Introduction to Complex Numbers

Classwork

Opening Exercise

Solve each equation for .

**Example 1: Addition with Complex Numbers**

Compute .

**Example 2: Subtraction with Complex Numbers**

Compute .

**Example 3: Multiplication with Complex Numbers**

Compute .

Lesson Summary

Every complex number is in the form , where is the real part and is the imaginary part of the number. Real numbers are also complex numbers; the real number can be written as the complex number . Numbers of the form , for real numbers , are called imaginary numbers.

Adding two complex numbers is analogous to combining like terms in a polynomial expression.

Multiplying two complex numbers is like multiplying two binomials, except one can use to further write the expression in simpler form.

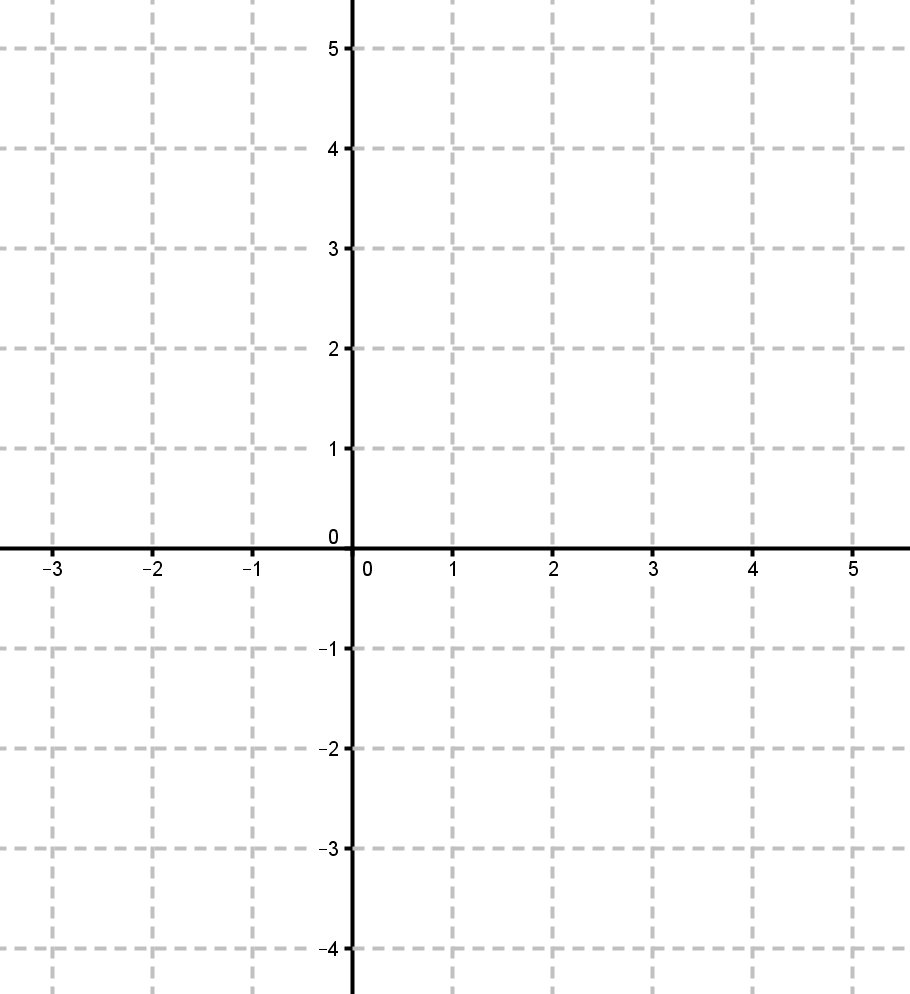
Complex numbers satisfy the associative, commutative, and distributive properties.

Complex numbers allow us to find solutions to polynomial equations that have no real number solutions.

**Example 4: Multiplication with Complex Numbers**

Verify that and are solutions to .

Practice Work:

1. Plot the point on the complex plane corresponding to the complex number given in parts (a)–(h). On one set of axes, label each point by its identifying letter. For example, the point corresponding to should be labeled .
2. Express each of the following in form.
3. Express each of the following in form.
4. Find the real values of and in each of the following equations using the fact that if , then and .
5. Express each of the following in form.
6. Express each of the following in form.
7. Evaluate for , so when
8. Evaluate for , so when .
9. Show by substitution that is a solution to .
   1. Evaluate the four products below.

Evaluate .

Evaluate

Evaluate

Evaluate

* 1. Suppose and are positive real numbers. Determine whether the following quantities are equal or not equal.

and

and