2.6 Changing Quadratics from Vertex Form to Standard Form

Graph each of the following using technology and compare the resulting graphs

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

b) $y = -\frac{1}{2}x^2 + 2x + 1$

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

Standard Form: $y = ax^2 + bx + c$

(notice the "a" value will be the same)

Ex. 1 Change from ***vertex*** form to ***standard*** form

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

$= (x+3)(x+3)$

$= x^2+3x+3x+9$

$= x^2+6x+9$

$(y = (x+3)^2 + 0)$

$V(-3, 0)$

y-int 9

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

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

$= -(x^2+4x+4x+16) - 2$

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

$= -x^2-8x-16 - 2$

$= -x^2-8x-18$

Ex. 2 Given the quadratic $y = 2(x - 1)^2 + 3$:

a) state the coordinate of the vertex. $(1, 3)$

b) change the equation of the quadratic to standard form.

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

$y = 2[x^2 - x - x + 1] + 3$

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

$y = 2x^2 - 4x + 2 + 3$ → $y = 2x^2 - 4x + 5$

c) the y intercept of the quadratic:

using vertex form:

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

Sub $x = 0$

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

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

$= 2(1) + 3$

$= 5$

using standard form:

You can always sub $x = 0$ to find y-int.

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

Sub $x = 0$

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

$= 5$

What can you see from the equation?

Vertex Form:

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

Stretch and direction of opening

vertex (h,k)

Standard Form:

$y = ax^2 + bx + c$

Stretch and direction of opening

y intercept

Ex 3: For each quadratic relation , write the equation in standard form

a) a = -3 and vertex at (-2, 7)

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

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

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

$y = -3(x^2+2x+2x+4) + 7$

$y = -3(x^2+4x+4) + 7$

$y = -3x^2 - 12x - 12 + 7$

$y = -3x^2 - 12x - 5$

b) $y = 2x^2 + bx + c$, vertex at (1, 5)

$a = 2$

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

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

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

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

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

$y = 2x^2 - 4x + 7$

c) a = 5 quadratic has a minimum of 3 occurring at x =2

Maximum and Minimum Values

the highest or lowest value of "y".

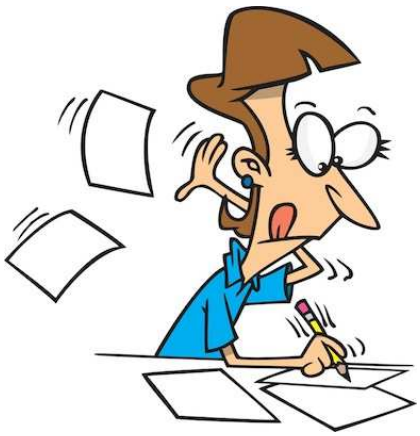
MAX if parabola opens down ie "a" is neg

MIN if parabola opens up ie "a" is pos

The highest or lowest point is the **VERTEX.**

$V(2, 3)$

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



Practice:

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1ac, 2ac, 3ac, 4ac, 6, 7ab, 8