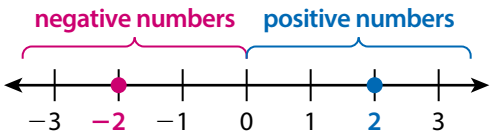
LESSON 23

Dear Family,

This week your student is learning about positive and negative numbers. **Positive numbers** have a value greater than 0. **Negative numbers** have a value less than 0.

Every positive number and negative number has an opposite. **Opposite numbers** are numbers that are the same distance from 0, but in opposite directions.



The numbers 2 and −2 are opposites.

The positive number 2 is sometimes written as +2.

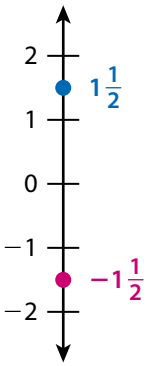
All whole numbers and their opposites are called **integers**. Every integer is also a **rational number**, meaning that it can be written as a positive or negative fraction with a whole-number numerator and denominator.

Your student will be modeling rational numbers like the ones below.

Show $1\frac{1}{2}$ and its opposite on a number line.

➤ **ONE WAY** to show a number and its opposite is to use a horizontal number line.

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



Both models show that $1\frac{1}{2}$ and its opposite, $-1\frac{1}{2}$, are the same distance from 0 and in opposite directions.

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.**

Mount Everest is the highest mountain in the world. It reaches a height of about 29,029 feet above sea level. The Dead Sea is the lowest point on land in the world. Its shore is about 1,410 feet below sea level. A point's position above or below a given level, such as sea level, is called its elevation. Positive and negative numbers can be used to represent elevations.

This means that Mount Everest has an elevation of $+29{,}029$ feet and the Dead Sea has an elevation of $-1{,}410$ feet.

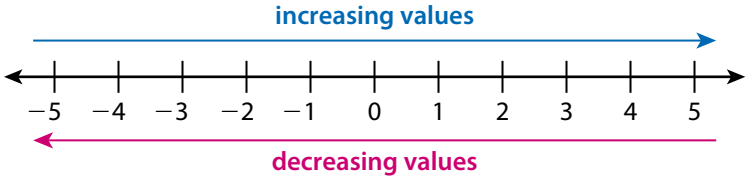
? Where else do you see positive and negative numbers used in the world around you?

LESSON 24

Order Positive and Negative Numbers

Dear Family,

This week your student is learning how to compare positive and negative numbers. The farther to the left a number is located on a horizontal number line, the lesser the value of that number.

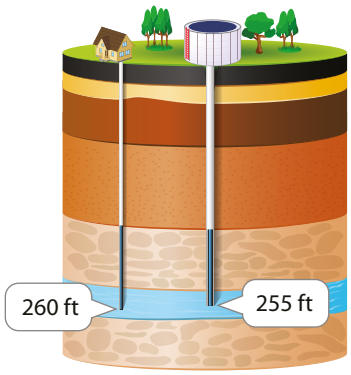


You can write an inequality to show which of two numbers has the greater or lesser value. For example, $2 > -3$ means that 2 is greater than -3.

Your student will be learning to solve problems like the one below.

> A town well extends to an elevation of 255 ft below ground level. Jesse's house well extends to an elevation of -260 ft. Which well is deeper?

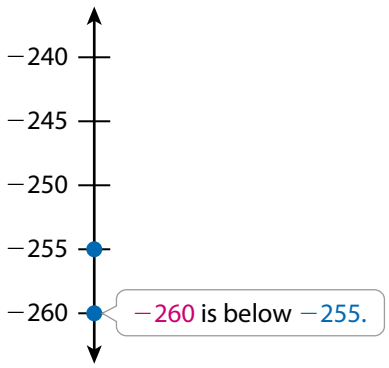
➤ **ONE WAY** to compare the elevations is to use words to describe their relationship in context.



A point 260 ft underground is deeper than a point 255 ft underground.

➤ **ANOTHER WAY** is to use symbols to write an inequality.

Look at the positions of -260 and -255 on a vertical number line.



$-260 < -255$

Both models show that Jesse's well is deeper than the town well.

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

Activity Thinking About Comparing Positive and Negative Numbers Around You

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

Did you know when you play golf, the lowest score wins? In fact, your final score could even be negative!

A score of -4 means a person used four fewer strokes than was expected in order to complete the golf course. A score of $+4$ means a person used four more strokes than was expected in order to complete the golf course. Using fewer strokes is better, so a score of -4 is better than $+4$!

DUSTY HILLS GOLF COURSE

SCORE CARD

Hole	Par	Strokes	Score
1	4	3	−1
2	4	4	−1
3	5	5	−1
4	6	7	0
5	4	6	+2
6	5	5	+2
7	5	6	+3
8	6	6	+3
9	4	5	+4

? Where else do you compare positive and negative numbers in the world around you?

LESSON 25

Dear Family,

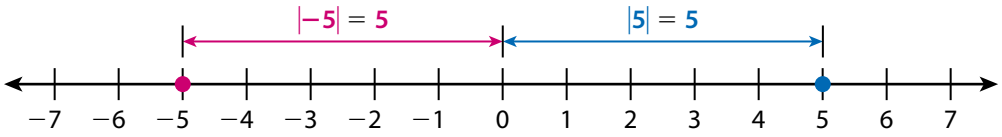
This week your student is learning about absolute value. The **absolute value** of a number is its distance from 0 on the number line.

The symbol $|5|$ is read as *the absolute value of 5*.

$|5| = 5$ because the distance from 5 to 0 is 5 units.

$|-5| = 5$ because the distance from -5 to 0 is 5 units.

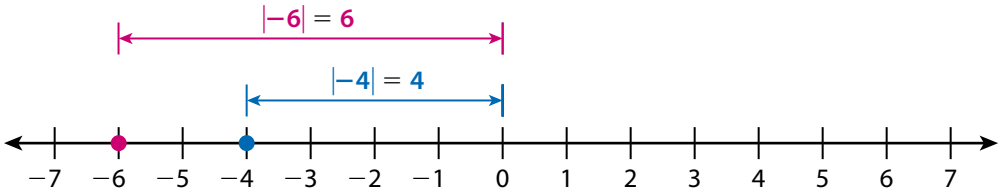
} This means $|5| = |-5|$.



Your student will be comparing absolute values such as the ones below.

Use $<$, $>$, or $=$ to compare the absolute values of -6 and -4.

➤ **ONE WAY** to compare absolute values is by using a number line.



It is a greater distance from -6 to 0 than it is from -4 to 0.

$|-6| > |-4|$

➤ **ANOTHER WAY** is to interpret the absolute values in a real-world situation.

Think of -6 and -4 as representing debts of \$6 and \$4.

Since $|-6| = 6$ and $|-4| = 4$, the absolute values of -6 and -4 represent the amounts owed, \$6 and \$4.

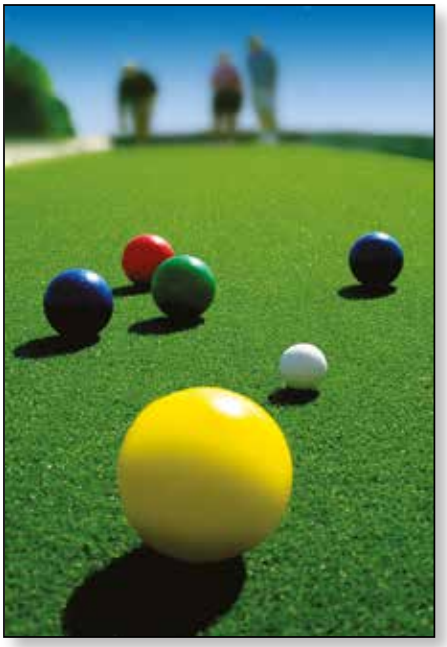
A person with a debt of \$6 owes more money than a person with a debt of \$4.

$|-6| > |-4|$

Using either model, you can see that $|-6| > |-4|$.

Use the next page to start a conversation about absolute value.

Activity Thinking About Absolute Value Around You



➤ **Do this activity together to investigate absolute value in the real world.**

Bocce is a game where players throw bocce balls to get as close to a smaller target ball as possible. It does not matter if your bocce ball rolls past the target ball or if it stops before. Either way, you measure the distance from your bocce ball to the target ball.

In this way, playing bocce is like using absolute value. You can think about the target ball as the 0 point on a number line. It does not matter if your bocce ball ends up past the target ball at $+5$ or in front of the target ball at -5, because the distance from the target ball is still 5.

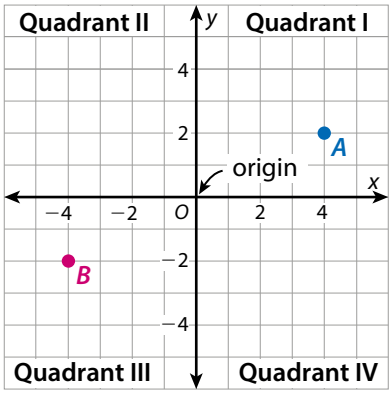
? Where else do you see absolute value in the world around you?

LESSON 27

Dear Family,

This week your student is exploring the four-quadrant coordinate plane.

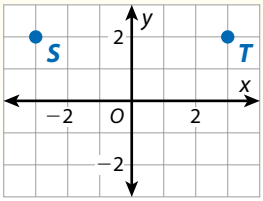
Previously, your student plotted points (x, y) in the upper right **quadrant** of the coordinate plane, where all x-coordinates and y-coordinates are positive. The four-quadrant coordinate plane extends the x-axis and y-axis to include points with negative coordinates.



To plot point A at (4, 2), move **4 units right** and **2 units up** from the origin. To plot point B at (−4, −2), move **4 units left** and **2 units down** from the origin.

Your student will be describing the location of points like the one below.

Point S and T are shown in the coordinate plane. Describe the location of point S.



➤ **ONE WAY** to describe the location of a point is with coordinates.

Point S is 3 units left of the origin, which means the x-coordinate is −3. Point S is 2 units up from the origin, which means the y-coordinate is 2. The coordinates of point S are (−3, 2).

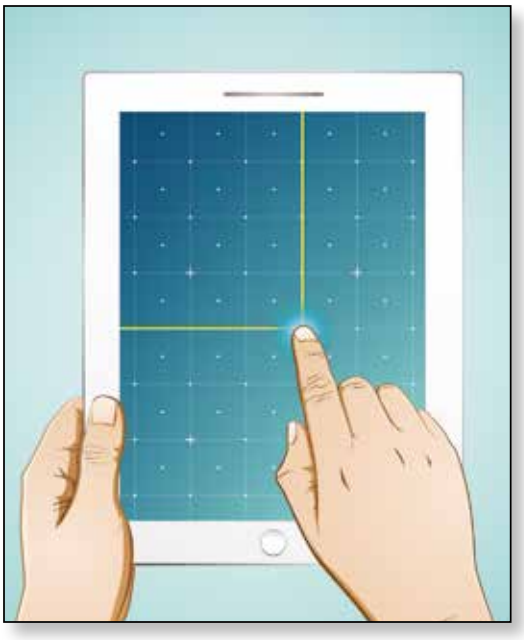
➤ **ANOTHER WAY** is to describe how the given point is related to another point.

Point T is 3 units to the right of the y-axis. Point S is 3 units to the left of the y-axis and on the same horizontal line as point T. This means point S is a **reflection** of point T across the y-axis.

Both ways of describing the location of point S help you understand the four-quadrant coordinate plane.

Use the next page to start a conversation about the coordinate plane.

Activity Thinking About Coordinate Planes Around You



➤ **Do this activity together to investigate coordinate planes in the real world.**

Did you know that technology companies use coordinates to develop touch screens on cell phones and other devices? When your finger presses down on a touch screen, the coordinates of the location you are pressing are sent to the phone's operating system. The operating system then tells the phone what to do based on where you touched your screen!

? Where else do you see coordinates being used to identify locations in the world around you?

LESSON 28

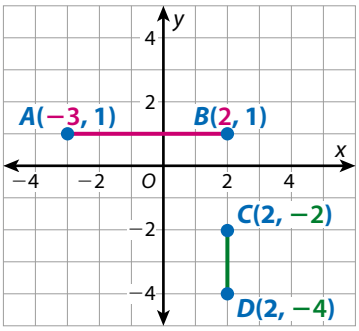
Solve Problems in the Coordinate Plane

Dear Family,

This week your student is learning how to find the distance between points on the same horizontal or vertical line in the coordinate plane.

Point A and point B are in **different quadrants**. So, **add the absolute values** of the coordinates that are different to find the distance between A and B.

$|-3| + |2| = 3 + 2 = 5$



Point D and point C are in the **same quadrant**. So, **subtract the absolute values** of the coordinates that are different to find the distance between D and C.

$|-4| - |-2| = 4 - 2 = 2$

Your student will be learning to solve problems like the one below.

> A rectangle has vertices at $A(-2, -1)$, $B(2, -1)$, $C(2, -3)$ and $D(-2, -3)$. What is the perimeter of the rectangle?

➤ **ONE WAY** to find the lengths of the sides is to use absolute value.

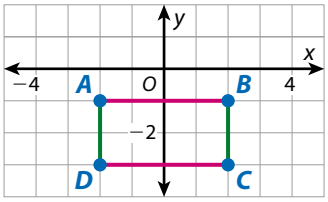
$AB = |-2| + |2| = 4$

$BC = |-3| - |-1| = 2$

$CD = |-2| + |2| = 4$

$AD = |-3| - |-1| = 2$

$4 + 2 + 4 + 2 = 12$



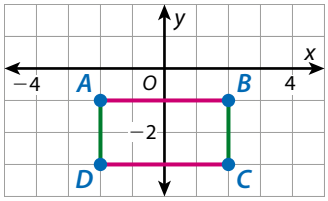
➤ **ANOTHER WAY** to is to use properties of polygons.

Opposite sides of rectangles have the same length.

$\ell = DC = |-2| + |2| = 4$

$w = DA = |-3| - |-1| = 2$

$2(4) + 2(2) = 12$



Using either method, the perimeter of the rectangle is 12 units.

Use the next page to start a conversation about coordinate planes.

Activity Thinking About Distance in the Coordinate Plane

➤ **Do this activity together to investigate using the coordinate plane to show distances in the real world.**

A land surveyor is someone who measures land to mark property boundaries, especially for construction of new buildings or houses.

Coordinate planes help land surveyors make precise maps that clearly identify where one person's property ends and another person's property begins. It would be a big problem if someone started building a new house right in someone else's backyard!

? How else can a coordinate plane be used when planning the construction of a new building or house?