Modeling Integers

Lesson Summary	The student will formulate rules for and solve practical problems involving basic operations (addition) with integers.

Major Topic and SOL

    Math SOL (2009)   7.5

Length of Unit   80 minutes

Student Objectives

In Mathematics the student will be able to:

- Determine patterns of addition integers
- Formulate rules for adding integers
- Apply rules to simplify expressions involving adding integers

In Language the students will be able to:

- Formulate rules
- Use the key vocabulary to find the sum of integers

21st Century Skills

- Critical-thinking and Problem Solving
- Communication
- Collaboration

Assessment Evidence

- Classroom discussion:
    - What are the rules for adding integers with like signs?
    - Unlike signs?
    - What is a zero pair?
    - How can we use zero pairs to model adding integers with like and unlike signs?
- Participation during discussion within groups
- Worksheets to reinforce using the rules for adding integers
- Quiz

Supplies/Materials/Technology
- ELMO document reader, LCD projector
- 2 sided color chips
- Modeling Integers worksheet

**Lesson Plan**

Presentation
- On the Document Reader, the teacher will place one chip with the red side up and another chip with the white side up.
    - o The teacher will explain that the white side of the chips is positive and the red side is negative.
        - So if we put the two chips together, that means that we were adding one positive and one negative, or $1 + (-1)$.
    - o The teacher should not let the students use calculators, as this part of the standards are non-calculator.
        - Therefore, the teacher should give the students an example dealing with money.
            - Money is a concept that most students understand and are interested in.
        - The teacher should say, if I have one dollar, but I owe John one dollar, how many dollars do I really have?
            - o They should say zero.
    - o Previously discuss that owing or having a debt means negative. Explain that 1 positive and 1 negative will cancel each other out and create a zero pair which means they add up to be zero.
- After the class discusses zero pairs, then demonstrate the first example on the Modeling Integers worksheet.
    - o The example is $5 + -3$.
        - The teacher should line up 5 positive chips and underneath lined up 3 negative chips.
        - The teacher should explain that when we model integers in this way we have to take away zero pairs until we can no longer make anymore zero pairs.
            - The students should explain that we could make 3 sets of zero pairs.
            - The teacher should ask them what is left over and be able to respond with positive 2.

- The students should then be paired up with a partner to model 6 other examples including adding like signs and unlike signs.
  - The teacher should let students refer back to the examples when answering the questions.

Modeling Integers
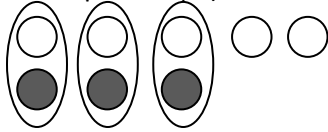
Materials: Two-Colored Chips

One negative chip and one positive chip make a zero pair. They cancel each other out.

⬤ = -1

⬤ + ◯ = 0

◯ = +1
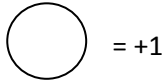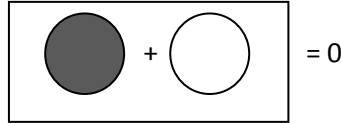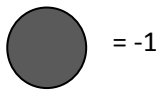
(-1) + (1) = 0
(zero pair)

Example: 5 + (-3)

There are +2 remaining, so 5 + (-3) = 2

Activity 1: Addition With Two-Colored Chips

1. Use the two-colored chips to represent each integer and manipulate them to show each problem given below. Make a sketch in each box to represent what you did in each problem.
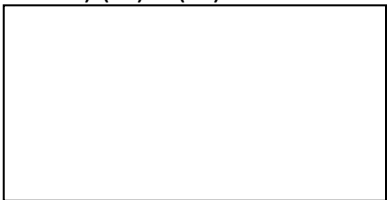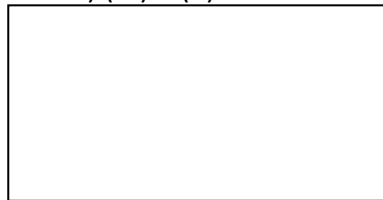
a.) (4) + (3)

b.) (8) + (-3)

c.) (-9) + (-2)

d.) (-4) + (7)

e.) (5) + (-5)

f.) (2) + (-6)

Use the two-colored chips to investigate the following questions and then write the answers to the given situations. You may draw an example showing the use of the two-colored chips to explain your answers.

2. Is the sum of two positive integers positive or negative? How do you know? Give an example.

3. Is the sum of two negative integers positive or negative? How do you know? Give an example.

4. When is the sum of a positive integer and a negative integer:
        a.) positive?

        b.) negative?

        c.) zero?

What patterns do you see?

When we add **two positive numbers**, what do we do?

When we add **two negative numbers**, what do we do?

When we add **two numbers with different signs**, what do we do?