Vertex Form
$$y = a(x - h)^2 + k$$
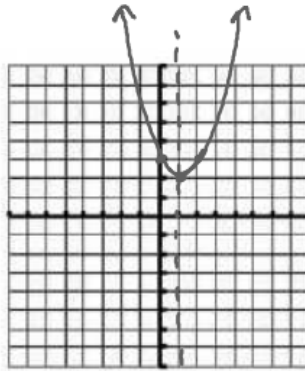
Vertex
(h, k)

$(0-1)^2 + 2$

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

Vertex: $(1, 2)$

Axis of Symmetry $x = 1$

Maximum or (Minimum?)
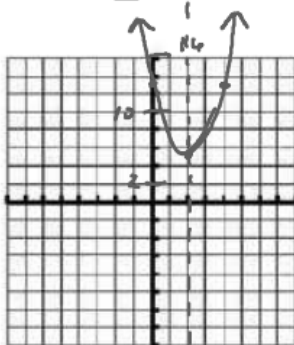
y-Intercept $(0, 3)$

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

$2(0-2)^2 + 5$

Vertex: $(2, 5)$

Axis of Symmetry $x = 2$

Maximum or (Minimum?)
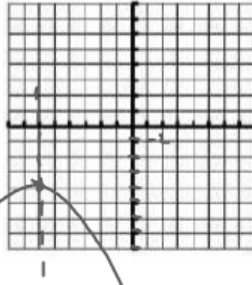
y-Intercept $(0, 13)$

$y = -3(x+7)^2 - 8$

Vertex: $(-7, -8)$ Axis of Symmetry $x = -7$

(Maximum) or Minimum?   y-Intercept $(0, -155)$
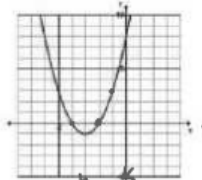
Write the equation of each parabola in vertex form.

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

Step #1 find Vertex

Step #2 pick a point on graph that is easy to find.

Step #3 Plus vertex in for (h, k) and other point for (x,y)

$(-3, -1)$

$(-2, 0)$
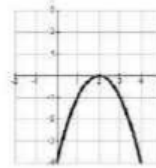   x   y

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

$0 = a(-2+3)^2 - 1$

$0 = a - 1$

$a = 1$

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

    h   K

$(2, 0)$

$(0, -4)$
  x   y

$y = a(x-h)^2 + k$
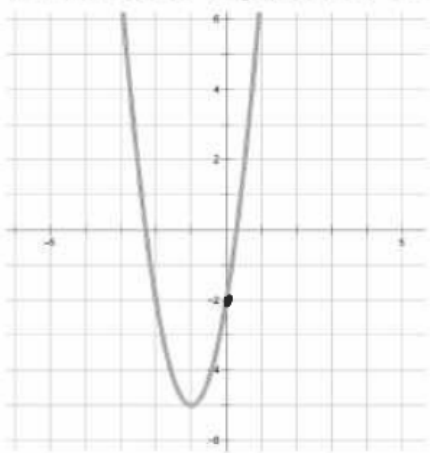
$-4 = a(0-2)^2 + 0$

$-4 = 4a$

$a = -1$

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

2 | P a g e

Step # 4 Solve for a

Step #5 rewrite equation with a, h, k only

Write the equation of the quadratic in vertex form

$$V(\underset{h}{-1}, \underset{k}{-5})$$

$$(\underset{x}{0}, \underset{y}{-2})$$

$$y = a(x-h)^2 + k$$
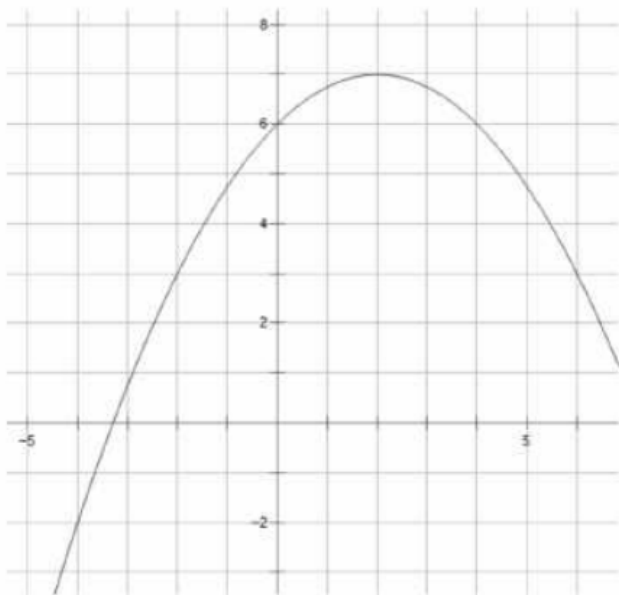
$$-2 = a(0+1)^2 - 5$$

$$-2 = a - 5$$

$$3 = a$$

$$y = 3(x+1)^2 - 5$$

Write the equation of the quadratic in vertex form

$V(2,7) \quad (0,6)$
$hk xy$

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

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

$6 = 4a + 7$
$-7 -7$

$-1 = 4a$

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

$y = -\frac{1}{4}(x-2)^2 + 7$

Given the quadratic equation, rewrite the equation in equivalent form

Complete ☐

Standard Form	Vertex Form	Intercept Form
$y = x^2 + 3x - 28$	$y = \left(x + \frac{3}{2}\right)^2 - \frac{121}{4}$	$y = (x+7)(x-4)$
$y = 3x^2 - 12x - 15$	$y = 3(x-2)^2 - 27$	$y = 3(x^2 - 4x - 5)$ $y = 3(x-5)(x+1)$
$y = x^2 - x - 30$	$y = \left(x - \frac{1}{2}\right)^2 - \frac{121}{4}$	$y = (x-6)(x+5)$
$4x^2 - 16x - 48$	$y = 4(x-2)^2 - 64$	$4(x-6)(x+2)$

$4(x-2)(x-2) - 64$

$4(x^2 - 4x + 4) - 64$

$4x^2 - 16x + 16 - 64$

$y = x^2 + 3x - 28$

$y + 28 = x^2 + 3x + \frac{9}{4}$

$+ \frac{9}{4}$

$y + \frac{121}{4} = \left(x + \frac{3}{2}\right)^2$

$y = 3(x-2)^2 - 27$

$3(x-2)(x-2) - 27$

$3(x^2 - 4x + 4) - 27$

$3x^2 - 12x + 12 - 27$

$3x^2 - 12x - 15$

$4(x^2 - 4x - 12)$

$4(x-6)(x+2)$