Review Examples:

1. Given: $f(x) = -3(x-2)(x+6)$. Find the coordinates of the vertex.

Remember that the x-coordinate of the Vertex is mid-way between the x-intercepts -6 and 2.

To find the mid-value, take the average of them: $\dfrac{-6+2}{2} = \dfrac{-4}{2} = -2$.

To find the y-coordinate of the Vertex: $f(-2) = -3(-2-2)(-2+6) = -3(-4)(4) = 48$

The Vertex is $\boxed{V(-2, 48)}$.

2. Write $f(x) = -2x^2 + 16x - 4$ in Vertex Form.

To do this, we must complete the square: Factor out the leading coefficient from the terms with x.

$-2(x^2 - 8x + \quad) - 4$

Now take half the x-coefficient, and square it. This will give $(-8 \div 2)^2 = 16$. When we insert 16 in the missing position, we are actually adding -32 because of the -2 outside of the parentheses. So we must compensate by adding +32.

We therefore get: $-2(x^2 - 8x + 16) - 4 + 32$

This leads to Vertex Form: $\boxed{f(x) = -2(x-4)^2 + 28}$.

3. Find the Vertex of: $f(x) = 3x^2 - 18x + 5$.

Remember that the x-coordinate of the vertex can be found using the expression $-\dfrac{b}{2a} = -\dfrac{-18}{6} = 3$.

To get the y-coordinate we evaluate $f(3) = 3(3^2) - 18(3) + 5 = 3(9) - 54 + 5 = 27 - 54 + 5 = -22$.

The Vertex is $\boxed{V(3, -22)}$.

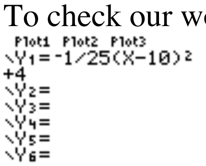
4. A typical 1-inch grasshopper can jump a distance of 20 inches. The maximum height during the jump is 4 inches. Write the Vertex Equation that represents the flight of the jump.

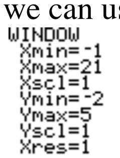
From the information we know that the x-intercepts are at 0 and 20. We also know that since the x-coordinate of the Vertex is mid-way between the x-intercepts, the x-coordinate of the vertex is 10.

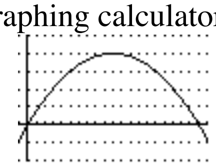
So far, we can write $f(x) = a(x-10)^2 + 4$. But since we also know that the height at the start of the jump, when x = 0, is also 0. Therefore $f(0) = a(0-10)^2 + 4 = 0$. This equation allows us to solve for a.

$100a + 4 = 0 \rightarrow 100a = -4 \quad a = -\dfrac{1}{25}$. Therefore the Vertex Equation is $\boxed{f(x) = -\dfrac{1}{25}(x-10)^2 + 4}$.

To check our work, we can use the graphing calculator.







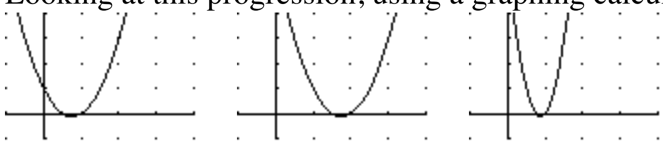
5. $f(x) = 2x^2 - 3x + 1$. Write the new function resulting from a translation 1 Unit Right followed by a Horizontal Shrink by a factor of ½.

Translate 1 Unit Right: $g(x) = f(x-1) = 2(x-1)^2 - 3(x-1) + 1 = 2(x^2 - 2x + 1) - 3x + 3 + 1$

$g(x) = f(x-1) = 2x^2 - 4x + 2 - 3x + 4 = 2x^2 - 7x + 6$

Horizontal Shrink by a factor of ½: $h(x) = g(2x) = 2(2x)^2 - 7(2x) + 6$ $\boxed{h(x) = 8x^2 - 14x + 6}$.

Looking at this progression, using a graphing calculator, we can see:



6. Find the x-intercepts: $f(x) = 3x^2 + 6x - 72$.

To re-write the equation in Intercept Form, we must Factor the function.

$f(x) = 3(x^2 + 2x - 24) = 3(x+6)(x-4)$ The x-intercepts are $\boxed{\text{-6 and 4}}$.

7. List the Transformations, in order that convert $f(x) = x^2$ to $g(x) = -2(-x+5)^2 - 8$.

A Possible List:

1. Reflection in the x-axis $-x^2$
2. Vertical Stretch by a Factor of 2 $-2x^2$
3. Translate Down 8 Units $-2x^2 - 8$
4. Translate 5 Units Left $-2(x+5)^2 - 8$
5. Reflection in the y-axis $-2(-x+5)^2 - 8$

8. $f(x) = -2x^2 + 8x + 3$ Find the vertex and 2 other points on opposite sides of the vertex.

The x-coordinate of the Vertex: $-\frac{b}{2a} = -\frac{8}{-4} = 2$. The y-coordinate: $f(2) = -2(4) + 8(2) + 3 = 11$.

The vertex is at V(2, 11). $f(3) = -2(9) + 24 + 3 = 9$ $f(1) = -2(1) + 8(1) + 3 = 9$

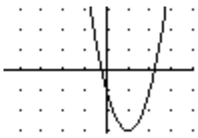
The Vertex is at $\boxed{(2, 11)}$ other points are at $\boxed{(3, 9) \ \& \ (1, 9)}$.

Algebra 2 Assignment 116 Monday October 5, 2015 Hour Name

NO Calculators

1. Starting with $f(x) = x^2$, Write the Standard Form Function resulting from the following Transformations. Translate 2 Unites Right, Horizontal Stretch by a Factor of 3.

2. Write the Standard Equation for the Graph below.



3. Find the minimum or maximum value for $f(x) = x^2 - 6x + 18$.

4. $f(x) = 4(x+1)(x+7)$ Find the Vertex.

5. Find the Standard Form of the Quadratic Function with Vertex (-5, 7) and point (-4, 4).