The *Big Ideas Math: Modeling Real Life* program uses a Universal Design for Learning to create a fun and innovative program that uses hands-on activities and scaffolded instruction. This allows for balanced lessons with built-in Response to Intervention that appeal to students and teachers alike. Learning targets and success criteria help to focus student learning and make learning visible to teachers and students. Explorations help students develop a growth mindset by engaging them in productive struggle, leading to conceptual understanding. With a strong emphasis on problem solving in the classroom, students can transfer their mathematical knowledge to new concepts and apply their understanding to real-life situations. Through practice and problem solving, students become more comfortable with the problem-solving process to become strategic mathematical thinkers.

*Big Ideas Math: Modeling Real Life* comes with a unique Teaching Edition, written by co-author Laurie Boswell, that provides professional development and instructional support at your fingertips. *Laurie's Notes* are provided at point-of-use and include step-by-step support, guiding questions, common errors and misconceptions, extensions, and much more!

## Getting Ready

Each *Chapter Exploration* develops conceptual understanding of chapter topics.

### Getting Ready for Chapter 4

**Chapter Exploration**

$$+ = +1$$
$$- = -1$$
$$+ = x$$

1. Work with a partner. Use algebra tiles to model and solve each equation.

   a. $x + 4 = -2$

   Model the equation $x + 4 = -2$.

   Add four $-1$ tiles to each side.

   Remove the zero pairs from the left side.

   Write the solution of the equation.

   b. $-3 = x - 4$

   Model the equation $-3 = x - 4$.

   Add four $+1$ tiles to each side.

   Remove the zero pairs from each side.

   Write the solution of the equation.

   c. $x - 6 = 2$     d. $x - 7 = -3$     e. $-15 = x - 5$

   f. $x + 3 = -5$     g. $7 + x = -1$     h. $-5 = x - 3$

2. **WRITE GUIDELINES** Work with a partner. Use your models in Exercise 1 to summarize the algebraic steps that you use to solve an equation.

*Learning Targets* and *Success Criteria* show students what they will be learning and encourage them to self-assess and evaluate their learning, which increases student accountability.
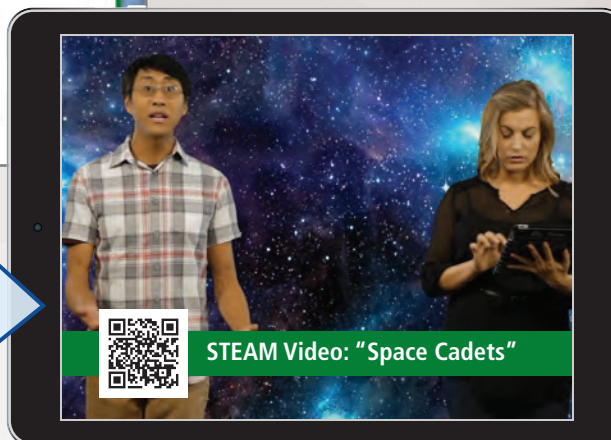
**Learning Target**

Find differences of rational numbers and find distances between numbers on a number line.

**Success Criteria**

- Explain how to model subtraction of rational numbers on a number line.
- Find differences of rational numbers by reasoning about absolute values.
- Find distances between numbers on a number line.

*STEAM Videos* build students' excitement so they can immediately make real-life connections to the mathematics at the start of every chapter.

STEAM Video: "Space Cadets"

## Rigorous by Design

### 1.5 Subtracting Rational Numbers

**Learning Target:** Find differences of rational numbers and find distances between numbers on a number line.

**Success Criteria:**
- I can explain how to model subtraction of rational numbers on a number line.
- I can find differences of rational numbers by reasoning about absolute values.
- I can find distances between numbers on a number line.

**EXPLORATION 1** Subtracting Rational Numbers

Work with a partner.

a. Choose a unit fraction to represent the space between the tick marks on each number line. What expressions involving subtraction are being modeled? What are the differences?

### Conceptual Understanding

*Explorations* help students reach a deeper level of conceptual understanding.

### Procedural Fluency

*Lessons* follow a gradual release model and give teachers opportunities for flexible instruction, providing opportunities for all levels of learners to attain procedural fluency. Self-Assessments provide students the opportunity to asses their understanding of the success criteria, taking ownership of their learning.

**EXAMPLE 1** Subtracting Rational Numbers

Find $-4\frac{1}{7} - \frac{5}{7}$.    Estimate $-4 - 1 = -5$

Rewrite the difference as a sum by adding the opposite.

$$-4\frac{1}{7} - \frac{5}{7} = -4\frac{1}{7} + \left(-\frac{5}{7}\right)$$

Because the signs are the same, add $\left|-4\frac{1}{7}\right|$ and $\left|-\frac{5}{7}\right|$.

$$\left|-4\frac{1}{7}\right| + \left|-\frac{5}{7}\right| = 4\frac{1}{7} + \frac{5}{7}$$    Find the absolute values.

$$= 4 + \frac{1}{7} + \frac{5}{7}$$    Write $4\frac{1}{7}$ as $4 + \frac{1}{7}$.

$$= 4 + \frac{6}{7}, \text{ or } 4\frac{6}{7}$$    Add fractions and simplify.

Because $-4\frac{1}{7}$ and $-\frac{5}{7}$ are both negative, use a negative sign in the difference.

So, $-4\frac{1}{7} - \frac{5}{7} = -4\frac{6}{7}$.    Reasonable? $-4\frac{6}{7} \approx -5$ ✓

**Try It** Find the difference. Write your answer in simplest form.

1. $\frac{1}{3} - \left(-\frac{1}{3}\right)$    2. $-3\frac{1}{3} - \frac{2}{3}$    3. $4 - 5\frac{1}{2}$

**EXAMPLE 4** Modeling Real Life

You measure the height of the tide using the support beams of a pier. What is the mean hourly change in the height?

To find the mean hourly change in the height of the tide, divide the change in the height by the elapsed time.

59 inches at 2 P.M.
8 inches at 8 A.M.

$$\text{mean hourly change} = \frac{\text{final height} - \text{initial height}}{\text{elapsed time}}$$

The elapsed time from 2 P.M. to 8 P.M. is 6 hours.

$$= \frac{8 - 59}{6}$$    Substitute.

$$= \frac{-51}{6}$$    Subtract.

$$= -8\frac{1}{2}$$    Divide.

The mean change in the height of the tide is $-8\frac{1}{2}$ inches per hour.

### Application

*Modeling Real Life examples* bring problem solving into the classroom, promoting application of concepts and skills and reaching higher levels of DOK.