**Lesson 29**

**Steps for solving quadratic equations by factoring:**

1. Move all terms to one side of the equation so the equation is set to zero.
2. Factor the polynomial.
3. Set each factor equal to zero.
4. Solve each new equation.

**How to write a quadratic equation when given the solutions:**

1. Set *x* equal to each solution.
2. If the solution is a fraction, multiply both sides by the denominator so you have integers.
3. Move the term over so the equation is set to zero.
4. Write the expression in parentheses. Repeat for the other solution(s).
5. Multiply the expressions. (Usually this means you will FOIL).

**Lesson 30**

**Steps for Solving Quadratics by Completing the Square:**

|  |  |
| --- | --- |
| Step 0: | Divide everything by “a” if “a” is something other than 1. |
| Step 1: | Move the constant to the right side of the equation. |
| Step 2: | Identify “b”. Divide “b” by 2. $\left(\frac{b}{2}\right)$ |
| Step 3: | Square $\left(\frac{b}{2}\right)$. Add $\left(\frac{b}{2}\right)^{2}$ to both sides of the equation. |
| Step 4: | Factor the left side. Hint: It will look like $\left(x+\frac{b}{2}\right)^{2}$ = \_\_\_\_\_. |
| Step 5: | Combine terms on right side. (You are adding the numbers together). |
| Step 6: | Solve for x. Hint: Start by taking the square root of both sides. Remember to put $\pm $ with the square root on the RIGHT. Ex: $x= -2\pm \sqrt{11}$ |

**Lesson 31**

**Steps to solve using the Quadratic Formula:**

1. Set the equation equal to zero. (***MUST* be set to zero**.)
2. Identify the values of *a*, *b*, and *c* from the equation.
3. Substitute *a*, *b*, and *c* into the quadratic formula.
4. Simplify the expression using the order of operations and rules for simplifying radicals.
5. If the simplified expression has a radical or $i$, then write it as *one* expression with ±.

If there is no radical or $i$, then split into *two* expressions (+ and −) and evaluate each.

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

The discriminant is what is under the radical. It is $b^{2}-4ac$.

**If the Discriminant is:**

1. Zero (0), then there is one real, rational root.
2. Perfect Square (positive), then there are two real, rational roots.
3. Positive, then there are two real, irrational roots.
4. Negative, then there are two complex roots. (There will be i’s in the roots.)

**Lesson 32**

**Steps to solve quadratic inequalities BY HAND (no calculator):**

1. Set the inequality to zero, if necessary.
2. Solve the related equation (Factor) to find the critical points.
3. Graph the critical points on a number line.
4. Test a value from each region in the inequality. (Plug in, see if it’s true or false.)
5. Use the graph to write the solution set for the inequality (compound inequality).

**Steps to solve quadratic inequalities ON CALCULATOR:**

1. Enter equation into "y=". (Must be set equal to zero.)
2. Graph.
3. Find the "zeros".
4. Put these points on your number line as your critical values.
5. Test your critical points. (Where is it positive? Where is it negative?)
6. Write your answers as an inequality.