Lesson 6: Complex Numbers as Vectors

Classwork

Opening Exercises

Perform the indicated arithmetic operations for complex numbers and .

* 1. Explain how you add and subtract complex numbers.

Exercise 1

1. The length of the vector that represents is because .
	1. Find at least seven other complex numbers that can be represented as vectors that have length .
	2. Draw the vectors on the coordinate axes provided below.



* 1. What do you observe about all of these vectors?
1. In the Opening Exercises, we computed . Calculate this sum using vectors.
2. In the Opening Exercises, we also computed . Calculate this sum using vectors.
3. For the vectors and pictured below, draw the specified sum or difference on the coordinate axes provided.
	1. **
4. Find the sum of and geometrically.
5. Show that by representing the complex numbers as vectors.

Problem Set

1. Let and . Find the following. Express your answers in form.
	1. What is the length of the vector representing ?
	2. What is the length of the vector representing ?
2. Let , , and . Find the following. Express your answer in form, and represent the result in the plane.
	1. What is the length of the vector representing ?
	2. What is the length of the vector representing
	?
3. Find the sum of and geometrically.
4. Show that by representing the complex numbers as vectors.
5. Let , , and . Prove the following using algebra or by showing with vectors.
	1.
6. Let and .
	1. Draw vectors representing and on the same set of axes.
	2. What are the lengths of the vectors representing and ?
	3. Find a new vector, , such that is equal to divided by the length of the vector representing .
	4. Find , such that is equal to divided by the length of the vector representing .
	5. Draw vectors representing and on the same set of axes as part (a).
	6. What are the lengths of the vectors representing and ?
	7. Compare the vectors representing to and to . What do you notice?
	8. What is the value of times ?
	9. What does your answer to part (h) tell you about the relationship between and ?
7. Let .
	1. Let be represented by the vector in the direction of with length . How can you find ? What is the value of ?
	2. Let be the complex number that when multiplied by , the product is . What is the value of ?
	3. What number could we multiply by to get a product of ?
8. Let .
	1. Draw a picture representing .
	2. What is the value of ?