LESSON 7

Understand Addition with Negative Integers

Dear Family,

This week your student is exploring addition with integers. The set of integers includes all whole numbers and their opposites. They can be positive, negative, or zero.

Integers: 1, −4, 0, 107, −200 **Not Integers:** $-\frac{1}{3}$, 2.35, −0.75, $\frac{7}{5}$

Here are some examples of situations in which you might need to add integers:

- It is −8°F and the temperature increases by 15°F. What is the new temperature?
- A hiking trail starts at 150 feet below sea level and increases by 600 feet in elevation. What is the ending elevation?

You can add integers just like you can add whole numbers. If you add an integer to its opposite, the sum is 0. The integers −4 and 4 are opposites.

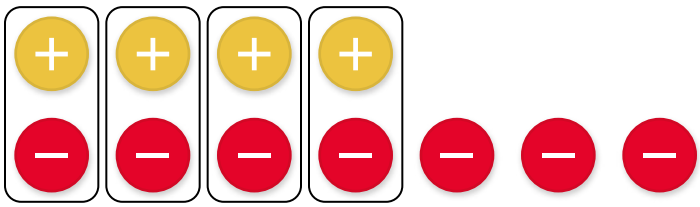
$4 + (-4) = 0$ $(-4) + 4 = 0$

Opposites, like 4 and −4, form **zero pairs** because their sum is 0.

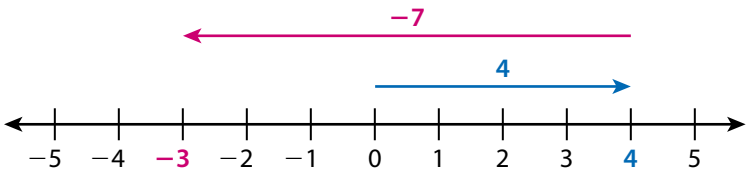
Your student will be modeling addition problems like the one below.

What is $4 + (-7)$?

➤ **ONE WAY** to model addition with negative integers is with integer chips.



➤ **ANOTHER WAY** is to use a number line. Move left to add a negative number.



Both models show that $4 + (-7) = -3$.

Use the next page to start a conversation about addition with negative integers.

Activity Thinking About Positive and Negative Numbers Around You

➤ **Do this activity together to investigate positive and negative numbers in the real world.**

Have you ever played a team sport and wondered how you impacted the game? Basketball has a statistic used to measure this called plus-minus.

To find a player's plus-minus, find how many points that player's team scored while the player was in the game. Then find how many points the other team scored during that same time, and write that as a negative number. Then add the two numbers.

So, if your team scores 10 points while you are in the game and the other team scores fewer than 10, your plus-minus is positive. But if the other team scores more than 10 points, your plus-minus is negative.

? What are other times that you combine positive and negative numbers in the world around you?

LESSON 9

Understand Subtraction with Negative Integers

Dear Family,

This week your student is exploring subtraction with negative integers.

Your student has already seen that subtracting a number and adding the opposite of that number have the same result.

Subtraction problem: $7 - 3 = 4$
Addition problem: $7 + (-3) = 4$
} same result

Now your student will see how to use this fact to subtract negative integers. The opposite of a negative integer is a positive integer. So, subtracting a negative number and adding a positive number have the same result.

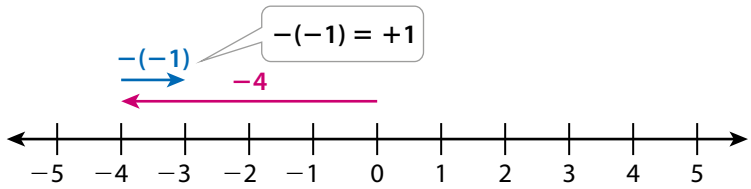
Subtraction problem: $7 - (-3) = 10$
Addition problem: $7 + 3 = 10$
} same result

Your student will be modeling subtraction problems with negative integers.

What is $(-4) - (-1)$?

➤ **ONE WAY** to model subtraction with negative integers is with integer chips.

➤ **ANOTHER WAY** is to use a number line. To show adding a negative number on a number line, draw an arrow to the left. To show subtracting a negative number on a number line, draw an arrow to the right.



Both models show that $(-4) - (-1) = -3$.

Use the next page to start a conversation about subtraction with negative integers.

Activity Exploring Subtraction with Negative Integers

➤ **Do this activity together to explore subtraction with negative integers.**

What do you notice about the two equations in each set?
How are the equations alike? How are they different?

SET 1

$(-6) - (-1) = -5$

$(-1) - (-6) = 5$

SET 2

$(-7) - 3 = -10$

$(-7) + (-3) = -10$

SET 3

$(-4) - (-12) = 8$

$(-12) + 8 = -4$

? Do you notice anything that is the same in two of the sets? In all of the sets?

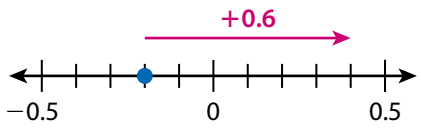
LESSON 10

Dear Family,

This week your student is learning about adding and subtracting positive and negative decimals and fractions.

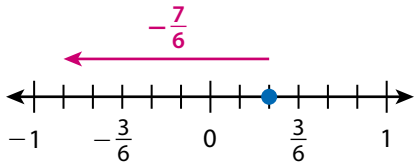
Your student has already learned to add and subtract integers. The strategies for adding and subtracting positive and negative decimals and fractions are similar to those for adding and subtracting integers.

Addition



$-0.2 + 0.6 = 0.4$

Subtraction

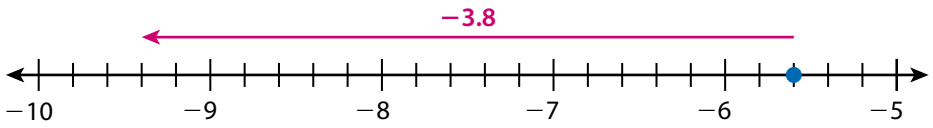


$\frac{2}{6} - \frac{7}{6} = -\frac{5}{6}$

Your student will be solving problems like the one below.

A manatee is swimming at −5.6 feet relative to sea level. It swims down 3.8 feet. What is the manatee's new elevation?

➤ **ONE WAY** to find the manatee's new elevation is to use a number line.



➤ **ANOTHER WAY** is to rewrite a subtraction problem as an addition problem.

$$\begin{aligned} -5.6 - 3.8 &= -5.6 + (-3.8) \\ &= [-5 + (-3)] + [-0.6 + (-0.8)] \\ &= -8 + (-1.4) \\ &= -9.4 \end{aligned}$$

Both ways show that the manatee's new elevation is −9.4 feet.

Use the next page to start a conversation about positive and negative numbers.

Activity Thinking About Positive and Negative Numbers Around You

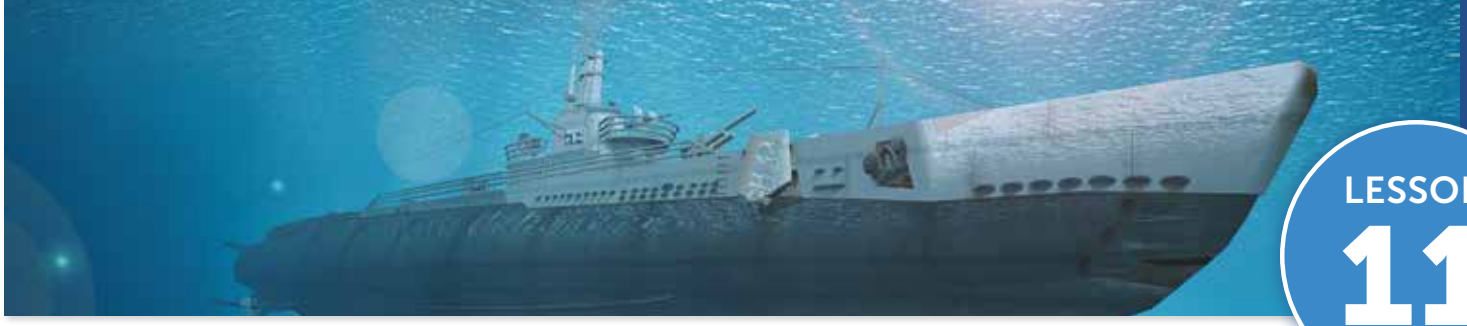
➤ **Do this activity together to investigate positive and negative numbers in the real world.**

The hottest temperature recorded in the United States was in California in 1913. It was 134.1°F!

In 1971, a settlement in Alaska reached −79.8°F. That is the coldest temperature recorded in the United States.

The difference between the hottest and coldest temperatures is 134.1 − (−79.8), or 213.9°F!

? Where else do you see positive and negative fractions and decimals around you?



LESSON 11

Understand Multiplication with Negative Integers

Dear Family,

This week your student is exploring multiplication with negative integers. Below are some examples of multiplying positive and negative integers that you may be familiar with.

- You can pay a bill by having the payment taken out of your bank account each month. To find the change in your account over several months, you can multiply the amount of the payment (negative) by the number of months (positive).
- A submarine's rate of change in elevation can be measured in feet per second. When it dives deeper, this rate is negative. You can multiply the rate (negative) by the amount of time it moves (positive) to find its change in elevation.

Your student will be modeling multiplication problems with negative integers like the one below.

What is $5 \cdot (-3)$?

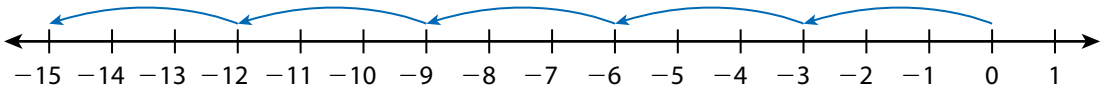
➤ **ONE WAY** to model multiplication with negative integers is with repeated addition.

Think of $5 \cdot (-3)$ as finding the sum of 5 groups of -3.

$(-3) + (-3) + (-3) + (-3) + (-3) = -15$

➤ **ANOTHER WAY** is to use a number line.

Each arrow represents adding one group of -3.



Both models show that $5 \cdot (-3) = -15$.

Use the next page to start a conversation about multiplication with negative integers.

Activity Seeing Patterns in Multiplication with Negative Integers

➤ **Do this activity together to look for patterns in multiplying negative integers.**

What do you notice about the factors and products in each set?
How are the equations alike? How are they different?

SET 1

$5 \cdot 7 = 35$

$5 \cdot (-7) = -35$

$-5 \cdot 7 = -35$

$-5 \cdot (-7) = 35$

SET 2

$9 \cdot (-3) = -27$

$-3 \cdot 9 = -27$

SET 3

$4 \cdot 2 = 8$

$4 \cdot 1 = 4$

$4 \cdot 0 = 0$

$4 \cdot (-1) = -4$

$4 \cdot (-2) = -8$

? Do you notice any similarities between two of the sets? Between all three?

LESSON 12

Dear Family,

This week your student is learning about multiplying and dividing negative rational numbers.

Your student has already learned to multiply and divide integers and positive **rational numbers**. Now your student will multiply and divide with all types of rational numbers, including negative fractions and decimals.

Every rational number can be written in the form $\frac{a}{b}$, where a and b are integers and b is not 0. Multiplying or dividing rational numbers is similar to multiplying or dividing integers.

- The **product of two positive numbers** is always **positive**.
- The **product of two negative numbers** is always **positive**.
- The **product of a positive number and a negative number** is always **negative**.

Your student will be solving problems like the one below.

> The shoreline at a local beach is receding by the same amount each year. Over 5 years, the width of the beach changes by $-12\frac{1}{4}$ ft. What is the yearly change in the shoreline?

ONE WAY to find the yearly change in the shoreline is to divide fractions.

$$-12\frac{1}{4} \div 5 = -\frac{49}{4} \div \frac{5}{1}$$
$$= -\frac{49}{4} \cdot \frac{1}{5}$$
$$= -\frac{49}{20}$$
$$= -2\frac{9}{20}$$

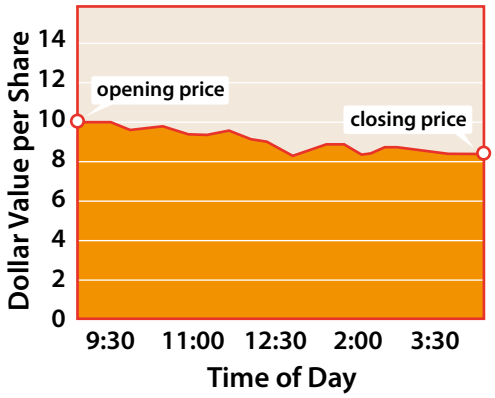
ANOTHER WAY is to divide decimals.

$$-12\frac{1}{4} \div 5 = -12.25 \div 5$$
$$= -2.45$$

Both methods show that the yearly change in the shoreline is $-2\frac{9}{20}$, or -2.45, ft. This means the shore is receding by an average of 2.45 ft each year.

Use the next page to start a conversation about rational numbers.

Activity Thinking About Multiplication and Division with Rational Numbers



➤ **Do this activity together to investigate multiplying and dividing rational numbers.**

Have you ever wanted to own a piece of your favorite company? Stocks let you own a piece, or a share, of a company.

Each day, the prices of stocks change depending on how the companies are doing. Suppose you own 6 shares of a company. On a given day, the change in the value of a share is -1.64. That means the change in the value of what you own is $6(-1.64) = -9.84$. So, your share of the company is worth $9.84 less.

? Where else might you multiply or divide with rational numbers in the world around you?