Algebra 1   Unit 8: Quadratic Functions   Notes
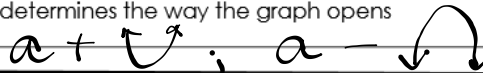
Day 7 – Writing Equations of Parabolas from a Graph

From days 5 – 8, you learned about three different forms of quadratic functions – vertex, standard, and factored form. Each form tells you something different about the graph.
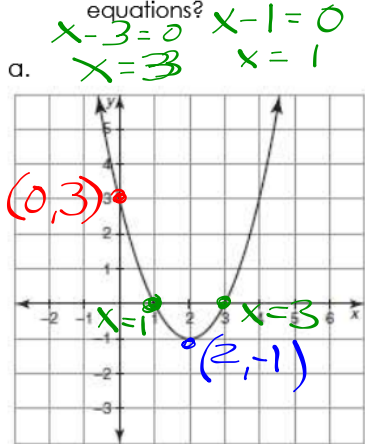
Vertex Form	Standard Form	Intercept Form (Factored Form)
$y = a(x-h)^2 + k$	$y = ax^2 + bx + c$ $(0, c)$	$y = a(x-p)(x-q)$ $x = p$ $x = q$
(h, k) is the vertex	c is the y-intercept	p and q are x-intercepts
a always determines the way the graph opens $a + \cup ; \quad a - \cap$		

Writing Equations of Parabolas Given a Graph

For the following graphs:
    A. Create an equation in both intercept and vertex form to describe the parabola. Assume there are no stretches or shrinks with each graph.
    B. Once you created both equations, convert both to standard form. Check to make sure the y-intercepts match both the graph and the equations in standard form. $a = 1 \cup \quad a = -1 \cap$
    C. Put all three equations into your graphing calculator. Do you get the same graph for all three equations?

a.

$x - 3 = 0 \quad x - 1 = 0$
$x = 3 \quad\quad x = 1$
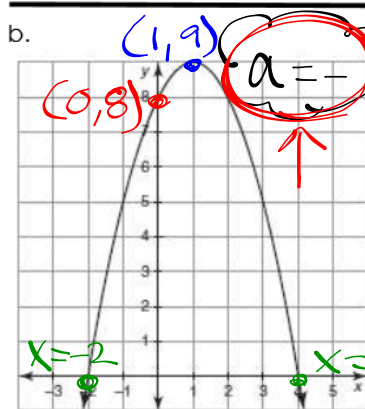
Factor $x = 1$
Intercept Form $x = 3$
$$y = (x-1)(x-3)$$

Vertex Form $(2, -1)$
$$y = a(x-h)^2 + k$$
$$y = (x-2)^2 - 1$$

$(0, 3)$

$x = 1 \quad x = 3$
$(2, -1)$

Standard Form $(0, 3)$
$y = (x-1)(x-3)$
$y = x^2 - 3x - x + 3$
$$y = x^2 - 4x + 3$$

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

b.

$(1, 9)$
$a = -$
$(0, 8)$
$x = -2 \quad\quad x = 4$

Factor
(x) Intercept Form $x = -2$
$\qquad\qquad\qquad x = 4$
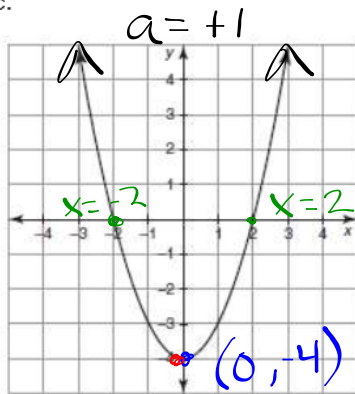$$y = (x+2)(x-4)$$

Vertex Form $(1, 9)$
$y = a(x-h)^2 + k$
$$y = -(x-1)^2 + 9$$

Standard Form $(0, 8)$
$y = -(x+2)(x-4)$
$y = (-x-2)(x-4)$
$y = -x^2 + 4x - 2x + 8$
$$y = -x^2 + 2x + 8$$

Standard Form
$y = -(x-1)^2 + 9$
$y = -(x-1)(x-1) + 9$
$y = -(x+1)(x-1) + 9$
$y = -x^2 + x + x - 1 + 9$
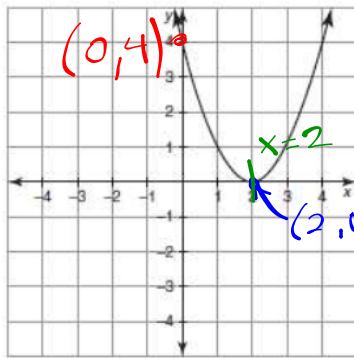$$y = -x^2 + 2x + 8$$

14

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c.

$a = +1$

$x = -2$
$x = 2$

$x = -2$ $x = 2$

$(0, -4)$

Intercept Form

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

Standard Form $(0, -4)$

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

Vertex Form $(0, -4)$

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

Standard Form

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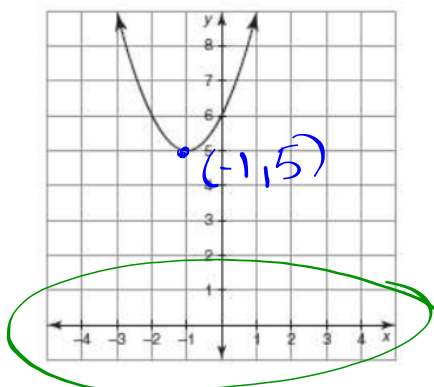$y = x^2 - 0x - 0x + 0 - 4$
$y = x^2 - 4$

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d.

$(0, 4)$

$x = 2$

$(2, 0)$

Intercept Form $x = 2$

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

$y = (x-2)^2$

Standard Form

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

Vertex Form $(2, 0)$

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

$y = (x-2)^2$

Standard Form

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e.

$(-1, 5)$

Intercept Form $x = $ none

Standard Form

no

Vertex Form $(-1, 5)$

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

Standard Form

yes

15