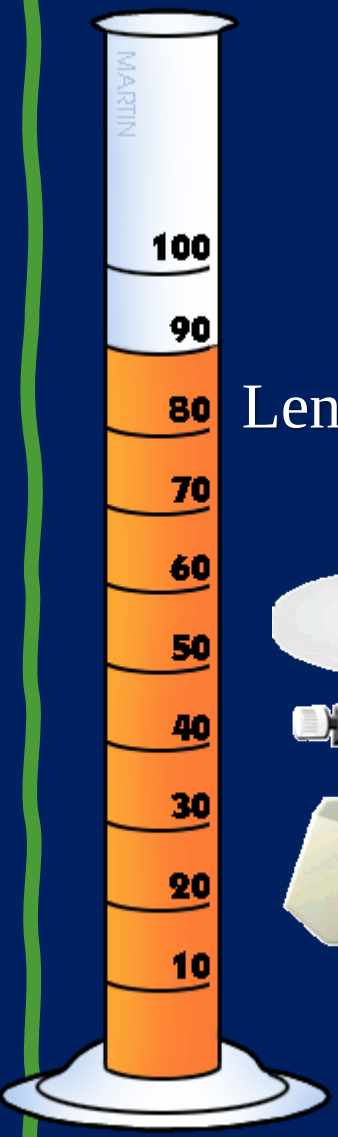
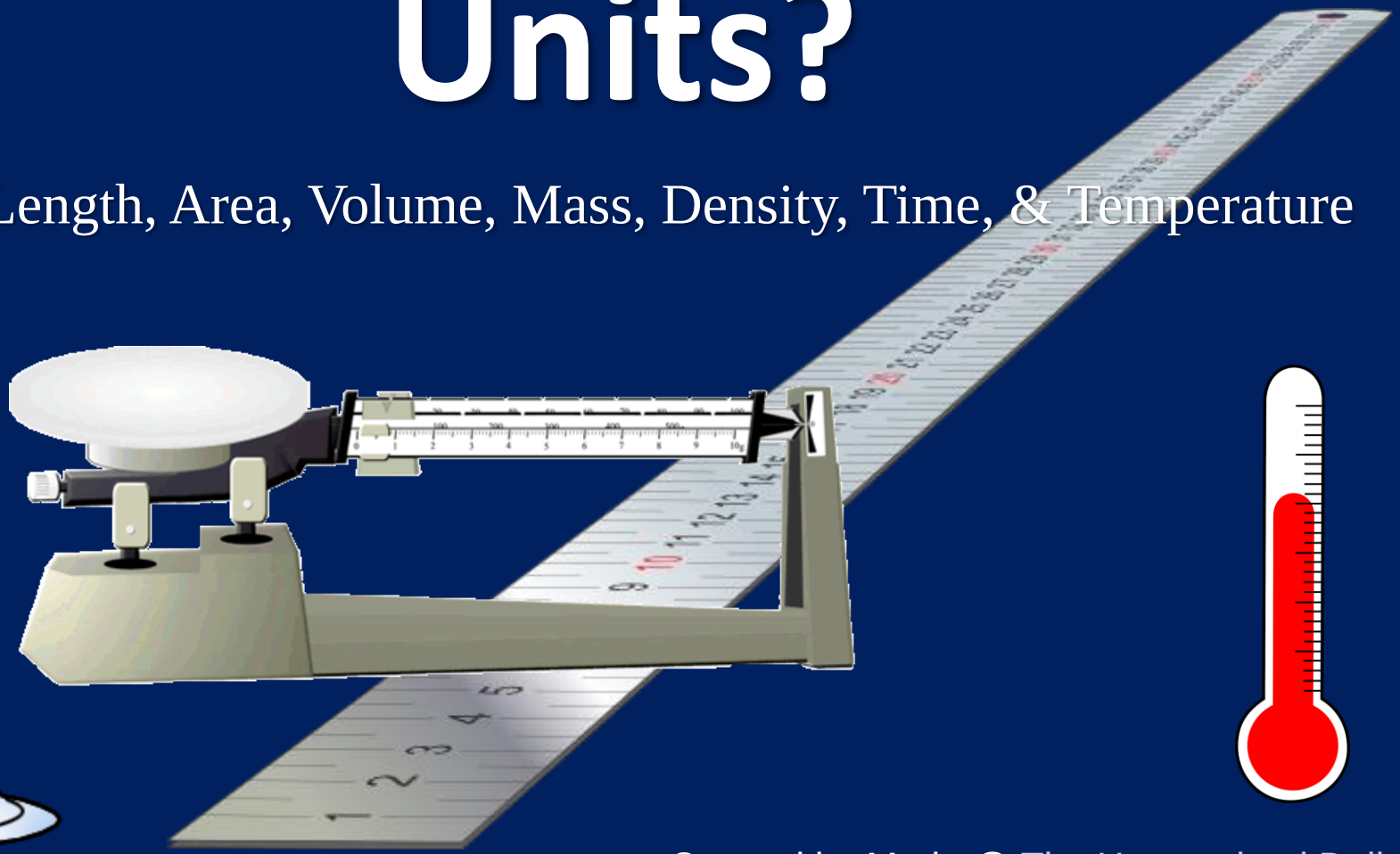
What are the SI Units?

Length, Area, Volume, Mass, Density, Time, & Temperature





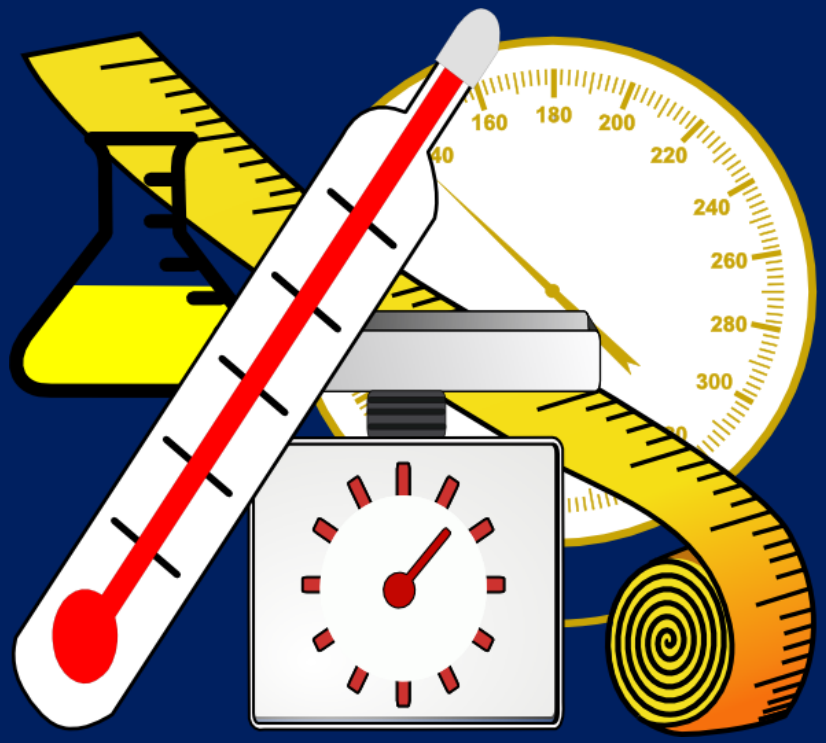
Created by Marie @ The Homeschool Daily

The SI Units is short for the International System of Units. This measurement system is used worldwide especially in the fields of science and medicine.

It is the modern-day metric system.

Even though the SI Units were adopted worldwide in 1960, Americans still use other forms of measurements daily. For example, inches, feet, and miles are used for length as opposed to centimeter, meter, and kilometer. In the U.S., SI units are used primarily in commerce, trade, and in science related fields.

Why do you think it is important for all scientists to use the same measurement system?



Scientists can communicate their data and findings clearly when they use the same system of measurement. That is why the SI Units are so important. It keeps scientists' measurements consistent amongst each other.

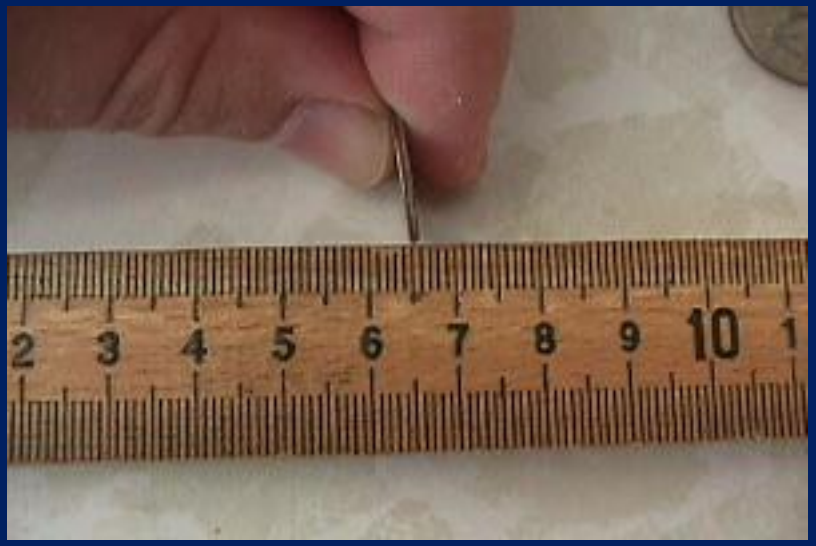
The SI Units is a standardized system of measurement founded on 7 base units.

Base Quantity	Name	Symbol
Length	meter	m
Mass	kilogram	kg
Time	second	s
Electrical Current	Ampere	A
Temperature	kelvin	K
Amount of Particles in a Substance	mole	mol
Luminosity	candela	cd

Let's start with…

Length

To measure length, or the distance between 2 points, you would use a meter stick. The base unit for length is the meter (m).



Length

When to use each measurement?

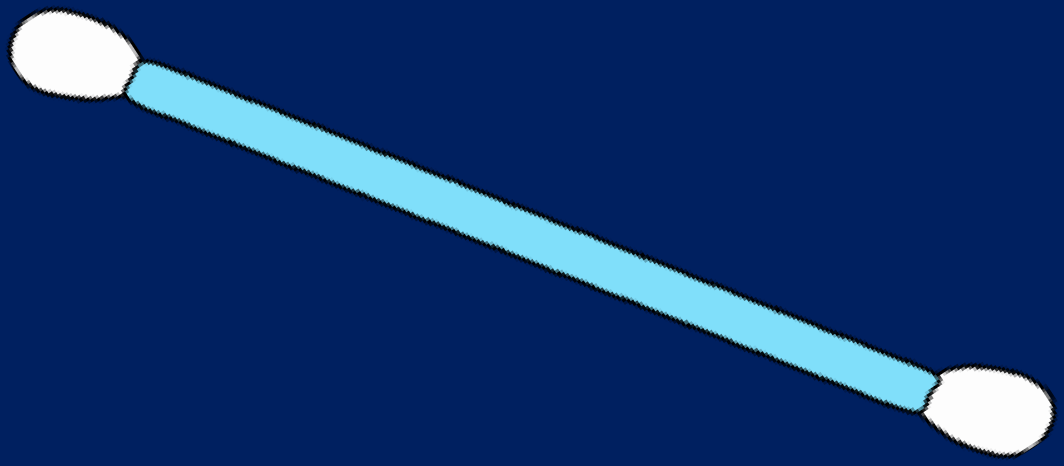
- **Meters: m**
  - Measuring from the floor to the doorknob
- **Kilometers: km**
  - Measuring a large distance (city to city)
- **Centimeters: cm**
  - Measuring small area (book)
- **Millimeters: mm**
  - Measuring smaller area (pencil eraser)

If you were measuring the distance from one state capital to another, what unit of measurement would you use?

If you were measuring the distance from one state capital to another, what unit of measurement would you use?

Kilometer

What if you were to measure the length of a Q-tip? What measurement would you use?



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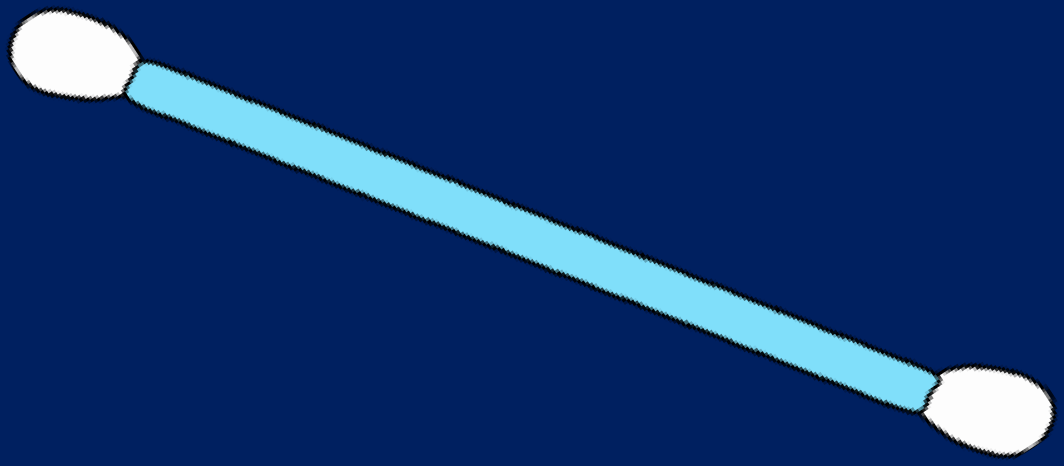
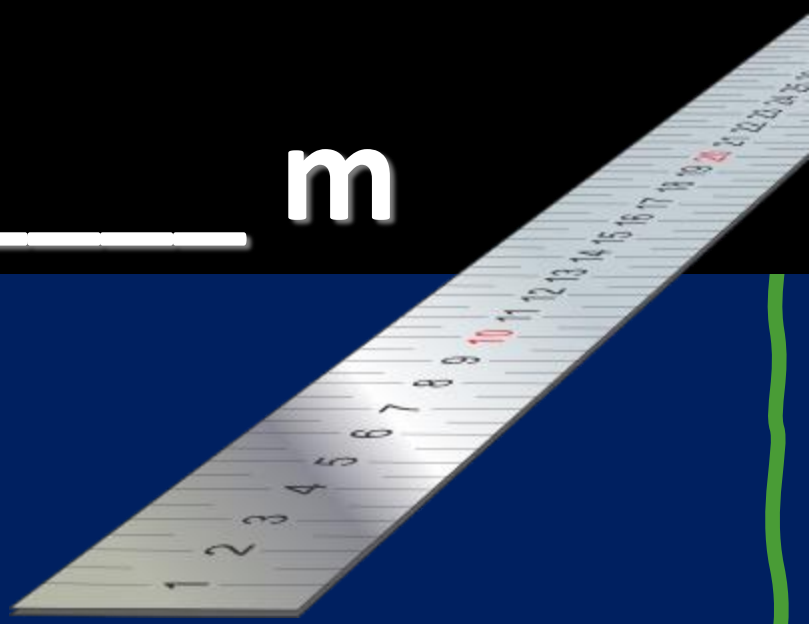


Centimeter

Can you convert these metrics?

If 1 km = 1,000 m, then…

5 km = _____ m



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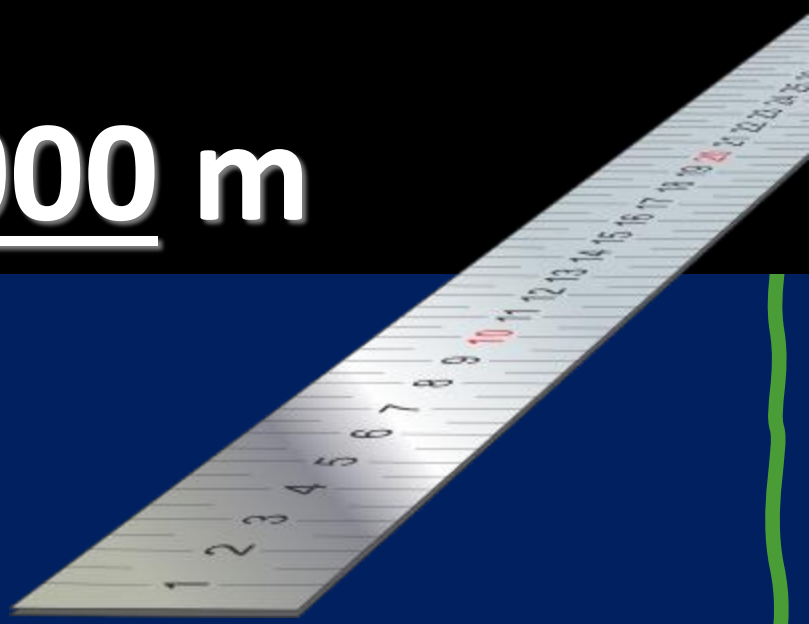


Use length to find…

Area

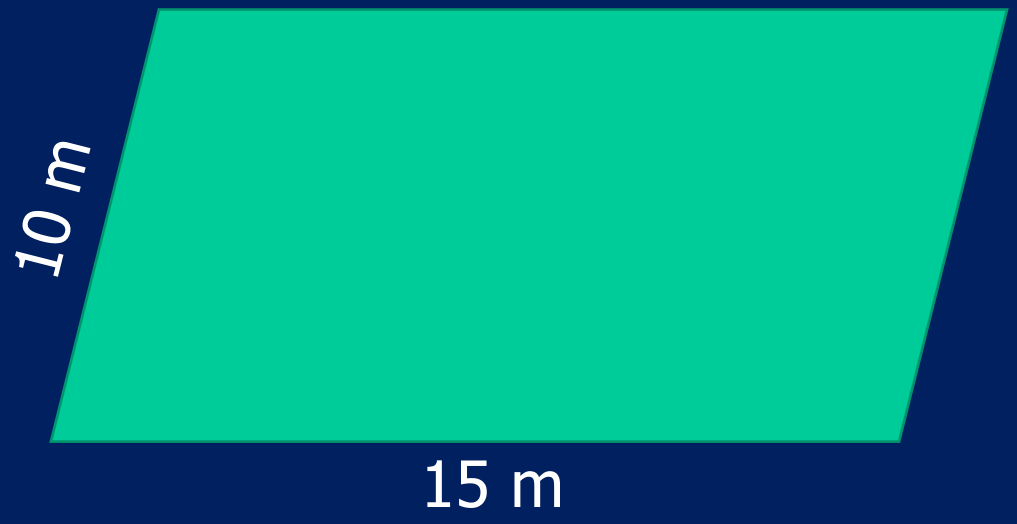
Area is the measure of how much surface an object has. To find the area of a surface, use this formula:

Area= Length x Width

A= L x W

For Example:

If a ballroom floor is 15 meters by 10 meters, what is the area of the room?



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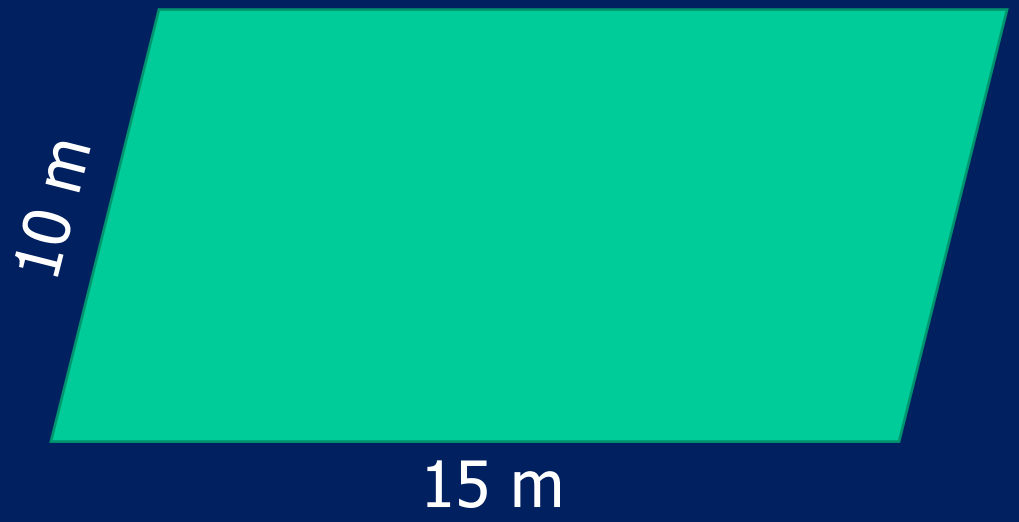


150 m^2

Moving onto…

Volume

The amount of space matter occupies is volume. To find the volume of an object, use this formula:

Volume=

Length x Width x Height

V= L x W x H

For Example:

You receive a birthday present. It is in a box. The box is 10 cm tall, 10 cm long, and 10 cm wide. What is the box's volume?

For Example:

You receive a birthday present. It is in a box. The box is 10 cm tall, 10 cm long, and 10 cm wide. What is the box's volume?

$1000\ cm^3$

Can you solve?

If a building is 200 meters tall, 100 meters wide, and 50 meters long, then what is its volume?

Can you solve?

If a building is 200 meters tall, 100 meters wide, and 50 meters long, then what is its volume?

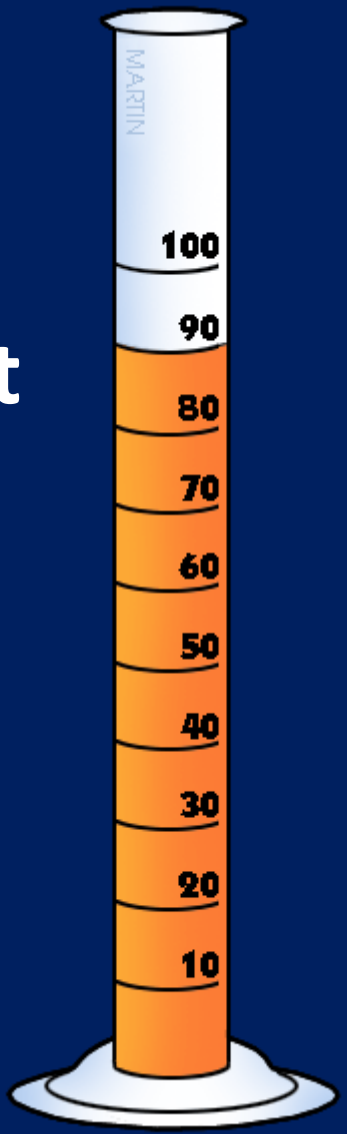
$1{,}000{,}000\ m^3$

Up Next...

Liquid Volume

To measure liquid volume, you would use the unit measurement known as the Liter (L). The tool you would use is a cylinder.

Liquid volume is also referred to as capacity.

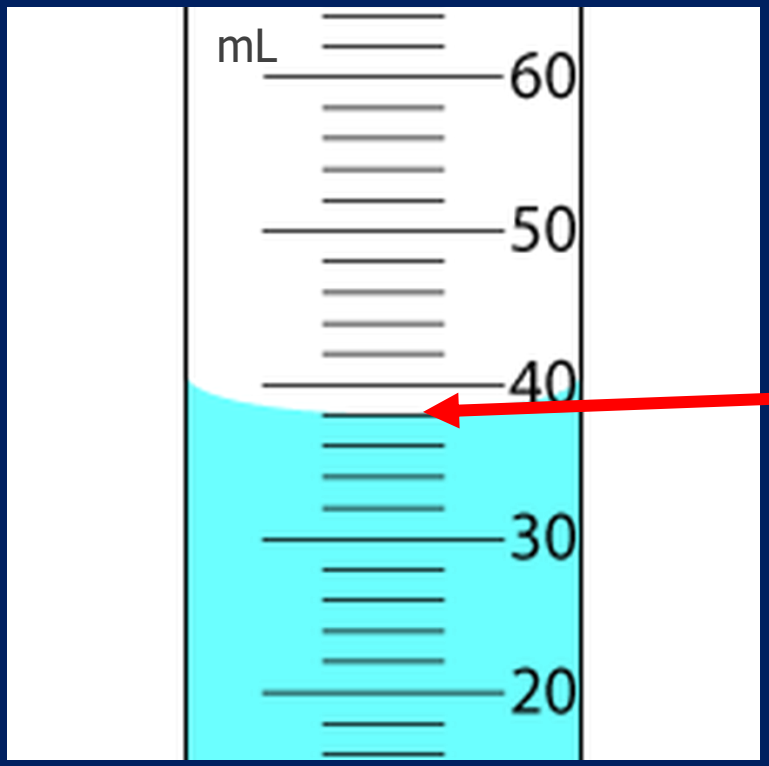


Liquid Volume

When to use each measurement?

- **Liters (L)**
  - Measuring amounts like in a jug of milk or large soda bottle
- **Milliliter (mL)**
  - Measuring smaller amounts like in a baby bottle

When measuring, you need to be aware of the meniscus. It is the curve in the water. You should measure at the bottom of the curve.

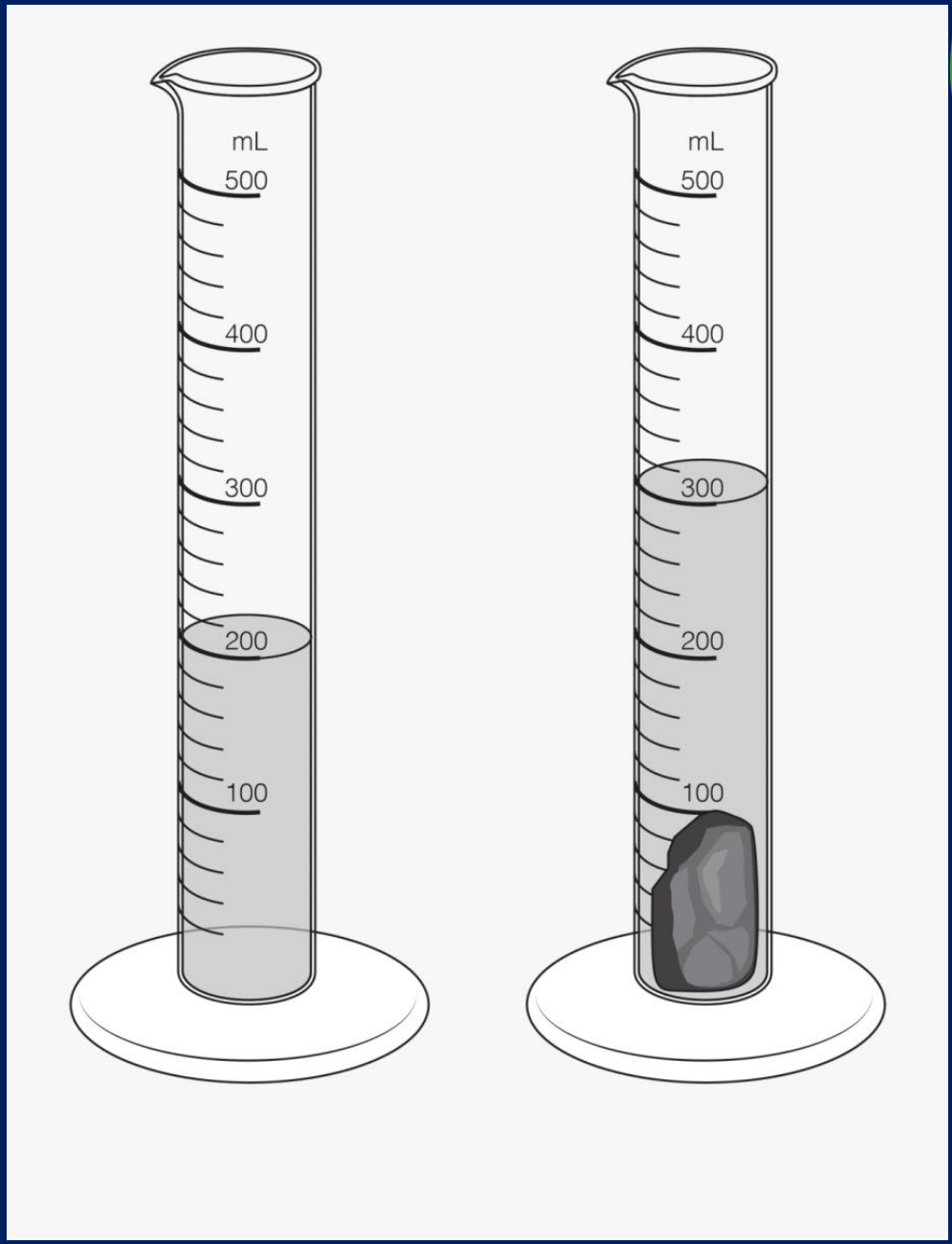


The liquid volume would be 38 mL.

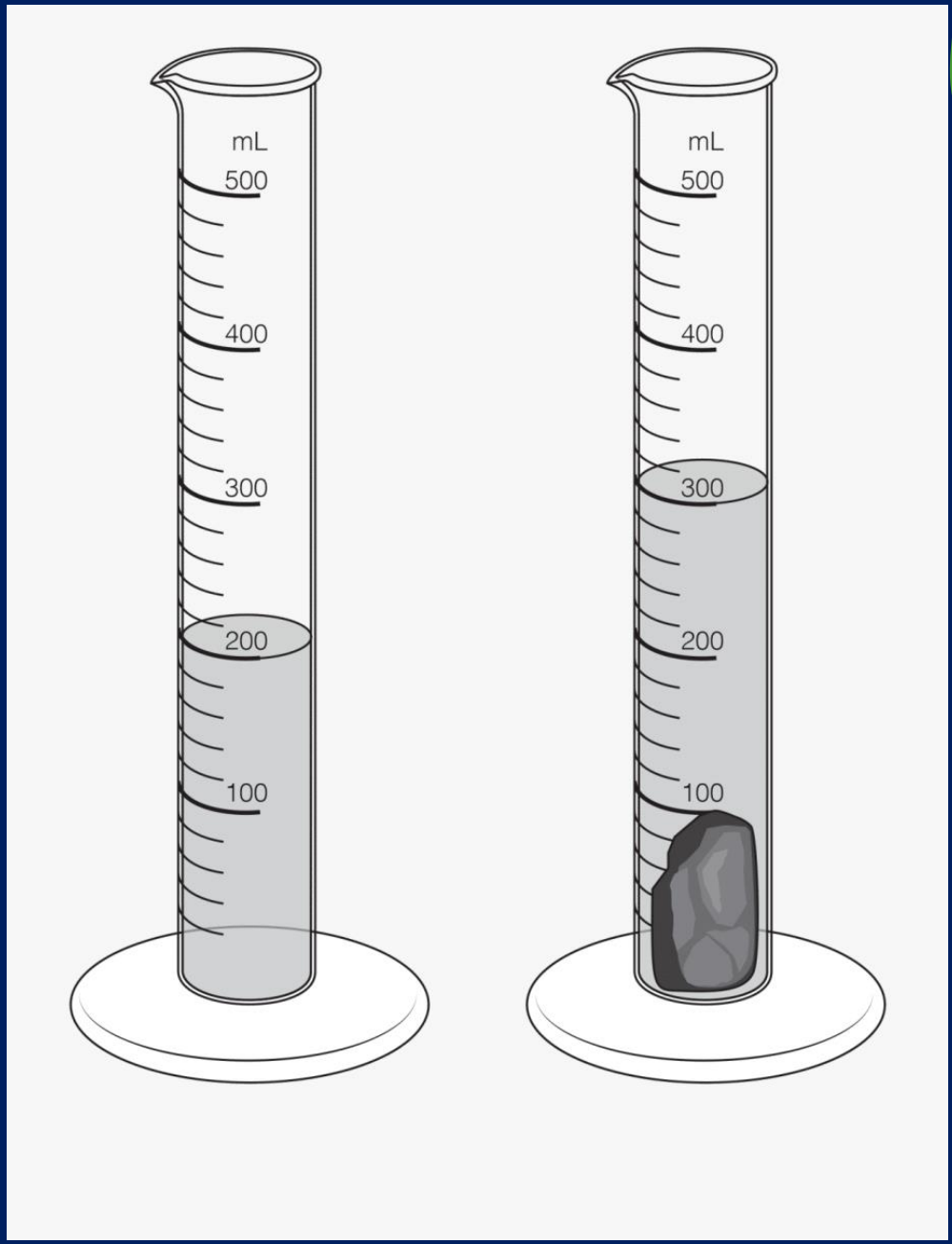
What about irregular objects?

Finding the volume of an irregular object like a rock can be tricky. You can't measure its sides, because they are not straight. So, what can you do?

To find the volume of an irregular object, fill a cylinder with water so that the object can be submerged when dropped in.



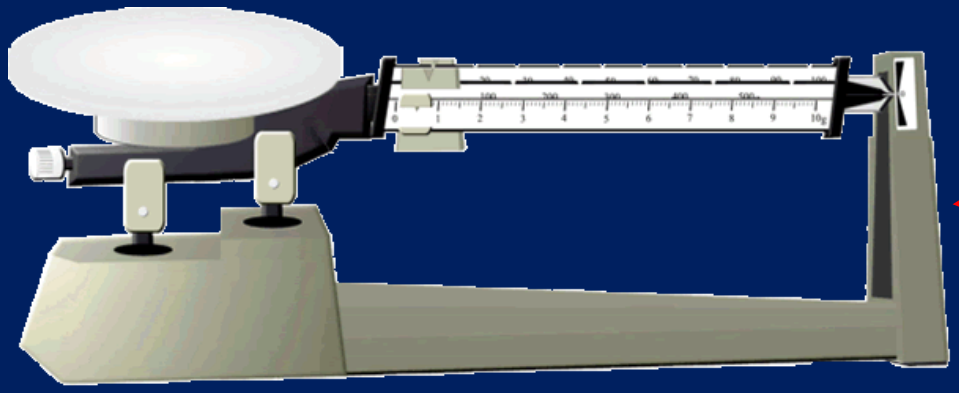
The cylinder measures 200 mL before the rock is added. After the rock has been dropped, the volume increases to 300 mL. The difference, 100 mL, is the volume of the rock.



Up Next…

Mass

Mass is the amount of matter in an object. The base unit for mass is kilogram (kg). The tool you would use is a scale or balance.



This measuring tool is called a triple beam balance.

Mass

When to use each measurement?

- **Grams: g**
  - Measuring small items like a candy bar

- **Kilograms: kg**
  - Measuring larger items like you

Over half-way done!

Density

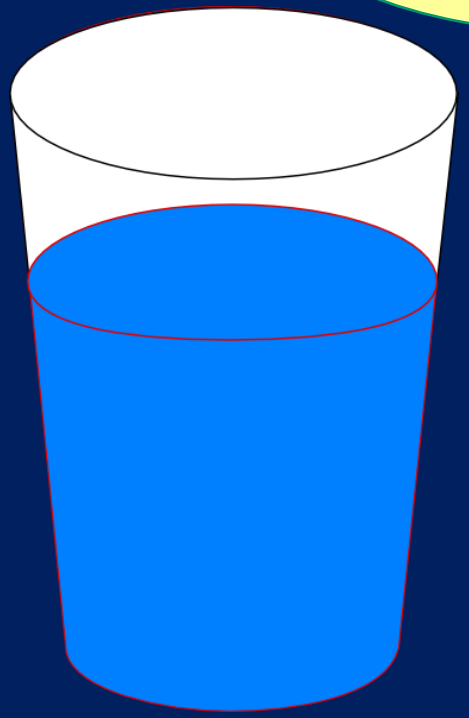
Density is the amount of mass in volume. Use this formula to find an object's density:

Density= Mass / Volume

D = M/V

What would the density of a cup of water be is if its volume was 15 mL and its mass was 15 g?

Do you know?



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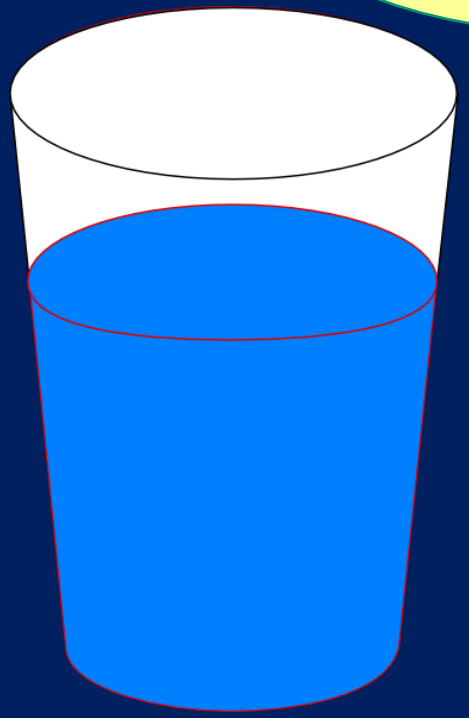
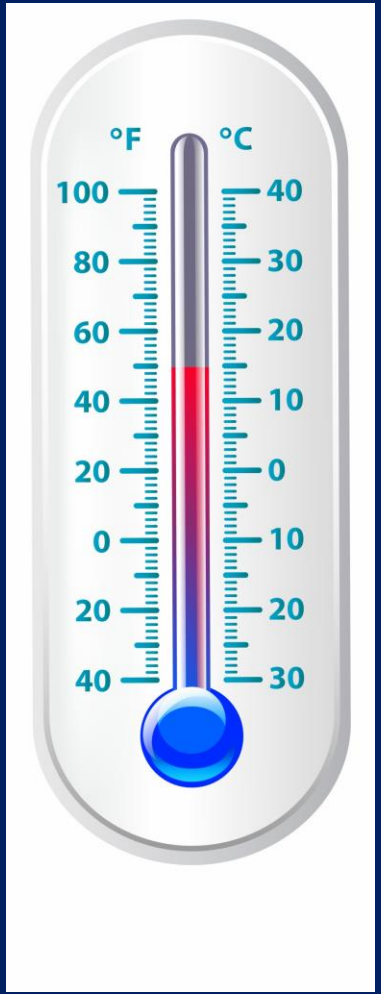


1 g/mL

Moving on…

Temperature

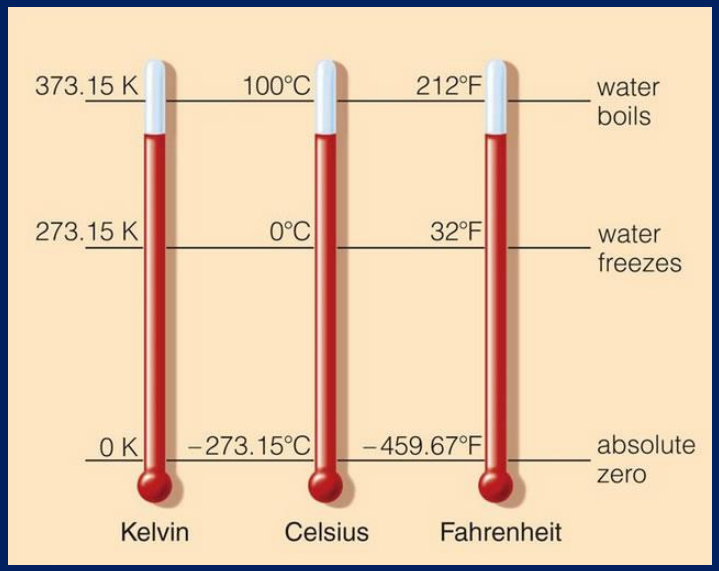
Temperature is the measurement of how hot or cold an object is. The base unit for temperature is Kelvin (K). Use a thermometer to find temperature.



Did you know?

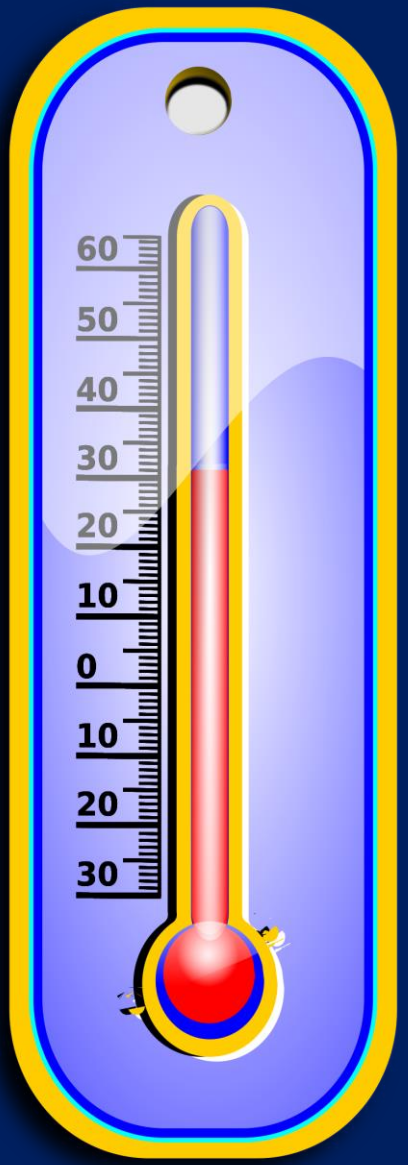
Temperature

When using a thermometer, the temperature is usually presented in Celsius or Fahrenheit. It is important to know how to convert Celsius to Kelvin.



Temperature

- To convert Celsius degrees to Kelvin, add 273.15 to the Celsius degrees.
- For example, if the temperature is 30 degrees Celsius, then add 273.15 to 30 and the answer is 303.15 K.



Last, but not least.

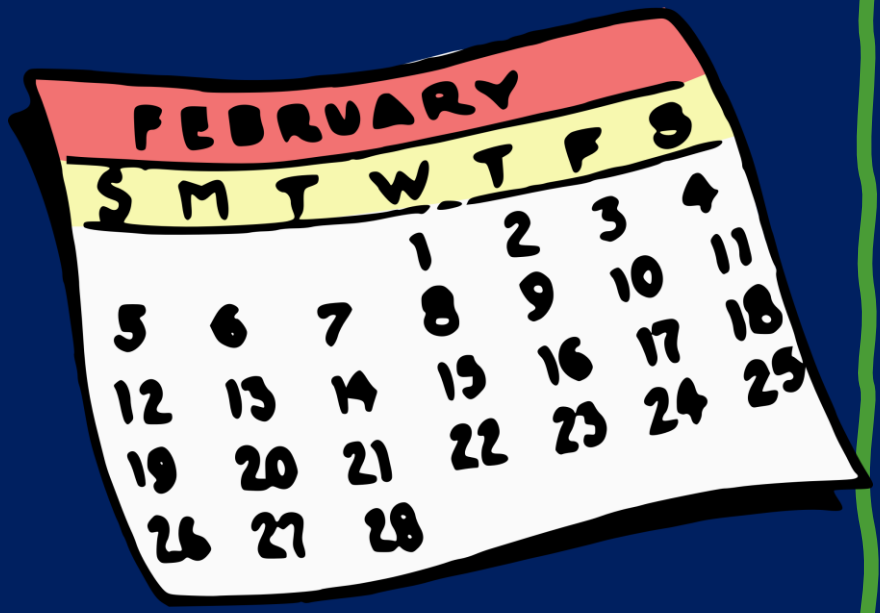
Time

Time is the ongoing sequence of events taking place. The base unit for time is seconds (s). A clock, timer, or stopwatch are all tools that can be used to measure time.

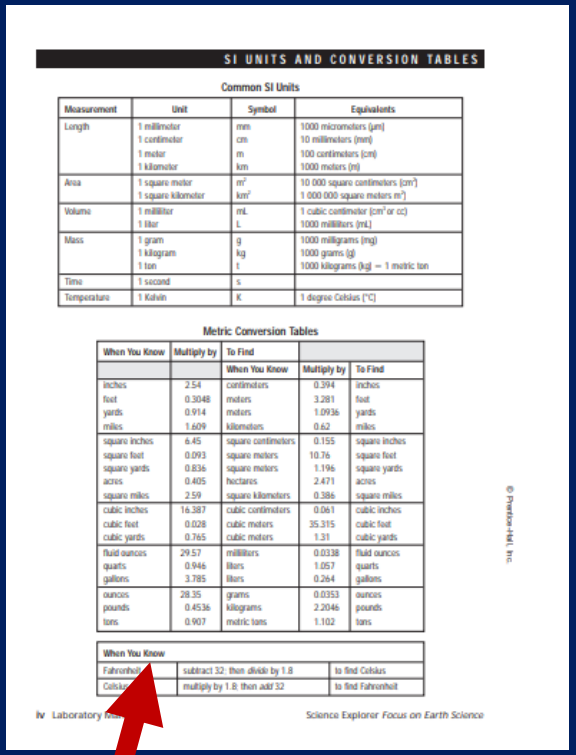
Last, but not least.

Time

- Second (s)
  - measure of time used to refer to greater measures of time
- Minute = 60 seconds
- Hour = 60 minutes
- Day = 24 hours
- Week= 7 days
- 12 Months= Year



As you learn more about the SI Units, you will find this metric conversion sheet helpful. It is a useful reference when converting measurements.



SI UNITS AND CONVERSION TABLES

Common SI Units

Measurement	Unit	Symbol	Equivalents
Length	1 millimeter	mm	1000 micrometers (μm)
	1 centimeter	cm	10 millimeters (mm)
	1 meter	m	100 centimeters (cm)
	1 kilometer	km	1000 meters (m)
Area	1 square meter	m^2	10 000 square centimeters (cm^2)
	1 square kilometer	km^2	1 000 000 square meters (m^2)
Volume	1 milliliter	mL	1 cubic centimeter (cm^3 or cc)
	1 liter	L	1000 milliliters (mL)
Mass	1 gram	g	1000 milligrams (mg)
	1 kilogram	kg	1000 grams (g)
	1 ton	t	1000 kilograms (kg) = 1 metric ton
Time	1 second	s	
Temperature	1 Kelvin	K	1 degree Celsius (°C)

Metric Conversion Tables

When You Know	Multiply by	To Find	When You Know	Multiply by	To Find
inches	2.54	centimeters	centimeters	0.394	inches
feet	0.3048	meters	meters	3.281	feet
yards	0.914	meters	meters	1.0936	yards
miles	1.609	kilometers	kilometers	0.62	miles
square inches	6.45	square centimeters	square centimeters	0.155	square inches
square feet	0.093	square meters	square meters	10.76	square feet
square yards	0.836	square meters	square meters	1.196	square yards
acres	0.405	hectares	hectares	2.471	acres
square miles	2.59	square kilometers	square kilometers	0.386	square miles
cubic inches	16.387	cubic centimeters	cubic centimeters	0.061	cubic inches
cubic feet	0.028	cubic meters	cubic meters	35.315	cubic feet
cubic yards	0.765	cubic meters	cubic meters	1.31	cubic yards
fluid ounces	29.57	milliliters	milliliters	0.0338	fluid ounces
quarts	0.946	liters	liters	1.057	quarts
gallons	3.785	liters	liters	0.264	gallons
ounces	28.35	grams	grams	0.0353	ounces
pounds	0.4536	kilograms	kilograms	2.2046	pounds
tons	0.907	metric tons	metric tons	1.102	tons

When You Know		
Fahrenheit	subtract 32; then divide by 1.8	to find Celsius
Celsius	multiply by 1.8; then add 32	to find Fahrenheit

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For God hath not given us the spirit of fear; but of power, and of love, and of a sound mind. 2 Timothy 1:7

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