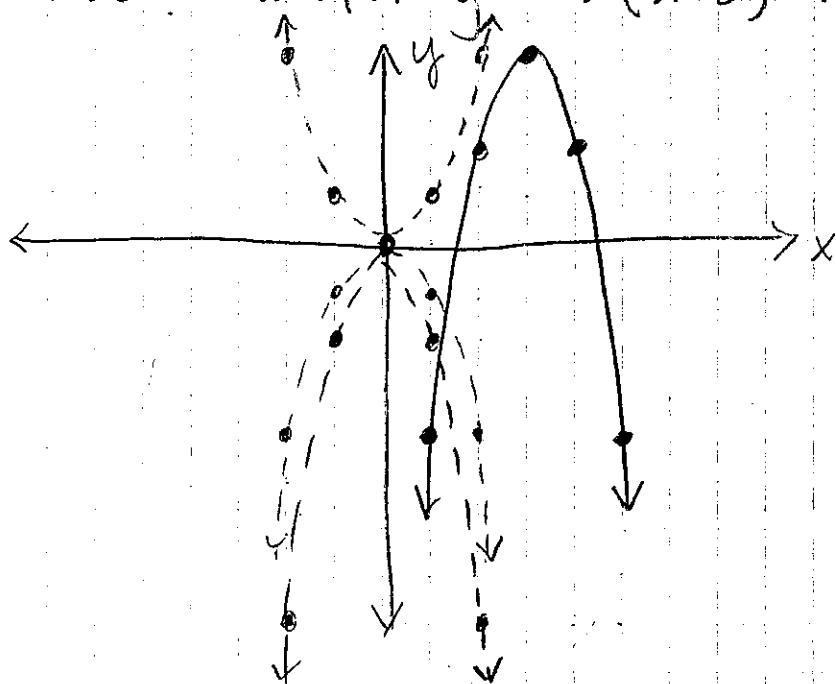


Section 5.2 - Graphing Quadratics

In Vertex Form and Standard Form

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



summary

- +k → up -k → down
- +h → left -h → right
- a → |a| stretch
- 0 < a < 1 compression
- a → down
- +a → up

Vertex form → $y = a(x-h)^2 + k$

VERTEX → (h, k)

D → $(-\infty, \infty)$ never changes!

R → $[\#, \infty)$ or $(-\infty, \#]$
 up down

a.o.s → $x = h$

min → opens up @ y

max → opens down @ y

ex: use the graph above:

V → (3, 4) use graph or EQ

D → $(-\infty, \infty)$

R → $(-\infty, 4]$

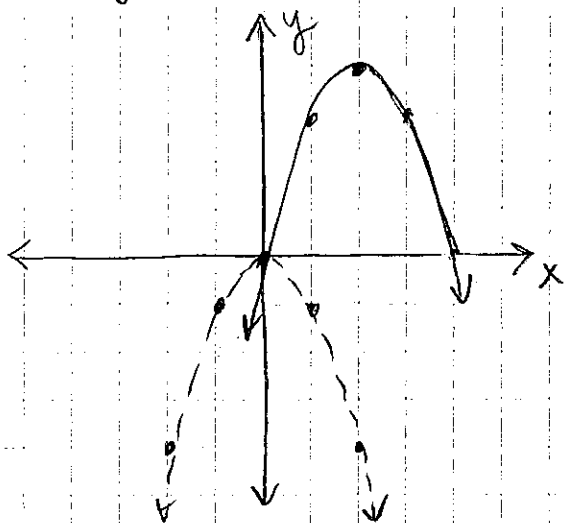
a.o.s → $x = 3$

max → @ y = 4

$$\begin{aligned}
 \text{y int} \rightarrow y &= -2(-3)^2 + 4 \\
 (0, -14) &= -2(9) + 4 \\
 &= -14
 \end{aligned}$$

y int → plug in 0 for x

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



$V \rightarrow (2, 4)$
 $D \rightarrow (-\infty, \infty)$
 $R \rightarrow (-\infty, 4]$
 $\text{AOS} \rightarrow x = 2$
 $\text{max/min} \rightarrow \text{max @ } y = 4$
 $y\text{-int} \rightarrow (0, 0)$

$y = -(0-2)^2 + 4$
 $y = -(-2)^2 + 4$
 $y = 0$

ex: $y = -6(x-2)^2 + 1$

$V \rightarrow (2, 1)$
 $D \rightarrow (-\infty, \infty)$
 $R \rightarrow (-\infty, 1]$
 $\text{AOS} \rightarrow x = 2$
 $\text{max/min} \rightarrow \text{max @ } y = 1$
 $y\text{-int} \rightarrow (0, -23)$
 $y = -6(-2)^2 + 1$
 $y = -23$

Standard Form $\rightarrow y = \underline{a}x^2 + \underline{b}x + \underline{c}$

ex: $y = -4x^2 - 12x - 3$

$x = \frac{12}{2(-4)} = \frac{12}{-8} = -\frac{3}{2}$

$a + \curvearrowright \quad a - \curvearrowleft$

$y = -4\left(-\frac{3}{2}\right)^2 - 12\left(-\frac{3}{2}\right) - 3$

$\text{AOS: } x = -\frac{b}{2a}$

$y = -4\left(\frac{9}{4}\right) + 18 - 3$

$\text{Vertex: } \left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$

$y = -9 + 18 - 3 = 6$

$\left(-\frac{3}{2}, 6\right)$

Vertex: $(-\frac{3}{2}, 6)$

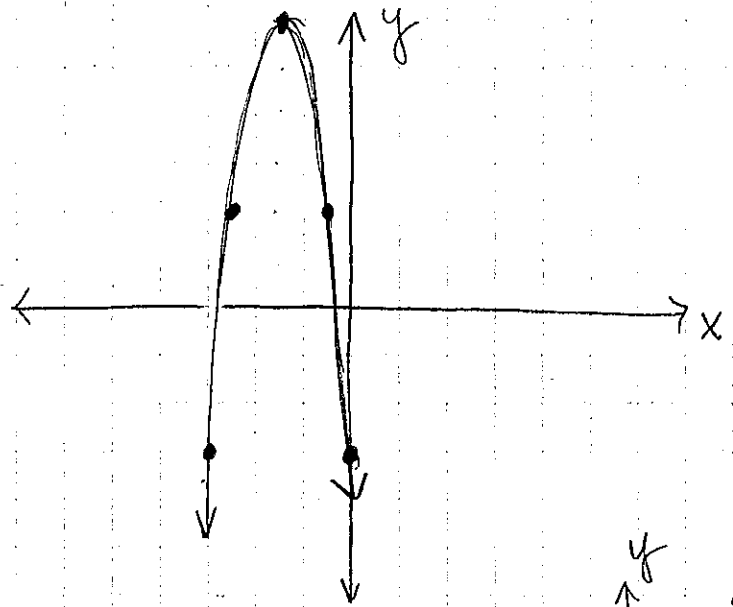
D: $(-\infty, \infty)$

R: $(-\infty, \infty)$

aos: $x = -\frac{3}{2}$

y-int: $(0, -3)$

min/max: max @ $y = 6$



ex: $y = 2x^2 - 4x + 5$

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

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

$$y = 2 - 4 + 5$$

$$y = 3$$

Vertex: $(1, 3)$

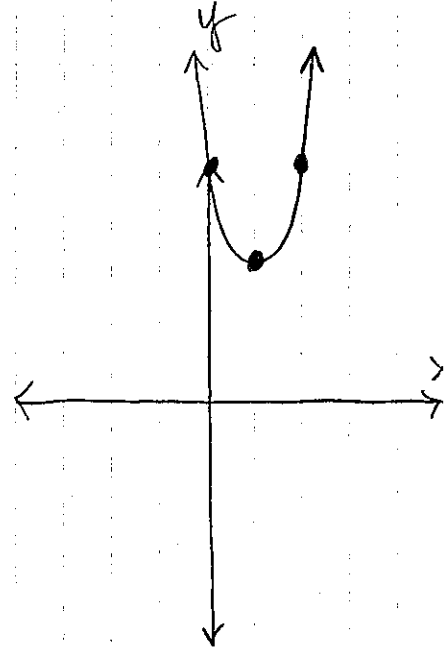
D: $(-\infty, \infty)$

R: $[3, \infty)$

aos: $x = 1$

max/min: min @ $y = 3$

y-int: $(0, 5)$



ex: $y = -x^2 - 2x + 3$

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

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

$$y = -1 + 2 + 3$$

$$y = 4$$

Vertex: $(-1, 4)$

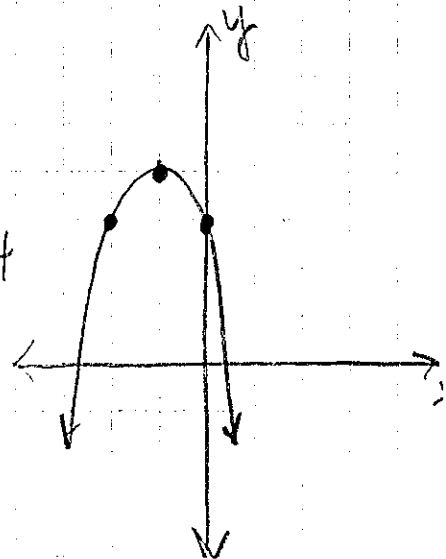
D: $(-\infty, \infty)$

R: $(-\infty, 4]$

aos: $x = -1$

max/min: max @ $y = 4$

y-int: $(0, 3)$



★ Show calc to find min/max.

