METRIC SYSTEM UNITS OF LENGTH

⇒ **To convert units of length in the metric system of measurement**

The basic unit of length in the **metric system** is the **meter**. All units of length in the metric system are derived from the meter. The prefix “centi-“means **one hundredth**.

1 centimeter=1 one-hundredth of a meter

- **kilo-** = 1000
- **hecto-** = 100
- **deca-** = 10
- **deci-** = 0.1
- **centi-** = 0.01
- **milli-** = 0.001

1 kilometer (km) = 1000 meters (m)
1 hectometer (hm) = 100 m
1 decameter (dam) = 10 m
1 meter (m) = 1 m
1 decimeter (dm) = 0.1 m
1 centimeter (cm) = 0.01 m
1 millimeter (mm) = 0.001 m

**Conversion between units of length** in the metric system involves **moving the decimal point to the right or to the left.** Listing the units in order from **largest to smallest** will indicate how many places to move the decimal point and in which direction.

**Example 1:** To convert **4200 cm** to meters, write the units in order from largest to smallest.

<table>
<thead>
<tr>
<th>km</th>
<th>hm</th>
<th>dam</th>
<th>m</th>
<th>dm</th>
<th>cm</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Converting cm to m requires moving **2 positions to the left**.

Move the decimal point the same number of places and in the same direction (to the left).

So 4200 cm = 42.00 m

A metric measurement involving **two units is customarily written in terms of one unit.** Convert the smaller unit to the larger unit and then add.

**Example 2:** To convert **8 km 32 m** to kilometers

First convert 32 m to kilometers.

<table>
<thead>
<tr>
<th>km</th>
<th>hm</th>
<th>dam</th>
<th>m</th>
<th>dm</th>
<th>cm</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td></td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Converting m to km requires moving **2 positions to the left**.

32 = 0.032 km

Move the decimal point the same number of places and in the same direction.

So 8 km 32 m = 8 km + 0.032 km

Add the result to 8 km

= 8.032 km
To solve application problems

Example 3: A piece measuring **142 cm** is cut from a board **4.20 m** long. Find the length of the remaining piece.

✦ **Strategy**
To find the length of the remaining piece:
⇒ Convert the length of the piece cut (142 cm) in meters.

\[
\begin{array}{cccccccc}
\text{km} & \text{hm} & \text{dam} & \text{m} & \text{dm} & \text{cm} & \text{mm} \\
1 & . & 4 & 2 \\
\end{array}
\]

✦ **Solution**
142 cm = 1.42 m
4.20 m + 142 cm = 4.20 m + 1.42 m
= **2.78 m**

The length of the piece remaining is **2.78 m**