Unit 4: Quadratics and other Polynomials:

There is a very useful formula to solve any quadratic equation...whether they factor or not you can always get the roots using the

Quadratic Formula

Here is the formula:

If $ax^2 + bx + c = 0$

Then $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

You should know this formula

Examples #1:

$2x^2 - 5x - 3 = 0$

a=2 b= -5 c = -5

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{5 \pm \sqrt{25 - 4(2)(-5)}}{2(2)}$$

$$x = \frac{5 \pm \sqrt{49}}{4}$$

$x = \frac{5 \pm 7}{4}$ so we get $\frac{12}{4}$ and we get $\frac{-2}{4}$ **this is the same as getting 3 and -.5**

By doing this formula you were able to get the roots of the quadratic equation. You can now get the

vertex by knowing to do the following 3 steps:

1) Add the roots
2) Divide your answer by 2
3) Do VARS of your answer in step 2

When might the quadratic formula be really useful?

Maybe if the equation does not factor? (What would that mean????) or
if the numbers were large and you did not want to try to factor it.

Example Number 2: Solve $60x^2 + 317x - 161 = 0$
Identify your a b and c values

a= 60   b = 317   c = -161

Now simply insert them into the quadratic formula...

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-317 \pm \sqrt{317^2 - 4(60)(-161)}}{2(60)}$$

$$x = \frac{-317 \pm \sqrt{139129}}{120}$$

$$x = \frac{-317 \pm 373}{120}$$

So we get the following 2 roots:

$\frac{56}{120}$ and $\frac{-690}{120}$

By doing this formula you were able to get the roots of the quadratic equation. You can now get the

vertex by knowing to do the following 3 steps:

1) Add the roots
2) Divide your answer by 2
3) Do VARS of your answer in step 2

What is the big deal….why don't we factor all the time?

Here is a problem that does NOT factor…so you would need to use the quadratic formula

Solve $x^2 + x - 1 = 0$

a=1 b = 1   c = -1

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-1 \pm \sqrt{1 - 4(1)(-1)}}{2(1)}$$

$$x = \frac{-1 \pm \sqrt{5}}{2}$$

$x = \frac{-1 + \sqrt{5}}{2}$ and $x = \frac{-1 - \sqrt{5}}{2}$

These are your two answers…..you can always use your calculator to approximate the square root of 5 and get a decimal approximation for the above.

By doing this formula you were able to get the roots of the quadratic equation. You can now get the vertex by knowing to do the following 3 steps:

1) Add the roots
2) Divide your answer by 2
3) Do VARS of your answer in step 2

Now you study and practice as much as you need to. There are a lot of practice problems here that you can use the quadratic formula for. The quadratic formula is a tool. You should be able to easily solve any quadratic using the quadratic formula and then once you have the roots you should always know the following three steps…

1) Add the roots
2) Divide your answer by 2
3) Do VARS of your answer in step 2