Using a map, Alex estimates the distance between his house and his grandparent’s house to be about 15,000 meters. About how many kilometers away from his grandparent’s house does Alex live?

The metric system is based on place value. Each unit is related to the next largest or next smallest unit by a power of 10.

**One Way** Convert 15,000 meters to kilometers.

<table>
<thead>
<tr>
<th>kilo-(k)</th>
<th>hecto-(h)</th>
<th>deka-(da)</th>
<th>meter (m)</th>
<th>deci-(d)</th>
<th>centi-(c)</th>
<th>milli-(m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Power of 10</td>
<td>Power of 10</td>
<td>Power of 10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**STEP 1** Find the relationship between the units.

Meters are _____ powers of 10 smaller than kilometers.

There are _____ meters in 1 kilometer.

**STEP 2** Determine the operation to be used.

I am converting from a ____________ unit to a ____________ unit, so I will ____________.

**STEP 3** Convert.

<table>
<thead>
<tr>
<th>number of meters</th>
<th>meters in 1 kilometer</th>
<th>number of kilometers</th>
</tr>
</thead>
<tbody>
<tr>
<td>15,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

So, Alex’s house is _____ kilometers from his grandparent’s house.
Another Way Use a diagram.

Jamie made a bracelet 1.8 decimeters long. How many millimeters long is Jamie’s bracelet?

Convert 1.8 decimeters to millimeters.

<table>
<thead>
<tr>
<th>kilo-</th>
<th>hecto-</th>
<th>deka-</th>
<th>meter</th>
<th>liter</th>
<th>gram</th>
<th>deci-</th>
<th>centi-</th>
<th>milli-</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**STEP 1** Show 1.8 decimeters.
Since the unit is decimeters, place the decimal point to show decimeters as the unit.

**STEP 2** Convert.
Cross out the decimal point and place it to show millimeters as the unit. Write zeros to the left of the decimal point as needed.

1.8 dm = ________ mm

So, Jamie’s bracelet is ________ millimeters long.

Try This! Complete the equation to show the conversion.

A Convert 247 milligrams to centigrams, decigrams, and grams.

Are the units being converted to a larger unit or a smaller unit? ________

Should you multiply or divide by powers of 10 to convert? ________

247 mg $\div$ 10 = ______ cg
247 mg $\div$ 100 = ______ dg
247 mg $\div$ 1,000 = ______ g

B Convert 3.9 hectoliters to dekaliters, liters, and deciliters.

Are the units being converted to a larger unit or a smaller unit? ________

Should you multiply or divide by powers of 10 to convert? ________

3.9 hL $\div$ 10 = ______ daL
3.9 hL $\div$ 100 = ______ L
3.9 hL $\div$ 1,000 = ______ dL
Complete the equation to show the conversion.

1. \[8.47 \text{ L} \bigcirc 10 = \underline{\quad} \text{ dL}\]  
   \[8.47 \text{ L} \bigcirc 100 = \underline{\quad} \text{ cL}\]  
   \[8.47 \text{ L} \bigcirc 1,000 = \underline{\quad} \text{ mL}\]

Think: Are the units being converted to a larger unit or a smaller unit?

2. \[9,824 \text{ dg} \bigcirc 10 = \underline{\quad} \text{ g}\]
   \[9,824 \text{ dg} \bigcirc 100 = \underline{\quad} \text{ dag}\]
   \[9,824 \text{ dg} \bigcirc 1,000 = \underline{\quad} \text{ hg}\]

Convert.

3. \[4.250 \text{ cm} = \underline{\quad} \text{ m}\]
4. \[6,000 \text{ mL} = \underline{\quad} \text{ L}\]
5. \[4 \text{ dg} = \underline{\quad} \text{ cg}\]

On Your Own

Convert.

6. \[7 \text{ g} = \underline{\quad} \text{ mg}\]
7. \[5 \text{ km} = \underline{\quad} \text{ m}\]
8. \[1,521 \text{ mL} = \underline{\quad} \text{ dL}\]

Compare. Write \(>\), \(<\), or \(=\).

9. \[32 \text{ hg} \bigcirc 3.2 \text{ kg}\]
10. \[6 \text{ km} \bigcirc 660 \text{ m}\]
11. \[525 \text{ mL} \bigcirc 525 \text{ cL}\]

12. **Mathematical Practice** Use Reasoning Are there less than 1 million, exactly 1 million, or greater than 1 million milligrams in 1 kilogram? Explain how you know.

13. **Go Deeper** Parker ran 100 meters, 1 kilometer, and 5,000 centimeters. How many meters did he run all together?
For 14–15, use the table.

14. **Go Deeper** Kelly made one batch of raisin and pretzel snack mix. How many grams does she need to add to the snack mix to make 2 kilograms?

15. **Think Smarter** Kelly plans to take juice on her camping trip. Which will hold more juice, 8 cans or 2 bottles? How much more?

16. Erin’s water bottle holds 600 milliliters of water. Dylan’s water bottle holds 1 liter of water. Whose water bottle holds more water? How much more water?

17. Liz and Alana each participated in the high jump at the track meet. Liz’s high jump was 1 meter. Alana’s high jump was 132 centimeters. Who jumped higher? How much higher?

18. **Think Smarter** Monica has 426 millimeters of fabric. How many centimeters of fabric does Monica have? Use the numbers and symbols on the tiles to write an equation to show the conversion.

\[
\begin{align*}
426 \times & \quad 4.26 \quad 42.6 \quad 0.426 \\
10 & \quad + \quad \quad = \\
100 & \quad = \quad 1,000
\end{align*}
\]
Metric Measures

Convert.

1. \(16 \text{ m} = \frac{16,000}{1,000} \text{ mm}\)
   - Number of meters \(= 16\)
   - Millimeters in 1 meter \(= 1,000\)
   - \(16 \times 1,000 = 16,000\)
   - 16 m = 16,000 mm

2. 6,500 cL = ______ L

3. 15 cm = ______ mm

4. 3,200 g = ______ kg

5. 12 L = ______ mL

6. 200 cm = ______ m

7. 70,000 g = ______ kg

8. 100 dL = ______ L

9. 60 m = ______ mm

Compare. Write <, >, or =.

10. 900 cm \(\bigcirc\) 9,000 mm

11. 600 km \(\bigcirc\) 5 m

12. 5,000 cm \(\bigcirc\) 5 m

13. 18,000 g \(\bigcirc\) 10 kg

14. 8,456 mL \(\bigcirc\) 9 L

15. 2 m \(\bigcirc\) 275 cm

Problem Solving


17. Ed fills his sports bottle with 1.2 liters of water. After his bike ride, he drinks 200 milliliters of the water. How much water is left in Ed’s sports bottle?

18. Write Math Explain the relationship between multiplying and dividing by 10, 100, and 1,000 and moving the decimal point to the right or to the left.
Lesson Check \(5.MD.A.1\)

1. Quan bought 8.6 meters of fabric. How many centimeters of fabric did he buy?

2. Jason takes 2 centiliters of medicine. How many milliliters is this?

Spiral Review \(5.NF.A.1, 5.MD.A.1, 5.G.A.1\)

3. Yolanda needs 5 pounds of ground beef to make lasagna for a family reunion. One package of ground beef weighs 2\(\frac{1}{2}\) pounds. Another package weighs 2\(\frac{3}{5}\) pounds. How much ground beef will Yolanda have left over after making the lasagna?

4. A soup recipe calls for 2\(\frac{3}{4}\) quarts of vegetable broth. An open can of broth contains \(\frac{1}{2}\) quart of broth. How much more broth do you need to make the soup?

5. Which point on the graph is located at (4, 2)?

6. A bakery supplier receives an order for 2 tons of flour from a bakery chain. The flour is shipped in crates. Each crate holds eight 10-pound bags of flour. How many crates does the supplier need to ship to fulfill the order?