5.11 Quadratics: Putting it All Together

1. A parabola is defined by $y = -5x^2 + 40x - 60$.

a) Determine the zeros.

$y = -5(x^2 - 8x + 12)$

$= -5(x-6)(x-2)$

$x = 6$ $x = 2$

$(6, 0)$ $(2, 0)$

b) Determine the vertex by completing the square.

$y = -5(x^2 - 8x + 16 - 16) - 60$

$= -5(x^2 - 8x + 16) + 80 - 60$

$= -5(x-4)^2 + 20$

$V(4, 20)$

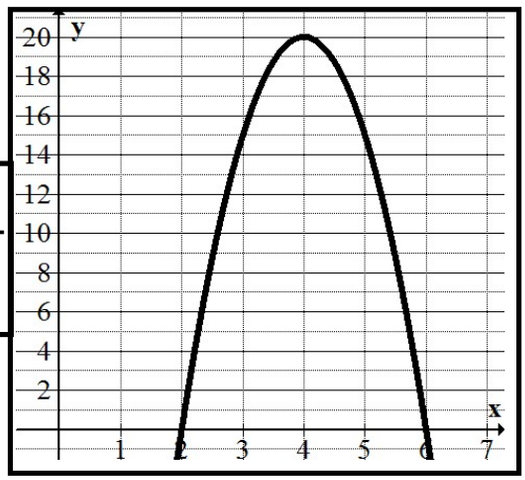
c) Write the equation in Factored form.

$y = -5(x-6)(x-2)$

d) Write the equation in Vertex form.

$y = -5(x-4)^2 + 20$

Graph



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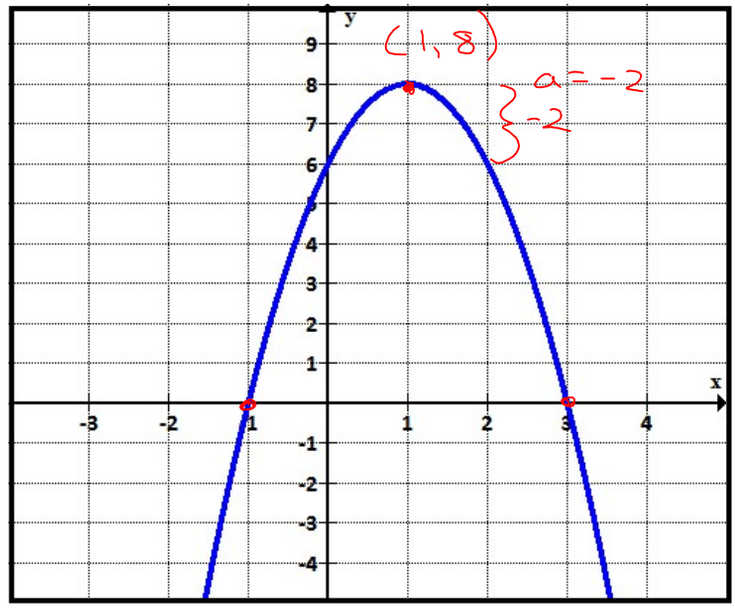
2. Determine the equation of the quadratic shown in:

a) vertex form

$V(1, 8)$

$a = -2$

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



b) factored form

$x = -1 \qquad x = 3$

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

c) standard form (from vertex)

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

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

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

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

$= -2x^2 + 4x - 2 + 8$

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

SAME!

d) standard form (from factored)

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

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

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

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

	x	1
x	x^2	x
-3	$-3x$	-3

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3. A quadratic is defined by y = -2(x+3)(x-7)

a) Determine the zeros.

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

$x = -3$ $\quad$ $x = 7$

b) Determine the max/min value and when it occurs.

A.O.S. $x = \frac{-3+7}{2} = 2$

Sub $x=2$: $y = -2(2+3)(2-7) = -2(5)(-5) = 50$

$(2, 50)$ $\quad$ $\therefore$ max of $y=50$ @ $x=2$

c) Write in vertex form.

$a = -2$ $\quad V(2, 50)$

$y = -2(x-2)^2 + 50$

d) Determine x when y = -10.

Solve from Vertex form is easiest

$-10 = -2(x-2)^2 + 50$

$-60 = -2(x-2)^2$

$30 = (x-2)^2$

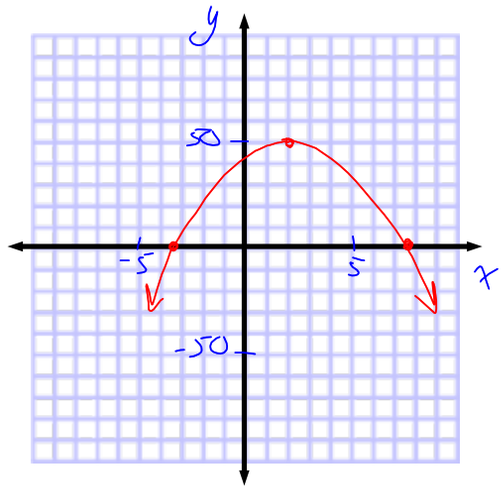
$\pm\sqrt{30} = x-2$

$\pm\sqrt{30} + 2 = x$

$x = \sqrt{30} + 2 = 7.5$ $\quad$ $x = -\sqrt{30} + 2 = -3.5$

e) Graph the relation.

$V(2, 50)$



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4. A quadratic is defined by $y = -2(x-2)^2+18$.

a) Determine the zeros

b) Determine the max/min value and when it occurs.

c) Write the equation in factored form.

d) Write the equation in standard form.

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