**Algorithm Activity Lesson Plan**

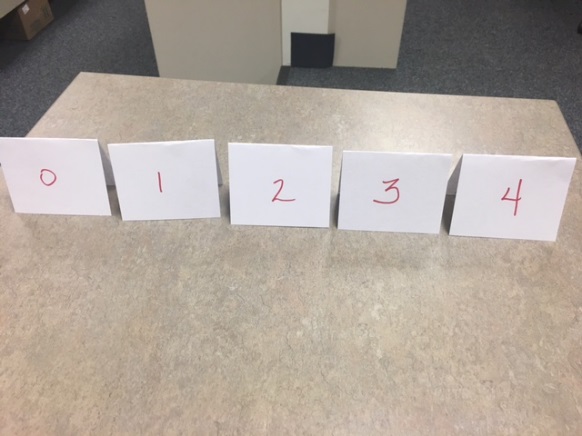
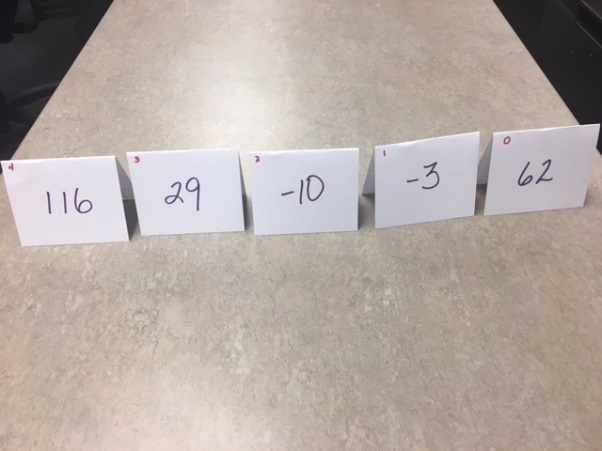
**Finding a Minimum in an Array of ints**

**Introduction**

In this activity, students will design an algorithm to find the smallest item in an array.  Tell students, “If a human being had a list of numbers, we could just have the person tell us the smallest number. Unfortunately this may not work for a computer. We need to tell the computer the process to find a minimum value in an array. Today you will write the process to find a minimum value in an array.”

**Instructions**

* Have students work in pairs or groups of 3. Each group should take some time to brainstorm ideas for the process of finding a minimum. They should write down their process in a step by step format. When they have the steps to show you, give them index cards for testing.
* Fold index cards in half. On one side write the index numbers. On the other put the index numbers in the top corner and the values being stored on each card. In the picture, the red numbers are the index numbers and the purple numbers are the values stored in the array. Note: Students may do this work. Be sure at some point they test values that include negative numbers.

* Students should test their algorithms using the cards in the group. One student should be on one side of the cards with only the index numbers showing. Another student should be on the side with the values. The student on the index side should read the algorithm exactly as it is written. The other student should do exactly what is read from the algorithm. If there is a 3rd student, he/she should be writing notes on what is working and what needs to be improved upon.
* After testing, adjustments should be made to the algorithm. Then testing should be repeated and adjustments made until the group feels their algorithm is working for all cases. NOTE: Encourage groups to test different cases before they are satisfied what they have works!
* When groups feel they are ready, have them give their algorithm to a different group. The new group should test the algorithm and give feedback to the other group.
* Based on the testing and feedback from the other group, each person should try to implement the java version of the algorithm in a class. NOTE: I usually have already started a java class with my students when we introduced array notes. I have students add a method to this class: public int findMin()
* Other algorithms can be done using this style of lesson. Some other possible algorithms are listed below:

1. Find a maximum
2. Sum of values
3. Search for an element and return the index
4. Count the number of even values (or some other characteristic)
5. Determine if all values in the array are even (or some other

characteristic)

* Other methods for setting up a physical representation of an array may be used. Some options include:

1. Use a deck of cards. You may want to make the red cards represent negative numbers and the black cards represent positive numbers.
2. Fill containers with rice of various amounts and compare weights. Plastic Easter eggs work well for this idea.
3. Egg cartons can be used as the array and use tiles or pieces of paper with numbers on them.