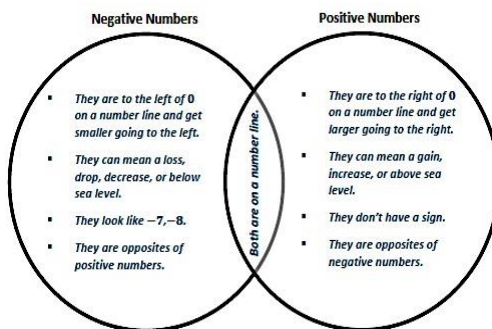


### Rational Numbers

In this 23-lesson module, students build on their understanding of rational numbers to add, subtract, multiply, and divide signed numbers. Students are also introduced to the Integer Game. This game helps students build their understanding of integer operations, among other strategies such as vector addition on the number line.

### Review of Positive and Negative Numbers



### Key Words

#### Additive Identity

The additive identity is 0 because adding zero in a sum does not affect the value of the sum, i.e.  $1+0=1$ ,  $5+0=5$ ,  $x+0=0$ , etc.

#### Additive Inverse

The additive inverse of a real number is the opposite of that number on the real number line. For example, the opposite of  $-3$  is 3. A number and its additive inverse have a sum of 0.

#### Break-Even Point

The break-even point is the point at which there is neither a profit nor loss.

#### Distance Formula

If  $p$  and  $q$  are rational numbers on a number line, then the distance between  $p$  and  $q$  is  $|p-q|$ .

#### Loss

A decrease in amount, as when the money earned is less than the money spent.

#### Multiplicative Identity

The multiplicative identity is 1 because multiplying 1 does not affect the value of any product, i.e.  $1x=1$ ,  $5x=5$ ,  $t \times 1=t$ , etc.

#### Profit

A gain, as in the positive amount represented by the difference between the money earned and spent.

#### Repeating Decimal

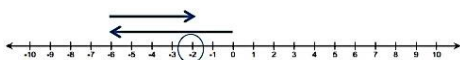
The decimal form of a rational number, for example,  $\frac{1}{3} = 0.3$ .

#### Terminating Decimal

A decimal is called terminating if its repeating digit is 0.

Below is an example of how to use a number line model to represent an expression.

$$-6 + 4$$



Start at 0. Move 6 units to the left to represent  $-6$ . Move 4 units to the right to represent 4. Your final value is  $-2$ .

#### What Came Before this Module:

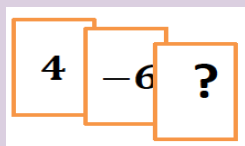
Students formed a conceptual understanding of integers through the use of the number line, absolute value, and opposites. Students also extended their understanding to include the ordering and comparing of rational numbers.

#### What Comes After this Module:

Students will use equivalent expressions to apply the properties of operations in order to write expressions in both standard form and in factored form. They also use algebraic reasoning with linear expressions, equations, and inequalities to solve various problems including a variety of geometric applications. Students use the number line to understand the properties of inequality and interpret solutions within the context of problems. Students will work with expressions and equations to solve problems involving area of a circle and composite area in the plane, as well as volume and surface area of right prisms.

### How can you help at home?

- ✓ Ask your child what they learned in school today and ask them to show you an example.
- ✓ In this module, your child learned how to play the Integer Game. Ask them to find the missing value of the card below if the total score equals 0. Have them explain how they determined the missing value.



### Key Common Core Standards:

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

- Add and subtract rational numbers and represent addition and subtraction on a horizontal or vertical number line diagram.
- Multiply and divide rational numbers.
- Solve real-world and mathematical problems involving the four operations with rational numbers.

Use properties of operations to generate equivalent expressions.

- Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

- Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

### Sprinting Towards Fluency!

Sprints help develop fluency, build excitement towards mathematics, and encourage students to do their personal best! They are not necessarily a competition among classmates, but a quest to improve upon a student's previous time, ultimately helping them achieve the desired fluency when they are working with numbers as well as provide a feeling of achievement when their second sprint shows improvement.

During the Sprint activity below, your role as the parent will be the same as the role of the teacher when the class is completing this activity. You will keep track of the time as well as be an exciting and encouraging coach for your child. You will give your child the following: a copy of Sprint A and Sprint B. You can make a copy of this newsletter or use the original and fold the newsletter in half so your child only sees one Sprint at a time. You can use a stopwatch to record the time. For these modified sprints, please give your child 15 seconds to complete the 11 problems. The answers for both Sprints are provided at the bottom of the newsletter.

## Timed Challenge:

## The SPRINT!

Can you beat your personal best?

## The Sprints!

Directions: Determine the difference of the integers.

A.

1.	$4 - 2$	
2.	$4 - 3$	
3.	$4 - 4$	
4.	$4 - (-1)$	
5.	$4 - (-2)$	
6.	$4 - (-3)$	
7.	$(-6) - 5$	
8.	$(-6) - 7$	
9.	$(-6) - 9$	
10.	$(-3) - (-2)$	
11.	$(-3) - (-3)$	

B.

1.	$3 - 2$	
2.	$3 - 3$	
3.	$3 - 4$	
4.	$3 - (-1)$	
5.	$3 - (-2)$	
6.	$3 - (-3)$	
7.	$(-8) - 5$	
8.	$(-8) - 7$	
9.	$(-8) - 9$	
10.	$(-5) - (-3)$	
11.	$(-3) - (-5)$	

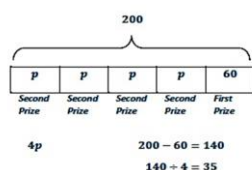
Below is a sample problem from the curriculum to show how an algebraic equation and tape diagram can be used to solve a problem. *Lesson 17 Problem Set Question 5*

**Problem:** Jackie won tickets playing the bowling game at the local arcade. The first time, she won 60 tickets. The second time she won a bonus, which was 4 times the number of tickets of the original second prize. All together, she won 200 tickets. How many tickets was the original second prize?

Algebraic Equation & Solution

First Prize: 60 tickets  
 Second Prize:  $p$  tickets  
 $4p + 60 = 200$   
 $4p + 60 - 60 = 200 - 60$   
 $4p + 0 = 140$   
 $(\frac{1}{4}) 4p = 140 (\frac{1}{4})$   
 $1p = 35$   
 $p = 35$

Tape Diagram



The original second prize was \$35.

### Answers for Sprint A and Sprint B

1.	2
2.	1
3.	0
4.	5
5.	6
6.	7
7.	-11
8.	-13
9.	-15
10.	-1
11.	0

1.	1
2.	0
3.	-1
4.	4
5.	5
6.	6
7.	-13
8.	-15
9.	-17
10.	-2
11.	2