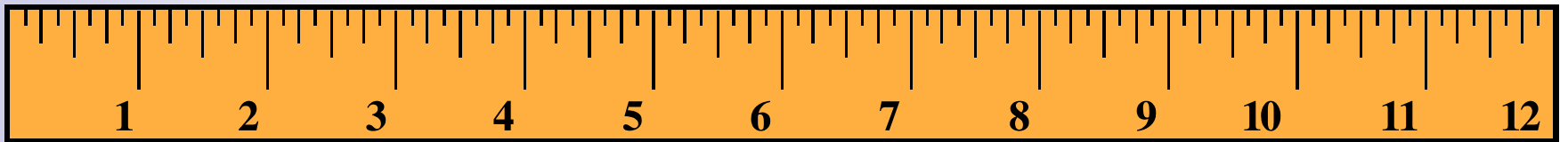
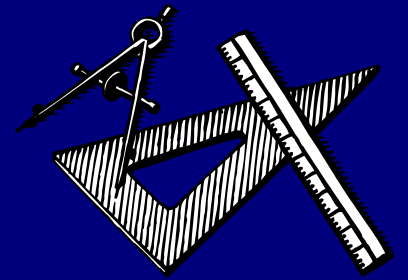


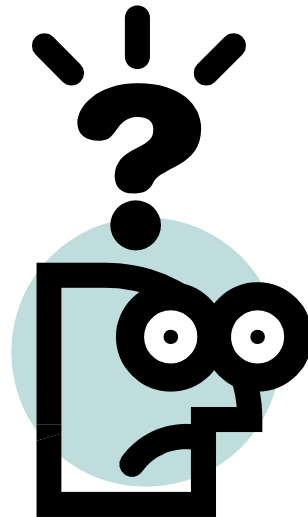
# The Metric System

The Language of Science



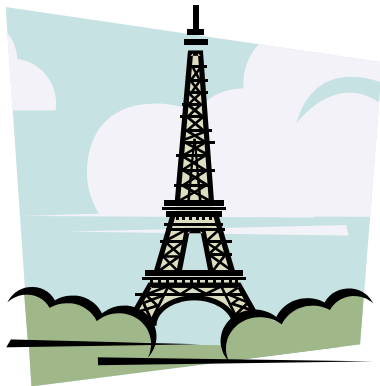
# Origins of the Metric System

- Before the 17<sup>th</sup> century, the systems of weights and measures in Europe were very confusing.
- Units of length, land area, and weight varied from region to region.



# Solution?

- In 1791 France developed the metric system to alleviate the confusion and differences among the systems.
- However, the system didn't become widespread until the 19<sup>th</sup> century.
- The U.S. has not yet adopted the metric system.



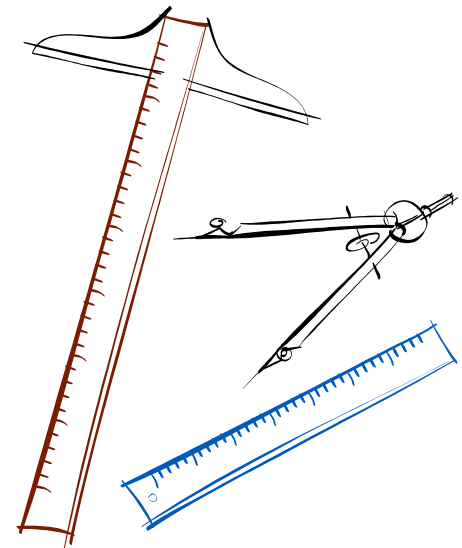
# The SI System

- To keep track of conversions between all the different systems, the SI system was created.



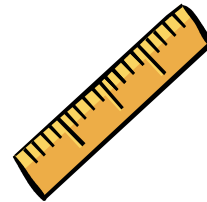
# The SI System

- **All** systems of weights and measures are linked through the **International System of Units**.
- It's called the SI system from the French term *Système International d'Unités*.
- The SI system has an approved set of prefixes and base units that are the same **all over the world**.



# Base SI Units

- The meter is used for distance,
- the kilogram for mass,
- the second for time,
- the ampere for electric current,
- the kelvin for temperature,
- the mole for amount of substance, and
- the candela for intensity of light.



# SI Prefixes

giga- (G-)  $10^9$  billion

mega- (M-)  $10^6$  million

kilo- (k-)  $10^3$  thousand

hecto- (h-)  $10^2$  hundred

deka- (da-)  $10^1$  ten

(base unit)

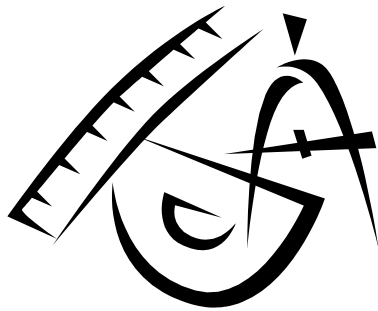
deci- (d-)  $10^{-1}$  tenth

centi- (c-)  $10^{-2}$  hundredth

milli- (m-)  $10^{-3}$  thousandth

micro- ( $\mu$ -)  $10^{-6}$  millionth

nano- (n-)  $10^{-9}$  billionth





# Conversions

- To convert from one unit to another, you must pay attention to the prefixes.
- The simplest way to convert is to convert back to the base unit first, and then go to the desired unit.



➤ **10mm = 1cm**

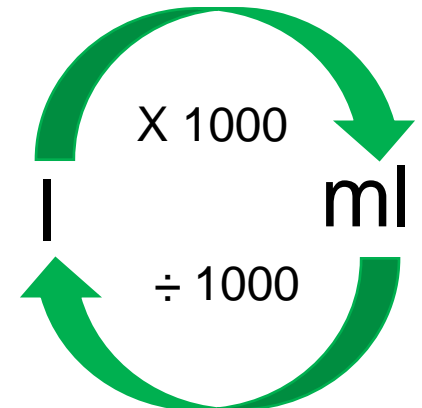
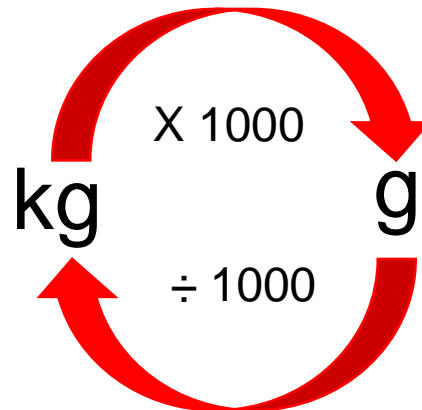
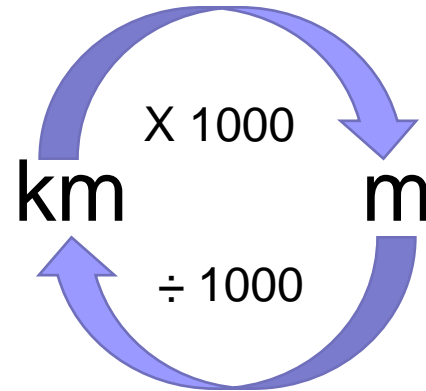
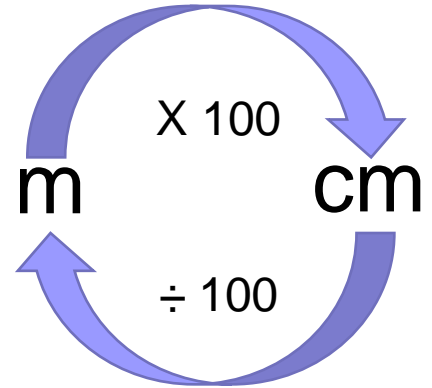
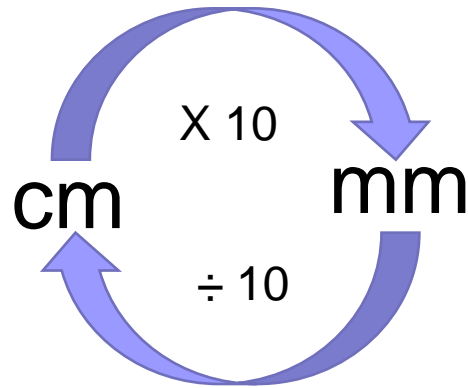
➤ **100cm = 1m**

➤ **1000m = 1km**

➤ **1000g = 1kg**

➤ **1000kg = 1 tonne**

➤ **1000ml = 1 litre**



# 10 milligrams = ? Kilograms

$$\cancel{10 \text{ milligrams}} \times \frac{1 \text{ gram}}{\cancel{1000 \text{ milligrams}}} = .01 \text{ grams}$$

$$\cancel{.01 \text{ grams}} \times \frac{1 \text{ kilogram}}{\cancel{1000 \text{ grams}}} = \mathbf{.00001 \text{ kilograms}}$$

1)  $5.9\text{m} = \dots\text{cm}$      **590cm**

2)  $43\text{mm} = \dots\text{cm}$      **4.3cm**

3)  $2.4\text{kg} = \dots\text{g}$      **2400g**

4)  $7.4\text{ litres} = \dots\text{ml}$      **7400ml**

5)  $9.5\text{kg} = \dots\text{g}$      **9500g**

6)  $70\text{cm} = \dots\text{m}$      **0.7m**

7)  $300\text{mm} = \dots\text{m}$      **0.3m**

8)  $600\text{ml} = \dots\text{l}$      **0.6l**

9)  $3\text{g} = \dots\text{kg}$      **0.003kg**

10)  $700\text{g} = \dots\text{kg}$      **0.7kg**

11)  $4\text{ litres} = \dots\text{ml}$      **4000ml**

12)  $509\text{g} = \dots\text{kg}$      **0.509kg**

13)  $63\text{ litres} = \dots\text{ml}$      **63000ml**

14)  $1400\text{ml} = \dots\text{ Litres}$      **1.4l**

15)  $3.5\text{km} = \dots\text{m}$      **3500m**

16)  $2500\text{kg} = \dots\text{t}$      **2.5t**

17)  $0.3\text{m} = \dots\text{cm}$      **30cm**

18)  $3.7\text{m} = \dots\text{mm}$      **3700mm**

19)  $5.02\text{kg} = \dots\text{g}$      **5020g**

20)  $10.3\text{cm} = \dots\text{mm}$      **103cm**