

Grade 6: Working with Integers

Math Background around Integers: <https://knowledgehook.docsend.com/view/inns6e3>

Misconceptions Representing, Comparing and Adding Integers: <https://knowledgehook.docsend.com/view/943eyd2>

Learning Goal: We want students to understand... - They can read and represent integers. - They can compare and order integers, decimal numbers and fractions separately and in combination. - They can plot and read coordinates in all four quadrants of a Cartesian plane and describe translations Success Criteria: - I can read and represent integers, using horizontal and vertical number lines. - I can compare and order integers, decimal numbers and fractions separately and in combination. - I can plot and read coordinates in all four quadrants of a Cartesian plane and describe translations	Expectations: B1.2, B1.3, E1.3 B1.2 read and represent integers, using a variety of tools and strategies, including horizontal and vertical number lines B1.3 compare and order integers, decimal numbers, and fractions, separately and in combination, in various contexts E1.3 plot and read coordinates in all four quadrants of a Cartesian plane, and describe the translations that move a point from one coordinate to another Key Concepts 1. The negative integers are the “opposites” of the whole numbers. Each integer is the reflection of its opposite across a line perpendicular to and cutting the number line in 0. 2. Integer operations are based upon the zero principle, the fact that $(-1) + (+1) = 0$ 3. The meanings for the operations that apply to the whole numbers, fractions and decimals also apply to negative integers. Each meaning can be represented by a model, although some models suit some meanings better than others.
Mind’s On: Where do you see or hear positive and negative numbers being used? Search in Google for Images of “Real Life Integers” (as a class or student led) Discuss with a partner one of the images and explain how the integers work. For example with temperature, when it is below zero or in the “minuses”, water freezes. When it is above zero in the “pluses” it is above freezing. • Temperatures • Floors below or above a main floor • Being below or above sea level or ground level • Golf scores below or above par • Being in debt or not Teacher note: When students are first starting to learn integers, it is encouraged to write a raised + or - sign or brackets around the number to write an integer, to make the distinction	Action! Activity: 1) Show/Provide a four quadrant Cartesian Plane. Have students plot points for which the first coordinate is the opposite of the second one. Join the points. What do you notice? https://drive.google.com/file/d/1HWAIFmDvUL9N0pc_I9oQSvTzIQ2S8CaU/view?usp=sharing 2) Provide students with for and against hockey scores for various teams. They can use positive numbers for goals scored and negative numbers for goals against and rank the teams based on these scores. (Put in pic of NHL standings) Teacher Notes: Principles for Comparing Integers <i>1. Any negative integer is less than any positive integer.</i>

between these symbols and operation symbols for addition and subtraction.
Source: Small, M. (2013) *Making Math Meaningful to Canadian Students, K-8*. Nelson Education (pp.324-325)

Every negative value is to the left of 0. Every positive value is to the right. Since the number line is built so that greater numbers are to the right, any positive integer must be greater than any negative number.

2.A positive integer closer to 0 is always less than a positive integer farther away from 0; for example, $+1 < +3$

0 is to the left of all the positive integers. So a positive integer closer to 0 is farther left than one farther from 0. Since it is farther left, it is less.

3.A negative integer closer to 0 is always greater than a negative integer farther away from 0; for example, $-7 > -10$

Zero Principle
Mathematicians have defined (-1) as the number that you add to $+1$ to result in 0; that is, by definition, $(-1) + (+1) = 0$. This is referred to as the zero principle and is the foundation for computations involving negative numbers. As a consequence of this definition, any number can be added to its opposite to result in a value of 0.

Manipulatives and Tools:

Consolidation Ideas - Connected back to the Learning Goal:
- Demonstrate ranking of hockey scores by using number line to compare for and against numbers(tiles or algebra tiles app). (See knowledge hook math background)

Independent Task / Assessment Opportunities:
Knowledge Hook Activity: <https://app.knowledgehook.com/app/Activity/d85f1456-bd08-eb11-974c-0050568c42b6>

Student Self Assessment: https://docs.google.com/document/d/17GcyC2TSmljE5_VX4m9xEnHvFDt_kN_KcujFnypypZR4/edit?usp=sharing
Teacher Rubric: https://docs.google.com/document/d/1C28aCyHpZFAwz6C7AGxu_hAvPTSUKbHtNvH3R-d9yDM/edit?usp=sharing

Game: Number Balls: Ordering Integers: https://www.mathplayground.com/mobile/numberballs_fullscreen.htm