NAME:_____

U3:L7 The Quadratic Formula

By completing the square, you can develop a formula that allows you to solve any quadratic equation:

$ax^2 + bx + c = 0, a \neq 0$ → STANDARD; $a \neq 0$ → not a quadratic

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

For example:

$3x^2 + 5x - 2 = 0$ → $y = 0$, $x = ?$ x-intercepts

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

$$x = \frac{-5 \pm \sqrt{25 - (-24)}}{6}$$

$$x = \frac{-5 \pm \sqrt{49}}{6}$$

$$x = \frac{-5 + \sqrt{49}}{6} \qquad x = \frac{-5 - \sqrt{49}}{6}$$

$$x = \frac{-5 + 7}{6} \qquad x = \frac{-5 - 7}{6}$$

$$x = \frac{2}{6} \qquad x = \frac{-12}{6}$$

$x = 1/3$ $\qquad$ $x = -2$

ROOTS = $1/3, -2$

Verify by substituting the values back into your original equation:

$3(1/3)^2 + 5(1/3) - 2 = 0$

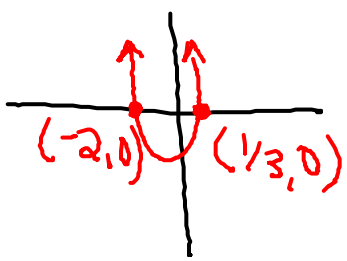
$3(1/9) + 5/3 - 2 = 0$

$3/9 + 5/3 - 2 = 0$

$1/3 + 5/3 - 6/3 = 0$

$\frac{1+5-6}{3} = 0$

$0 = 0$



$3(-2)^2 + 5(-2) - 2 = 0$

$3(4) + (-10) - 2 = 0$

$12 - 10 - 2 = 0$

$0 = 0$

Discriminant

The discriminant is the value under the radical sign in the quadratic formula:

$$\sqrt{b^2-4ac}$$

$\sqrt{-m}$ → ERR → Imaginary

There are three situations possible, which can be determined by looking at the discriminant:

$b^2-4ac > 0$	2 ROOTS
$b^2-4ac < 0$	NO ROOTS
$b^2-4ac = 0$	1 ROOTS

EXAMPLES:

a) $-2x^2 + 3x + 8 = 0$

b^2-4ac

$3^2-4(-2)(8)$

$9-(-8(8)$

$9-(-64)$

73

$73 > 0$

$\therefore$ 2 ROOTS

a b c

b) $1x^2 - 5x + 4 = 0$

$y = x^2 - 5x + 4$

$b^2 - 4ac$

$(-5)^2 - 4(1)(4)$

$25 - 4(4)$

$25 - 16$

9

$9 > 0$

2 ROOTS

PRACTICE: Page 254 Q1 (ab), 2(ef), 3(ab), 5(ab),10