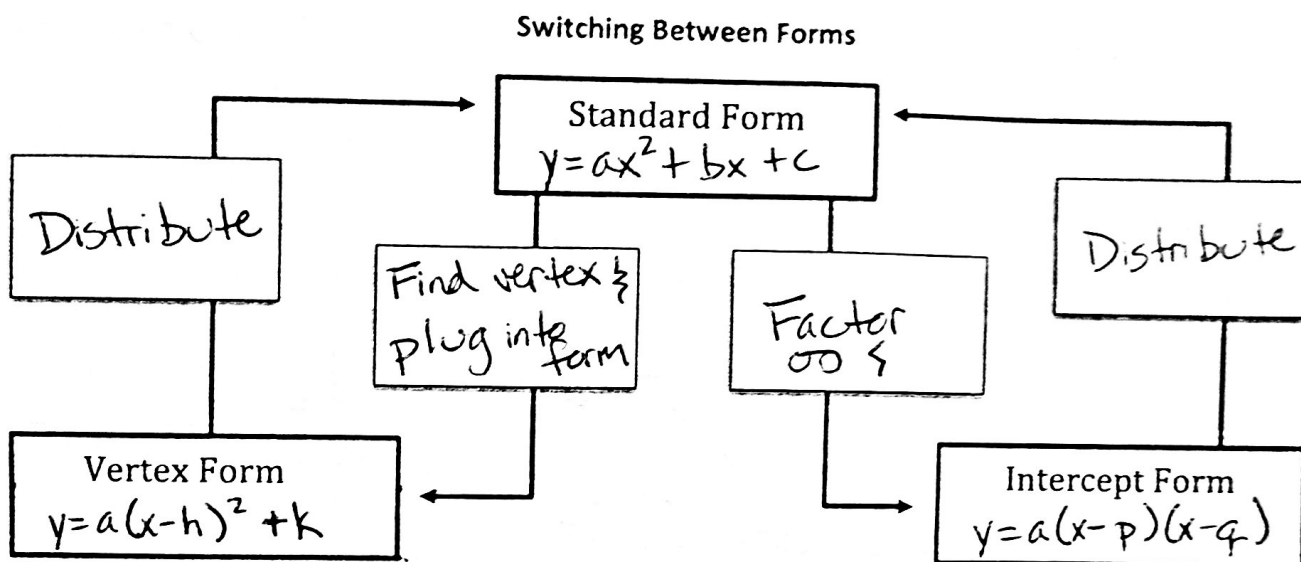


5.7 Switching Between Forms

We have now covered three forms of quadratics: standard form, intercept form, and vertex form. Even though it is possible to find all critical points from each of these forms individually, it is valuable to know how to switch between forms in case you remember the procedures of one form better than another.



1) Write the equation in all three forms.

a. $y = -2(x-1)(x+3)$

Standard Form

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

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

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

$$y = -2x^2 - 4x + 6$$

Intercept Form

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

Vertex Form

$$y = -2x^2 - 4x + 6$$

$a = -2 \quad b = -4 \quad c = 6$

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

$$y = -2(-1)^2 - 4(-1) + 6 = 8$$

Vertex: $(-1, 8)$

$h \quad k$

$a = -2$

$$y = -2(x+1)^2 + 8$$

Vertex Form

$$y = x^2 + 2x - 24$$

$a = 1 \quad b = 2 \quad c = -24$

$$\frac{-b}{2a} = \frac{-2}{2(1)} = \frac{-2}{2} = -1$$

$$y = (-1)^2 + 2(-1) - 24 = -25$$

Vertex: $(-1, -25)$

$a = 1$

$$y = (x+1)^2 - 25$$

b. $y = (x-4)(x+6)$

Standard Form

$$y = (x-4)(x+6)$$

$$y = x^2 + 6x - 4x - 24$$

$$y = x^2 + 2x - 24$$

Intercept Form

$$y = (x-4)(x+6)$$

c. $y = x^2 - 8x + 15$

Standard Form

$$y = x^2 - 8x + 15$$

Intercept Form

$$y = (x^2 - 8x + 15)$$

$-15x^2$
 \uparrow
 $-5x \quad -3x$

$$y = (x-5)(x-3)$$

Vertex Form

$$y = x^2 - 8x + 15$$

$a=1 \quad b=-8 \quad c=15$

$$\frac{-b}{2a} = \frac{8}{2(1)} = \frac{8}{2} = 4$$

$$y = (4)^2 - 8(4) + 15 = -1$$

Vertex: $(4, -1)$

$a=1$

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

d. $y = 3x^2 + 2x - 8$

Standard Form

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

Intercept Form

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

\uparrow

If a is not 1 and does not factor out as a GCF, then we will not write the equation in intercept form.

Vertex Form

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

$a=3 \quad b=2 \quad c=-8$

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

$$y = 3\left(-\frac{1}{3}\right)^2 + 2\left(-\frac{1}{3}\right) - 8 = -\frac{25}{3}$$

Vertex: $\left(-\frac{1}{3}, -\frac{25}{3}\right)$

$a=3$

$$y = 3\left(x + \frac{1}{3}\right)^2 - \frac{25}{3}$$

e. $y = (x-2)^2 - 9$

Standard Form

$$y = (x-2)(x-2) - 9$$

$$y = x^2 - 4x + 4 - 9$$

$$y = x^2 - 4x - 5$$

Intercept Form

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

$-5x^2$
 \uparrow
 $-5x \quad 1x$

$$y = (x-5)(x+1)$$

Vertex Form

$$y = (x-2)^2 - 9$$

f. $y = 2(x+1)^2 + 4$

Standard Form

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

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

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

$$y = 2x^2 + 4x + 6$$

Intercept Form

$$y = 2x^2 + 4x + 6$$

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

$3x^2$
 \uparrow

Doesn't factor

N/A

Vertex Form

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