Lesson Title 3.4 Using the Quadratic Formula NOTES **Algebra 2** **Date** _____

OBJECTIVE 1: Quadratic Formula

Use the quadratic formula when you have standard form of a quadratic set equal to zero.

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

STEPS:

1) MUST be in Standard form
2) MUST be = 0
3) Determine a, b, & c
4) Plug in your a, b, & c into the Quadratic Formula
5) Simplify

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

TASK 1. Use the quadratic formula to solve these equations.

a) $m^2 - 5m - 14 = 0$

$a=1 \quad b=-5 \quad c=-14$

$m = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(-14)}}{2(1)}$

$m = \frac{5 \pm \sqrt{81}}{2} = \frac{5 \pm 9}{2} = 7, -2$

b) $2b^2 - 3b - 5 = 0$

$a=2 \quad b=-3 \quad c=-5$

$b = \frac{-(-3) \pm \sqrt{(-3)^2 - (4)(2)(-5)}}{2(2)}$

$b = \frac{3 \pm \sqrt{49}}{4} = \frac{3 \pm 7}{4} = \frac{5}{2}, -1$

c) $r^2 = -80$

$r^2 + 80 = 0$

$a=1 \quad b=0 \quad c=80$

$r = \frac{0 \pm \sqrt{(0)^2 - 4(1)(80)}}{2(1)}$

$r = \frac{\pm\sqrt{-320}}{2} = \frac{\pm 8i\sqrt{5}}{2} = \pm 4i\sqrt{5}$

d) $0 = -(x \quad 2)^2 + 3$

$0 = -x^2 + 4x - 7$

$a=-1 \quad b=4 \quad c=-1$

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

$x = \frac{-4 \pm \sqrt{12}}{-2} = \frac{-4 \pm 2\sqrt{3}}{-2} = 2 \pm \sqrt{3}$

$(x-2)^2$

$(x-2)(x-2)$

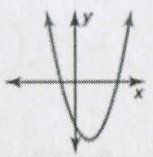
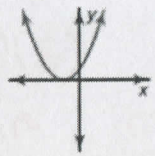
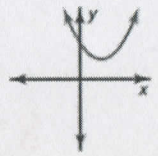
$-(x^2 - 4x + 4) - 3$

$x^2 - 4x + 7$

OBJECTIVE 2: The Discriminant

*The discriminant formula comes from under the square root in the quadratic formula. It tells you the **number** and **type of solutions** for that quadratic equation.*

Analyzing the Discriminant of $ax^2 + bx + c = 0$

Value of discriminant	$b^2 - 4ac > 0$	$b^2 - 4ac = 0$	$b^2 - 4ac < 0$
Number and type of solutions	Two real solutions	One real solution	Two imaginary solutions
Graph of $y = ax^2 + bx + c$	 Two x-intercepts	 One x-intercept	 No x-intercept

TASK 2: Use the discriminant to determine the number and type of roots for the quadratic equation.

a) $x^2 - 6x + 10 = 0$

$a=1 \quad b=-6 \quad c=10$

$(-6)^2 - 4(1)(10) = .$

$36 - 40 = \boxed{-4}$

2 imaginary solutions

b) $x^2 - 6x + 9 = 0$

$a=1 \quad b=-6 \quad c=9$

$(-6)^2 - 4(1)(9)$

$36 - 36$

$\boxed{0}$

one real double root

c) $x^2 - 6x + 8 = 0$

$a=1 \quad b=-6 \quad c=8$

$(-6)^2 - 4(1)(8)$

$36 - 32$

$\boxed{4}$

2 real solutions

Methods for Solving Quadratic Equations

Method	When to Use
Graphing	Use when approximate solutions are adequate.
Using square roots	Use when solving an equation that can be written in the form $u^2 = d$, where u is an algebraic expression.
Factoring	Use when a quadratic equation can be factored easily.
Completing the square	Can be used for *any* quadratic equation $ax^2 + bx + c = 0$ but is simplest to apply when $a = 1$ and b is an even number.
Quadratic Formula	Can be used for *any* quadratic equation.

Still need help with: