

Parabolas (Left and Right)

$$X = a(y - k)^2 + h$$

(equation: vertex form)

$$(h, k)$$

Vertex

$$y = k$$

axis of symmetry

$$\left(h + \frac{1}{4a}, k\right)$$

focus

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

Directrix

$$a > 0 \quad \curvearrowright$$

$$a < 0 \quad \curvearrowleft$$

Direction

Notes Parabolas(Opening Left or Right)

Use the information provided to write the vertex form equation of each parabola.

1) Vertex: $(8, -7)$, Focus: $\left(\frac{383}{48}, -7\right)$

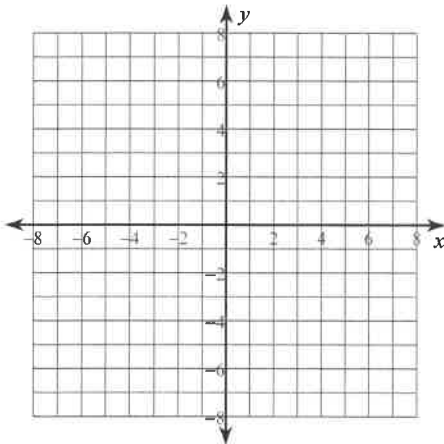
2) Vertex: $(-6, 5)$, Focus: $\left(-\frac{73}{12}, 5\right)$

3) Vertex: $(-1, -10)$, Focus: $\left(-\frac{7}{8}, -10\right)$

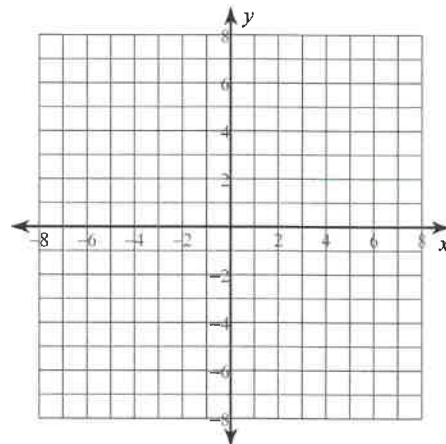
4) Vertex: $(-3, 10)$, Focus: $\left(-\frac{13}{4}, 10\right)$

Identify the vertex, focus, axis of symmetry, and directrix of each. Then sketch the graph.

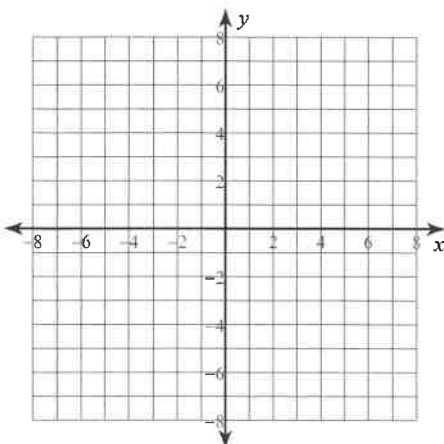
5) $y^2 + 2x - 4y = 0$



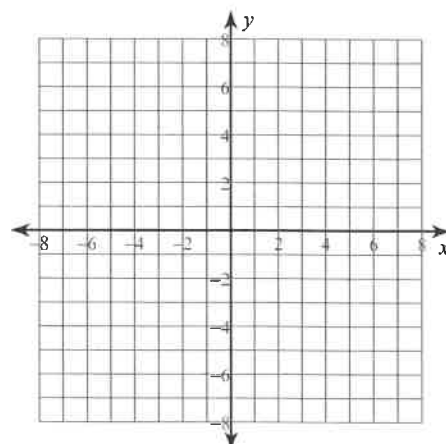
6) $-y^2 + x - 6y - 3 = 0$



7) $4y^2 + x - 32y + 65 = 0$



8) $-y^2 + 3x + 8y - 19 = 0$



Notes Parabolas(Opening Left or Right)

Use the information provided to write the vertex form equation of each parabola.

1) Vertex: $(8, -7)$, Focus: $(\frac{383}{48}, -7)$

$$x = -12(y + 7)^2 + 8$$

2) Vertex: $(-6, 5)$, Focus: $(-\frac{73}{12}, 5)$

$$x = -3(y - 5)^2 - 6$$

3) Vertex: $(-1, -10)$, Focus: $(-\frac{7}{8}, -10)$

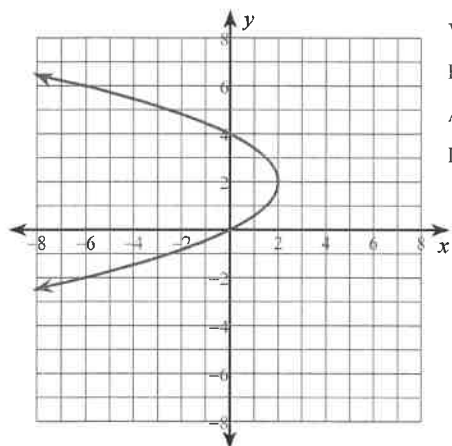
$$x = 2(y + 10)^2 - 1$$

4) Vertex: $(-3, 10)$, Focus: $(-\frac{13}{4}, 10)$

$$x = -(y - 10)^2 - 3$$

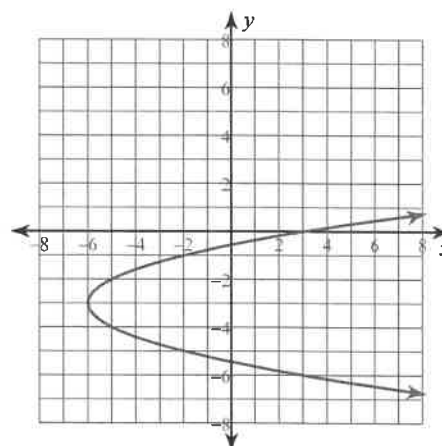
Identify the vertex, focus, axis of symmetry, and directrix of each. Then sketch the graph.

5) $y^2 + 2x - 4y = 0$



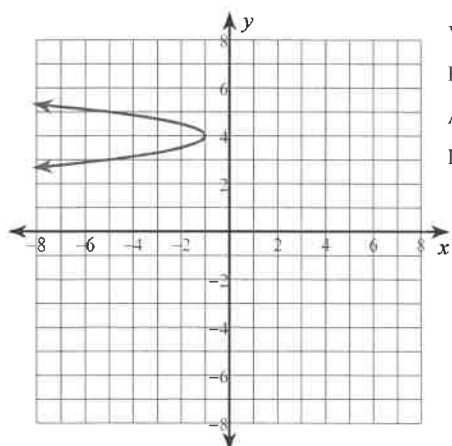
Vertex: $(2, 2)$
 Focus: $(\frac{3}{2}, 2)$
 Axis of Sym.: $y = 2$
 Directrix: $x = \frac{5}{2}$

6) $-y^2 + x - 6y - 3 = 0$



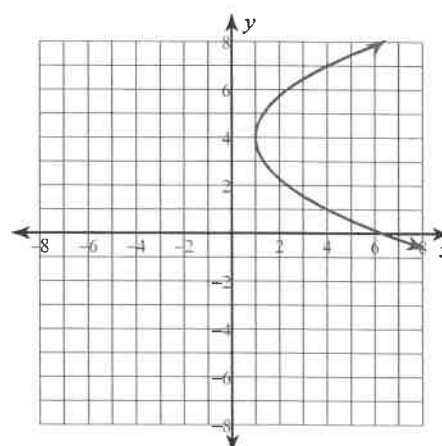
Vertex: $(-6, -3)$
 Focus: $(-\frac{23}{4}, -3)$
 Axis of Sym.: $y = -3$
 Directrix: $x = -\frac{25}{4}$

7) $4y^2 + x - 32y + 65 = 0$



Vertex: $(-1, 4)$
 Focus: $(-\frac{17}{16}, 4)$
 Axis of Sym.: $y = 4$
 Directrix: $x = -\frac{15}{16}$

8) $-y^2 + 3x + 8y - 19 = 0$



Vertex: $(1, 4)$
 Focus: $(\frac{7}{4}, 4)$
 Axis of Sym.: $y = 4$
 Directrix: $x = \frac{1}{4}$

Notes Parabolas (Left or Right)
How I got the answers to Notes

1. $V(8, -7)$ (h, k)

$F\left(\frac{383}{48}, -7\right)$ $(h + \frac{1}{4a}, k)$

$X = a(y - k)^2 + h$

$X = a(y - -7)^2 + 8$

$X = -12(y + 7)^2 + 8$

$h + \frac{1}{4a} = \frac{383}{48}$

$8 + \frac{1}{4a} = \frac{383}{48}$
 -8

$\frac{1}{4a} = \frac{-1}{48}$

$-4a = 48$

$a = -12$

$\frac{383}{48} - \frac{8}{1}$

$\frac{383}{48} - \frac{384}{48}$

$= \frac{-1}{48}$

Cross multiply

2. $V(-6, 5)$ (h, k)

$F\left(-\frac{73}{12}, 5\right)$ $(h + \frac{1}{4a}, k)$

$X = a(y - 5)^2 - 6$

$X = -3(y - 5)^2 - 6$

$h + \frac{1}{4a} = -\frac{73}{12}$

$-6 + \frac{1}{4a} = -\frac{73}{12}$
 $+6$

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

$-4a = 12$

$a = -3$

$-\frac{73}{12} + \frac{6}{1}$

$-\frac{73}{12} + \frac{72}{12}$

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

Cross multiply

3. $V(-1, -10)$ (h, k)

$F\left(-\frac{7}{8}, -10\right)$ $(h + \frac{1}{4a}, k)$

$X = a(y - -10)^2 - 1$

$X = 2(y + 10)^2 - 1$

$h + \frac{1}{4a} = -\frac{7}{8}$

$-1 + \frac{1}{4a} = -\frac{7}{8}$
 $+1$

$\frac{1}{4a} = \frac{1}{8}$

$4a = 8$

$a = 2$

$-\frac{7}{8} + 1$

$-\frac{7}{8} + \frac{8}{8}$

$= \frac{1}{8}$

Cross multiply

$$5. \quad y^2 + 2x - 4y = 0$$

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

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

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

$$2x - 4 = -1(y - 2)(y - 2)$$

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

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

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

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

$$\text{Rewrite: } x = a(y - k)^2 + h$$

complete the square

$$\frac{1}{2}(-4) = -2$$

$$(-2)^2 = 4$$

add to both sides

Vertex $(2, 2)$

axis of symmetry $y = 2$

focus $(h + \frac{1}{4a}, k)$

$$\left(2 + \frac{1}{4(-\frac{1}{2})}, 2\right)$$

$$\left(2 + \frac{1}{-2}, 2\right)$$

$$\left(\frac{3}{2}, 2\right)$$

directrix

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

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

$$x = \frac{5}{2}$$

$$6. \quad -y^2 + x - 6y - 3 = 0$$

$$x = y^2 + 6y + 3$$

$$x = (y^2 + 6y \quad) + 3$$

$$x + 9 = (y^2 + 6y + 9) + 3$$

$$x + 9 = (y + 3)(y + 3) + 3$$

$$x + 9 = (y + 3)^2 + 3$$

$$\begin{array}{ccc} -9 & & -9 \end{array}$$

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

re write: $x = a(y - k)^2 + h$

$$\frac{1}{2}(6) = 3$$

$$3^2 = 9$$

add to both sides

Vertex $(-6, -3)$

axis of symmetry $y = -3$

focus $(h + \frac{1}{4a}, k)$

$$\left(-6 + \frac{1}{4(1)}, -3\right)$$

$$\left(-6 + \frac{1}{4}, -3\right)$$

$$\left(-5\frac{3}{4}, -3\right)$$

Directrix

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

$$x = -6 - \frac{1}{4}$$

$$x = -6\frac{1}{4} = -\frac{25}{4}$$

$$7. 4y^2 + x - 32y + 65 = 0$$

$$x = -4y^2 + 32y - 65$$

$$x = -4(y^2 - 8y) - 65$$

$$x + 4(16) = -4(y^2 - 8y + 16) - 65$$

$$x - 64 = -4(y-4)(y-4) - 65$$

$$x - 64 = -4(y-4)^2 - 65$$

$$+64 \qquad +64$$

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

Vertex $(-1, 4)$

a. of S. $y = 4$

Focus $(-1 + \frac{1}{4(-4)}, 4)$

$(-1 + \frac{1}{-16}, 4)$

$(-1\frac{1}{16}, 4)$

Directrix $x = -1 - \frac{1}{-16}$

$x = -1 + \frac{1}{16}$

$x = -\frac{15}{16}$

$$8. -y^2 + 3x + 8y - 19 = 0$$

$$3x = y^2 - 8y + 19$$

$$3x = (y^2 - 8y) + 19$$

$$3x + 16 = (y^2 - 8y + 16) + 19$$

$$3x + 16 = (y-4)(y-4) + 19$$

$$3x + 16 = (y-4)^2 + 19$$

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

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

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

Vertex $(1, 4)$

a. of S. $y = 4$

Focus $(1 + \frac{1}{4(\frac{1}{3})}, 4)$

$(1 + \frac{1}{\frac{4}{3}}, 4)$

$(1 + \frac{3}{4}, 4)$

$(1\frac{3}{4}, 4)$

Directrix $x = 1 - \frac{1}{\frac{4}{3}}$

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

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

HW Parabolas(Opening Left or Right)

Use the information provided to write the vertex form equation of each parabola.

1) Vertex: $(7, 3)$, Focus: $\left(\frac{29}{4}, 3\right)$

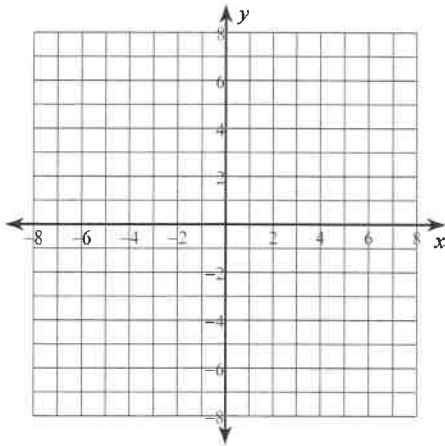
2) Vertex: $(-2, 10)$, Focus: $\left(-\frac{17}{8}, 10\right)$

3) Vertex: $(-1, -7)$, Focus: $\left(-\frac{5}{4}, -7\right)$

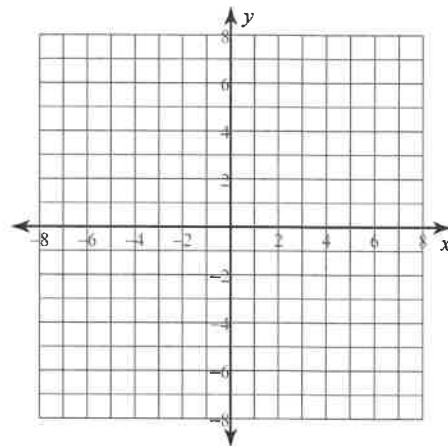
4) Vertex: $(-3, 1)$, Focus: $\left(-\frac{11}{4}, 1\right)$

Identify the vertex, focus, axis of symmetry, and directrix of each. Then sketch the graph.

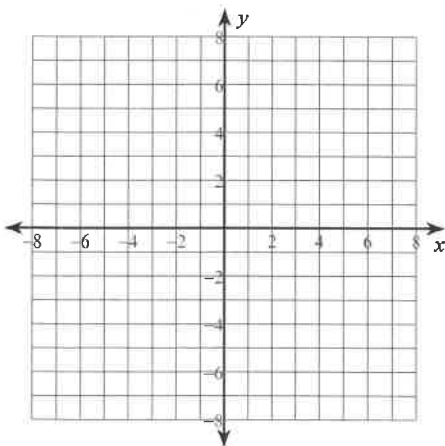
5) $y^2 + x - 8y + 20 = 0$



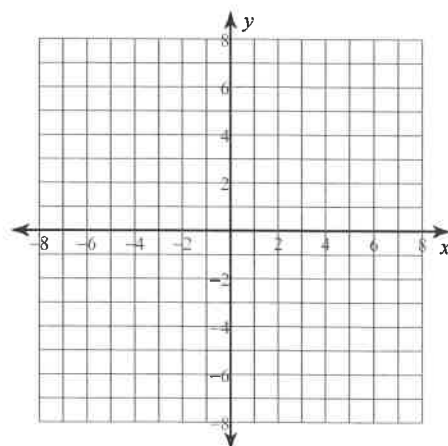
6) $y^2 + x + 10y + 23 = 0$



7) $-y^2 + x - 6y - 9 = 0$



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



HW Parabolas(Opening Left or Right)

Use the information provided to write the vertex form equation of each parabola.

1) Vertex: $(7, 3)$, Focus: $(\frac{29}{4}, 3)$

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

2) Vertex: $(-2, 10)$, Focus: $(-\frac{17}{8}, 10)$

$$x = -2(y - 10)^2 - 2$$

3) Vertex: $(-1, -7)$, Focus: $(-\frac{5}{4}, -7)$

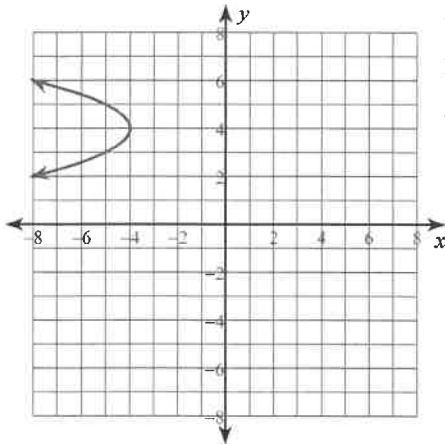
$$x = -(y + 7)^2 - 1$$

4) Vertex: $(-3, 1)$, Focus: $(-\frac{11}{4}, 1)$

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

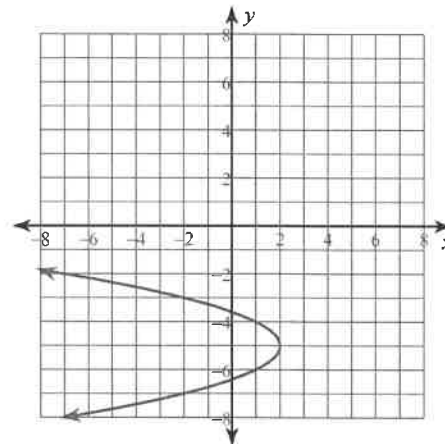
Identify the vertex, focus, axis of symmetry, and directrix of each. Then sketch the graph.

5) $y^2 + x - 8y + 20 = 0$



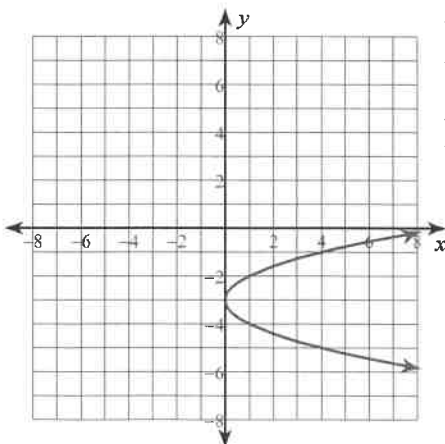
Vertex: $(-4, 4)$
 Focus: $(-\frac{17}{4}, 4)$
 Axis of Sym.: $y = 4$
 Directrix: $x = -\frac{15}{4}$

6) $y^2 + x + 10y + 23 = 0$



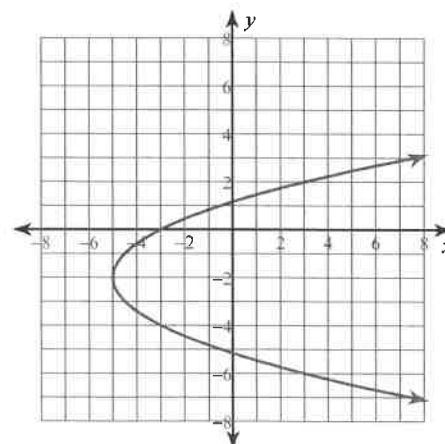
Vertex: $(2, -5)$
 Focus: $(\frac{7}{4}, -5)$
 Axis of Sym.: $y = -5$
 Directrix: $x = \frac{9}{4}$

7) $-y^2 + x - 6y - 9 = 0$



Vertex: $(0, -3)$
 Focus: $(\frac{1}{4}, -3)$
 Axis of Sym.: $y = -3$
 Directrix: $x = -\frac{1}{4}$

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



Vertex: $(-5, -2)$
 Focus: $(-\frac{9}{2}, -2)$
 Axis of Sym.: $y = -2$
 Directrix: $x = -\frac{11}{2}$