LESSON 6

Comparing Rational Numbers

Objective

Compare rational numbers using a number line.

Common Core State Standards

- **6.NS.6c** Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
- **6.NS.7b** Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3 °C > –7 °C to express the fact that –3 °C is warmer than –7 °C.*

Students at this level are becoming increasingly accomplished in working with fractions, decimals, and percentages. They are also becoming more flexible in their mathematical thinking. This lesson brings comparing and ordering rational numbers to the concrete level by having students line up Fraction Tower Cubes on a number line. Allowing students to see when a negative is closer to being positive helps them to conceptualize the relative magnitude of rational numbers.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- **Ask:** *What is a rational number?*
- **Ask:** *What number is represented by each of the bars on the graph? How do you know whether the number is positive or negative?*
- **Ask:** *Which Fraction Tower Cubes will you use to represent each bar? How many Fraction Tower Cubes of each color will you need to accurately represent the information on the graph?*
- **Say:** *Explain how a large tower can represent a smaller number than a small tower when they are placed on the negative side of the number line.*

Solve It

Reread the problem with students. Have students write a brief report to Mr. Grimley presenting their results and how they arrived at them.

More Ideas

For another way to teach about comparing rational numbers—

- Have students solve this and similar problems by using the other faces of the Fraction Tower Cubes to express the given quantities as decimals and percentages.

Formative Assessment

Have students try the following problem.

Order the following set of numbers from largest to smallest: $-\frac{3}{10}, \frac{5}{12}, -\frac{3}{8}, \frac{1}{4}$.

A. $\frac{5}{12}, \frac{1}{4}, -\frac{3}{8}, -\frac{3}{10}$

B. $\frac{5}{12}, \frac{1}{4}, -\frac{3}{10}, -\frac{3}{8}$

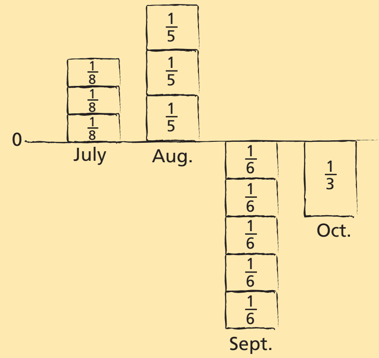
C. $\frac{1}{4}, \frac{5}{12}, -\frac{3}{8}, -\frac{3}{10}$

D. $\frac{1}{4}, \frac{5}{12}, -\frac{3}{10}, -\frac{3}{8}$

Try It! 30 minutes | Groups of 3

Here is a problem about comparing rational numbers.

The following chart shows changes in profits for Acme Motors for the months of July, August, September, and October of last year. Mr. Grimley, your boss, wants you to write the increases and decreases as rational numbers. Then you are to order the numbers from largest to smallest.

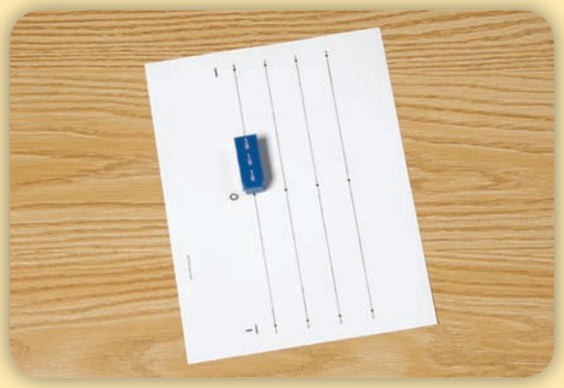


Introduce the problem. Then have students do the activity to solve the problem. Sketch the graphic from the story problem on the board. Distribute Fraction Tower Equivalency Cubes and number lines to students.

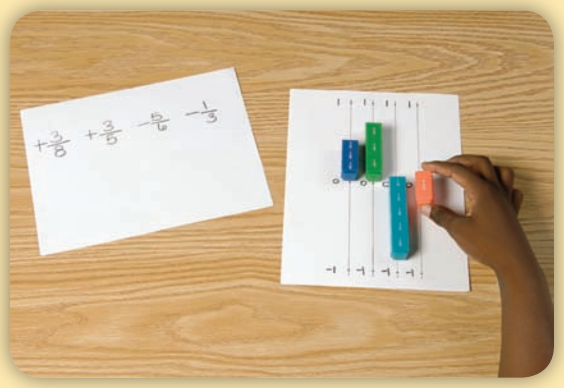
Materials

- Fraction Tower® Equivalency Cubes
- Double Fraction Tower Number Line (BLM 4; 1 per group)

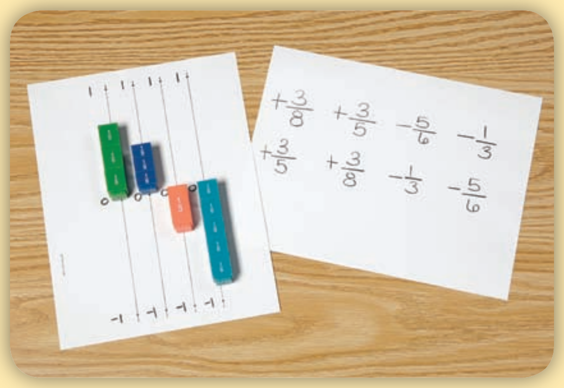
Caution students to ignore the tenon on the bottom of each Fraction Tower Cube, which allows the pieces to be snapped together. It should not be included in the length of the piece.



1. Ask: *Look at the first bar on the graph. What number does it represent?* ($\frac{3}{8}$) **Say:** *Write the number it represents on a piece of paper.* **Say:** *Now find the appropriate Fraction Tower Cubes to represent this amount. Place them on the first number line on the BLM.*



2. Say: *Follow the same procedure for the other bars on the graph.*



3. Say: *Now order the change in profits from largest to smallest. Move the towers into the correct positions.*

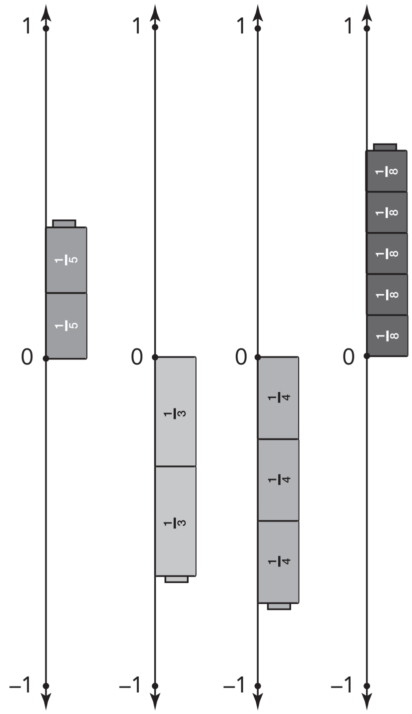
⚠ Look Out!

Some students may be confused to see that a large tower in the negative portion of the number line represents a smaller number than a shorter tower. (Compare the teal $\frac{5}{6}$ tower with the smaller orange $\frac{1}{3}$ tower in the photos above and at left.) Remind students that the teal tower is "more negative," while the orange tower is "closer to positive." It also may be helpful for students to mark the lower end of each tower on the BLM with a pencil. They can then remove the towers and read the relative values on the number line.

Use Fraction Towers to model each rational number on a number line. Write each number. Then write the numbers in order from least to greatest.

(Check students' work.)

1.



Numbers:

$\frac{2}{5}, -\frac{2}{3}, -\frac{3}{4}, \frac{5}{8}$

Ordered from least to greatest:

$-\frac{3}{4}, -\frac{2}{3}, \frac{2}{5}, \frac{5}{8}$

Using Fraction Towers, model each rational number. Sketch the models on number lines. Write the numbers in order from least to greatest.

2. $\frac{3}{8}, -\frac{1}{4}, \frac{7}{12}, -\frac{2}{5}$

Ordered from least to greatest: $-\frac{2}{5}, -\frac{1}{4}, \frac{3}{8}, \frac{7}{12}$

Use < or > to compare the numbers.

3. $\frac{7}{8} > \frac{3}{4}$

4. $\frac{7}{10} < \frac{9}{12}$

5. $\frac{1}{3} > \frac{1}{4}$

6. $\frac{2}{5} < \frac{1}{2}$

7. $\frac{1}{6} < \frac{1}{4}$

8. $\frac{3}{12} < \frac{2}{6}$

Answer Key

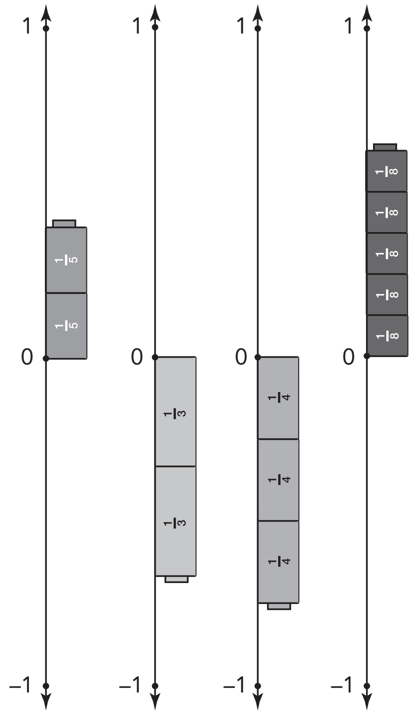
Challenge! Explain how comparing negative rational numbers is different than comparing positive rational numbers.

Challenge: (Sample) Negative numbers are left of 0 on a number line and in the reverse order of the positive numbers that are to the right of 0 on a number line.

Name ____________________________

Use Fraction Towers to model each rational number on a number line. Write each number. Then write the numbers in order from least to greatest.

1.



Numbers:

____

Ordered from least to greatest:

____

Using Fraction Towers, model each rational number. Sketch the models on number lines. Write the numbers in order from least to greatest.

2. $\frac{3}{8}, -\frac{1}{4}, \frac{7}{12}, -\frac{2}{5}$

Ordered from least to greatest: ____________________________

Use < or > to compare the numbers.

3. $\frac{7}{8}$ ◯ $\frac{3}{4}$

4. $\frac{7}{10}$ ◯ $\frac{9}{12}$

5. $\frac{1}{3}$ ◯ $\frac{1}{4}$

6. $\frac{2}{5}$ ◯ $\frac{1}{2}$

7. $\frac{1}{6}$ ◯ $\frac{1}{4}$

8. $\frac{3}{12}$ ◯ $\frac{2}{6}$

Name ___________________________________

Challenge! Explain how comparing negative rational numbers is different than comparing positive rational numbers.

Name

BLM 4

Double Fraction Tower® Number Lines