Investigation 3.1 Extending the Number Line: Integers and Mixed Numbers - Day 2

You can express the absolute value of a number two ways without words.

Remember that absolute value is always positive!

Absolute Value Bars

$$\left|2\tfrac{1}{2}\right| = 2\tfrac{1}{2}$$
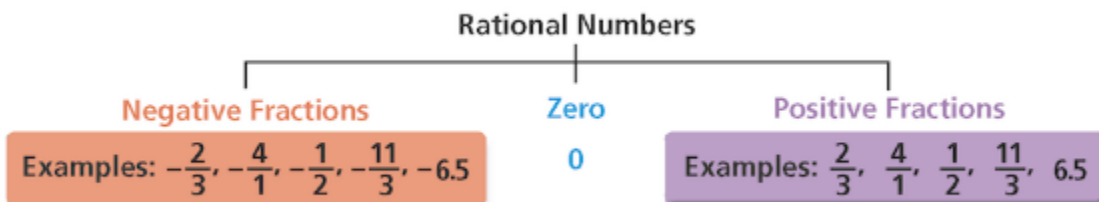
$$\left|-2\tfrac{1}{2}\right| = 2\tfrac{1}{2}$$

OR

Calculator Notation

$$\text{abs}\left(2\tfrac{1}{2}\right) = 2\tfrac{1}{2}$$

$$\text{abs}\left(-2\tfrac{1}{2}\right) = 2\tfrac{1}{2}$$

- What is the opposite of -2/3? **2/3**
- What is the opposite of 2/3? **-2/3**
- What is the absolute value of -2/3? **2/3**
- What is the absolute value of 2/3? **2/3**

- Zero, whole numbers, fractions, and their opposites are rational numbers.
    - Example of rational numbers: -9/5   -3   0   2/3   2 1/3
- Negative numbers can be improper fractions. Absolute value of improper fractions will be greater than or equal to 1.

Rational Numbers

Negative Fractions

Examples: $-\tfrac{2}{3}, -\tfrac{4}{1}, -\tfrac{1}{2}, -\tfrac{11}{3}, -6.5$

Zero

0

Positive Fractions

Examples: $\tfrac{2}{3}, \tfrac{4}{1}, \tfrac{1}{2}, \tfrac{11}{3}, 6.5$

Question 1: What numbers have an absolute value of one?

Answer 1: 1 and -1

Question 2: How many numbers have an absolute value of 5/4?

Answer 2: Two numbers

Question 2 Part 2: What are the two numbers?

Answer 2 Part 2: 5/4 and -5/4

Question 3: How many numbers have an absolute value of 0?

Answer 3: One number, 0.

Example 1: Aaron is playing a video game in which he earns points for a correct answer and loses the same number of points for an incorrect answer.

Part A Question: Aaron has 0 points. The next question is worth 300 points. Aaron says, "It doesn't matter whether I get the answer right or wrong, the absolute value of my score will be 300."

Do you agree with Aaron? Why or why not?

Part A Answer: Aaron is correct. If he gets the answer right, he will have 300 points. If he gets the answer wrong, he will have -300 points. The absolute value of each of these number of points is 300.

Part B Question: Later in the game Aaron's score is back to zero. He then answers two more questions and his score is back to zero again. What could be the point values of the last two questions?

Part B Answer: The point values of the questions could be any pair of opposites.

Evaluating Absolute Value

1.) $|5| = 5$

2.) $|-11| = 11$

3.) $|-1 \; 2/3| = 1 \; 2/3$

4.) $|2| = 2$

5.) $|-7 \; 1/2| = 7 \; 1/2$

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Solving Problems Involving Absolute Value

1.) $|-8| + |-14| = 8 + 14 = 22$

2.) $|-7| + |-11| = 7 + 11 = 18$

3.) $|-41| - |18| = 41 - 18 = 23$