Examples for each lesson:

Lesson 10.1

**Customary Length**

You can convert one customary unit of length to another customary unit of length by multiplying or dividing.

*Multiply* to change from larger to smaller units of length.

*Divide* to change from smaller to larger units of length.

Convert 3 feet to inches.

**Step 1**
Decide: Multiply or Divide

- feet → inches
- larger → smaller

**Step 2**
Think:

1 ft = 12 in., so

3 ft = (3 × 12) in.

**Step 3**
Multiply:

3 × 12 = 36

So, 3 feet = 36 inches.

Convert 363 feet to yards.

**Step 1**
Decide: Multiply or Divide

- feet → yards
- smaller → larger

**Step 2**
Think:

3 ft = 1 yd,
so 363 ft = (363 ÷ 3) yd.

**Step 3**
Divide:

363 ÷ 3 = 121

So, 363 feet = 121 yards.

More information on this strategy is available on Animated Math Model #33.
Lesson 10.2

Customary Capacity

You can convert one unit of customary capacity to another by multiplying or dividing.

*Multiply* to change from *larger* to *smaller* units.

*Divide* to change from *smaller* to *larger* units.

**Convert 8 cups to quarts.**

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decide: Multiply or Divide</td>
<td>Think:</td>
<td>Divide.</td>
</tr>
<tr>
<td>cups → quarts smaller → larger</td>
<td>4 c = 1 qt, so 8 c = (8 \div 4) qt.</td>
<td>8 ÷ 4 = 2</td>
</tr>
</tbody>
</table>

So, 8 cups = 2 quarts.

**Convert 19 gallons to quarts.**

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decide: Multiply or Divide</td>
<td>Think:</td>
<td>Multiply.</td>
</tr>
<tr>
<td>gallons → quarts larger → smaller</td>
<td>1 gal = 4 qt, so 19 gal = (19 \times 4) qt.</td>
<td>19 × 4 = 76</td>
</tr>
</tbody>
</table>

So, 19 gallons = 76 quarts.

More information on this strategy is available on Animated Math Model #34.
Lesson 10.3

Weight

You can convert one customary unit of weight to another by multiplying or dividing.

Multiply to change from larger to smaller units.

Divide to change from smaller to larger units.

Customary Units of Weight

1 pound (lb) = 16 ounces (oz)
1 ton (T) = 2,000 pounds

Convert 96 ounces to pounds.

Step 1
Decide: Multiply or Divide
ounces → pounds smaller → larger

Step 2
Think:
16 oz = 1 lb
so 96 oz = (96 ÷ _16_) lb.

Step 3
Divide.
96 ÷ 16 = 6

So, 96 ounces = 6 pounds.

Convert 4 pounds to ounces.

Step 1
Decide: Multiply or Divide
pounds → ounces larger → smaller

Step 2
Think:
1 lb = 16 oz,
so 4 lb = (4 × _16_) oz.

Step 3
Multiply.
4 × 16 = 64

So, 4 pounds = 64 ounces.

More information on this strategy is available on Animated Math Model #35.
Lesson 10.4

Multistep Measurement Problems

An ice cream parlor donated 6 containers of ice cream to a local elementary school. Each container holds 3 gallons of ice cream. If each student is served 1 cup of ice cream, how many students can be served?

**Step 1** Record the information you are given.

There are 6 containers of ice cream.

Each container holds 3 gallons of ice cream.

**Step 2** Find the total amount of ice cream in the 6 containers.

\[ 6 \times 3 \text{ gallons} = 18 \text{ gallons of ice cream} \]

**Step 3** Convert from gallons to cups.

There are 4 quarts in 1 gallon, so 18 gallons = 72 quarts.

There are 2 pints in 1 quart, so 72 quarts = 144 pints.

There are 2 cups in 1 pint, so 144 pints = 288 cups.

So, 288 students can be served 1 cup of ice cream.

More information on this strategy is available on Animated Math Models #33, 34, 35.

Lesson 10.5

Metric Measures

The metric system is based on place value. To convert between units, you multiply or divide by a power of 10. You multiply to change larger units to smaller units, such as liters to centiliters.

You divide to change smaller units to larger units, such as meters to kilometers.

**Convert 566 millimeters to decimeters.**

- **Think** about how the two units are related.

  1 decimeter = 100 millimeters

- **Think:** Should I multiply or divide?

  Millimeters are smaller than decimeters.

  So, divide, or move the decimal point left for each power of 10.

  \[
  \frac{566}{100} = 5.66
  \]

  millimeters mm in 1 dm total decimeters

  So, 566 mm = 5.66 dm.

More information on this strategy is available on Animated Math Models #36, 37.
Lesson 10.6

Problem Solving • Customary and Metric Conversions

You can use the strategy make a table to help you solve problems about customary and metric conversions.

Jon’s faucet is dripping at the rate of 24 centiliters in a day. How many milliliters of water will have dripped from Jon’s faucet in 24 hours?

<table>
<thead>
<tr>
<th>Conversion Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>1 L</td>
</tr>
<tr>
<td>1 dL</td>
</tr>
<tr>
<td>1 cL</td>
</tr>
<tr>
<td>1 mL</td>
</tr>
</tbody>
</table>

I can use the Conversion Table to find the number of milliliters in 1 centiliter. There are 10 milliliters in 1 centiliter.

<table>
<thead>
<tr>
<th>cL</th>
<th>mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>240</td>
</tr>
</tbody>
</table>

So, 240 milliliters of water will have dripped from Jon’s faucet in 24 hours.

More information on this strategy is available on Animated Math Models #33, 34.
Lesson 10.7

**Elapsed Time**

You can solve elapsed time problems by converting units of time.

Starting at 4:20 p.m., Connie practiced piano for 90 minutes. At what time did Connie stop practicing piano?

**Convert 90 minutes to hours and minutes. Then find the end time.**

**Step 1** To convert minutes to hours, divide.

\[
90 \div 60 = 1 \text{ r } 30
\]

90 min = 1 hr 30 min

**Units of Time**

| 60 seconds (s) = 1 minute (min) |
| 60 minutes = 1 hour (hr) |
| 24 hours = 1 day (d) |
| 7 days = 1 week (wk) |
| 52 weeks = 1 year (yr) |
| 12 months (mo) = 1 ycar |
| 365 days = 1 ycar |

**Step 2** Count forward by hours until you reach 1 hour.

4:20 → 5:20 → 1 hour

**Step 3** Count forward by minutes until you reach 30 minutes.

5:20 → 5:30 → 1 hour 10 minutes
5:30 → 5:40 → 1 hour 20 minutes
5:40 → 5:50 → 1 hour 30 minutes

Connie stops practicing piano at 5:50 p.m.

More information on this strategy is available on Animated Math Models #38, 39.

**Vocabulary**

**Capacity** – the amount that a container can hold

**Decimeter** – a metric unit used to measure length or distance; 10 decimeters = 1 meter

**Dekameter** – a metric unit used to measure length or distance; 10 meters = 1 dekameter

**Milligram** – a metric unit used to measure mass; 1 milligram = 0.001 gram

**Milliliter** – a metric unit used to measure capacity; 1 milliliter = 0.001 liter

**Millimeter** – a metric unit used to measure length or distance; 1 millimeter = 0.001 meter