



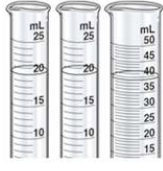
Measuring length or distance  
**meter (m)**  
*Tool : ruler or tape*



Measuring mass  
**gram (g)**  
*Tool : triple beam balance*



Measuring liquid volume  
**Liter (L)**  
*Tool : graduated cylinder*



When measuring matter that is bigger or smaller than the basic units *prefixes* are added

Use prefixes *before* the basic unit.

**Length:** *kilometer* is a very long distance, a *millimeter* is a very short distance.

**Mass:** A *kilogram* measures a larger mass than a *milligram*, a very small mass.

**Liquid volume:** A larger volume of liquid would be a *kiloliter*, a very small volume would be a *milliliter*.

Understanding how to use prefixes

When recording measurements, it is best to use the unit with the smallest *whole number* to allow for easier understanding.

For example: The length of a room may be 6000 millimeters(mm) but it is better visualized as 6 meters(m).  
 $6000\text{mm} = 6\text{m}$

Scientists should convert their measurements to the most easily understood number.

HOW TO CONVERT WITHIN THE METRIC SYSTEM

While doing math is helpful for understanding metric conversion, it is not necessary! We will use a HOP system where we will simply move a decimal point to convert one measurement to another.

**HOP CHART:**

kilo (k)	hecto (h)	deka (dk)	BASIC UNITS (m,g,L)	deci (d)	centi (c)	milli(m)
1000	100	10	1	1/10	1/100	1/1000

**To memorize order use:**  
king henry died unexpectedly drinking chocolate milk

## Converting within the Metric System

It is important to understand that the hop chart is used for three different TYPES of measurements: length (m), mass (g) & Liquid volume (L). \*\*Remember the same **prefixes** are used for all **basic units**.

kilo (k)	hecto (h)	deka (dk)	BASIC UNITS (m,g,L)	deci (d)	centi (c)	milli(m)
1000	100	10	1	1/10	1/100	1/1000

### Steps for Converting

**6000 millimeters (mm) = ? m**

\*\*notice we are converting for length (meters), so our prefixes will come in front of meters(m)

**STEP 1**  
Determine where you start on the chart and where you need to get to.

kilo (km)	hecto (hm)	deka (dkm)	(m)	deci (dm)	centi (cm)	milli (mm)
1000	100	10	1 "m"	1/10	1/100	1/1000 "mm"

"mm to m is 3 to the left"

#### STEP 2

Locate the position of the decimal on the number you are converting. On whole numbers, the decimal is immediately to the right of the "ones" position

6000mm

Where's the decimal?  
\_\_\_\_\_

#### STEP 3

Simply move, "HOP" the decimal the number of spots and the direction that you figured out in step 1.

**6000. mm**

#### STEP 4

Rewrite the new number with the new unit!  
Be sure to use the correct unit!

**6m**

The above would have been the same if it were a mass problem or a liquid volume problem.

FOR EXAMPLE:

*Mass:* 6000 mg (milligrams) = \_\_\_\_\_ g (grams)

*Liquid Volume:* 6000mL (milliLiters) = \_\_\_\_\_ L (Liters)

# Practice

Match the basic unit for each type of measurement.

- |                    |                |
|--------------------|----------------|
| 1. Mass            | ___ meters(m)  |
| 2. Liquid Volume   | ___ grams (g)  |
| 3. Length/distance | ___ Liters (L) |

Match the measurement with the **best** units.

- |                                     |        |
|-------------------------------------|--------|
| 1. Mass of 10 grains of sand.       | ___ kg |
| 2. Volume of a dose of medicine.    | ___ kL |
| 3. Length of a ruler.               | ___ cg |
| 4. Length of teachers desk.         | ___ L  |
| 5. Mass of a brick.                 | ___ kg |
| 6. Amount of pop in a large bottle. | ___ m  |
| 7. Mass of 25 pennies.              | ___ cm |
| 8. Amount of water in a pond.       | ___ mL |
| 9. Mass of you.                     | ___ cg |

Match the abbreviation with the correct measurement.

- |        |                |
|--------|----------------|
| 1. kg  | ___ kiloliter  |
| 2. mL  | ___ milliliter |
| 3. cm  | ___ dekameter  |
| 4. dkm | ___ milligram  |
| 5. hL  | ___ kilogram   |
| 6. mg  | ___ centimeter |
| 7. kL  | ___ hectoliter |

True or False?

- We will use feet and inches in science? T or F
- We will convert within the metric system? T or F
- Mass measures the length of something? T or F
- The hop chart will help us convert metrics? T or F
- The hop chart is used for 3 types of measures? T or F

Fill in the hop chart with the correct prefixes with abbreviations and basic units in the center box.

_____	_____	_____	<b>BASIC UNITS</b>	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
1000	100	10	1	1/10	1/100	1/1000

Convert measurements using the techniques described on page 2.

	<u># of hops</u>	<u>Direction?</u>	<u>Answer</u>
1. .001 hm= ?dm	_____	_____	_____ dm
2. .0017 km= ?m	_____	_____	_____ m
3. .6 cg=?mg	_____	_____	_____ mg
4. .09 hL=?L	_____	_____	_____ L
5. .0000009 Kg=?mg	_____	_____	_____ mg
6. 10,000 mg=?g	_____	_____	_____ g
7. 57.65m=?cm	_____	_____	_____ cm
8. .098 km=?m	_____	_____	_____ m
9. .009L=?mL	_____	_____	_____ mL
10. 345.978 dkm=?mm	_____	_____	_____ mm