METRIC SYSTEM

THE METRIC SYSTEM

* The metric system is <u>much</u> easier. All metric units are related by factors of 10.

* Nearly the entire world (95%), except the United States, now uses the metric system.

* Metric is used exclusively in science.

* Because the metric system uses units related by factors of ten and the types of units (distance, area, volume, mass) are simply-related, performing calculations with the metric system is much easier.

METRIC CHART

Prefix	Symbol	Factor Number	Factor Word
Kilo	K	1,000	Thousand
Hecto	H	100	Hundred
Deca	Dk	10	Ten
Base Unit	**Meter, gram, liter**	**1**	**One**
Deci	D	0.1	Tenth
Centi	C	0.01	Hundredth
Milli	M	0.001	Thousandth

The metric system has three units or bases.

Meter – the basic unit used to measure length
Gram – the basic unit used to measure weight
Liter – the basic unit used to measure liquid capacity (think 2 Liter cokes!)
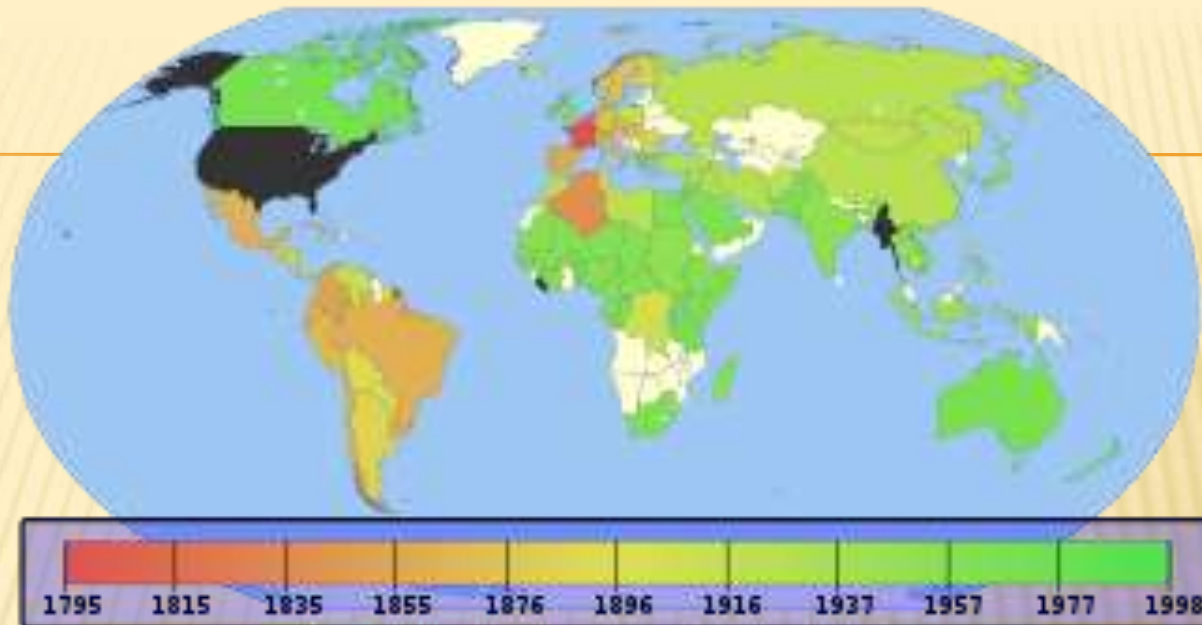
The United States, Liberia and Burma (countries in black) have stuck with using the Imperial System of measurement.

You can think of "the metric system" as a nickname for the *International System of Units*, or *SI*.

HOW TO REMEMBER THE PREFIXES

Kids ————————→ Kilo

Have ————————→ Hecto

Dropped ————————→ Deca

Over ————————→ base unit (gram, liter, meter)

Dead ————————→ Deci

Converting ————————→ Centi

Metrics ————————→ Milli

Large Units – Kilo (1000), Hecto (100), Deca (10)
Small Units – Deci (0.1), Centi (0.01), Milli (0.001)

Because you are dealing with multiples of ten, you do not have to calculate anything. All you have to do is move the decimal point, but you need to understand what you are doing when you move the decimal point.

MR (move right) – moving the decimal point to the right means you are multiplying.

ML (move left) – moving the decimal point to the left means you are dividing.

This is a process that once you learn it, you will never forget!! The best part is you won't have to memorize any conversion values.

Right/Multiply   **Left/Divide**

EXAMPLE

* Change 2 Kilometers to meters

2 K = ? m

Kids	Have	Dropped	Over	Dead	Converting	Metrics
Kilo	Hecto	Deca	**Base**	Deci	Centi	Milli

You are moving the decimal point <u>left to right 3 spaces;</u> that is, kilo to the base unit is three spaces over to the right.

2 K = 2000 m

Note: When a number does not have a decimal point, it is understood to be at the end of the number. So 2 would be 2.0

EXAMPLE

× Change 25 millimeters to meters

25 mm = ? m

Kids	Have	Dropped	Over	Dead	Converting	Metrics
Kilo	Hecto	Deca	**Base**	Deci	Centi	Milli

You are moving the decimal point <u>right to left 3 spaces</u>; that is from milli to the base unit is three spaces to the left.

25 mm = .025 m

Note: When a number does not have a decimal point, it is understood to be at the end of the number. So 2 would be 2.0

METRIC STAIRS

Kilo - means 1,000

Hecto - means 100

To convert Up -
Divide by 10

Deka - means 10

Chart works around the ones place
e.g. 1 meter, gram or liter

Deci - means 1/10 or 0.1
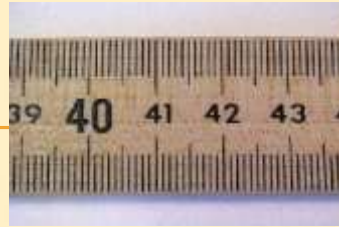
Down
Multiply by
10

Centi - means 1/100 or 0.01

Mili - means 1/1000 or 0.001
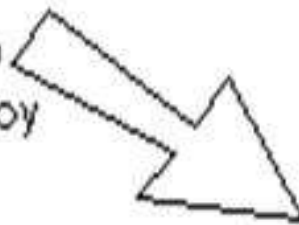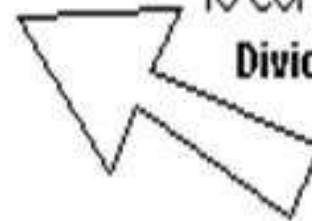
RELATIONSHIP BETWEEN UNITS

- In the S.I. system, there is a relationship between volume (liters), mass (grams), and distance (meter).
  - 1 milliliter is the same volume as 1 cubic centimeter.
    - 1 ml = 1 cm^3
  - The mass of 1 milliliter of water is approximately 1 gram.
    - 1 L of water has a mass of approximately 1 kg

LENGTH

✖ The standard unit of length in the metric system is the meter.

| Other units of length and their equivalents in meters	We symbolize these lengths as follows
1 millimeter = 0.001 meter	1 millimeter = 1 mm
1 centimeter = 0.01 meter	1 centimeter = 1 cm
1 decimeter = 0.1 meter	1 meter = 1 m
1 kilometer = 1000 meters	1 decimeter = 1 dm
	1 kilometer = 1 km
For reference, 1 meter is a little longer than 1 yard or 3 feet.	
1 inch is 2.54 centimeters	

VOLUME

✖ The standard unit of volume in the metric system is the liter.

Other units of volume and their equivalents in meters	We symbolize these lengths as follows
1 milliliter = 0.001 meter	1 milliliter = 1 ml
1 centiliter = 0.01 meter	1 centiliter = 1 cl
1 deciliter = 0.1 meter	1 1 deciliter = 1 dl
1 kiloliter = 1000 meters	1 liter = 1 l
	1 kiloliter = 1 kl
For reference, 1 liter is a little more than 1 quart.	
One teaspoon equals about 5 milliliters.	

Centiliter is not used. We would say 10 ml, not 1 cl.
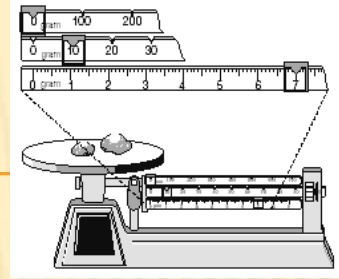
MENISCUS – RELATED TO VOLUME
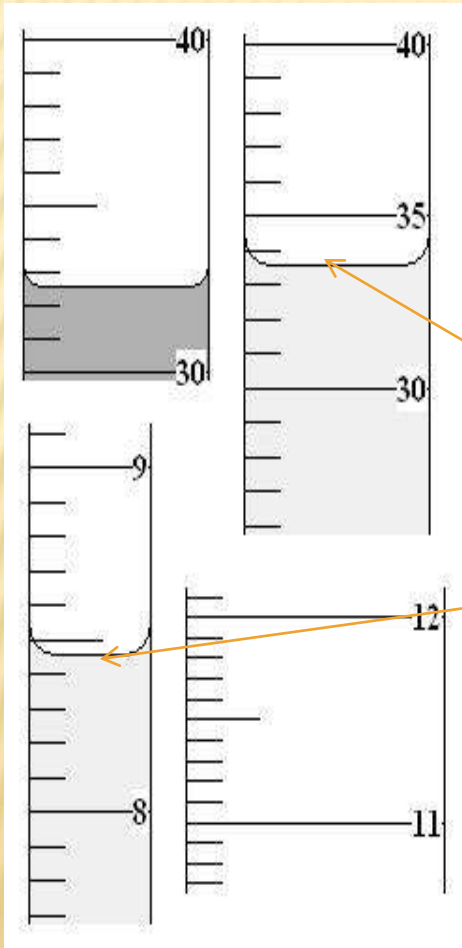
Water molecules are attracted to the negatively charged glass. This forms a **meniscus.**

The definition of a meniscus is "*A concave surface of a liquid resulting from surface tension.*"

The level in a graduated cylinder is read at the <u>bottom</u> of the meniscus.

MASS

The standard unit of mass in the metric system is the gram.

Other units of grams and their equivalents in meters	We symbolize these masses as follows
1 milligram = 0.001 gram	1 milligram= 1 mg
1 centigram = 0.01 gram	1 centigram = 1 cg
1 decigram = 0.1 gram	1 gram = 1 g
1 kilogram = 1000 gram	1 decigram = 1 dg
	1 kilogram = 1 kg

For reference, 1 gram is about the mass of a paper clip.

One kilogram is about the mass of a liter of water.

Centigram and decigram are not used. We would say 100 mg, not 1 dg.

TEMPERATURE
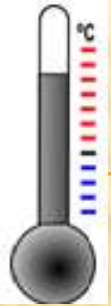
Temperature is expressed as degrees Celsius in the metric system.

The **boiling point** of water (at sea level) is 100° Celsius, or 100°C.

The **freezing point** of water (at sea level) is 0°Celsius.

A hot day is about 30° Celsius.

The following equations convert between Celsius and Fahrenheit

$$F = \frac{9}{5}C + 32 \qquad\qquad C = \frac{5}{9}(F - 32)$$

Example

45°C = ____ °F

$$F = \frac{9}{5}C + 32$$

$$F = \frac{9}{5}(45) + 32$$

$$F = 81 + 32$$

$$F = 113$$

95°F = ____ °C

$$C = \frac{5}{9}(F - 32)$$

$$C = \frac{5}{9}(95 - 32)$$

$$C = \frac{5}{9}(63)$$

$$C = 35°$$