Algebra/Geometry Institute Summer 2007

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6th Grade

1. Teaching objective(s):

   ✖ The student will model addition of integers

2. Instructional Activities:
   Ask students
   - How would I write a 5° increase in temperature? Discuss student answers. Make sure students understand that a 5° increase can be written as +5.
   - How would I write a temperature decrease of 5°? Discuss the student answers. Make sure students understand that a 5° decrease can be written as -5.

   Draw a number line on the overhead. Mark zero for the 0, 1 through 10 on the right, and (-1) through (-10) on the left. Discuss the number line with the students. Discuss where the 5° decrease in temperature and the 5° increase in temperature would be located. Remind students to start at 0 before deciding increase or decrease
   Read the objective to the students.
   Ask students
   - What is an integer? Discuss answers.
   - Tell the students that an integer is any of the natural numbers, the negatives of these numbers, or zero. Remind/review that the word negative means to decrease. Refer back to the number line transparency—identify the negative numbers on the number line.

   Tell the students:
   - Today we are going to model addition of integers.
   Ask the students:
   - How do we model something? Discuss answers.

   Tell the students:
   - Today we are going to use two color counters to create models of integer addition problems.
   - We are also going to draw our models on paper.

   Teacher:
   - Put students in groups of two. Give each group two color counters, typing paper, and crayons (red and yellow). Tell students to use typing paper and crayons to record their models.

- o Set a standard with the students—the red side of the counter will be negative and the yellow side of the counter will be positive. Remember negative is below 0, and positive is above 0.

- o Put 1 yellow counter on the overhead.

Ask the students:
- o What does this counter represent? Discuss answers.

Tell the students:
- o 1 yellow counter
- o 1 positive
- o (+1)—tell students that parenthesis are put around the number to make sure they see it is positive, not to be confused with a plus sign.

Teacher: Put 1 red counter on the overhead.

Ask the students:
- o What does this counter represent? Discuss answers

Tell the students:
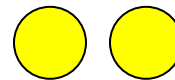- o 1 red counter
- o 1 negative
- o -1

Teacher:
- o Tell the students to model with their counters what you are modeling on the overhead.
- o Put these integers on the overhead, walk around to see if groups are modeling the integers with the correct color counters. Give any verbal clues necessary.
- o -3   + 5   + 4   -7

Ask the students:
- o How did you model each integer? Discuss answers. As you discuss the answers model the integer on the overhead. Make any corrections necessary.

Teacher:
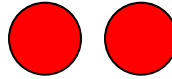- o Display 2 yellow counters on the overhead.

Ask the students:
- o What mathematical expression is shown with these two counters? Discuss answers.
    - o 1 yellow counter + 1 yellow counter
    - o 1 positive + 1 positive
    - o (+1) + (+ 1)
- o What does (+1) + (+ 1) mean? Discuss answers.

- o (+1) + (+ 1) means the same as 1 + 1; therefore, 1 yellow counter + 1 yellow counter = 2 yellow counters. Also, 1 + 1 = 2, so (+1) + (+ 1) = 2, positive 2, or (+2).

Teacher:
- o Display 2 red counters on the overhead.

Ask the students:
- o What mathematical expression is shown with these two counters? Discuss answers.
  - o 1 red counter + 1 red counter
  - o 1 negative + 1 negative
  - o -1 + -1
- o What does -1 + -1 mean? Discuss answers.
  - o 1 red counter + 1 red counter = 2 red counters
  - o 1 negative + 1 negative = 2 negatives
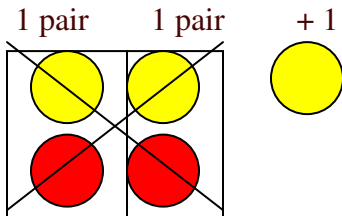 - o -1 + -1 = -2

Teacher:
- o Put one red counter and one yellow counter on the overhead.

- o Remember, one red counter = -1, and 1 yellow counter = +1.
- o Think back to the number line—if you move left one place (-1), then right one place (+1), where are you on the number line? Discuss answers.
- o So, according to the number line, you are on 0; therefore – 1 + (+1) = 0.
- o Tell all students to stand up. Tell students to take one step back (-1), now take one step forward (+1). You end up where you started—back at 0.
- o Write +3 + -2 on the overhead. Tell the students we are going to model this problem to find the answer. First display 3 yellow counters, then display 2 red counters.

Ask the students:
- o How many pairs of red and yellow counters can you make? (2)
- o What did we discover about 1 red counter and 1 yellow counter? (they equal 0)
- o Since 1 red and 1 yellow counter equal 0, I can remove them from the model, so what is left? (1 yellow counter or +1)
- o Therefore; +3 + -2 = +1

1 pair   1 pair   + 1

Teacher:
- o Write - 4 + - 4 on the overhead. Tell the students to model this problem to discover the answer. Walk around to observe student models. Give any clues necessary.

- Ask a group to come to overhead and display their answer. Make sure 8 red counters are displayed. Students should discover that -4 + -4 = -8.
- List the following problems on the overhead. Allow time for students to model and discover the answers. Have groups come to overhead and explain their models and answers.
  - -2 + -3
  - (+3) + (+3)
  - -9 +-3
  - (+5) + -2
  - -4 +-9
  - (+7) + (+4)
- Pass out worksheet 1. In groups work on 1-5. While students are working, walk around and observe students. Give any clues necessary.

Ask the students
  - Did you need to remove any pairs of 0 (pairs of red and yellow counters)? Why or why not? No; only used one color counter

Allow time for groups to complete chart. While students are working on chart, walk around and observe student work. Give any clues necessary. Once chart is complete, have groups come and display answers. Discuss any questions/answers.

After completing chart, ask the students:
- If Jan lost 3 pounds during June, and gained 5 pounds in July, how much total weight did she lose or gain during the two months?
  - Discuss the answers with students. Allow time to model answer. Have a group model answer on the overhead.

Closing
  Teacher: Ask the students:
  - What did we learn today? Discuss answers
    - The use of yellow and red counters to represent positive and negative numbers.
    - Addition of positive numbers
    - Addition of negative numbers
    - Adding positive and negative numbers
  - How does lining up and removing different colored counters help with adding integers? The remaining counters represent the answer.

3. Materials and Resources:
  Materials
  - two color counters
  - overhead
  - markers--overhead
  - typing paper/pencils/crayons
  - transparencies
  - worksheet 1
  - assessment
  - Heath Mathematics Connections

Resources

- Lesson adapted from 6th grade Mathematics text.
- Manfre, Edward, Moser, James M., Lobato, Joanne E., and Morrow, Lorna (1994) <u>Heath Mathematics Connections</u> Grade 6
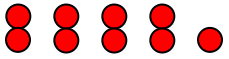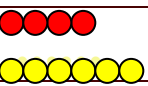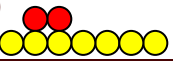- www.m-w.com

4. Assessment:
  Teacher will observe students using counters to add positive and negative integers.
  Teacher will ask questions and respond to answers while students are adding positive and negative integers.
  At the end of the week, teacher will give weekly test (assessment 1) on adding positive and negative integers.
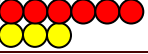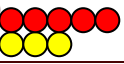
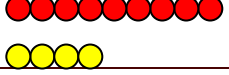# Worksheet 1—adapted from Heath Connections Grade 6

Directions—Fill in the chart. Use counters to model expression.

Expression shown with counters	Expression written with integers	Counters left after removing pairs of 0	Sum
1)			
2)	-2 + -1		
3)	+4 + (+2)		
4)			
5)	+3 + (+8)		
6)	-4 + (+6)		
7)	+5 + -2		
8)			
9)			
10)	-3 + (+8)		
11)	-4 + -3		

Assessment 1

Teacher—Distribute assessment to each student. Allow time for each student to complete assessment.

Directions—Fill in the chart.

Expression shown with counters	Expression written with integers	Counters left after removing pairs of 0	Sum
1)	-4 + (+6)		
2)	+5 + -2		
3) (6 red, 2 yellow counters)			
4) (5 red, 2 yellow counters)			
5)	-4 + (+9)		
6)	-4 + -11		
7) (6 red counters)			
8)	-10 + -13		
9)	+4 + (+7)		
10) (8 red, 3 yellow counters)			
11)	+3 + -9		

Solve each problem. Draw counters to justify your answer.

12. 0 + -4

13. -6 + (+3)

14. -1 + (+1)

15. Mary lost 4 pounds on her diet during the month of May. During June, she gained 3 pounds. How much total weight did she lose or gain on her diet?