Examples for each lesson:

Lesson 8.1

Divide Fractions and Whole Numbers

You can use a number line to help you divide a whole number by a fraction.

Divide: \( \frac{6}{2} \)

**Step 1** Draw a number line from 0 to 6. Divide the number line into halves. Label each half on your number line, starting with \( \frac{1}{2} \).

**Step 2** Skip count by halves from 0 to 6 to find \( 6 \div \frac{1}{2} \).

**Step 3** Count the number of skips. It takes 12 skips to go from 0 to 6. So the quotient is 12.

\[
6 \div \frac{1}{2} = 12 \text{ because } 12 \times \frac{1}{2} = 6.
\]

You can use fraction strips to divide a fraction by a whole number.

Divide: \( \frac{1}{2} \div 5 \)

**Step 1** Place a \( \frac{1}{2} \) strip under a 1-whole strip.

**Step 2** Find 5 fraction strips, all with the same denominator, that fit exactly under the \( \frac{1}{2} \) strip.

Each part is \( \frac{1}{10} \) of the whole.

**Step 3** Record and check the quotient.

\[
\frac{1}{2} \div 5 = \frac{1}{10} \text{ because } \frac{1}{10} \times 5 = \frac{1}{2}.
\]

So, \( \frac{1}{2} \div 5 = \frac{1}{10} \).

More information on this strategy is available on Animated Math Model #29.
Lesson 8.2

Problem Solving • Use Multiplication

Nathan makes 4 batches of soup and divides each batch into halves. How many \( \frac{1}{2} \)-batches of soup does he have?

<table>
<thead>
<tr>
<th>Read the Problem</th>
<th>Solve the Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What do I need to find?</strong></td>
<td>Since Nathan makes 4 batches of soup, my diagram needs to show 4 circles to represent the 4 batches. I can divide each of the 4 circles in half.</td>
</tr>
<tr>
<td>I need to find the number of ( \frac{1}{2} )-batches of soup Nathan has</td>
<td></td>
</tr>
<tr>
<td><strong>What information do I need to use?</strong></td>
<td>To find the total number of halves in the 4 batches, I can multiply 4 by the number of halves in each circle.</td>
</tr>
<tr>
<td>I need to use the size of each batch of soup and the total number of batches of soup Nathan makes.</td>
<td>(4 \times \frac{1}{2} = 4 \times 2 = 8)</td>
</tr>
<tr>
<td><strong>How will I use the information?</strong></td>
<td>So, Nathan has 8 one-half-batches of soup.</td>
</tr>
<tr>
<td>I can make a diagram to organize the information from the problem. Then I can use the diagram to find the number of ( \frac{1}{2} )-batches of soup Nathan has after he divides the 4 batches of soup.</td>
<td></td>
</tr>
</tbody>
</table>

More information on this strategy is available on Animated Math Model #29.
Lesson 8.3

Connect Fractions to Division

You can write a fraction as a division expression.
\[
\frac{4}{5} - 4 \div 5 \quad \quad \frac{15}{3} - 15 \div 3
\]

There are 8 students in a wood-working class and 5 sheets of plywood for them to share equally. What fraction of a sheet of plywood will each student get?

**Divide.** \(\frac{5}{8}\) Use a drawing.

**Step 1** Draw \(\frac{5}{8}\) rectangles to represent 5 sheets of plywood. Since there are 8 students, draw lines to divide each piece of plywood into **eighths**.

![Diagram of rectangles divided into eighths]

Each student’s share of 1 sheet of plywood is \(\frac{1}{8}\).

**Step 2** Count the total number of eighths each student gets. Since there are 5 sheets of plywood, each student will get 5 of the **eighths**, or \(\frac{5}{8}\).

**Step 3** Complete the number sentence.
\[
5 \div 8 = \frac{5}{8}
\]

**Step 4** Check your answer.
Since \(\frac{5}{8} \times \frac{8}{5} = 1\), the quotient is correct.

So, each student will get \(\frac{5}{8}\) of a sheet of plywood.
Lesson 8.4

Fraction and Whole-Number Division

You can divide fractions by solving a related multiplication sentence.

Divide. $4 \div \frac{1}{3}$

Step 1 Draw 4 circles to represent the dividend, 4.

Step 2 Since the divisor is $\frac{1}{3}$, divide each circle into thirds.

Step 3 Count the total number of thirds.
When you divide the $\frac{4}{3}$ circles into thirds, you are finding the number of thirds in 4 circles, or finding 4 groups of $\frac{3}{3}$.
There are $12$ thirds.

Step 4 Complete the number sentence.
$4 \div \frac{1}{3} = 4 \times \frac{3}{3} = 12$

More information on this strategy is available on Animated Math Model #29.

Lesson 8.5

Interpret Division with Fractions

You can draw a diagram or write an equation to represent division with fractions.

Beatriz has $3$ cups of applesauce. She divides the applesauce into $\frac{1}{4}$-cup servings. How many servings of applesauce does she have?

One Way Draw a diagram to solve the problem.
Draw 3 circles to represent the 3 cups of applesauce. Since Beatriz divides the applesauce into $\frac{1}{4}$-cup servings, draw lines to divide each "cup" into fourths.

To find $3 \div \frac{1}{4}$, count the total number of fourths in the 3 circles.
So, Beatriz has $12$ one-fourth-cup servings of applesauce.

Another Way Write an equation to solve.
Write an equation. $3 \div \frac{1}{4} = n$
Write a related multiplication equation. $3 \times \frac{4}{4} = n$
Then solve. $12 = n$
So, Beatriz has $12$ one-fourth-cup servings of applesauce.

More information on this strategy is available on Animated Math Model #29.
**Vocabulary**

**Dividend** – the number that is to be divided in a division problem

**Equation** – an algebraic or numerical sentence that shows that two quantities are equal

**Fraction** – a number that names a part of a whole or a part of a group

**Quotient** – the number, not including the remainder, that results from dividing

**Whole number** – a number that belongs to the set 0, 1, 2, 3, ...