## **Algebra/Geometry Institute Summer 2004**

## **Lesson Plan Two**

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5g-- The student will use algebraic counters to subtract integers

- 2 Instructional Activities
  - Ask the students to consider the following situation. You borrowed \$40 from a friend to buy two CDs. You agreed to pay back \$5 per week until the debt was paid in full. When you make your first payment, the payment of \$5 is credited to your account. How would you describe the situation using a number sentence?

Answer: 
$$\$ - 40 + (\$5) = \$ - 35$$

• Lead a discussion on subtracting integers using counters. Review how to make a zero pair. Tell the students that they will learn to subtract integers using the take-away method. Provide the students with examples. The teacher will use the overhead to demonstrate the integers and subtraction problem. The students will write the examples in their notebooks.



• Give students counters and a blank sheet of paper for a building mat. Tell the students that the mat should be positioned with its length turned horizontally or left to right.

• Have the students review by modeling positive and negative integers. Have the students to model +4 and -3 on their mat. Discuss each by asking the students to describe what they have displayed for each integer.



• Have the students clear their mat. Have the students place 7 positive counters on the mat. Ask them to take away or remove 2 positive counters from the ones that they already have.



- Ask students, "How many counters are remaining?" Listen for correct responses. Tell the students that the +5 counters left remaining on the mat is the difference. Have a student volunteer to write a number sentence on the overhead to record the result: (+7) (+2) = +5. Discuss the students' answers.
- Have the students place 8 negative counters on the building mat, and then remove 3 of the negative counters. Have the students count the remaining counters. The result will be 5 negative counters or -5 left. Ask a student to volunteer write the number sentence for the problem modeled. The number sentence should be (-8) (-3) = -5. Have the students write the model and number sentence in their notebooks.



- Tell the students that the examples worked previously required a direct removal of counters as in whole numbers. The next examples will involve the application of zero pairs before any removal of counters can occur.
- Have the students remove the counters from their mat. Have the students model +3 with the counters on their mat. Ask the student: "If you want to remove +5 from the mat, can you do it now? If not, what changes might be made to the counters on the mat to make removal of +5 possible." The students should respond by stating that there are not enough counters on the mat and we need to add more counters.



- Ask the students, "What will happen to the amount of the counters and the total value of the counters on the mat if you place several zero pairs on the mat with the other +3?" Listen for responses such as: Extra counters will be on the mat, including positive and negative counters.
- Tell the students that several zero pairs are needed in order to remove +5 from the counters on their mat. Allow students to decide how many pairs are needed. Remind the students that their goal is to have enough positive counters on the mat to be able to remove +5. Have a student volunteer to model the number of zero pairs needed on the overhead. Discuss the students' response. Tell the students that two zero pairs are needed.



• Tell the students after 5 positive counters have been removed from the

mat, the counters left on the mat is the difference. Have a student volunteer to model the problem and write a number sentence: (+3) - (+5) = -2.

• Have students clear their mats and model (-7) - (+3) with the counters. Make sure students have seven negative counters placed on the mat first.



• Ask students, "There are only negative counters on the mat. What changes must we make in order to be able to remove 3 positive counters?" Listen for responses such as "place 3 more zero pairs on the mat in order for 3 positive counters can be removed."



Have the students model the problem. Have a student come to the overhead to present the problem. The student should remove 3 positive counters from the mat. After the student has removed the counters, there should be 10 negative counters left on the mat. Have another student go to the board and write a number sentence on the board for the problem presented: (-7) - (+3) = -10.



Discuss the idea that if no counters are on the mat, the value shown on the mat is 0. Ask the students, "If your mat is empty, how can you subtract or remove -6 from the mat?" Listen for a response such as, "place zero pairs of counters on the mat until you can see 6 negative counters; the total value in counters is still 0." Have the students place six zero pairs on the mat, then remove 6 of the negative counters. Ask the students, "What is the difference to this equation?" Listen for the response: (-6). Make sure that the students remove 6 negative counters from the mat. Write the number sentence: 0 - (-6) = +6 on the board. Discuss the students' answers.



• Distribute worksheets and have students complete the activity on subtracting integers using their counters. Have the students use the take-away method to complete this activity. Allow students extra time for this activity if needed. (See attached worksheet)

## 3 Materials and Resources

- ✓ Textbook: Prentice Hall: Pre-Algebra/Tool For A Changing World. Prentice Hall, Inc. (2001), Pp. 29-30.
- ✓ Resource book: Hands-on Algebra: Ready –to –Use Games & Activities for Grades 7-12, Pp. 15-19.
- ✓ Counters
- ✓ Unlined paper (building mat)
- ✓ Pencils
- ✓ Worksheet 1A
- ✓ Overhead Projector
- ✓ Overhead Counters
- 4 Assessment
  - ✓ Teacher should observe students as they work to make sure they are using the correct counters on the mat and receiving the correct differences.
  - ✓ Teacher should listen for correct responses during oral discussions.
  - $\checkmark$  Grade worksheet for correct responses.

## Worksheet 1A: **Tile Take Away**

Directions: Use the counters to complete the following sentences with the missing differences.

(+7) - (-2) =(+4) - (+4) =(-2) - (-8) =(+4) - (+1) =(+1) - (5) =0 - (+4) =(-10) - (+6) =

(-10) - 0 =

Now write two of your own. Briefly explain in writing how you found the differences.