Unit 3. Section 6. Quadratic Equations.

Section 5 Review

Special factorizations of quadratic functions:

- Square of binomial

  $(ax+b)^2 = a^2x^2 + 2abx + b^2$

  $(ax-b)^2 = a^2x^2 - 2abx + b^2$

- Difference of squares

  $(ax-b)(ax+b) = a^2x^2 - b^2$

Warm-up.

Question 1. Use the special factorizations to simplify the following functions.

A) $(x+3)^2$

B) $(2x-1)^2$

C) $(3x-1)(3x+1)$

Question 2. Use the special factorizations to factor the following functions.

A) $x^2 + 2x + 1$

B) $9x^2 + 6x + 1$

C) $25x^2 - 16$

The Quadratic Formula

An equation in the standard form, $ax^2 + bx + c = 0$ has solutions

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

We call the expression

Practice 1. Use the quadratic formula to calculate the solutions of the following quadratic equation

$$x^2 - 8x + 15 = 0$$

Practice 2. Use the quadratic formula to calculate the solutions of the following quadratic equation

$$x^2 + x + 2 = 0$$

Imaginary number i

The *imaginary number* i, is a number with the property $i^2 = -1$.

Practice 3. Simplify $\sqrt{-100}$.

Complex Numbers

A complex number is a pair of real numbers, a and b, written $a + bi$.

Examples: $2 + 3i$, i, 7, 0, $\sqrt{2} + i\sqrt{3}$.

Practice 4. What are the real and imaginary parts of $\sqrt{2} + i\sqrt{3}$?

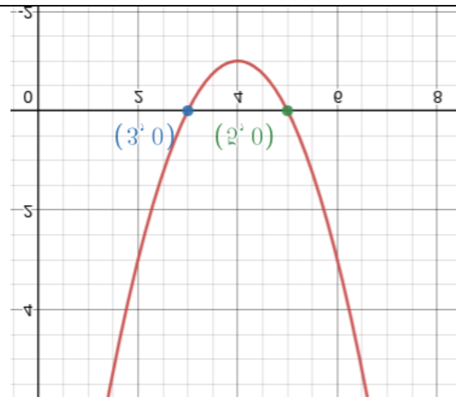
Complex Conjugates

Two complex numbers $a + bi$ and $a - bi$ are called complex conjugates.

Number and Type of Solutions

Discriminant	Number of distinct solutions	Type of solutions
$b^2 - 4ac < 0$	2	Complex Conjugates
$b^2 - 4ac = 0$	1	Real
$b^2 - 4ac > 0$	2	Real

Practice 4 Solve the quadratic equations using the indicated method.

Equation	Method	Solution
$x^2 - 8x + 15 = 0$	Graph	
$x^2 - 8x + 15 = 0$	Factor using guess and check.	
$x^2 - 8x + 15 = 0$	Factor using split the middle.	
$x^2 - 8x + 16 = 0$	Factor using special factorizations.	