

# Algebra/Geometry Institute Summer 2004

## Lesson Plan 3

**Faculty Name:** Andrea Jinks

**School:** Eastwood Cleveland, MS

**Grade Level:** 8<sup>th</sup>



### 1 Teaching objective(s)

The students will model the basic operations with real numbers.

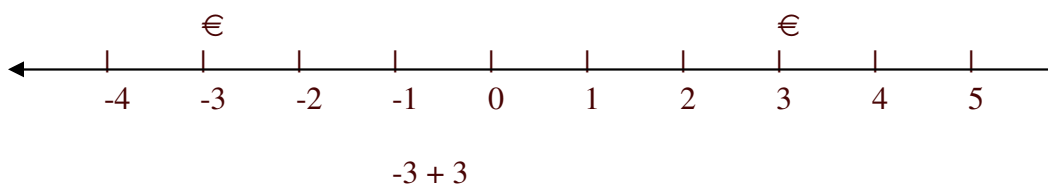
### 2 Instructional Activities

Open Activity – Discussion of all the operations and how to perform each with whole numbers.

During the discussion the teacher will pass out the materials. Each student should receive a long strip of drawing paper, two small Styrofoam cups, and about twenty to thirty double sided counters. The students will need additional paper and a pencil of their own to write the problems down.

You need to discuss the number line and how the operations of whole numbers move. Then ask the students to draw a number line on their strip of paper from -10 to 10 including zero. You will need want to discuss negative numbers if you have not addressed them before doing this activity.

The activity is started by placing a + sign on one cup and a – sign on the other cup. Have the students place the cup with the – sign on the -3 and the + sign cup on the +3 of the number line they drew as shown below. The symbol € represents the cups.

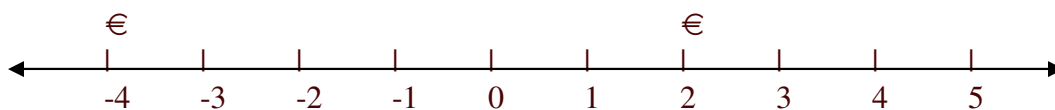


After they have their cups on the proper numbers ask the students to place 3 counters into each cup (three in the – cup and three in the + cup). Now we are going to add the -3 to the +3 and find the sum. Ask the students what their predictions of the sum will be. You can write the problem on the board then write all possible answers next to the problem.

Now you will ask the students to take one counter out of the – cup and one counter out of the + cup. Ask how many counters are left in each cup and ask what happened when they took one counter out of each. Then ask them to take out another counter from each cup and they continue this until there are no counters left in the cups. Ask what is the answer to the problem? The answer should be zero because there are no counters left in either

cup. You will need to discuss at this point that each time you take out a counter from each cup you are “canceling out the other” or call this a “zero pair”. The term “zero pair” is important because it will be used later for more practice in the adding and subtracting of integers.

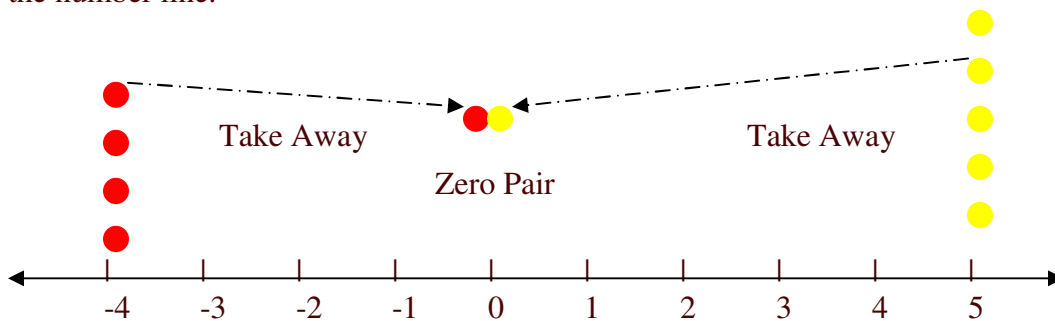
Now do several more problems on the board using the cups. Examples may be:  $-4 + 2$ . They will put four counters in the  $-$  cup and two counters in the  $+$  cup. Then they will remove (take out) one counter from each cup until one cup has zero counters in it. The cup with counters left is the sum of the problem with the sign of the cup that the counters are in.



You might want to do several more problems with the cups and the number line.

Examples:  $-8 + 5$        $9 + -2$        $6 + -4$        $-7 + 6$

Now that they have an understanding of adding integers using the cups, take the cups away. This will allow them to relate the meaning more. The activity now will work the same except this time you will place the actual number of counters over the number on the number line.

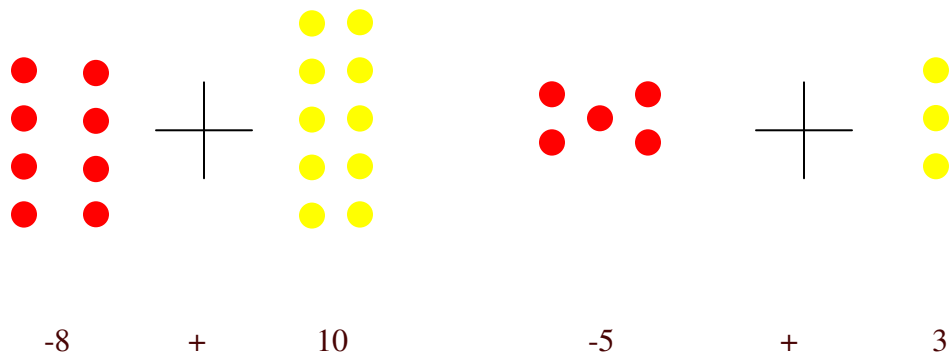


The red side of the counters represents negative numbers while the yellow side represents the positive side. If you had this problem  $-4 + 5$ , you would place four red counters above  $-4$  on the number line then place five yellow counters above  $+5$ . Ask the students how they would solve this problem to find the sum. Hopefully, they will relate the taking away of one positive and one negative counter, which is called zero pairs. After they take away all the possible zero pairs then they will see that there is one yellow counter left making the sum  $+1$ .

You will want to do several examples so they can see how the positive and negative counters work with the number line. Examples:  $0 + -6$        $-3 + 2$        $9 + -6$   
 $4 + -7$

You do as many examples that the students need to understand the concept before taking away the number line. The last step for the students to fully understand the concept is to

take the number line away and just use the counters. Examples to work without the cups or number line are:



The students will use the same concept of taking away as many zero pairs as possible to find the sum of the numbers. In the two examples above, the first sum is +2 and the second example is -2. Give the students more examples to work with the counters. Other possible examples are:  $4 + -9$        $-10 + 7$        $0 + -1$        $9 + -2$

You can extend this activity to do the other operations of integers using the counters. Also, you can develop the integer rules by asking the students to tell you what happened every time you added or subtracted a positive and a negative number.

### 3 Materials and Resources

- Paper
- Pencil
- Whiteboard
- Dry erase marker
- Strips of drawing paper (need to be long enough to make 10 positive numbers and 10 negative numbers plus 0)
- Small Styrofoam cups
- Double sided counters

**References: Resource Book** – Algebra Hands On. Hands On, Inc., 1990. Pages 120. Kindergarten through Grade Nine.

### 4 Assessment

Teacher Observations  
 Problems from the board – Ask the students to make the models on their desk then draw their models onto their paper for a grade.

Sample problems	$0 + -3$	$6 + -9$	$-1 + 5$	$8 + 0$
	$10 + -4$	$-10 + 6$	$-2 + 8$	$-7 + 1$