**CONCEPT:** METRIC PREFIXES

- **Metric Prefixes** are modifiers that are multiples of _____.

## Metric Prefix Multipliers

| $10^{12}$ | $10^{9}$ | $10^{6}$ | $10^{3}$ | $10^{2}$ | $10^{1}$ | $10^{0}$ | $10^{-1}$ | $10^{-2}$ | $10^{-3}$ | $10^{-6}$ | $10^{-9}$ | $10^{-12}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| tera | giga | mega | **k**ilo | **h**ecto | **d**eca | **BASE** | **d**eci | **c**enti | **m**illi | micro | nano | pico |
| ____ | ____ | ____ | ____ | ____ | ____ | ____ | ____ | ____ | ____ | ____ | ____ | ____ |

**MEMORY TOOL**

**T**he **G**reat **M**onarch **K**ing **H**enry's **Da**ughter **B**arbara **d**rinks **c**hocolate **m**ilk **µ**ntil **n**ine **p**m

- The metric prefixes act as "labels" that can be placed in front of various base units.

| Metric Prefixes | | | |
|---|---|---|---|
| **Base Units** | **Metric Prefixes** | **Base Units** | **Metric Prefixes** |
| L | ___ L | mol | ___ mol |
| s | ___ s | A | ___ A |

**EXAMPLE:** Convert the following value to the desired units: 694 kg to µg

**STEP 1:** If the given value has a **metric prefix** then convert it to the _____ unit.

- □ In order to cancel out units always make sure they are on opposite levels.
- □ Always place the coffecient _____ on the side with the **metric prefix**.

**STEP 2:** If necessary, convert the _____ unit to a new **metric prefix**.

**CONCEPT:** METRIC PREFIXES

**PRACTICE:** Which quantity in the following pair is smaller?

155 pm or $7.8 \times 10^{-9}$ cm

**PRACTICE:** Use the prefix multipliers to express each measurement without any exponents.

a) $32 \times 10^{-13}$ L

b) $7.3 \times 10^{6}$ g

c) $18.5 \times 10^{11}$ s

**PRACTICE:** Use scientific notation to express each quantity with only the base unit.

a) 83 μm

b) 193 kg

c) 2.7 mmol

**PRACTICE:** If a room has a volume of $1.15 \times 10^{8}$ $cm^3$, what is the volume in $km^3$?