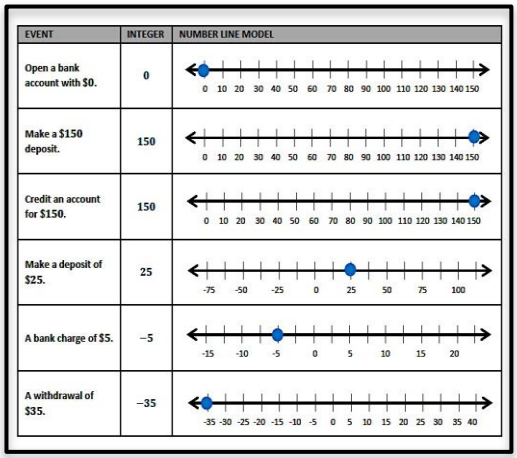
Eureka Math™ Tips for Parents

Grade 6
Module 3

Rational Numbers

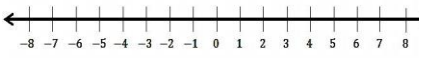
In this 19-lesson module, students extend the number line (both horizontally and vertically) to include the opposites of whole numbers. The number line serves as a model to relate integers and other rational numbers to statements of order in real-world contexts. Students also see how the number line model is extended to two-dimensions, use the coordinate plane to model, and solve real-world problems involving rational numbers.



EVENT	INTEGER	NUMBER LINE MODEL
Open a bank account with $0.	0	0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
Make a $150 deposit.	150	0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
Credit an account for $150.	150	0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
Make a deposit of $25.	25	-75 -50 -25 0 25 50 75 100
A bank charge of $5.	−5	-15 -10 -5 0 5 10 15 20
A withdrawal of $35.	−35	-35 -30 -25 -20 -15 -10 -5 0 5 10 15 20 25 30 35 40

Ask your child to put these five integers in order from least to greatest. Ask them to check their solution using a number line.

$$-6,\ 0,\ 3,\ -4,\ 7$$



What Came Before this Module:

Students completed their understanding of the four operations as they studied division of whole numbers, division by a fraction, division of decimals and operations on multi-digit decimals.

What Comes After this Module:

Students will extend their arithmetic work to include using letters to represent numbers. Students will explore letters as representations of numbers and see that arithmetic is carried out exactly as it is with numbers. Students will explore operations in terms of verbal expressions and determine that arithmetic properties hold true with expressions because nothing has changed and the arithmetic is the same. Students will determine that letters are used to represent specific but unknown numbers and are used to make statements or identities that are true for all numbers or a range of numbers.

Key Words

Absolute Value: The absolute value of a number is the distance between the number and zero on the number line. For example, $|3| = 3$, $|-4| = 4$, etc.

Charge: As in a *charge* to an account, or a fee *charged*, which is the amount of money a person must pay.

Credit: A decrease in an expense, as in money *credited* to an account. For instance, when a deposit is made into a checking account, the money is *credited* to the account. A credit is the opposite of a debit.

Debit: An increase in an expense or money paid out of an account. For instance, using a *debit* card to make a purchase will result in an expense, and money will be deducted from the related bank account.

Deposit: The act of putting money into a bank account.

Elevation: The height of a person, place, or thing above or below a certain reference level.
Integers: The numbers $\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots$ on the number line.

Magnitude: The absolute value of a measurement, given the measurement of a positive or negative quantity.

Negative Number: A number less than zero.
Opposite: In a position on the other side, as the negative numbers are the opposite direction from zero as the positive numbers.

Positive Number: A number greater than zero.

Quadrants: The four sections of the coordinate plane formed by the intersection of the axes.
Rational Number: A fraction or the opposite of a fraction on the number line.

Withdraw: The act of taking money out of a bank account.

How can you help at home?

- ✓ Every day, ask your child what they learned in school and ask them to show you an example.
- ✓ Ask your child to explain the difference between the opposite of a number and the absolute value of a number.
- ✓ Discuss the following questions with your child.

Where are negative numbers located on a horizontal number line?

Where are negative numbers located on a vertical number line?

What is the opposite of 2?

What is the opposite of 0?

Describe the relationship between 10 and −10.

Answers: On a horizontal number line, negative numbers are located on the left side of zero. On a vertical number line, negative numbers are located below zero. The opposite of 2 is −2, zero has no opposide and 10 and −10 are opposites.

Key Common Core Standards:

Apply and extend previous understandings of numbers to the system of rational numbers.

- Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
- Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
- Understand ordering and absolute value of rational numbers.
- Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

Jessie and his family drove up to a picnic area on a mountain. In the morning, they followed a trail that led to the mountain summit, which was $2,000$ feet above the picnic area. They then returned to the picnic area for lunch. After lunch, they hiked on a trail that led to the mountain overlook, which was $3,500$ feet below the picnic area.

a. Locate and label the elevation of the mountain summit and mountain overlook on a vertical number line. The picnic area represents zero. Write a rational number to represent each location.

picnic area: _____0_____

mountain summit: _____

mountain overlook: _____

b. Use absolute value to represent the distance on the number line of each location from the picnic area.

Distance from the picnic area to the mountain summit: _____

Distance from the picnic area to the mountain overlook: _____

c. What is the distance between the elevations of the summit and overlook? Use absolute value and your number line from part (a) to explain your answer.

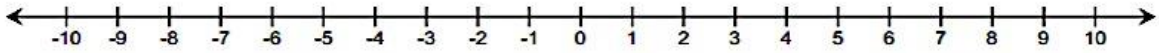
How do you use integers in your daily life?

With your child, discuss times throughout your day where you can use positive and negative numbers to represent a situation. For example, observe and discuss the temperature changes throughout the day or what it means when a football team gains/loses yards during a game.

Ordering Integers and Other Rational Numbers

Order the following set of rational numbers from least to greatest, and explain how you determined their order.

$$-3, 0, -\frac{1}{2}, 1, -3\frac{1}{3}, 6, 5, -1, \frac{21}{5}, 4$$



Solution:

$$-3\frac{1}{3}, -3, -1, -\frac{1}{2}, 0, 1, 4, \frac{21}{5}, 5, 6$$

I drew a number line and started at zero. I located the positive numbers to the right and their opposites (the negative numbers) to the left of zero. The positive integers listed in order from left to right are $1, 4, 5, 6$. And since $\frac{21}{5}$ is equal to $4\frac{1}{5}$, I know that it is $\frac{1}{5}$ more than 4 but less than 5. Therefore, I arrived at $0, 1, 4, \frac{21}{5}, 5, 6$. Next, I ordered the negative numbers. Since -1 and -3 are the opposites of 1 and 3, they are 1 unit and 3 units from zero but to the left of zero. And $-3\frac{1}{3}$ is even farther left, since it is $3\frac{1}{3}$ units to the left of zero. The smallest number is farthest to the left, so I arrived at the following order: $-3\frac{1}{3}, -3, -1, -\frac{1}{2}, 0, 1, 4, \frac{21}{5}, 5, 6$.