Understanding Positive and Negative Numbers

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Numbers aren't just the counting numbers we know - they can go in both directions! Just like an elevator can go up above ground level or down below ground level, numbers can be positive (above zero) or negative (below zero).

Real-World Connection: Imagine you're a video game character exploring a magical tower. You start on the ground floor (0). When you climb stairs, you go to floors 1, 2, 3, and higher - these are positive numbers! But this tower also has basement levels for treasure hunting. When you go down, you reach floors -1, -2, -3, and lower - these are negative numbers! The deeper you go, the more negative the number becomes.

The Number Line: Your Mathematical Map

A number line is like a horizontal thermometer or ruler that shows all numbers in order. Zero sits in the middle, positive numbers extend to the right, and negative numbers extend to the left. The farther right you go, the larger the positive number. The farther left you go, the smaller (more negative) the number becomes.

Example 1: Draw a number line and locate the numbers: 3, -2, 0, 5, -4

Solution: Draw a horizontal line with arrows on both ends. Mark zero in the center. Count 3 spaces right for +3, 2 spaces left for -2, 5 spaces right for +5, and 4 spaces left for -4.

Moving right from zero gives us positive numbers, while moving left gives us negative numbers. Each space represents one unit.

Example 2: Which number is larger: -3 or -7?

Solution: -3 is larger than -7

On a number line, -3 is to the right of -7. Numbers to the right are always larger. Think of temperature: -3°F is warmer (larger) than -7°F!

Key Points:
* Zero is neither positive nor negative
* Numbers get larger as you move right
* Numbers get smaller as you move left
* Negative numbers are written with a minus sign (-)

Opposites: Perfect Number Pairs

Every number (except zero) has an opposite that is exactly the same distance from zero but on the opposite side. Opposites are like mirror images across zero. When you add a number and its opposite together, you always get zero!

Example 1: What is the opposite of +8?

Solution: The opposite of +8 is -8

Both +8 and -8 are exactly 8 units away from zero, just in different directions. They are the same distance but opposite sides of zero.

Example 2: What is the opposite of -12?

Solution: The opposite of -12 is +12 (or just 12)

The opposite of a negative number is positive. Both numbers are 12 units from zero but on opposite sides.

Example 3: A submarine dives 50 feet below sea level (-50 feet). Later, it rises to the opposite position. Where is it now?

Solution: The submarine is now 50 feet above sea level (+50 feet)

The opposite of -50 is +50. Sea level is like zero on our number line.

Key Points:
* Opposites are the same distance from zero
* The opposite of a positive number is negative
* The opposite of a negative number is positive
* Zero is its own opposite

Absolute Value: Distance from Home Base

Absolute value tells us how far a number is from zero, regardless of direction. It's always positive or zero because distance is never negative! We write absolute value using two vertical bars around the number, like this: |number|. Think of it as asking 'How many steps from zero?'

Example 1: Find |+7|

Solution: |+7| = 7

The number +7 is exactly 7 units away from zero on the number line, so its absolute value is 7.

Example 2: Find |-9|

Solution: |-9| = 9

The number -9 is exactly 9 units away from zero (just in the negative direction), so its absolute value is 9.

Example 3: The temperature dropped to -15°F. What is the absolute value of this temperature, and what does it represent?

Solution: |-15| = 15. This represents that the temperature is 15 degrees away from 0°F.

Absolute value shows the distance from zero without caring about the direction (positive or negative).

Key Points:

* Absolute value is always positive or zero
* It measures distance from zero
* Use vertical bars | | to show absolute value
* Opposite numbers have the same absolute value

Vocabulary

Integer: Whole numbers that can be positive, negative, or zero (...-3, -2, -1, 0, 1, 2, 3...)
Positive Number: A number greater than zero, located to the right of zero on a number line
Negative Number: A number less than zero, located to the left of zero on a number line
Number Line: A horizontal line that shows numbers in order, with zero in the middle
Opposite: Two numbers that are the same distance from zero but on different sides
Absolute Value: The distance a number is from zero on a number line, always positive or zero

Summary:

We've discovered that numbers extend in both directions from zero! Positive numbers go right, negative numbers go left, and every number (except zero) has an opposite. The number line helps us visualize and compare all integers, while absolute value tells us how far any number is from zero. These concepts help us understand real situations like temperature, elevation, and money - making math much more powerful and useful!

Try These:

1. Order these numbers from smallest to largest: -4, 2, -1, 0, 3

   Answer: _____

2. What is the opposite of -25?

   Answer: _____

3. Find the absolute value: |-8| + |+3|

   Answer: _____

4. An elevator starts at floor 0, goes down 3 floors, then up 5 floors. What floor is it on now?

   Answer: _____