P.669 Ext

Tuesday, April 29, 2014
3:10 PM

Honors Algebra 1
Ext. pg. 669 – Vertex Form

Name:
Period:

Vertex Form:

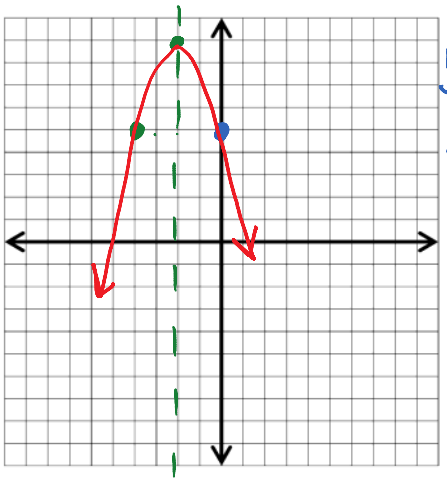
$y = a(x-h)^2 + k$

Vertex: (h, k) Axis of Symmetry: $x = h$

a: a is positive → graph opens ↑
a is negative → graph opens ↓

(1-2) Graph the following quadratic equations:

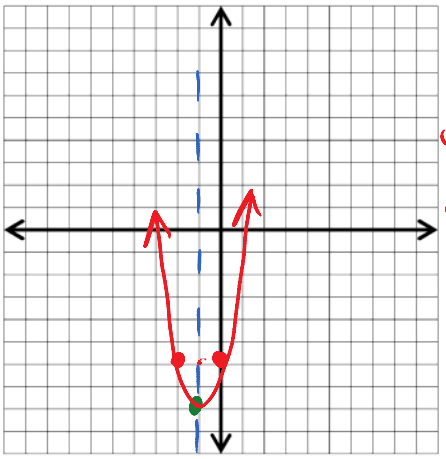
1. $y = -(x+2)^2 + 9$ $[x-(-2)]$ $(-2, 9)$



$y = -(0+2)^2 + 9$
$y = -(2)^2 + 9$
$y = -(4) + 9$
$y = 5$
$(0, 5)$

Vertex: $(-2, 9)$
Axis of Symmetry: $x = -2$
Graph opens: ↓
Domain: $(-\infty, \infty)$
Range: $(-\infty, 9]$

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



$y = 2(0+1)^2 - 8$
$y = 2(1)^2 - 8$
$y = 2(1) - 8$
$y = 2 - 8$
$y = -6$
$(0, -6)$

Vertex: $(-1, -8)$
Axis of Symmetry: $x = -1$
Graph opens: ↑
Domain: $(-\infty, \infty)$
Range: $[-8, \infty)$

(3-5) Find the important characteristics of a parabola for the quadratic equations below.

3. $y = 2(x+6)^2 - 7$

Vertex: $(-6, -7)$
A.O.S.: $x = -6$
Graph opens: ↑
Domain: $(-\infty, \infty)$
Range: $[-7, \infty)$

4. $y = -3(x-5)^2 + 81$

Vertex: $(5, 81)$
A.O.S.: $x = 5$
Graph opens: ↓
Domain: $(-\infty, \infty)$
Range: $(-\infty, 81]$

5. $y = 100(x+8)^2 - 16$

Vertex: $(-8, -16)$
A.O.S.: $x = -8$
Graph opens: ↑
Domain: $(-\infty, \infty)$
Range: $[-16, \infty)$

Domain: $(-\infty, \infty)$
Range: $[-7, \infty)$

Domain: $(-\infty, \infty)$
Range: $(-\infty, 81]$

Domain: $(-\infty, \infty)$
Range: $[-16, \infty)$

Translate the following quadratic equations into vertex form by completing the square.

1. $y = (x^2 - 8x) + 11$

$\frac{-8}{2} = (-4)^2 = 16$

$y + 16 = (x^2 - 8x + 16) + 11$

$y + 16 = (x-4)^2 + 11$
$\quad -16 \qquad\quad -16$

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

vertex @ $(4, -5)$

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

$\frac{8}{2} = 4^2 = 16$

$y + 16 = (x^2 + 8x + 16) + 15$

$y + 16 = (x+4)^2 + 15$
$\quad -16 \qquad\quad -16$

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

vertex @ $(-4, -1)$

3. $y = (2x^2 - 12x) + 19$

$y = 2(x^2 - 6x) + 19$

$\frac{-6}{2} = (-3)^2 = 9$

$y + 18 = 2(x^2 - 6x + 9) + 19$

$y + 18 = 2(x-3)^2 + 19$
$\quad -18 \qquad\quad -18$

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

vertex @ $(3, 1)$

4. $y = (3x^2 + 12x) - 1$

$y = 3(x^2 + 4x) - 1$

$\frac{4}{2} = 2^2 = 4$

$y + 12 = 3(x^2 + 4x + 4) - 1$

$y + 12 = 3(x+2)^2 - 1$

$y = 3(x+2)^2 - 13$

vertex @ $(-2, -13)$

5. Convert $y = (x^2 - 12x) + 13$ from standard form to vertex form. Then identify the vertex and range.

$y + 36 = (x^2 - 12x + 36) + 13$

$y + 36 = (x-6)^2 + 13$
$\quad -36 \qquad\quad -36$

$y = (x-6)^2 - 23$

$\frac{-12}{2} = (-6)^2 = 36$

Range: $[-23, \infty)$

vertex @ $(6, -23)$

6. Convert from vertex form to standard form. $y = 5(x-4)^2 + 6$

7. *CHALLENGE!* Convert $y = (x+2)(x-4)$ from factored form to vertex form. Then identify the vertex and range.

8. *CHALLENGE!* Convert $y = 4(x+2)^2 - 64$ from vertex form to factored form

8. *CHALLENGE!* Convert $y = 4(x+2)^2 - 64$ from vertex form to factored form.