Lesson 4.8 Complex Numbers (Clickers)

Essential Understanding: The complex numbers are based on a number whose square is -1.

The imaginary unit i is the complex number whose square is -1. So, $i^2 = -1$, and $i = \sqrt{-1}$.

Key Concept Square Root of a Negative Real Number

Algebra	Example
For any positive number a, $\sqrt{-a} = \sqrt{-1 \cdot a} = \sqrt{-1} \cdot \sqrt{a} = i\sqrt{a}$.	$\sqrt{-5} = i\sqrt{5}$

Note that $(\sqrt{-5})^2 = (i\sqrt{5})^2 = i^2(\sqrt{5})^2 = -1 \cdot 5 = -5$ (not 5).

Ex. How do you write $\sqrt{-18}$ by using the imaginary unit i?

Ex. How do you write $\sqrt{-12}$ by using the imaginary unit i?

1 How do you write $\sqrt{-25}$ by using the imaginary unit i?

2 How do you write $\sqrt{-7}$ by using the imaginary unit i?

An imaginary number is any number of the form a + bi where a and b are real numbers and b ≠ 0. Imaginary numbers and real numbers together make up the set of complex numbers.

Key Concept Complex Numbers

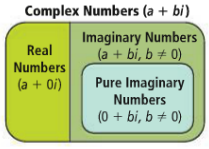
You can write a **complex number** in the form $a + bi$, where a and b are real numbers.

If $b = 0$, the number $a + bi$ is a real number.

If $a = 0$ and $b \neq 0$, the number $a + bi$ is a **pure imaginary number**.

$a + bi$

a: Real part; bi: Imaginary part



Essential Understanding #2: You can define operations on the set of complex numbers so that when you restrict the operations to the subset of real numbers, you get the familiar operations on the real numbers.

Ex. Simplify

a. (4 - 3i) + (-4 + 3i)

b. (5 - 3i) - (-2 + 4i)

3 Simplify: (7 - 2i) + (-3 + i)

4 Simplify: (8 + 6i) - (8 - 6i)

Ex. Find the product: 3i(-5 + 2i)

Ex. Find the product: (4 + 3i) (-1 - 2i)

Ex. Find the product: (2- 3i)(4 + 5i)

5 Find the product: (7i)(3i)

6 Find the product: (-4 + 5i)(-4 - 5i)

Lesson 4.8 Day 2 (Clickers)

Essential Understanding: Every quadratic equation has complex number solutions (that sometimes are real numbers).

Ex. Solve $2x^2 - 3x + 5 = 0$

Ex. Solve $3x^2 - x + 2 = 0$

Ex. Solve: $x^2 - 4x + 5 = 0$

7 Simplify
$\sqrt{-75}$

8 Simplify:
$(5+2i)+(-2-3i)$

9 Simplify:
$4i(5-2i)$

10 Simplify:
$(1+2i)(4-3i)$

11 Solve:

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

12 Solve: 2x(x - 3) = -5