

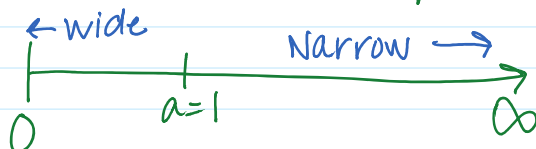
Summarize $y = a(x-h)^2 + k$ vertex form

this will graph a parabola

a positive opens up
 a negative opens down
 a = 0 Not a parabola

$(h, k) = \text{Vertex}$

$x = h$
 axis of symmetry



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

vertex: $(-5, -2)$

AOS: $x = -5$

opens down

Narrow

In less than 1 minute, expand and simplify:

A. $(x+3)^2$

B. $(x-4)^2$

C. $(x - \frac{1}{2})^2$

$$x^2 + 6x + 9$$

$$x^2 - 8x + 16$$

$$x^2 - x + \frac{1}{4}$$

PENCILS DOWN!

1. Convert from standard form to vertex form.

$$\begin{aligned}y &= x^2 + 6x - 2 \\&= \underbrace{x^2 + 6x + 9}_{(x+3)^2} - 9 - 2 \\&= (x+3)^2 - 11\end{aligned}$$

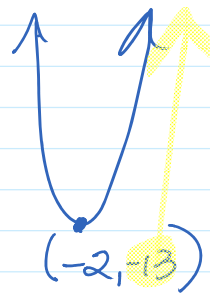
Convert from standard form to vertex form.
Then, identify the vertex.

$$\begin{aligned}y &= x^2 - 10x + 7 \\&= x^2 - 10x + 25 - 25 + 7 \\&= (x-5)^2 - 18\end{aligned}$$

$(5, -18)$

3. Convert from standard form to vertex form.
Then, identify the range.

$$\begin{aligned}y &= \underbrace{2x^2 + 8x}_{2(x^2 + 4x)} - 5 \\&= 2(x^2 + 4x + 4) - 8 - 5 \\&= 2(x+2)^2 - 13\end{aligned}$$



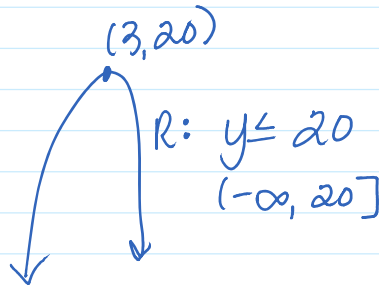
Range: $y \geq -13$

$[-13, \infty)$

4. Convert from standard form to vertex form.

Then, identify the range.

$$\begin{aligned}y &= -3x^2 + 18x - 7 \\ &= -3(x^2 - 6x) - 7 \\ &= -3(x^2 - 6x + 9) - 7 + 27 \\ &= -3(x-3)^2 + 20\end{aligned}$$



5. Convert from standard form to vertex form.

$$\begin{aligned}y &= 2x^2 + 14x - 3 \\ &= 2(x^2 + 7x) - 3 \\ &= 2(x^2 + 7x + (7/2)^2) - 3 \\ &= 2(x^2 + 7x + \frac{49}{4}) - 3 - \frac{49}{2} \\ &= 2(x + 7/2)^2 - \frac{55}{2}\end{aligned}$$

6. Convert from standard form to vertex form.

$$\begin{aligned}y &= \frac{1}{2}x^2 + 3x - 7 \\ &= \frac{1}{2}(x^2 + 6x) - 7 \\ &= \frac{1}{2}(x^2 + 6x + 9) - 7 - \frac{9}{2} \\ &= \frac{1}{2}(x+3)^2 - \frac{23}{2}\end{aligned}$$

$$\begin{aligned}2y &= x^2 + 6x - 14 \\ 2y &= x^2 + 6x + 9 - 14 - 9 \\ 2y &= (x+3)^2 - 23 \\ y &= \frac{1}{2}(x+3)^2 - \frac{23}{2}\end{aligned}$$

$$= \frac{1}{2}(x+3)^2 - \frac{23}{2}$$

$$y = \frac{1}{2}(x+3) - \frac{23}{2}$$

7) Convert from standard form to vertex form.

$$y = \frac{1}{3}x^2 - 5x + 5$$

$$3y = x^2 - 15x + 15$$

$$3y = x^2 - 15x + \frac{225}{4} - \frac{225}{4} + 15$$

$$3y = \left(x - \frac{15}{2}\right)^2 - \frac{165}{4}$$

$$y = \frac{1}{3}\left(x - \frac{15}{2}\right)^2 - \frac{165}{12}$$

8) Convert to vertex form:

$$y = 2x^2 - 15x + 7$$