UNIT ONE: INTEGERS
Accentuate the Negative

Big Idea

For a given set of integers (…, -3, -2, -1, 0, 1, 2, 3…) there are relationships between positives and negative numbers that are always true, and these are the rules that govern arithmetic and algebra.

Enduring Understandings

- Numerical representations can be used to describe and compare the value of real-world quantities.
- Relationships exist between positive and negative integers.
- Applying number properties can simplify expressions.
- Absolute value is a number's distance from zero.
- Understand additive inverse and that opposite quantities combine to make zero.
- Understand subtraction of integers as adding the additive inverse and apply this to real world situations.
- Operations can be used to solve problems and equations with both positive and negative numbers.
- Solving real-world problems involves using all properties of operations and all integer rules.

Essential Questions & Khan Academy Links

- How can we predict that the sum of two integers is positive, negative or zero?
- What is the difference between the opposite and the absolute value of a number?
- How do we add integers with different signs?
- How can concrete and pictorial models represent operations with integers?
- How can any difference a – b of two integers be restated as an equivalent addition statement?
- How do we determine if the product or quotient of two integers is positive or negative?

Common Core Standards: Content & Skills

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

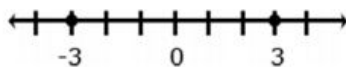|	
7.NS.1 Visit: U1L1 U1L2 Khan Academy	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.* Example -3 and 3 are shown to be opposites on the number line because they are equal distance from zero and therefore have the same absolute value and the sum of the number and its opposite is zero. b. Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of integers by describing real-world contexts. Example You have \$4 and you need to pay a friend \$3. What will you have after paying your friend? 4 + (-3) = 1 or (-3) + 4 = 1
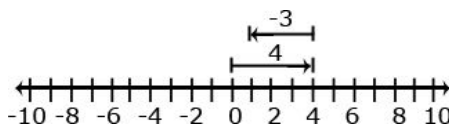
c. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two integers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

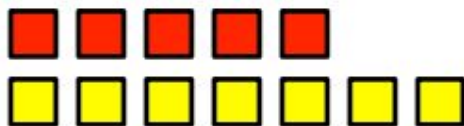d. Apply properties of operations as strategies to add and subtract integers.

<u>Example</u>
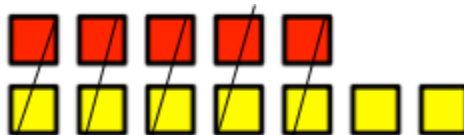*Algebra Tiles*

Key:
 Red Tile = - 1

 Yellow Tile = 1

Use algebra tiles to solve $7 + (-5)$:
Lay out 7 yellow tiles to represent +7 and then 5 red tiles to represent the action of adding -5.

Next, group zero pairs (where a negative cancels out a positive).

This leaves a solution of +2.

7.NS.2

Apply and extend previous understandings of multiplication and division to integers.

a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of integers by describing real-world contexts.
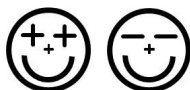
Equation	Number Line Model	Context
2 x 3 = 6		Selling two posters at $3.00 per poster
2 x -3 = -6		Spending 3 dollars each on 2 posters
-2 x 3 = -6		Owing 2 dollars to each of your three friends
-2 x -3 = 6		Forgiving 3 debts of $2.00 each

b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (–p)/q = p/(–q). Interpret quotients of integers by describing real world contexts.

c. Apply properties of operations as strategies to multiply and divide rational numbers.

Multiplying & Dividing Integers

1) Signs the same: answer is positive

$(+)(+) = (+)$ $(+) \div (+) = (+)$
$(-)(-) = (+)$ $(-) \div (-) = (+)$

2) Signs different: answer is negative

$(+)(-) = (-)$ $(+) \div (-) = (-)$
$(-)(+) = (-)$ $(-) \div (+) = (-)$

* Remember to work 2 numbers at a time *

Visit:

U1L3a

Khan Academy

7.NS.3

Visit:

U1L3b

Solve real-world and mathematical problems involving the four operations with rational numbers.

Examples
Your cell phone bill is automatically deducting $32 from your bank account every month. How much will the deductions total for the year?

-32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 = 12 (-32)

It took a submarine 20 seconds to drop to 100 feet below sea level from the surface. What was the rate of the descent?

$$\frac{-100 \text{ feet}}{20 \text{ seconds}} = \frac{-5 \text{ feet}}{1 \text{ second}} = -5 \text{ ft/sec}$$