**Activity 8.2.4 The Zero Vector and Subtracting Vectors**

In this activity we will examine the ways in which vectors are subtracted. Similar to vector addition, a vector’s representation impacts the manner in which we subtract vectors.

1. Let’s begin by working with arrows. Using a large sheet of graph paper and a vector, consider what vector would have to be like in order to have the property that .
2. Let’s consider the vector addition shown below.



What vector could have the property that . Look at the ordered-pair representations below to help.

The key to solving Questions 1 and 2 is the *zero vector*. The zero vector (in 2-D space) is the vector:

So, for any vector ,

1. Next, think about how the ordered pair notation can help you decide that for a vector what vector would have the property that ?

In order for the sum to be 0, and .

1. What would need to be?
2. What would need to be?
3. Look at the diagram below. Check to see if .



When and we use this idea to subtract vectors. To subtract a vector , we can add . This is similar to the way that we can subtract scalar quantities. To subtract , we add the opposite of –5 to 3, and the resulting sum is 8.

The diagram shows and .



1. Determine the ordered pair notation for .
2. Verify that
3. If = (0, 3) and = (5,0) then find - .
4. If = (1, -2) and = (4, -5) then find - .