Adding and Subtracting Integers

First Place Winner 2006 NASCO Middle School Math Lesson Plan Contest
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Instructional Objective:
   Students will learn how to add and subtract integers.

Materials:
   Two-Color Counters
   Desk-topper Number Strips

Steps:
1. Place students into small groups (or the activity can be done individually).

2. Adding Integers
   • Give each child or group a pile of counters. (The number of counters per group depends on how many counters and how many groups you have.)
   • Write on the board (or display) that yellow counters will be positive and red counters will be negative numbers. The color will be facing up as you use it.
   • Write this example where all can see (board, overhead, etc.): 5+3 =
   • The students then make one pile of 5 yellow counters and another pile of 3 yellow counters. When you add integers, if the color (or sign) is the same, move all the counters to the end and add them together. In this case, there are 9 yellow counters so the answer is 8 (or positive 8).
   • Next, try this example: -5 + -3 =
   • The students will make one pile of 5 red counters and another pile of 3 red counters. Remember, when the colors are all the same, you move all the counters to the end and add them together. In this case, the answer is -8 because all the counters are red.
   • Lead into this rule: When you add integers, if the sign is the same, keep the sign and add the numbers.
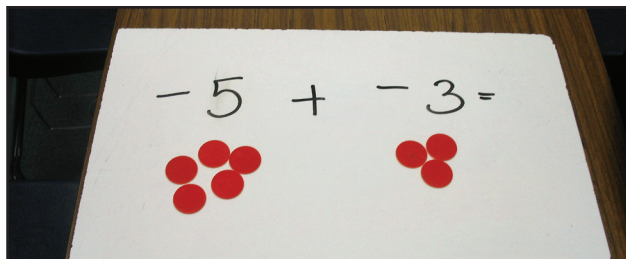
   • Try some other examples with both signs the same.

   • Set up a new example here. The colors will still represent yellow for a positive number and red for a negative number. Try this example: -5 + (+3) =
   • Set up is the same, one pile of 5 yellow counters and another pile of 3 red counters. But the problem is that the colors are different, so you can't add them all together. So, one red counter takes out one yellow counter and together they are removed from their piles in pairs. Keep pairing one red and one yellow counter until you can't make any more pairs. What you have left is your answer and your sign. In this example, you have 2 red counters left, so your answer is -2.
   • Here is the rule: When the signs are different and you are adding integers, take the sign of the larger number and subtract the two numbers.
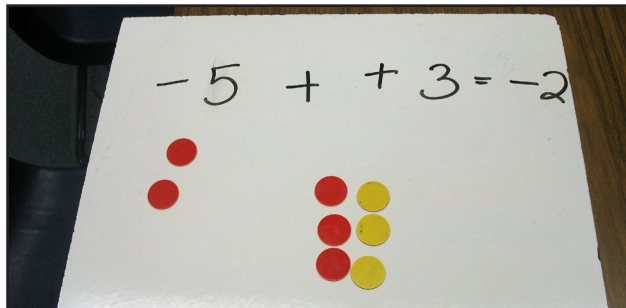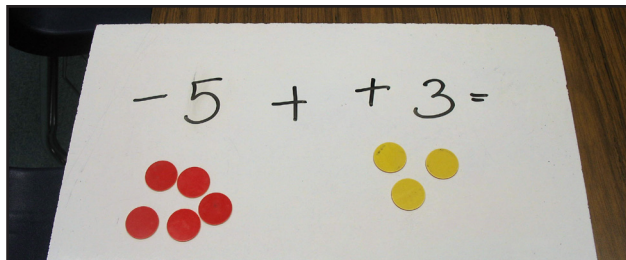
• Have students try several more examples. Make sure they state why they added or why they subtracted the numbers each time.
• If more instruction is needed, use Desk-topper Number Strips. Place one on the board where all can see and one on each students' desk. To add integers, start on the first number (place your finger there). If the next number added is positive, move your finger that many places to the right on the number line. If the number is negative, move your finger to the left that many places. So, if your equation is -5 + 4, start at -5 and move your finger 4 places to the right and land on negative one.

3. Subtracting Integers
• Put an equation on the board, but note that this time they will be subtracting. Subtraction can also be called take away or the opposite of.
• Set up this example: -8 – (-4) =
• You will have one pile of 8 red counters and another of 4 red counters. When you subtract, you will turn over the counter pile that is directly after the minus sign because subtract means to do the opposite. Therefore, you will now have 8 red counters and 4 yellow counters. You now have an addition problem and the answer is -4.
• When subtracting integers, you make two moves: one is to change the subtraction sign to addition and the other is to change the sign of the number directly following the subtraction sign.
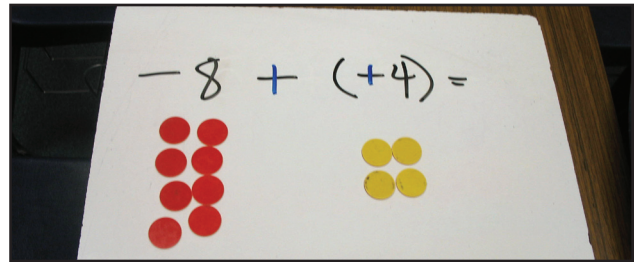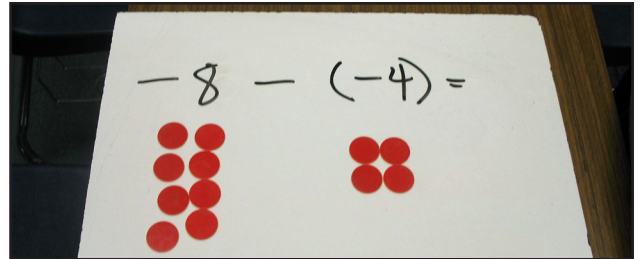
• Try another example: 8 – (-8) =
• Start with one pile of 8 yellow counters followed by one pile of 8 red counters. Turn the 8 red over to yellow because we are subtracting. Now you have 8 yellow in the first pile and 8 yellow in the second pile. We are now back to addition and our answer is 8 + 8 = 16. The counters are all the same color, so we add them together and keep the sign.
• Here is the rule: When you subtract, you make two changes. Change the subtraction sign to addition and then change the sign of the number directly following the subtraction sign to the opposite sign.
• So -9 – (7) will be changed to -9 + -7 = -16.
• If further explanation is needed, use the number line on each student's desk. Start with your finger on the first number. Remember that subtraction means to do the opposite of.
• Using these counters and / or number lines helps the students to have a hands-on way to visualize how to solve equations. Correlating the color with the sign helps students to "see" the answer. Physically flipping the counters over when you subtract helps the student to remember the process because of the movement and because using color helps move those concrete learners into the abstract.

Individual Differences:
The activity can be adapted for various levels by using single- or double-digit numbers. The kinesthetic and visual use of the counters and number lines helps students with different learning styles grasp the concepts. The lesson works well as a cooperative learning or individual activity.