Alg 2

6-5 The Quadratic Formula & Discriminant

Used to solve *any* Quadratic Equation

Quadratic Formula

$ax^2 + bx + c = 0$, where $a \neq 0$

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

Example 1 - Two Rational Roots

$$x^2 - 8x = 33$$

a=
b=
c=

$$x^2 - 12x = 28$$

a=
b=
c=

Example 2 - One Rational Root

$x^2 - 34x + 289 = 0$

a=
b=
c=

$x^2 + 22x + 121 = 0$

a=
b=
c=

Example 3 - Irrational Roots

$2x^2 + 4x - 5 = 0$

$a=$
$b=$
$c=$

$x^2 - 6x + 2 = 0$

$a=$
$b=$
$c=$

Example 4 - Irrational Roots

$x^2 - 4x = -13$

a=

b=

c=

$x^2 + 13 = 6x$

a=

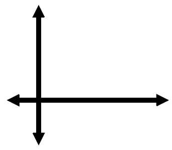
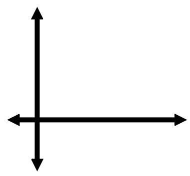
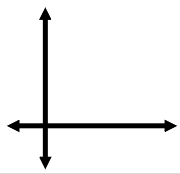
b=

c=

Discrimminant

$b^2 - 4ac$ ← the expression under the square root

The value of the discrimminant can be used to determine the NUMBER and TYPES of solutions

Value of Discrimminant	# & Type of Solutions	Example Graphs
$b^2 - 4ac > 0$ (positive); *$b^2 - 4ac$ (perfect square)*	2 Real, Rational Roots	
$b^2 - 4ac > 0$ (positive); *$b^2 - 4ac$ (<u>not</u> a perfect square)*	2 Real, Irrational Roots	
$b^2 - 4ac = 0$	1 Real, Rational Root	
$b^2 - 4ac < 0$	2 Complex Roots	

Example 5 - Describe the Roots

$x^2 + 6x + 9 = 0$

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

$x^2 + 8x - 4 = 0$

$x^2 - 11x + 10 = 0$

Solving Quadratic Equations

METHOD	CAN BE USED	WHEN TO USE
GRAPHING	sometimes	To estimate
FACTORING	sometimes	If the constant term is 0 or if the factors are easily determined $x^2 - 3x = 0$
SQUARE ROOT PROPERTY	sometimes	If a perfect square is equal to a constant $(x + 13)^2 = 9$
COMPLETING THE SQUARE	always	If b is even $x^2 + 14x - 9 = 0$
QUADRATIC FORMULA	always	If other methods fail or are too tedious $3.4x^2 - 2.5x + 7.9 = 0$