Name: ____________________ Mr. Johnson

Date: ____________________ Pre-Calc 11

Unit 3: Solving Quadratic Equations Outline

Test Deadline: ____

3.1 – Factoring Polynomial Expressions

- Watch Lesson Video & Complete Notes ☐
- Assignment: Pg. 176-183, #'s 3bd, 4bd, 5bd, 6bd, 7b, 8, 9, 10bd, 13, 18bd, 20 ☐

3.2 – Solving Quadratic Equations by factoring

- Watch Lesson Video & Complete Notes ☐
- Journal prompt: When you solve a quadratic equation by factoring, why must one side of the equation be 0 before you factor the polynomial? ☐
- Assignment: Pg. 189-196, #'s 5bd, 6bd, 8bd, 10bd, 12a, 13, 16, 18 ☐

3.3 – Using Square Roots to Solve Quadratic Equations

- Quiz 3.1 / 3.2 ☐
- Watch Lesson Video & Complete Notes ☐
- Assignment: Pg. 206-211, #'s 4bd, 5bd, 8bd, 9, 10bd, 11, 15 ☐

3.4 – Developing & Applying the Quadratic Formula

- Watch Lesson Video & Complete Notes ☐
- Assignment: Pg. 217-227, #'s 5bd, 6bd, 9, 10bd, 11bd, 12, 18 ☐
- Journal prompt: Now that you know the quadratic formula (lesson 3.4) and how to complete the square (lesson 3.3) , I want you to try deriving the Quadratic formula beginning with $ax^2 + bx + c$. If you need to check your notes or text you can, but make notes of the parts you missed. Once you have written the entire proof I want you to explain what is happening in each step. You will be required to do this on your unit test! ☐

3.5 – Interpreting the discriminant

- Quiz 3.3 / 3.4
- Watch Lesson Video & Complete Notes
- Assignment: Pg. 232-239, #'s 1, 2, 4bd, 5bd, 7bd, 8, 9, 10, 15,
- Journal Prompt: Summarize all of the different things you have learned into a small study guide.

Review

- Review Assignment: Pg. 242-245 (Practice Test from workbook is optional)
- Practice Test (via Moodle)
- 'Hot Seat' with Mr. Johnson

Write Unit Test on Moodle

Name: ______________ Pre-Calculus 11

Date: _______________ Mr. Johnson

Lesson 3.1 – Factoring Polynomial Equations

Last year we spent a significant amount of time factoring. This section will review some of the factoring strategies we learned.

Example 1: Is $d-4$ a factor of each trinomial? Justify the answer.

a. $2d^2+6d-56$

b. $2d^2+13d+4$

Example 2: Factor each trinomial with rational coefficients.

a. $x^2 - 1.5x + 0.5$

b. $x^2 - \frac{17}{3}x - 2$

Some polynomial expressions contains ________________ of a variable; for instance $(x+3)^2 - 6(x+3) - 16$ contains $f(x) = x + 3$. Therefore we will use ____________________ to help us factor.

Example 3: Factor each polynomial expression.

a. $x^2 + 5x - 24$

b. $2(x-6)^2 + 10(x-6) - 48$

c. $3(2x+5)^2 + 10(2x+5) - 8$

Example 4: Factor each polynomial expression using the Difference of Squares Pattern.

a. $a^2 - b^2$

b. $(3x+4)^2 - (2y-1)^2$

c. $27(2x-3)^2 - 75(y-4)^2$

Name: _______________ Pre-Calculus 11

Date: ________________ Mr. Johnson

Lesson 3.2 – Solving Quadratic Equations by Factoring

We will use many of the skills we have developed for factoring expressions and use them to help us factor equations.

Quadratic Equation

A quadratic equation is any equation that can be written in the form $ax^2 + bx + c = 0$, where *a*, *b*, *c*, are constants and $a \neq 0$.

When an equation contains _______________ terms it cannot be solved by __________________ the variable. The strategy we must use depends on the following Zero Product Property:

- If the product of two numbers is _____, then either number or both numbers equals _______.
- That is, if __________, then __________, or ______________, or ____________.

Example 1: Solve each equation, then verify the solution.

a. $x^2 + x - 56 = 0$

b. $(3x+1)(x-6)=22$

c. $3x^2+75=-30x$

d. $5x^2=-20x$

e. $\sqrt{6-x}+4=x$

All solutions of equations should be verified by ____________________ into the

_________________ equation. Sometimes a solution of a quadratic equation produces an

__________________________, which means the number is a root to the equation but is not a solution to the problem.

Name: _______________ Pre-Calculus 11

Date: ________________ Mr. Johnson

Lesson 3.3 - Using Square Roots to Solve Quadratic Equations & Completing the Square

In a quadratic equation __________________________, when _____________ it becomes the equation ______________________. If this equation has a solution, it can be solved by using square roots.

Example 1: Solve each equation. Verify the solution.

a. $3x^2 - 7 = 8$

b. $(x+3)^2 = 20$

Not all quadratic equations have roots that are _____________________.

Some quadratic equations, for example ____________________, cannot be solved by factoring. We use the strategy of ______________________________ to try to solve the equation.

Steps for Completing the Square: ___________________________________

1. Remove the coefficient of x^2 term by multiplying or dividing

2. Move the constant term to the other side of the equation

3. Complete the square by dividing the x term by 2 and squaring it to both sides of the equation.

4. Factor the perfect square and simplify the side of the equation with the constants.

5. Lastly, take the square root of both sides.

Example 2: Solve each equation by completing the square.

a. $x^2 + 4x - 3 = 0$

b. $-5x^2 - 10x + 2 = 0$

c. $\frac{1}{2}x^2 + 3x - \frac{9}{2} = 0$

Name: ______________ Pre-Calculus 11

Date: ______________ Mr. Johnson

Lesson 3.4 - Developing and Applying the Quadratic Formula

When a quadratic equation is solved by completing the square, a formula is generated that can be used to solve any quadratic equation.

*** YOU MUST BE ABLE TO DERIVE THIS FORMULA ON YOUR OWN***

Quadratic Formula

The solution of a quadratic equation, $ax^2 + bx + c = 0$, where a, b, and c are constant and $a \neq 0$, is given by the quadratic formula:

Example 1: Solve each equation.

a. $x^2 + 2x + 7 = 0$

b. $x^2 - 2x - 7 = 0$

c. $2x = 3(x-1)(x+1)$

d. $\frac{2}{3}x^2 + 1 = \frac{5}{6}x$

Name: _______________ Pre-Calculus 11

Date: ________________ Mr. Johnson

Lesson 3.5 - Interpreting the Discriminant

Depending of the quadratic equation there are ________ types of possible solutions.

The expression ________________________, is called the _________________________ of the quadratic equation, because it discriminates among the types of possible solutions.

Number of Roots of a Quadratic Equation

The quadratic equations $ax^2+bx+c=0$ has:

- two real roots when
- exactly one real root when
- no real roots when

Example 1: Without solving, determine whether the equation $9x^2-6x+1=0$ has one, two, or no real roots.

Example 2:

a. Determine the values of k for which $2x^2 + 7x + k = 0$ has no real roots.

b. Use one value of k to write an equation that has no real roots.