



## English Standard Measures

### Long Measure

1 mile = 1760 yards = 5280 feet.  
1 yard = 3 feet = 36 inches.  
1 foot = 12 inches.

### Surveyor's Measure

1 mile = 8 furlongs = 80 chains.  
1 furlong = 10 chains = 220 yards.  
1 chain = 4 rods = 22 yards = 66 feet = 100 links.  
1 link = 7.92 inches.

### Square Measure

1 square mile = 640 acres = 6400 square chains.  
1 acre = 10 square chains = 4840 square yards = 43,560 square feet.  
1 square chain = 16 square rods = 484 square yards = 4356 square feet.  
1 square rod = 30.25 square yards = 272.25 square feet = 625 square links.  
1 square yard = 9 square feet.  
1 square foot = 144 square inches.  
An acre is equal to a square, the side of which is 208.7 feet.

### Dry Measure

1 bushel (U. S. or Winchester struck bushel) = 1,2445 cubic foot = 2150.42 cubic inches.  
1 bushel = 4 pecks = 32 quarts = 64 pints.  
1 peck = 8 quarts = 16 pints.  
1 quart = 2 pints.  
1 heaped bushel = 1-1/4 struck bushel.  
1 cubic foot = 0.8036 struck bushel.  
1 British Imperial bushel = 8 Imperial gallons = 1,2837 cubic foot = 2218.19 cubic inches.

### Liquid Measure

1 U. S. gallon = 0.1337 cubic foot = 231 cubic inches = 4 quarts = 8 pints.  
1 quart = 2 pints = 8 gills.  
1 pint = 4 gills.  
1 British Imperial gallon = 1,2003 U. S. gallon = 277.27 cubic inches.  
1 cubic foot = 7.48 U. S. gallons.

### Circular and Angular Measure

60 seconds (") = 1 minute (').  
60 minutes = 1 degree (°).  
360 degrees = 1 circumference (C).

### Specific Gravity

The specific gravity of a substance is its weight as compared with the weight of an equal bulk of pure water.  
For making specific gravity determinations the temperature of the water is usually taken at 62° F, when 1 cubic foot of water weighs 62.355 lbs. Water is at its greatest density at 39.2° F, or 4° Centigrade.

### Temperature

The following equation will be found convenient for transforming temperature from one system to another:  
Let F = degrees Fahrenheit; C = degrees Centigrade; R = degrees Reamur.  
$$\frac{F - 32}{180} = \frac{C}{100} = \frac{R}{80}$$

### Avoirdupois or Commercial Weight

1 gross or long ton = 2240 pounds.  
1 net or short ton = 2000 pounds.  
1 pound = 16 ounces = 7000 grains.  
1 ounce = 16 drams = 437.5 grains.

### Measures of Pressure

1 pound per square inch = 144 pounds per square foot = 0.068 atmosphere = 2.042 inches of mercury at 62 degrees F. = 27.7 inches of water at 62 degrees F. = 2.31 feet of water at 62 degrees F.  
1 atmosphere = 30 inches of mercury at 62 degrees F. = 14.7 pounds per square inch = 2116.3 pounds per square foot = 33.95 feet of water at 62 degrees F.  
1 foot of water at 62 degrees F. = 62.355 pounds per square foot = 0.433 pound per square inch.  
1 inch of mercury at 62 degrees F. = 1,132 foot of water = 13.58 inches of water = 0.491 pound per square inch.  
Column of water 12 in. high, 1 in. dia. = .341 lbs.

### Cubic Measure

1 cubic yard = 27 cubic feet.  
1 cubic foot = 1728 cubic inches.  
The following measures are also used for wood and masonry:  
1 cord of wood = 4 X 4 X 8 feet = 128 cubic feet.  
1 perch of masonry = 16-1/2 X 1-1/2 X 1 foot = 24-3/4 cubic feet.

### Shipping Measure

For measuring entire internal capacity of a vessel:  
1 register ton = 100 cubic feet.  
For measurement of cargo:  
1 U. S. shipping ton = 40 cubic feet = 32.143 U. S. bushels = 31.16 Imperial bushels.  
British shipping ton = 42 cubic feet = 33.75 U. S. bushels = 32.72 Imperial bushels.

### Troy Weight, Used for Weighing

#### Gold and Silver

1 pound = 12 ounces = 5760 grains.  
1 ounce = 20 pennyweights = 480 grains.  
1 pennyweight = 24 grains.  
1 carat (used in weighing diamonds) = 3.086 grains.  
1 grain Troy = 1 grain avoirdupois = 1 grain apothecaries' weight.

### Measure Used for Diameters and

#### Areas of Electric Wires

1 circular inch = area of circle 1 inch in diameter = 0.7854 square inch.  
1 circular inch = 1,000.000 circular mils.  
1 square inch = 1,2732 circular inch = 1,273,239 circular mils.  
A circular mil is the area of a circle 0.001 inch in diam.

### Board Measure

One foot board measure is a piece of wood 12 inches square by 1 inch thick, or 144 cubic inches. 1 cubic foot therefore equals 12 feet board measure.



## Metric System of Measurements

The principal units are the meter for length, the liter for capacity and the gram for weight. The following prefixes are used for sub-divisions and multiples: milli = 1/1000; centi = 1/100; deci = 1/10; hecto = 100; kilo = 1000.

### Measures of Length

10 millimeters (mm.) = 1 centimeter (cm.)  
 10 centimeters = 1 decimeter (dm.)  
 10 decimeters = 1 meter (m.)  
 1000 meters = 1 kilometer (km.)

### Measures of Weight

10 milligrams (mg.) = 1 centigram (cg.)  
 10 centigrams = 1 decigram (dg.)  
 10 decigrams = 1 gram (g.)  
 10 grams = 1 decagram (Dg.)  
 10 decagrams = 1 hectogram (Hg.)  
 10 hectograms = 1 Kilogram (Kg.)  
 1000 kilograms = 1 (metric) ton (T.)

### Surveyor's Square measure

100 square meters (m.<sup>2</sup>) = 1 are (ar.)  
 100 acres = 1 hectare (har.)  
 100 hectares = 1 sq. kilometer (Km.<sup>2</sup>)

### Square Measure

100 sq. millimeters (mm.<sup>2</sup>) = 1 sq. centimeter (cm.<sup>2</sup>)  
 100 sq. centimeters = 1 sq. decimeter (dm.<sup>2</sup>)  
 100 sq. decimeters = 1 sq. meter (m.<sup>2</sup>)

### Cubic Measure

1000 cu. millimeters (mm.<sup>3</sup>) = 1 cu. centimeter (cm.<sup>3</sup>)  
 1000 cu. centimeters = 1 cu. decimeter (dm.<sup>3</sup>)  
 1000 cu. decimeters = 1 cu. meter (m.<sup>3</sup>)

### Dry and Liquid Measure

10 milliliters (ml.) = 1 centiliter (cl.)  
 10 centiliters = 1 deciliter (dl.)  
 10 deciliters = 1 liter (l.)  
 100 liters = 1 hectoliter (Hl.)  
 1 liter = 1 cubic decimeter = the volume of 1 kilogram of pure water at a temperature of 39.2 degrees F.

### Length Conversion Constants for Metric and U.S. Units

Millimeters X .039370 = inches.  
 Meters X 39.370 = inches.  
 Meters X 3.2808 = feet.  
 Meters X 1.09361 = yards.  
 Kilometers X 3.280.8 = feet.  
 Kilometers X .62137 = Statute Miles.  
 Kilometers X .53959 = Nautical Miles.

Inches X 25.4001 = millimeters.  
 Inches X .0254 = meters.  
 Feet X .30480 = meters.  
 Yards X .91440 = meters.  
 Feet X .0003048 = kilometers.  
 Statute Miles X 1.60935 = kilometers.  
 Nautical Miles X 1.85325 = kilometers.

### Weight Conversion Constants for Metric and U.S. Units

Grams X 981 = dynes.  
 Grams X 15.432 = grains.  
 Grams X .03527 = ounces (Avd.)  
 Grams X .033818 = fluid ounces (water).  
 Kilograms X 35.27 = ounces (Avd.).  
 Kilograms X 2.20462 = pounds (Avd.)  
 Metric Tons (1000 Kg.) X 1.10231 = Net Ton (2000 lbs.).  
 Metric Tons (1000 Kg.) X .98421 = Gross Ton (2240 lbs.).

Dynes X .0010193 = grams.  
 Grains X .0648 = grams.  
 Ounces (Avd.) X 28.35 = grams.  
 Fluid Ounces (Water) X 29.57 = grams.  
 Ounces (Avd.) X .02835 = kilograms.  
 Pounds (Avd.) X .45359 = kilograms.  
 Net Ton (2000 lbs.) X .90719 = Metric Tons (1000 Kg.).  
 Gross Ton (2240 lbs.) X 1.01605 = Metric Tons (1000 Kg.).

### Area Conversion Constants for Metric and U.S. Units

Square Millimeters X .00155 = square inches.  
 Square Centimeters X .155 = square inches.  
 Square Meters X 10.76387 = square feet.  
 Square meters X 1.19599 = square yards.  
 Hectares X 2.47104 = acres.  
 Square Kilometers X 247.104 = acres.  
 Square Kilometers X .3861 = square miles.

Square Inches X 645,163 = square millimeters.  
 Square Inches X 6.45163 = square centimeters.  
 Square Feet X .0929 = square meters.  
 Square Yards X .83613 = square meters.  
 Acres X .40469 = hectares.  
 Acres X .0040469 = square kilometers.  
 Square Miles X 2,5899 = square kilometers.

### Volume Conversion Constants for Metric and U.S. Units

Cubic Centimeters X .033818 = fluid ounces.  
 Cubic Centimeters X .061023 = cubic inches.  
 Cubic Centimeters X .271 = fluid drams.  
 Liters X 61,023 = cubic inches.  
 Liters X 1.05668 = quarts.  
 Liters X .26417 = gallons.  
 Liters X .035317 = cubic feet.  
 Hectoliters X 26,417 = gallons.  
 Hectoliters X 3.5317 = cubic feet.  
 Hectoliters X 2.83794 = bushel (2150.42 cu. in.)  
 Hectoliters X .1308 = cubic yards.  
 Cubic Meters X .264.17 = gallons.  
 Cubic Meters X 35.317 = cubic feet.  
 Cubic Meters X 1.308 = cubic yards.

Fluid Ounces X 29.57 = cubic centimeters.  
 Cubic Inches X 16,387 = cubic centimeters.  
 Fluid Drama X 3.69 = cubic centimeters.  
 Cubic Inches X .016387 = liters.  
 Quarts X .94636 = liters.  
 Gallons X 3.78543 = liters.  
 Cubic Feet X 28, 316 = liters.  
 Gallons X .0378543 = hectoliters.  
 Cubic Feet X .28316 = hectoliters.  
 Bushels (2150.42 cu. in.) X .352379 = hectoliters.  
 Cubic Yards X 7.645 = hectoliters.  
 Gallons X .00378543 = cubic meters.  
 Cubic Feet X .028316 = cubic meters.  
 Cubic Yards X .7645 = cubic meters.

### Power and Heat Conversion Constants for Metric and U.S. Units

Calorie X 0.003968 = B.T.U.  
 Joules X .7373 = foot pounds.  
 Kilogrammeters X 7.233 = foot pounds.  
 Cheval Vapeur X .9863 = Horsepower.  
 Kilowatts X 1.34 = Horsepower.  
 Kilowatt Hours X 3415 = B.T.U.  
 (Degrees Cent. X 1.8) + 32 = degrees Fahr.  
 (Degrees Reamur X 2.25) + 32 = degrees Fahr.

B.T.U. X 252 = calories.  
 Foot Pounds X 1.3563 = joules.  
 Foot Pounds X .13825 = kilogrammeters.  
 Horsepower X 1.014 = Cheval Vapeur.  
 Horsepower X .746 = Kilowatts.  
 B.T.U. X .00029282 = kilowatt hours.  
 (Degrees Fahr. - 32) X .555 = degrees Cent.  
 (Degrees Fahr. - 32) X .444 = degrees Reamur.