Positive or Negative?

Strategies for Teaching Integers

NCTM Conference 2018
Washington DC

Hello!

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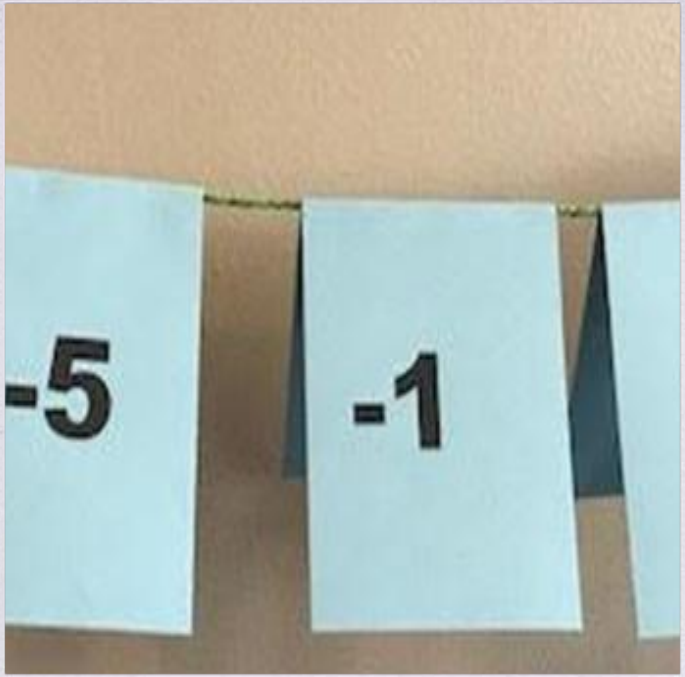


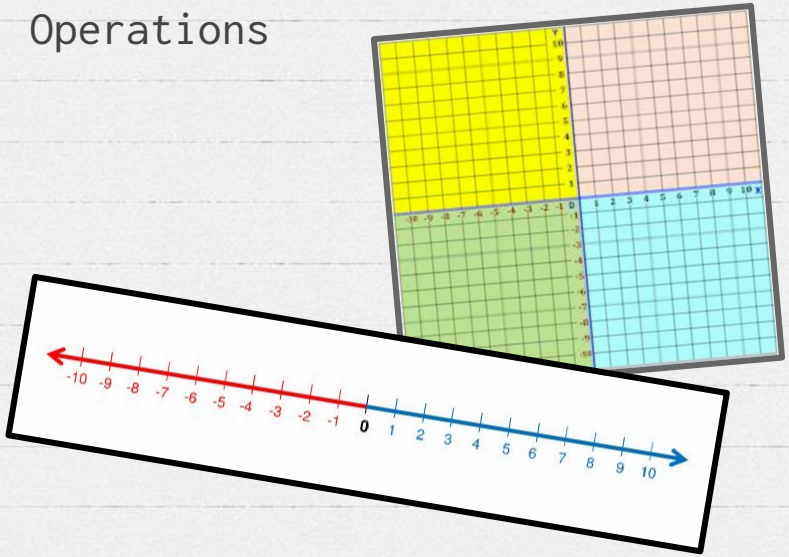
Clothesline Math

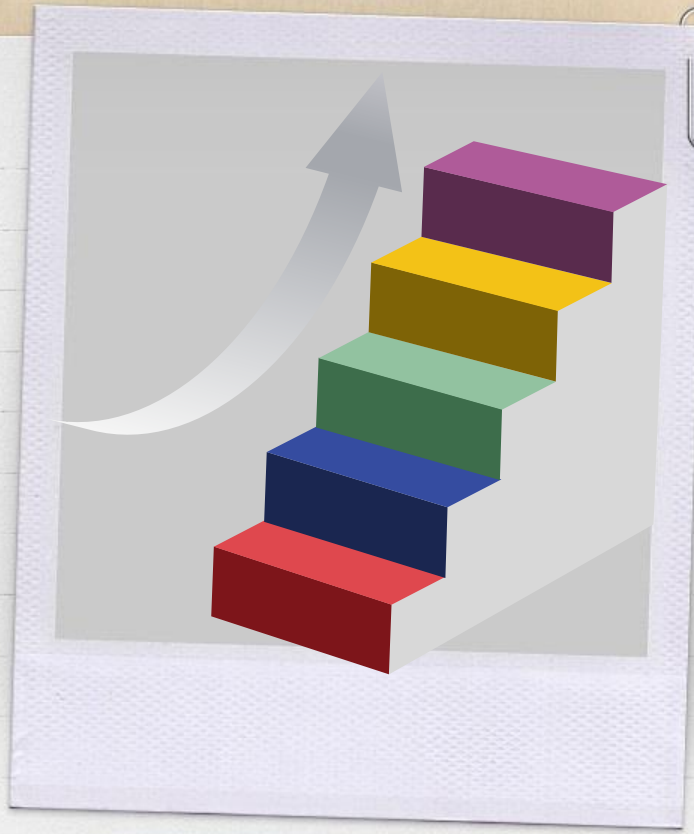
Why Integers?

Rationale

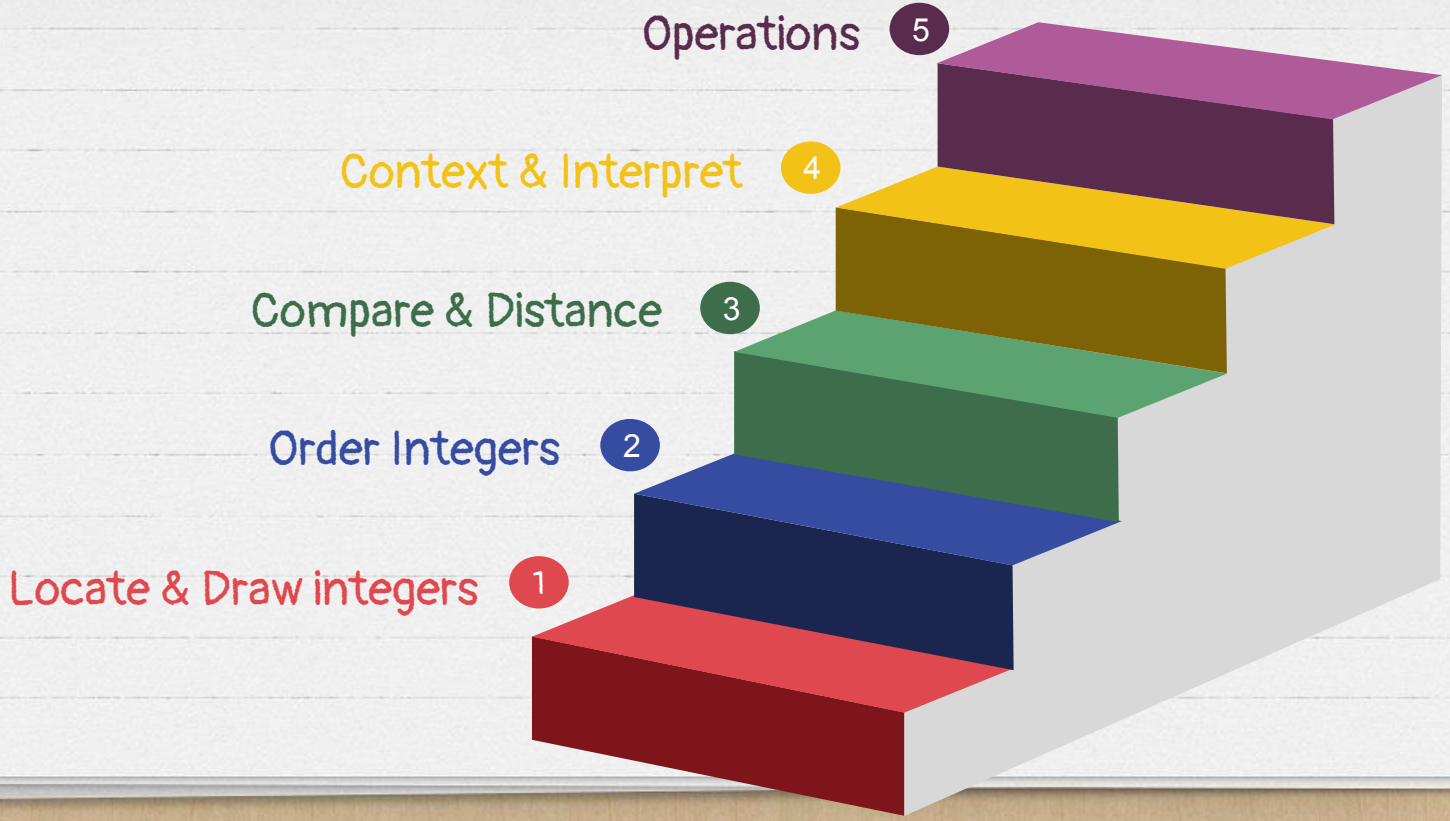
Groundwork for Integers

Conceptual Development of Integer Operations

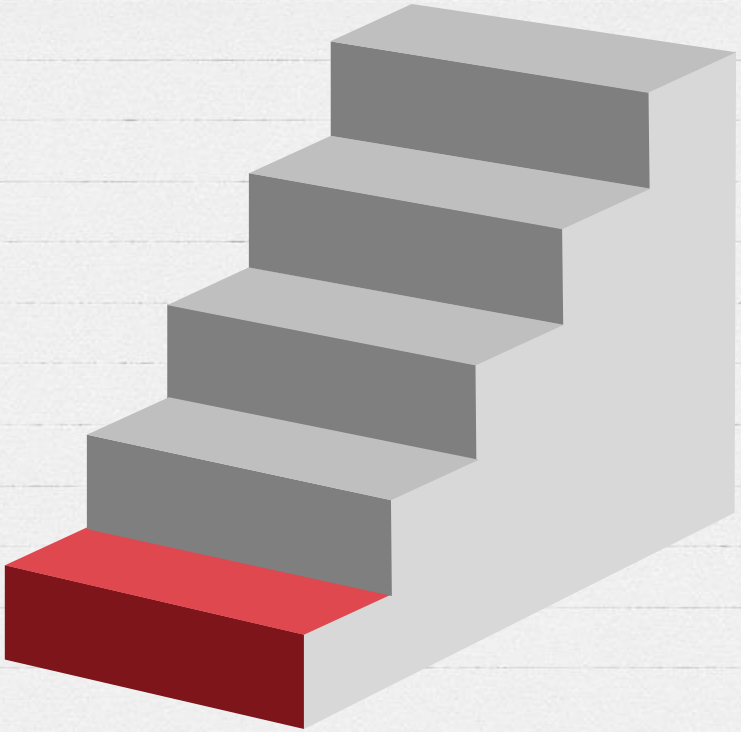




Groundwork for Understanding Integers



Locate and Draw Integers on a Number Line



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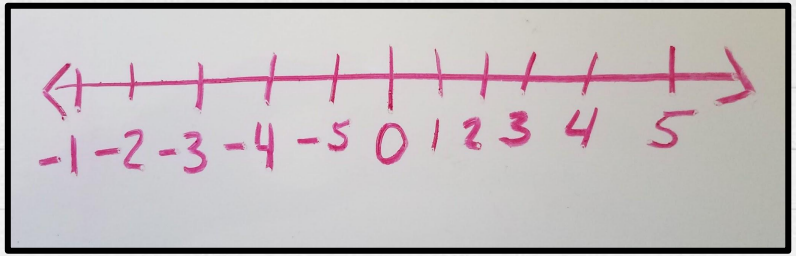
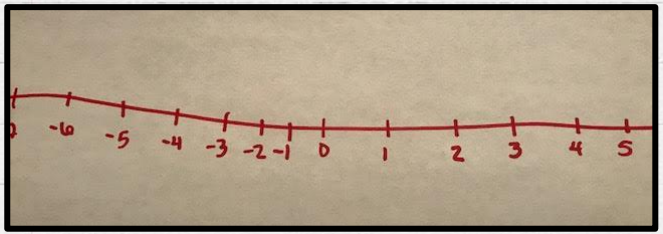
Grade 6 Standard

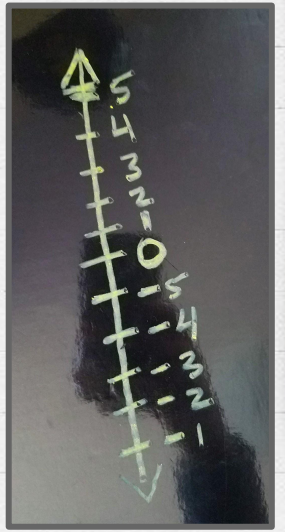
Understand a rational number as a point on a number line.

Find and position number on a number line.





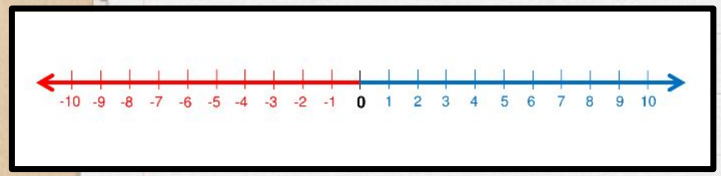
If we don't catch this misconception at the beginning we are setting them up for additional problems as we move through the standards.

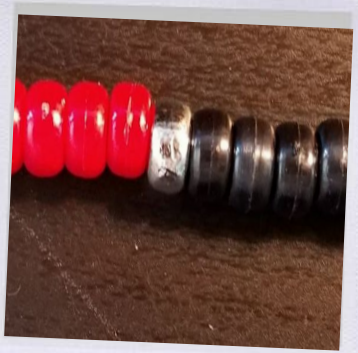


Integer Misconceptions in this Step:

- Drawing a numberline
- Distance from zero

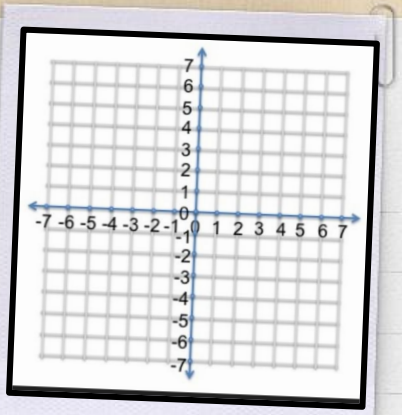
Create Opportunities to Explore the Structure of Number Lines

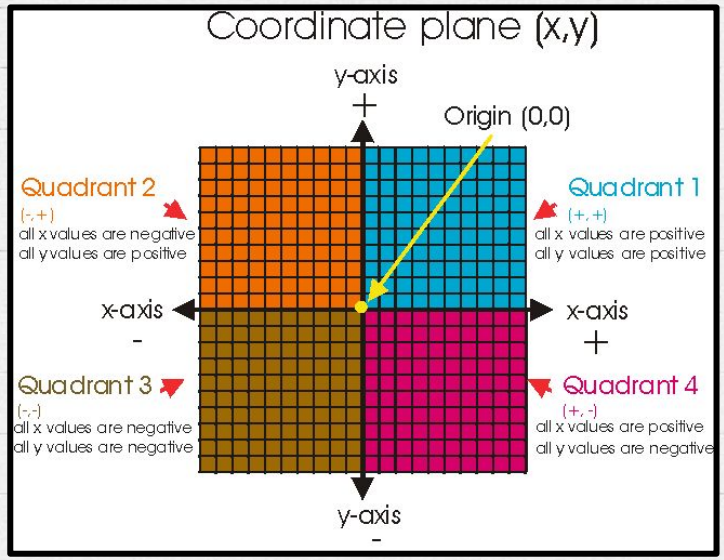




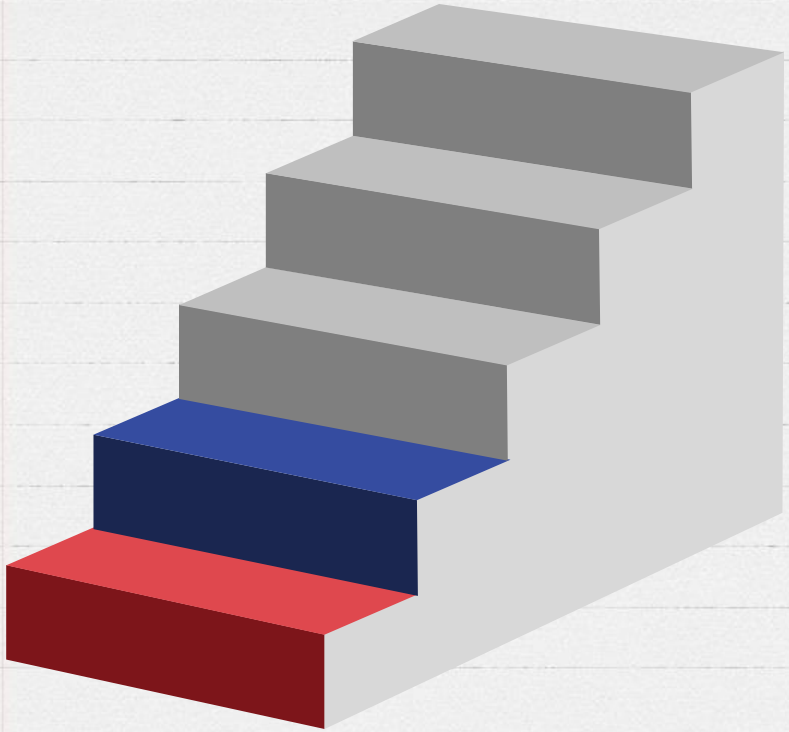
Beaded Number Line

Create Opportunities to Explore the Structure of the Coordinate Grid





Order Integers



2 Grade 6 Standard

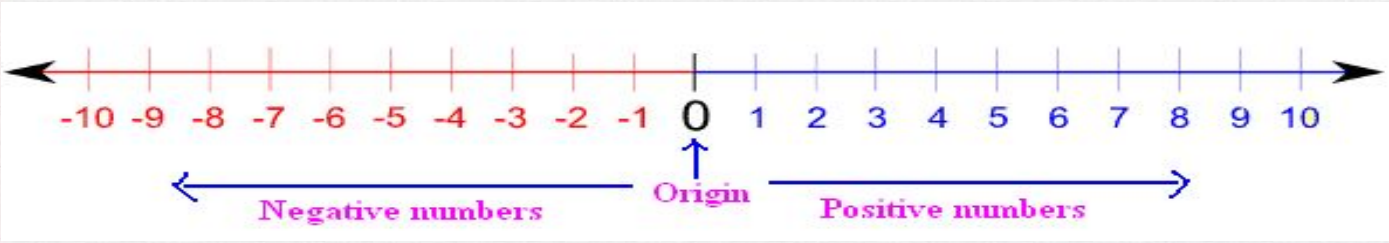
Write, interpret, and explain statements of order of rational numbers in real-world contexts.

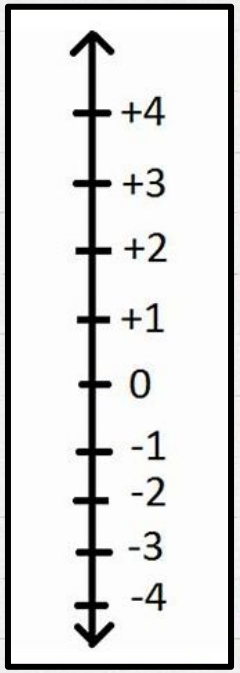
Create Opportunities to Order Integers

This can be as simple as giving students a list of integers to order on a horizontal and vertical number-line (beaded or otherwise). Or you can provide a context like:

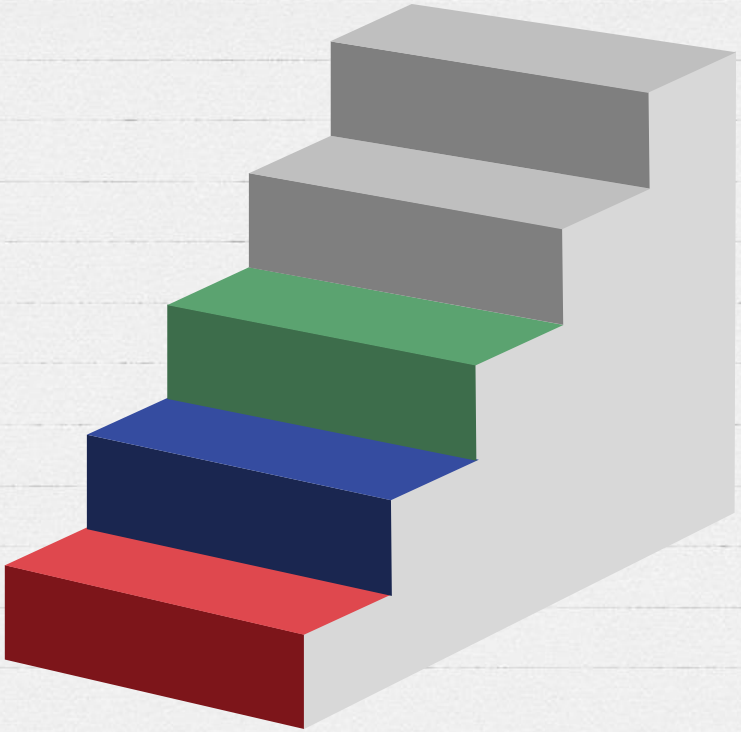
In which situation would you have the least amount of money?

a. You deposit $28
b. You withdraw $52
c. You spend $45
d. You earned $78





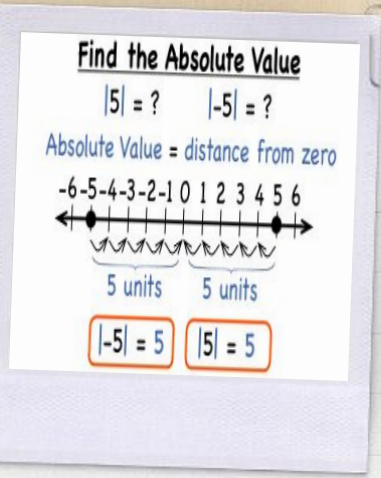
Compare Integers and Understand Absolute Value



3 Grade 6 Standard

Understand absolute value as a magnitude for a positive and negative quantity in a real-world situation.

Absolute Value Misconceptions



Students may also think that taking the absolute value means to "change the sign of a number," which is true for negative numbers but not for positive numbers or 0.

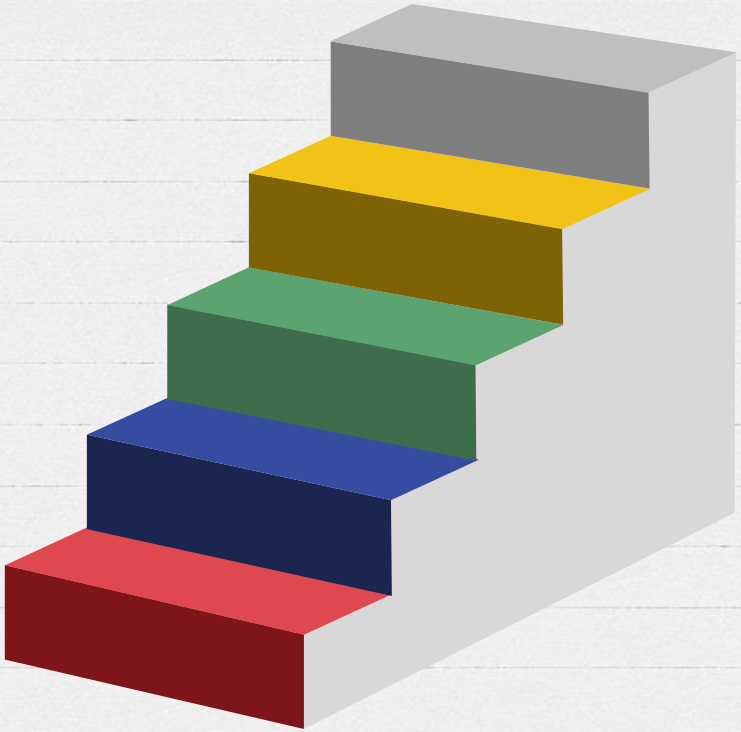
Positive Numbers	Absolute Value is positive
Negative Numbers	Absolute Value is positive

For negative numbers, as the value of the number decreases, the absolute value increases. Example:

–24 is less than –14. However, the absolute value of –24 is greater than the absolute value of –14 because it is farther from zero.

Create Opportunities to Understand Distance From Zero

Interpret Real-world Contexts with Integers



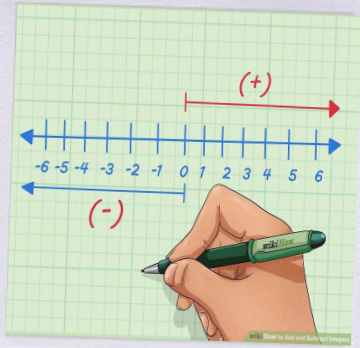
4 Grade 6 Standard

Solve real-world problems involving absolute value, coordinate plane, and ordering.

Same but Different Math

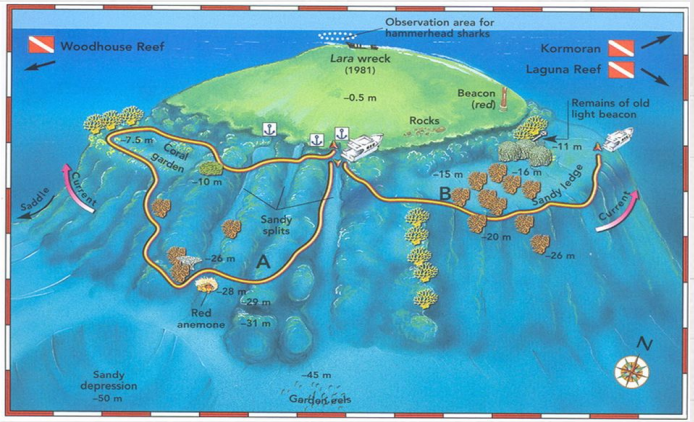
Monday it was 23 degrees. Tuesday the temperature fell to -5.

Wednesday the temperature was -5 degrees. Thursday the temperature was 23 degrees.

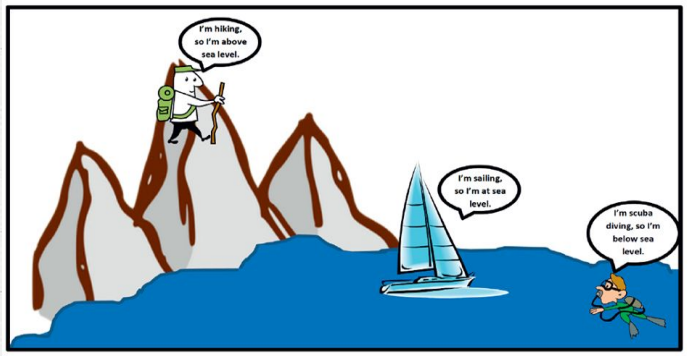


Want to know more about Same but Different Math? Visit: https://www.samebutdifferentmath.com/

Picture It!

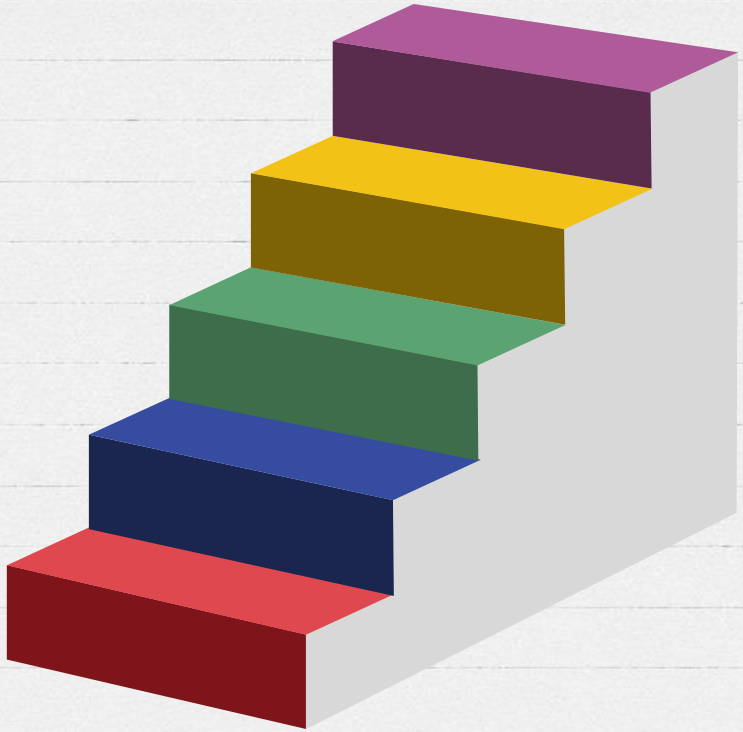


Choose two pictures. For each picture write a description of where the positive and negative numbers would be represented.



Images available at www.looneymathconsulting.com

Operations with Rational Numbers



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Grade 7 Standard

Add, subtract, multiply , and divide rational numbers . Interpret sums, differences, products, and quotients by describing real world contexts.

Operations Misconceptions

$-4 \times -2 = -8$

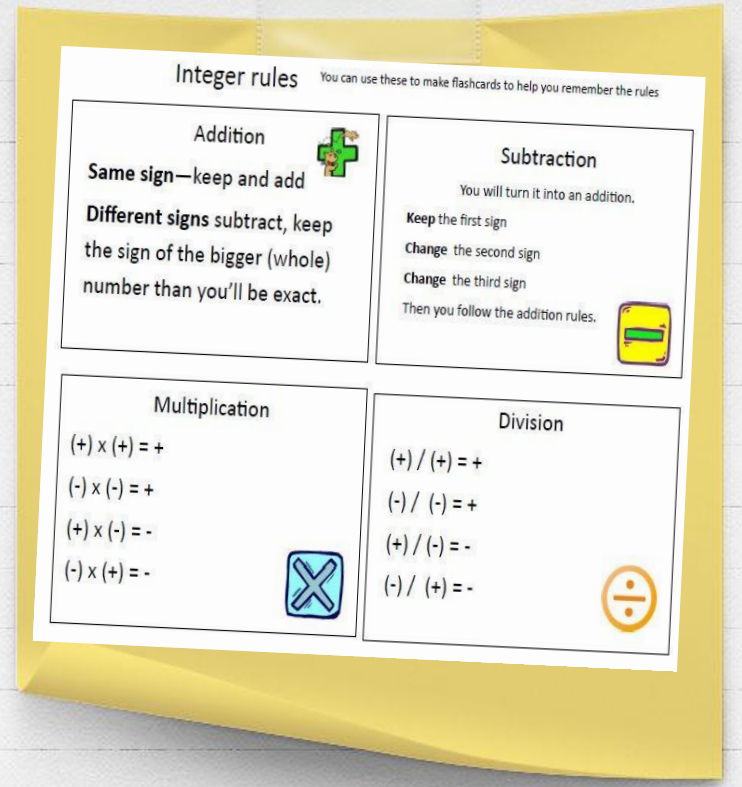
$-12/4 = 3$

$-5 + 1 = -6$

$-7 - (-8) = -15$

Since $6 - (-3) = 9$ then $-3 + (-4) = 7$ since two negatives make a positive.

Most misconceptions are really errors because they haven't conceptualized rules!

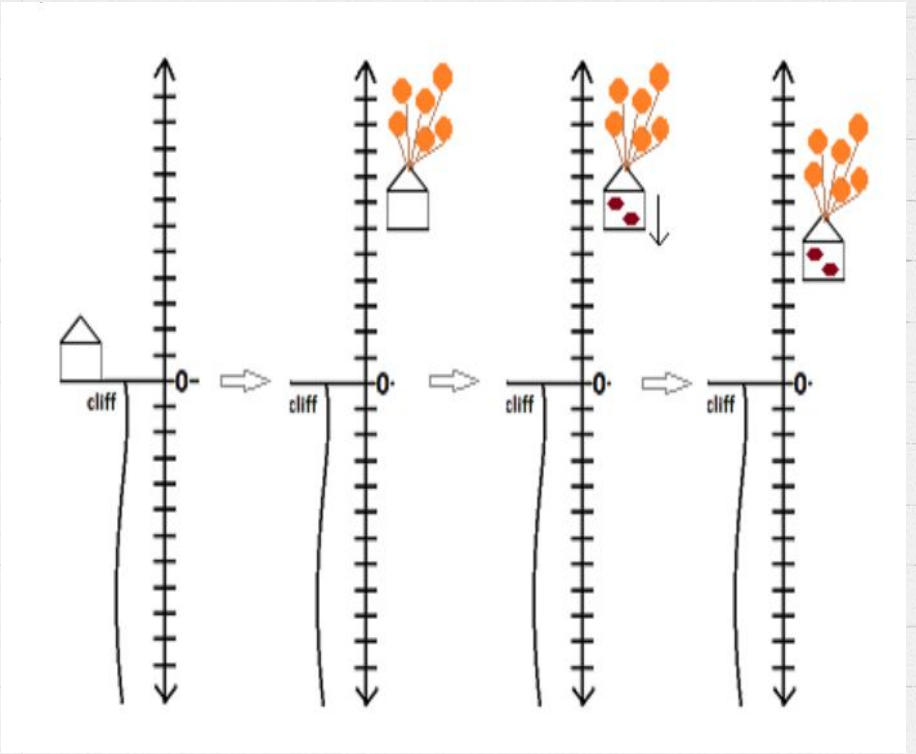


Understanding Addition and Subtraction

A man, Mr. Fredericksen, decides to go on an adventure by taking his house with him. In order to do that, he uses helium balloons to help his house float. To lower the house, he either cuts away some balloons, or uses sandbags to help weigh his house down even more.

The movie: UP!

Balloons & Sandbags



$6 + (-2)$

Taken from an Illuminations lesson. https://illuminations.nctm.org/lesson.aspx?id=4086

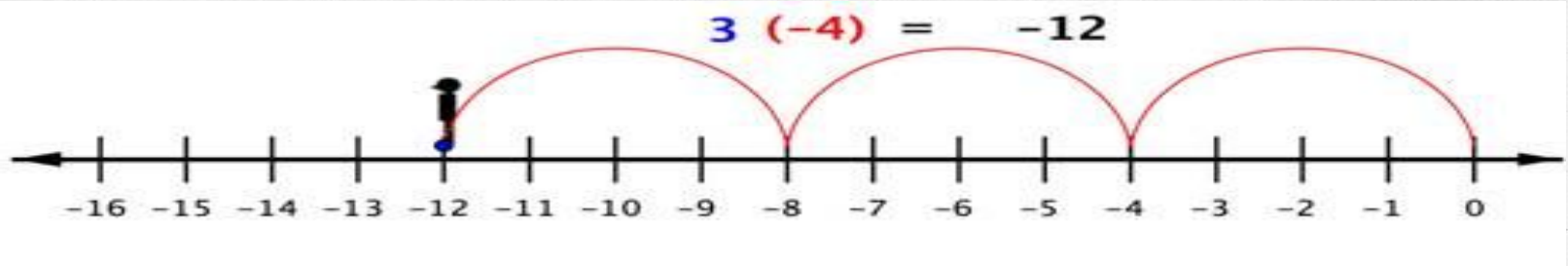
Multiplication

3 x 4 = 3 groups of 4

3 x -4 = 3 groups of -4

-3 x 4 = the opposite of 3 groups of 4

-3 x -4 = the opposite of 3 groups of -4



Thanks!

Any questions?

You can find us at:

- @hlsabnani & @molly_math
- www.looneymathconsulting.com

Resources We Like

- www.samebutdifferentmath.com
- http://www.softschools.com/math/number_line/integer_game/
- https://www.cde.ca.gov/ci/ma/cf/documents/mathfwgrade6lmg2.pdf
- https://illuminations.nctm.org/lesson.aspx?id=4086

- https://www.bigmarker.com/GlobalMathDept/A-Conceptual-Approach-to-Teaching-Integer-Operations

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