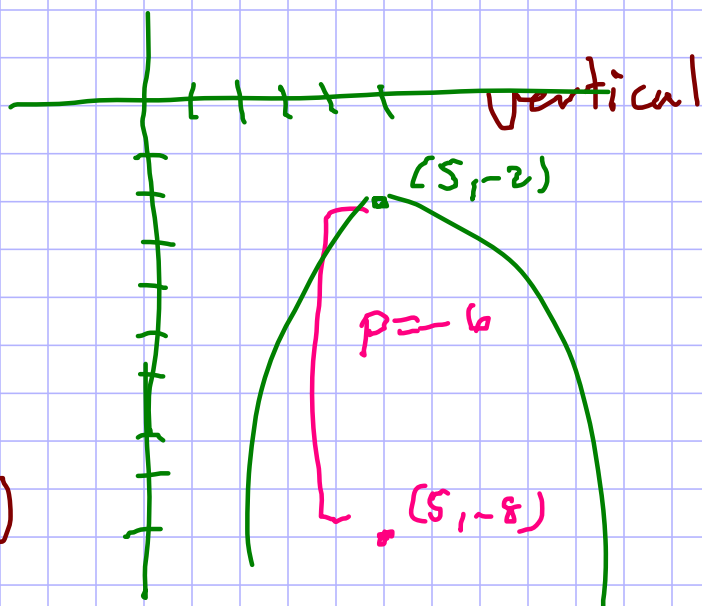
30. vertex $(5, -2)$

focus $(5, -8)$

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

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

$$(x-5)^2 = -24(y+2)$$

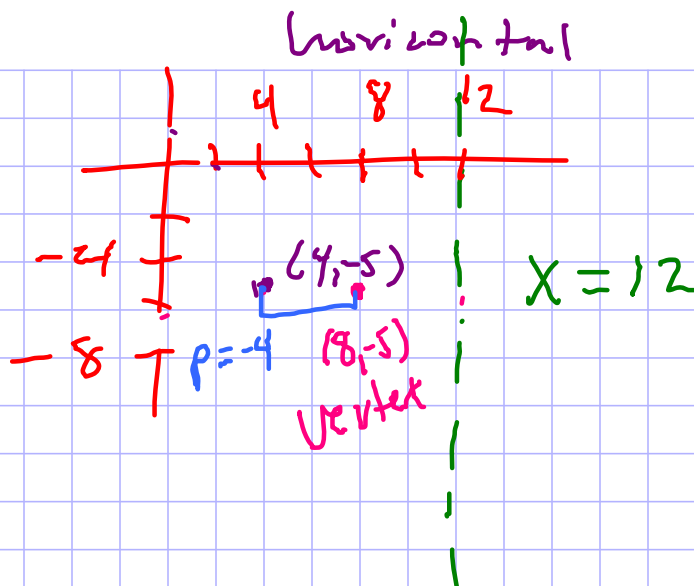


D: all \mathbb{R}

R: all \mathbb{R} $y \leq -2$

33. focus $(4, -5)$

directrix: $x = 12$



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

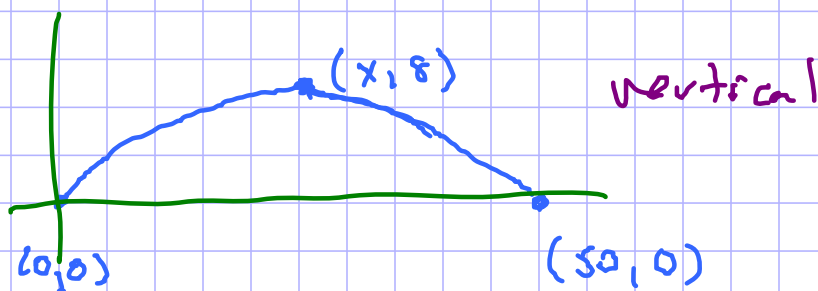
$$(y - (-5))^2 = 4(-4)(x - 8)$$

$$(y+5)^2 = -16(x-8)$$

D: all $\mathbb{R} \quad x \leq 8$

R: all \mathbb{R}

36.



a) vertex $= \left(\frac{0+50}{2}, 8 \right)$

vertex $= (25, 8)$

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

$$(x-25)^2 = 4p(y-8)$$

$$(0-25)^2 = 4p(0-8)$$

$$625 = 4p(-8)$$

$$-\frac{625}{8} = 4p$$

$$(x-25)^2 = -\frac{625}{8}(y-8)$$

$$b) \frac{10 \cancel{\text{ft}}}{3 \cancel{\text{ft}}} \cdot 1 \text{ yrd} = \frac{10}{3} \text{ yrds}$$

When $x = 40$, is $y \geq \frac{10}{3}$

$$(40 - 25)^2 = -\frac{625}{8} (y - 8)$$

$$\frac{-8}{625} \cdot 225 = -\frac{625}{8} (y - 8) \cdot \frac{-8}{625}$$

$$-2.88 = y - 8$$

$$5.12 = y$$

Yes; at 40 yards the ball will be 5.12 yds in the air which is higher than $\frac{10}{3}$ yrds.

$$37. \quad y = -\frac{1}{532} (x + 96)^2 + 174$$

$$-532 (y - 174) = (x + 96)^2 \quad \text{vertical}$$

$$4p = -532$$

$$p = -133$$

a) focus $(h, k + p)$

sun is at $(-96, 41)$

b) distance btwn focus & vertex

$$d = \sqrt{(-96 - (-96))^2 + (41 - 174)^2}$$

$$d = \sqrt{(-133)^2} = \boxed{133 \text{ million miles}}$$

c) the comet is closest to the sun
at the vertex $(-96, 174)$

$\boxed{12.6 \neq 22, 26, 30}$

$$22. x^2 + 20x - 4y + 100 = 0$$

vertical
parabola

$$(x^2 + 20x + \underline{100}) = 4y - 100 + 100$$

$$\left(\frac{20}{2}\right)^2 = (10)^2 = 100$$

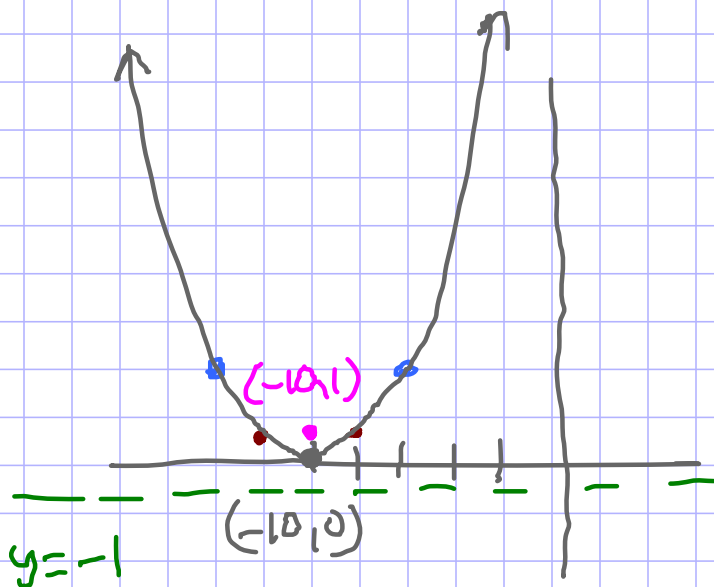
$$(x + 10)^2 = 4y$$

vertex $(-10, 0)$

$$4p = 4 \\ p = 1$$

focus $(-10, 1)$

directrix $y = -1$



x	y
-6	4
-8	1
-10	0
-12	1
-14	4

$$(-8+10)^2 = 4y$$

$$4 = 4y$$

$$1 = y$$

$$(-6+10)^2 = 4y$$

$$16 = 4y$$

$$4 = y$$

vertical
parabola

$$26. \quad x^2 - 2x - 20y - 79 = 0$$

$$(x^2 - 2x + 1) = 20y + 79 + 1$$

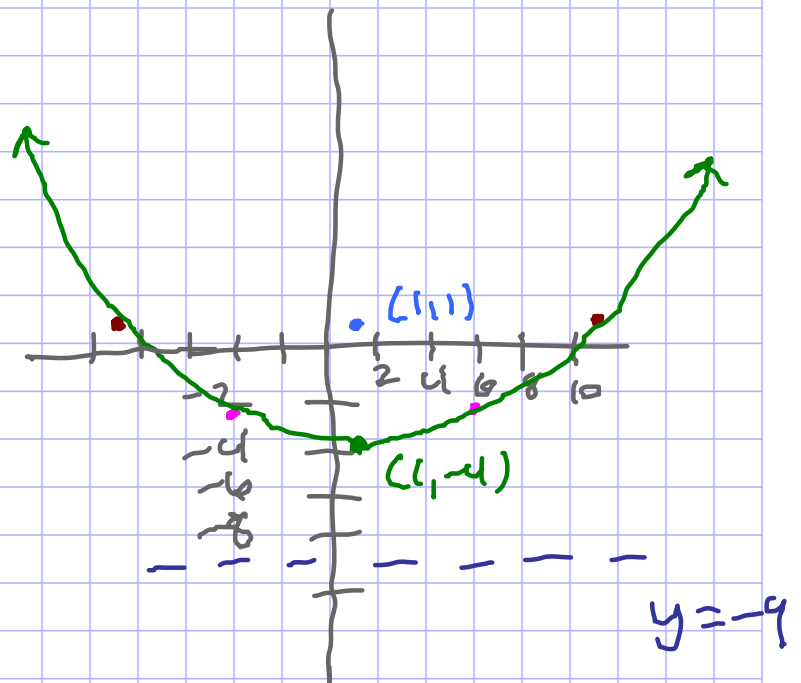
$$(x-1)^2 = 20y + 80$$

$$(x-1)^2 = 20(y+4)$$

vertex (1, -4)

focus (1, 1) $4p=20$
 $p=5$

directrix: $y = -9$



11	1
6	-2.75
1	-4
-4	-2.75
-9	1

$$(6-1)^2 = 20(y+4) \quad (11-1)^2 = 20(y+4)$$

$$25 = 20(y+4)$$

$$100 = 20(y+4)$$

$$1.25 = y+4$$

$$5 = y+4$$

$$-2.75 = y$$

$$1 = y$$

30.

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

horizontal
parabola

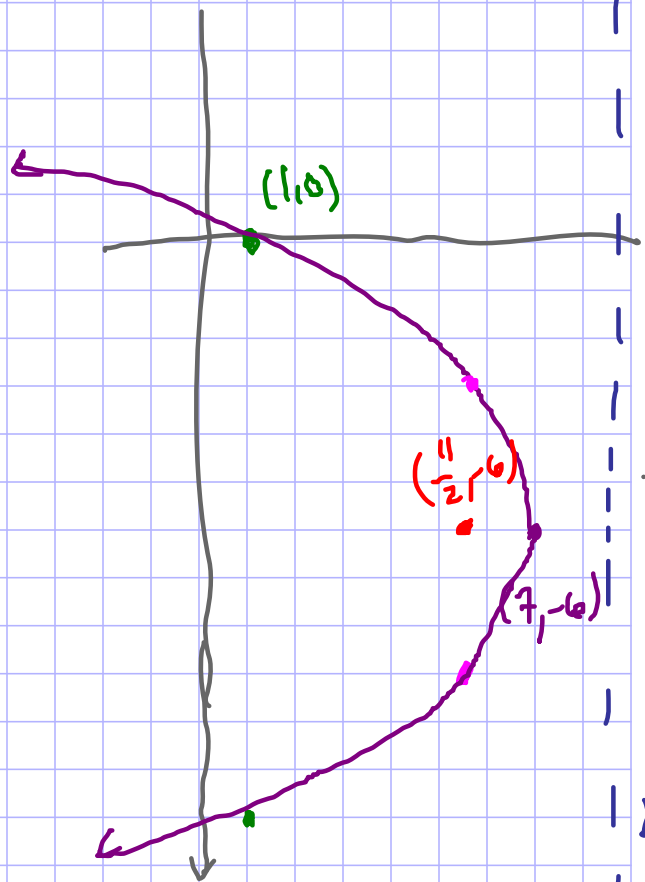
$$(y^2 + 12y + \underline{36}) = -6x + 6 + 36$$

$$\left(\frac{12}{2}\right)^2 = (6)^2 = 36$$

$$(y+6)^2 = -6x + 42$$

$$(y+6)^2 = -6(x-7)$$

vertex (7, -6)

focus $\left(\frac{11}{2}, -6\right)$ $4p = -6$
 $p = -3/2$ directrix: $x = \frac{17}{2}$ 

x	y
1	0
11/2	-6
7	-6
11/2	-9
1	-12

$$(-3+6)^2 = -6(x-7)$$

$$9 = -6(x-7)$$

$$-\frac{3}{2} = x-7$$

$$\frac{11}{2} = x$$

$$(0+6)^2 = -6(x-7)$$

$$36 = -6(x-7)$$

$$-6 = x-7$$

$$1 = x$$

 $x = \frac{17}{2}$