Math 3 1.2 Imaginary & Complex Numbers Unit 1

*EQ: What is a complex number? How do we simplify complex expressions?*

Imaginary Numbers

Until now you have been told you cannot take the square root of a negative number. Now, however, you can take the square root of a negative number, but it involves a new number called “i” which is called the imaginary number.

$$i=\sqrt{-1}$$

Simplify:

Ex. $\sqrt{-25}$ Ex. $\sqrt{-9}$ Ex. $\sqrt{-40}$ Ex. $\sqrt{-125x^{2}}$

Where have we seen imaginary numbers before?

In Math 1, we learned the quadratic formula and the discriminant. The discriminant, b2 – 4ac, determines the number of solutions and the type of solutions we will have with a quadratic equation.

**Two Real**

**One Real**

**No Real**

b2 – 4ac > 0

b2 – 4ac = 0

b2 – 4ac < 0







Simplifying Powers of i’s

To simplify i to any power, try to get the exponent to an even power by removing an i if the exponent is odd, and then reverse the “power to a power” rule by dividing by two. Simplify using the properties of algebra.

Ex. $i^{17}=$

Ex. $i^{98}=$

Ex. $i^{39}=$

Ex. $i^{65}=$

Imaginary Numbers: For any positive b, 

**Example 1:** Simplify$ 2\sqrt{-12}∙3\sqrt{-3}$. **You Try!** Simplify 

 **Complex Numbers:** What is a complex number? **Example 2:** Name the real and imaginary part of

 a + b*i* 

 The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ part is ALWAYS first!

**Adding and Subtracting Complex Numbers:** Only combine like terms. Double check with your calculator.

1. Simplify 
2. Simplify 

Let x and y be real numbers. What are the values of x and y?

1. 
2. 

**Multiplying Complex Numbers:** Make sure to FOIL. Double check with your calculator.

1. Simplify 
2. Simplify 

**Dividing Complex Numbers:**  Imaginary numbers may NEVER be in the denominator. To simplify, multiply the complex numbers by the conjugate (just like with radicals).

1. Simplify
2. Simplify