Absolute Value of Integers

Strand: Number and Number Sense

Topic: Identifying and describing the absolute value of an integer

Primary SOL: 6.3 The student will

> c) identify and describe absolute value of integers.

Related SOL: 6.3a, 6.3b

Materials

- Index cards
- Tape
- Chart paper
- Markers
- Decks of playing cards
- Scissors
- Card stock (optional)
- Plastic snack bag (optional) or paper bag (optional)
- Sample Number Lines activity sheet (attached)
- Absolute Value Integer War activity sheet (attached)
- Absolute Value Integer War Scoring Chart (attached)
- True or False Sort activity sheet (attached)

Vocabulary

absolute value, integer, negative, opposite, positive, unit (earlier grades)

Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Place an X on the floor using tape (painter's tape or masking tape). Call up two students to engage in an interactive demonstration. One will stand to the left of the X and the other to the right of the X. Share with the students that X represents zero (0). Ask the two students to move so that they are equidistant to the X. The class will estimate the distance (in inches or yards) that each student is from the X. Then, ask, "If the two students were to switch places, would their estimation be different? Why or why not?" Next, measure how far each student is from the X and display the distance for each student. Ask students the following: Can distance ever be negative?

2. Distribute the Sample Number Lines activity sheet. Have students place a point at –12 on the number line labeled –20 to 20. Next, have students plot a point at its opposite (12). Ask students to count the number of units that both –12 and 12 are from zero (0). Provide students with three additional examples using the –10 to 10 and –5 to 5 number lines and display their responses. Students should discover that the given number and its opposite are the same distance from zero on a number line. Discuss with students that the absolute value of a number is the distance of that number from zero on the number line, regardless of direction. Absolute value is represented using the symbol $|\Box|$

(e.g., $|-6|=6$, $|6|=6$, and $6=|-6|$). The absolute value of zero is zero. Ask, "Why is the absolute value of a number positive?"

3. Following this discussion, provide a table similar to the one below that requires students to identify at least three integers, their opposites, and then each absolute value. Allow students to communicate their examples with a partner, small group, or through whole-group discussion.

Integer	Opposite	Absolute value

4. Distribute the True or False Sort activity sheet to students. Consider printing on card stock to increase durability. Have students either cut out each block with scissors, or precut them before the lesson. Place the sorting cards into a plastic snack bag or paper bag. Arrange the True and False cards such that they serve as headers to the given statements. Ask the students to sort the statement on the card under the True or False header. Once all cards are sorted, divide the class into small groups and assign each group a statement. Then, using chart paper, ask each group to justify their answers and to explain their reasoning.

5. Distribute the Absolute Value Integer War activity sheet and a deck of cards. Allow the students to play the game, share their responses, and then provide feedback to the class.

6. Integrate dynamic software to create a number line. Have students plot an integer and its opposite on the number line and then determine the absolute value of each integer. Draw students back to the discussion notes described in instruction 2 to justify their reasoning and their constructions.

Assessment

- **Questions**
    - What is the absolute value of a number?
    - Can the absolute value be a negative number? Why or why not? Explain your reasoning.
    - Is the opposite of a number the same as the absolute value of a number? Why or why not? Explain your reasoning.
    - Is the absolute value of zero equal to zero? Why or why not? Explain your reasoning.

- **Journal/Writing prompts**
    - Is $-|3|$ equivalent to $|-3|$? Why or why not? Explain your reasoning.
    - Create a situation in which you would need to use the absolute value of an integer.
    - Explain the difference between the absolute value symbol and parentheses.

- **Other Assessments**
  - o Task 1: Provide students with the following scenario:

    > Henry and Jenny were comparing two integers. Henry said, "My integer is greater than your integer." Jenny said, "That may be true, but the absolute value of my integer is greater than your integer."

    Locate Henry's and Jenny's integers on a number line and explain your reasoning. Ask students to then compare their answers with each other. Ask students to report out their observations as well as variations in responses.

  - o Task 2: Have students create three examples of absolute value of integers (e.g., $|-12|$, $|9|$, and $|0|$). Each example should be written on a separate index card. Next, students should engage in a "give one, get one" exchange of cards, in which they simplify each absolute value they receive. During this activity, pause intermittently to have students identify opposites with an equivalent absolute value (i.e., $|-10|$ and $|10|$).

Extensions and Connections (for all students)

  - o As an extension of the True and False activity, have each group engage in a gallery walk. Provide each group with a different colored marker in order to readily recognize group responses. Students may add any other justifications beyond the ones initially given on the chart paper or place a check mark if they agree with the given justification.

  - o As an extension of Task 2, have students make connections to the related SOL by ordering and comparing the absolute values of selected integers or by simplifying numerical expressions using absolute value as a grouping symbol.

Strategies for Differentiation

- Give students a number line with positive and negative integers. Students can place the end of a piece string on zero and cut the other to the length of a given number, such as 7. Keeping one end of the string at zero, rotate the piece of string to the other side of zero. The number the same length as the string has the same absolute value as the original number.

- Use a compass. Place one end of the compass on zero and place the pencil on a number line. Draw a circle. The distance of the circle from zero determines the absolute value.

- Use two color counters to plot points on a number line. Let one side represent a positive integer and the other a negative integer. Slide the two color counters an equal distance from zero. Have students to articulate the absolute value of the designated integers.

- Have students work with a partner to complete the True/False activity in the first half of the activity from step 4.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

Sample Number Lines
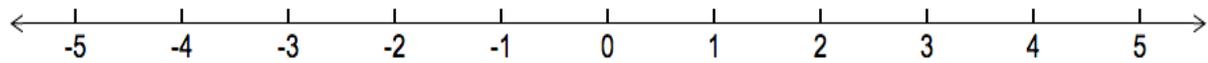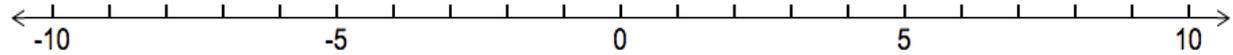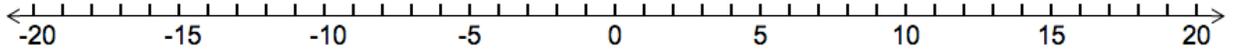
Absolute Value Integer War

Before beginning the game, players must determine the game type: whether the winner of each round will be the player with the greatest absolute value or the player with the least absolute value.

Deal the cards to each member of the group until all cards are used. Keep the cards facedown. Each black card represents a positive integer and each red card represents a negative integer. Aces equal one point; a jack is worth 10 points; a queen is worth 11 points; and, a king is worth 12 points. Remove the jokers from the deck of cards. Each player will lay a card face up at the same time, and the round winner will take all of the cards. After a player runs out of cards, they will mix up the cards they won and continue playing. At the end of the activity, the player with the most cards is the winner for the whole game. Use the Scoring Chart below to keep track of points by writing down the name of each winner after each round is played. For example:

Game Type: <u>Greatest absolute value</u>

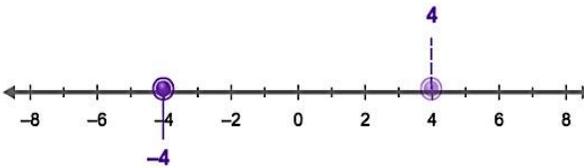Player 1 Name: John   Player 3 Name: Christopher
Player 2 Name: Sara   Player 4 Name: Jasmine

Winner	Player 1	Player 2	Player 3	Player 4
Jasmine	$|-5| = 5$	$|2| = 2$	$|1| = 1$	$|-12| = 12$

Absolute Value Integer War Scoring Chart

Game Type: _____

Player 1 Name: Player 3 Name:

Player 2 Name: Player 4 Name:

Winner	Player 1	Player 2	Player 3	Player 4

True or False Sort

TRUE	FALSE

-|8| = 8	The absolute value of –3 is equal to 3.
|5| = 5	|−15| = −15
The absolute value of –8 and the absolute value of 8 are equivalent.	9 = |9|
 These integers have equivalent absolute values.	The opposite of –1 does not have the same absolute value as –1.
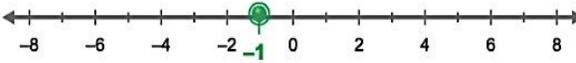
$\|0\| = 1$	The absolute value of $\|2\|$ is greater than the absolute value of $\|-2\|$.
$\|25\| < \|-25\|$	−17 and 17 are the same distance from zero on a number line. Therefore, the absolute value of both numbers is equivalent.
$\|-3\| > \|1\|$	If the absolute value of −9 is 9, then −9 has a greater absolute value than 4.