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*Special Thanks to my daughter **Chloe** who helped select the images and created design the cover for this workbook! Thanks to my son **Breland** who inspired me to create this workbook when he was a 7th grader.*

Standard(s) 7.NS.1.A

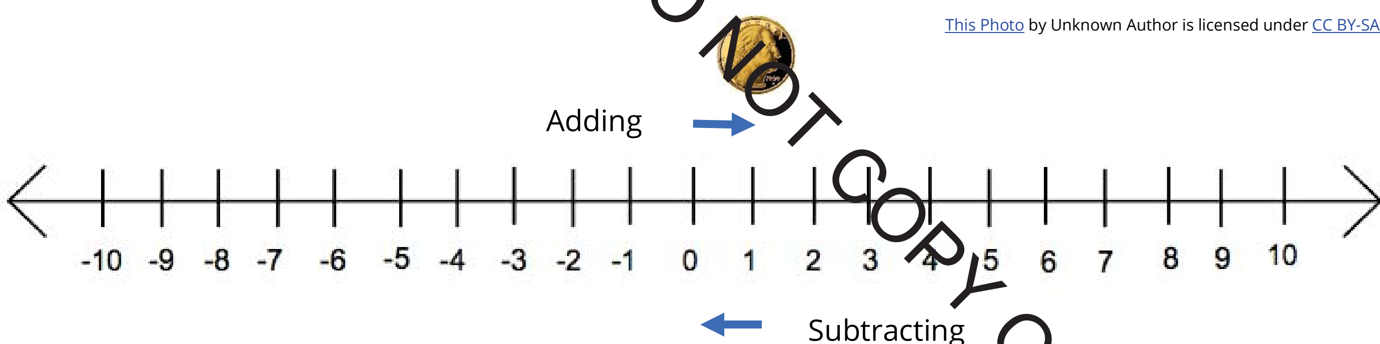
Describe situations in which **opposite quantities combine to make 0**. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged*.

7.NS.A.1.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 rational numbers by **describing real-world contexts.**

Let's say you add a penny to your piggy bank. You now have one cent in your piggy bank. If you then take away one penny from your piggy bank, you now have **zero** money in your piggy bank. Mathematically we can write this expression as **1 – 1 = 0**. Any amount can be added to the empty piggy bank, but if I subtract that same amount, I always get zero. **Subtract any number from itself, you get zero!**

I can also express this on a number line. In this case, you can see that the amount of money in the piggy bank started at zero (0), but when money was added, the total amount moved to the **right** of zero a **distance** of one unit. When money is taken out of the piggy bank, the total moves to the left based on the amount that was taken out.



What if you let the subtraction operation be expressed as a **negative number** that represents subtraction? What if you had an opposite coin, a coin that represents a negative amount instead of just a positive amount?

+1 plus -1 = zero

This is called a zero pair!

Even if you used the **commutative property of addition** to move the coins around, you still get **zero**.

-1 plus +1 = zero

Let’s Practice Now!

Use the number line provided. Mark the location of the first number on the number line, then draw an arrow in the **direction** of the operation with and **distance** of the second number. Then **draw zero pairs** that correspond to the problem to check your answer. No calculators here.

1-1 = -5 -4 -3 -2 -1 0 1 2 3 4 5 +1 plus -1 = 0	-1+1= -5 -4 -3 -2 -1 0 1 2 3 4 5	1+1-2= -5 -4 -3 -2 -1 0 1 2 3 4 5 +1 -1 +1 -1
2-2= -5 -4 -3 -2 -1 0 1 2 3 4 5	-2+2= -5 -4 -3 -2 -1 0 1 2 3 4 5	2+2-4= -5 -4 -3 -2 -1 0 1 2 3 4 5
3-3= -5 -4 -3 -2 -1 0 1 2 3 4 5	-3+3= -5 -4 -3 -2 -1 0 1 2 3 4 5	-3+1+2= -5 -4 -3 -2 -1 0 1 2 3 4 5
4-4= -5 -4 -3 -2 -1 0 1 2 3 4 5	-4+4= -5 -4 -3 -2 -1 0 1 2 3 4 5	-1-2+3= -5 -4 -3 -2 -1 0 1 2 3 4 5
5-5= -5 -4 -3 -2 -1 0 1 2 3 4 5	-5+5= -5 -4 -3 -2 -1 0 1 2 3 4 5	5-2+1-4= -5 -4 -3 -2 -1 0 1 2 3 4 5

Integer Rules for Addition and Subtraction

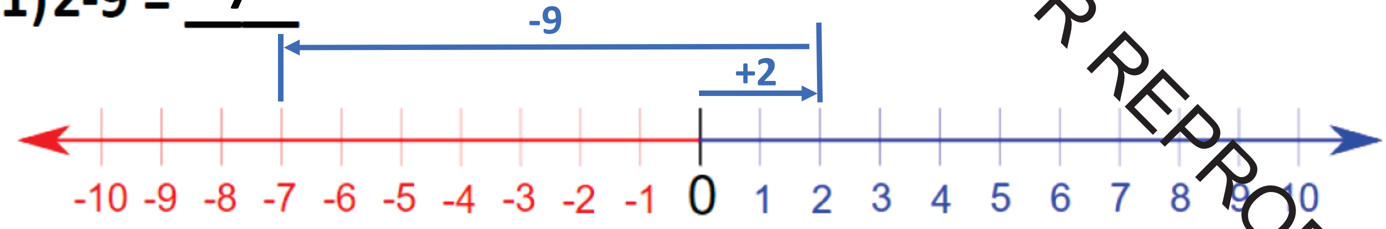
Problem	Means	Is the Same As	Is the Same As
2+(-3)	Adding a negative	2-3 Two minus three	Subtracting
2-(+3)	Subtracting a Positive	2-3 Two minus three	Subtracting
2+(+3)	Adding a Positive	2+3 Two plus three	Adding
2-(-3)	Subtracting a Negative	2+3 Two plus three	Adding

Graphing Integer Operations Using a Number Line

When graphing using a number line, always start the graph at zero (0). From there, draw an arrow in the direction and distance of the first number in the problem using an arrow and a vertical line. Then from there, draw another arrow in the direction and distance of the second number in the problem. If done correctly, where the arrow stops, should be the answer to the problem.

Let's look at problem #1.

1) 2-9 = <u>-7</u>



If we start from zero and go right to **positive 2**, then from positive 2 we go left to **negative 9**, we end up at **negative 7**. So, the answer is **-7**. You can verify this using your four-function calculator, using the keystrokes: [2] [-] [9] [=]

This same problem can be written in different forms using the rules for adding and subtracting integers.

For example, **2 – 9** can be written as **2 – (+9)** or **2 + (-9)**.

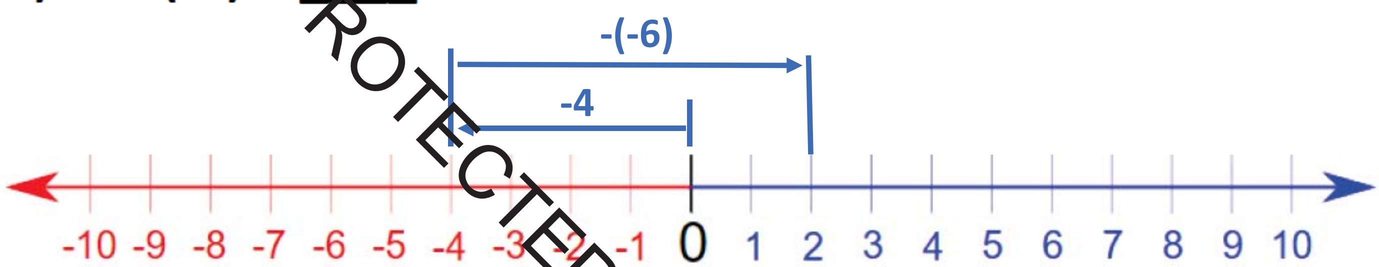
So, **-9** is the same as **– (+9)** or **+ (-9).**

Learn the rules and practice rewriting problems in different forms every time you work a problem.

Let's look at another problem (#2).

2)-4 – (-6) = <u>+2</u>

-(-6) is the same as +6



We can rewrite the problem as **– 4 + 6** or **– 4 + (+6)**. Again, we can check our calculations using a four-function calculator and keystrokes: [(-)] [4] [-] [(-)] [6] [=]

Some calculators require a different series of keystrokes: [4] [(-)] [-] [6] [(-)] [=]

Check the manufacturers guide or quick reference card for instructions on how to use your calculator.

Whenever possible, always practice using the same type of calculator you will have during your district or state assessments so you know what to do and what keys to press, in what order, when the time comes.