

## Figure 8.3. Operating on Integers Lesson Plan – Day 1

Date: 10/10

Standards:

Understand that positive and negative numbers are used together to describe quantities having opposite directions or values.

Highlighted Standards for Mathematical Practice:

SMP4: Model with mathematics.

SMP5: Use appropriate tools strategically.

SMP6: Attend to precision.

SMP8: Look for and express regularity in repeated reasoning.

**Know:**

- Vocabulary: absolute value, integer, negative, number system, opposite, positive, zero pair
- The layout of a number line
- How to model integers and integer operations with two-colored counters and number lines
- Notation of absolute value and integers

**Understand:**

- A negative in mathematics always means “the opposite.”
- Any number is a member of one or more number systems, and each number system has clearly defined properties including basic operations.

**Be able to Do:**

- Model integers and integer operations in different ways
- Explain the relationships between positive and negative numbers

Whole Class:

1. Ask students to find a partner and brainstorm everything they can think of that has to do with the words “positive” and “negative.” It does not have to be only limited to math – it can be in their lives, other subjects, or anything at all they can think of. To record their ideas, choose one of the following (interest differentiation):

- Make a bulleted list

- Draw pictures
- Create a word splash
- Make a two-column table (+ and –)
- A record of your choosing other than we'll just remember.

Finally summarize, how can you explain the relationship between positive and negative? (Get students to the point of understanding they are opposite.)

## 2. Discussion and Notes:

- Numbers can also be positive and negative – and we just decided that this describes an opposite. So what is the opposite of 12? ( $-12$ ) What is the opposite of  $-6$ ? (6) In math, when you see a negative sign, you can think opposite. We will keep coming back to that idea.
- We describe situations with positive and negative numbers. For example, when you lose points on a test, you see “minus 1” which is written as  $-1$ . That is also a “negative 1.” If you give me \$5, I gained money and can write it as  $+5$ . Give several examples and ask students the number to describe the situation.
- Introduce Integers
  - Any number can be positive or negative, except for 0, which we say is neither positive or negative.
  - Positive and negative whole numbers and zero make up “integers.” Give examples of positive and negative numbers and have students say yes or no for integer.
  - All positive and negative whole numbers and fractions, and zero are called rational numbers – we'll talk about those next unit.

Note: With modeling below, show the notation of absolute value, negative numbers with parentheses as needed, and that we are really adding opposite numbers as an equation.

- Models for integers
  - Number line (work in definition of absolute value here)
  - 2-color counters
- Zero Pairs
  - Model with contexts
  - Model on number line
  - Model with counters

### Small Group:

Groups of 3 (choice of partners): Hands, brain and pencil activity. After each specific task, roles rotate so with each task students have a different job.

1. Model absolute values – brain tells hands what to do or write, pencil records the notation
  - a. Show an absolute value of 4 on number line (repeat twice to get both possibilities)
  - b. Show an absolute value of 8 with counters (repeat twice to get both possibilities)
2. Model making a zero and record the equation.
  - a. With a number line model, brain tells hands how to draw to make a zero pair with addition (repeat three times to have all students experience all three roles)
  - b. With two-color counters, brain tells hands how to draw to make a zero pair with addition (repeat three times to have all students experience all three roles)

3. As a group, come up with an explanation of how to “make zero.” You must use the three vocabulary terms: Absolute value, positive and negative.

Individual Exit Card:

Give two examples of making a zero:

1. Use a number line model and write the resulting equation.
2. Draw 2-color counters and write the resulting equation.

Formative Assessment: Teacher will rotate and provide feedback as groups are working on their tasks, and have them correct or extend their thinking in the moment.

Check for Understanding: Exit card

