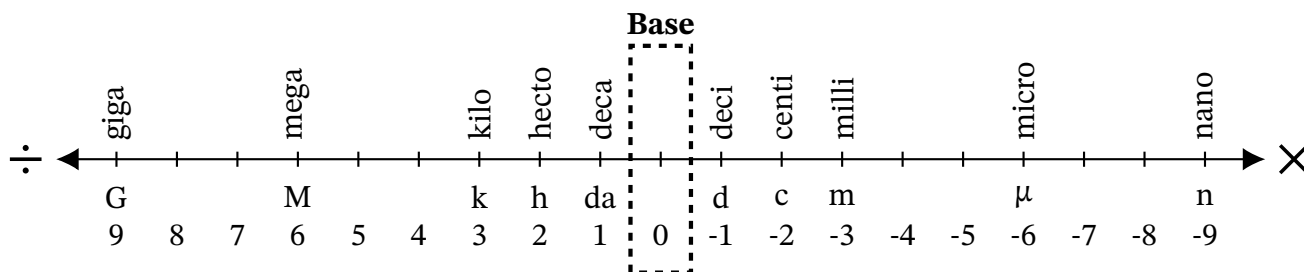


Metric System Conversion Guide (U.S. Version)

Metric units are composed of a base unit and a prefix except when the unit **is** the base unit. For example, centimeter (cm) is the base unit meter (m) with the prefix centi (c).

Base Units: There are many base units possible including ones that are not really Metric, but are accepted for use with Metric prefixes. The main ones K-8 students might encounter are meters, grams, litres, and seconds. Their symbols are m, g, L and s. The L is usually uppercase so it isn't confused with the number one or an exclamation mark.

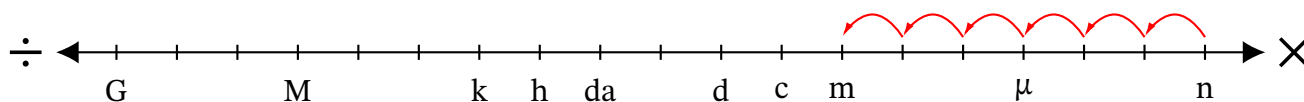
Prefixes: Prefixes tell you how big or small the unit is compared to the base unit. Centi, for example is 1/100 of the base unit and mega 1,000,000 times the base unit. Usually these are written in powers of ten like 10^{-2} and 10^6 . The **Conversion Line** below shows many of the Metric prefixes, their symbols and their powers of ten.



All Methods: All methods involve using the conversion line to determine how many **jumps** and whether to multiply or divide when converting from the first unit to the second unit.

Converting from a smaller unit to a larger unit (jumping left) means you must divide. Converting from a larger unit to a smaller unit (jumping right) means you must multiply.

Example: Convert 8,737,000 nanometers (nm) to millimeters (mm). This will require six jumps to the left.



Method 1 (Powers of Ten): Each jump counts as a power of ten. Divide (left) or multiply (right) by that power of ten. In the example there were six jumps to the left: $8,737,000 \text{ nm} \div 10^6 = 8.737 \text{ mm}$

Method 2 (Repeated Multiplication or Division): Divide (left) or multiply (right) by 10 for each jump. In the example there were six jumps to the left: $8,737,000 \text{ nm} \div 10 \div 10 \div 10 \div 10 \div 10 \div 10 = 8.737 \text{ mm}$

Method 3 (Move the Decimal): Move the decimal the same number of times and the same direction as your jumps. In the example, you would move the decimal six places to the left.