Examples for each lesson:

Lesson 5.1

Model Percents

A percent is a ratio that compares a number to 100. It represents part of a whole.

Model 54% on the 10-by-10 grid. Then write the percent as a ratio.

Step 1 The grid represents 1 whole. It has 100 equal parts. To show 54%, shade 54 of the 100 equal parts.

Step 2 A ratio can be written as a fraction. Write the number of shaded parts, 54, in the numerator. Write the total number of parts in the whole, 100, in the denominator.

So, 54% is 54 out of 100 squares shaded, or \( \frac{54}{100} \).

Lesson 5.2

Write Percents as Fractions and Decimals

You can write a percent as a decimal and a fraction.

Write 140% as a decimal and as a fraction in simplest form.

Step 1 Write 140% as a decimal by changing the percent sign to a decimal point and moving it two places to the left. \( 140\% = 1.40 \)

Step 2 Write 140% as a fraction by removing the percent sign and placing 140 in the numerator. Since percent means out of 100, place 100 in the denominator. \( 140\% = \frac{140}{100} \)

Step 3 Simplify. \( \frac{140}{100} = \frac{7}{5} \) or \( 1 \frac{2}{5} \)

So, 140% = 1.40 = \( \frac{7}{5} \) or \( 1 \frac{2}{5} \).

More information on this strategy is available on Animated Math Model #16.
Lesson 5.3

**Write Fractions and Decimals as Percents**

You can write fractions and decimals as percents.

To write a decimal as a percent, multiply the decimal by 100 and write the percent symbol.

\[ 0.375 = 37.5\% \quad \text{To multiply by 100, move the decimal point two places to the right.} \]

To write a fraction as a percent, divide the numerator by the denominator. Then write the decimal as a percent.

To write \(\frac{3}{8}\) as a percent, first divide 3 by 8.

\[
\begin{align*}
8) & \ 3.000 \\
-24 & \\
\underline{60} & \\
-56 & \\
\underline{40} & \\
-40 & \\
\underline{0} & \\
\end{align*}
\]

So, \(\frac{3}{8} = 0.375\).

\[ 0.375 = 37.5\% \quad \text{To write 0.375 as a percent, multiply by 100 and write the percent symbol.} \]

More information on this strategy is available on Animated Math Model #16.

Lesson 5.4

**Percent of a Quantity**

You can use ratios to write a percent of a quantity.

**Find 0.9\% of 30.**

**Step 1** Write the percent as a rate per 100.

\[ 0.9\% = \frac{0.9}{100} \]

**Step 2** Multiply by a fraction equivalent to 1 to get a whole number in the numerator.

\[ \frac{0.9}{100} \times \frac{10}{10} = \frac{9}{1,000} \]

**Step 3** Write the multiplication problem.

\[ \frac{9}{1,000} \times 30 \]

**Step 4** Multiply.

\[ \frac{9}{1,000} \times 30 = \frac{27}{100} = 0.27 \]

So, 0.9\% of 30 is 0.27.
Lesson 5.5

Problem Solving • Percents

Use a model to solve the percent problem.

Lucia is driving to visit her parents, who live 240 miles away from her house. She has already driven 15% of the distance. How many miles does she still have to drive?

<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>Use a bar model to help.</td>
</tr>
<tr>
<td></td>
<td>Draw a bar to represent the total distance. Then draw a bar that represents the distance driven plus the distance left.</td>
</tr>
<tr>
<td><strong>What information do I need to use?</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>total distance</td>
</tr>
<tr>
<td></td>
<td>240 miles</td>
</tr>
<tr>
<td></td>
<td>distance driven</td>
</tr>
<tr>
<td></td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>15%</td>
</tr>
<tr>
<td><strong>How will I use the information?</strong></td>
<td>The model shows that 100% = ____ miles, so 1% of 240 = ( \frac{240}{100} ) = ____ miles.</td>
</tr>
<tr>
<td></td>
<td>15% of 240 = 15 \times ____ = ____</td>
</tr>
<tr>
<td></td>
<td>So, Lucia has already driven ____ miles.</td>
</tr>
<tr>
<td></td>
<td>She still has to drive 240 - ____ = ____ miles.</td>
</tr>
</tbody>
</table>
Lesson 5.6

Find the Whole From a Percent

You can use equivalent ratios to find the whole, given a part and the percent.

54 is 60% of what number?

Step 1 Write the relationship among the percent, part, and whole. The percent is 60%.
The part is 54. The whole is unknown.

\[ \text{percent} = \frac{\text{part}}{\text{whole}} \]

\[ 60\% = \frac{54}{\text{whole}} \]

Step 2 Write the percent as a ratio.

\[ \frac{60}{100} = \frac{54}{\text{whole}} \]

Step 3 Simplify the known ratio.

- Find the greatest common factor (GCF) of the numerator and denominator.
  \[ 60 = 2 \times 2 \times 3 \times 5 \]
  \[ 100 = 2 \times 2 \times 5 \times 5 \]
  \[ \text{GCF} = 2 \times 2 \times 5 = 20 \]

- Divide both the numerator and denominator by the GCF.
  \[ \frac{60}{20} = 3 \]
  \[ \frac{100}{20} = 5 \]

Step 4 Write an equivalent ratio.

- Look at the numerators. Think: 3 \times 18 = 54

- Multiply the denominator by 18 to find the whole.
  \[ \frac{3 \times 18}{5 \times 18} = \frac{54}{90} \]

So, 54 is 60% of 90.

Vocabulary

Percent – a ratio of a number to 100

Equivalent fractions – two or more fractions that name the same amount

Equivalent ratios – ratios that name the same comparison

Ratio – a comparison of two quantities using division

Simplify – to write a fraction or a ratio so that the numerator and denominator have only 1 as a common factor