BarCharts, Inc.®

WORLD'S #1 ACADEMIC OUTLINE

Quick Study® ACADEMIC

WEIGHTS & MEASURES

BASIC MEASUREMENT SYSTEMS

All measurement is derived from seven basic units and is described internationally as the **Systéme International d'Unitiés (SI)** or sometimes referred to as SI-metric. These basic units are:

Ampere	A	Electric current
Candela	cd	Luminosity (intensity of light)
Kelvin	K	Thermodynamic Temperature
Kilogram	kg	Weight (mass)
Meter (Metre)	m	Length
Mole	mol	Substance (molecule)
Second	s	Time

LENGTH

Unit	Abbr	SI/metric	Imperial
Angstrom	Å	.0001μ (10^{-10})	.000,000,004 in
Cable	cb	219.456 m	120 fathoms / 720 ft
Centimeter	cm	.01 m	.3937 in
Chain (Gunter's/surveyor's)	chG	20.1168 m	66 feet/4 rods
Chain (Ramden's/engineer's)	chR	30.48 m	100 ft
Decimeter	dm	.1 m	3.937 in
Dekameter	dam	10 m	32.8 ft
Fathom	fm	1.83 m	6 ft
Foot	ft	.3048 m	12 in
Furlong	fur	201.168 m	⅛ statute mi
Hand (horse's height)	–	10.16 cm	4 in
Inch	in	2.54 cm	–
Kilometer	km	1000 m	.621 mi
League	–	4.8 km	3 statute mi
Link (Gunter's)	–	.201 m	7.92 in
Link (Ramden's)	–	.305 m	12 in
Meter	m	–	39.37 in
Micrometer (Micron)	μ	.001 mm	3.9370x10^{-5} in
Mile (statute/land)	mi	1.609 km	5280 ft
Mile (nautical/sea)	nmi	1.85 km	6076.11549 ft
Millimeter	mm	.001 m	.03937 in
Mil	mil	.0254 mm	.001 in
Point (type size)	–	.353 mm	.0138 in
Pica (type size)	–	4 mm	12 points(.1668 in)
Rod	rd	5.029 m	16.5 ft
Yard	yd	.9144 m	3 ft

AREA

Unit	Abbr	SI/metric	Imperial
Acre	A	4047 m^2	43,560 ft^2
Are	a	100 m^2	1076.39 ft^2
Hectare	ha	10,000 m^2	2.471 A
Square centimeter	cm^2	100 mm^2	.155 in^2
Square foot	ft^2	.0929 m^2	144 in^2
Square inch	in^2	6.4516 cm^2	-
Square kilometer	km^2	1,000,000 m^2	.386 mi^2
Square meter	m^2	10,000 cm^2	10.764 ft^2
Square mile	mi^2	2.59 km^2	640 A
Square millimeter	mm^2	–	.00155 in^2
Square rod	rd^2	25.293 m^2	272.25 ft^2
Square yard	yd^2	.836 m^2	9 ft^2

ENERGY

Unit	Abbr	Equivalent
British Thermal Unit	Btu	.0002929 Kw
Calorie (@15.5˚c)	cal_{15}	4.1858 J
Horsepower (mechanical)	HP	746 watts
Joule (absolute)	J	.7376 ft/lbs
Kilowatt	Kw	1.341 HP

VOLUME (LIQUID)

Unit	Abbr	SI/Metric	Imperial
Barrel (US) fluid	bbl	26.2 gal (UK)	31.5 gal*
Dram (US)	dr	3.697 ml	.125 oz
Gill (¼ UK pint)	gi	.142 L	4.8038 oz
Gallon (UK)	gal	4.546 L	1.201 gal
Gallon (US)	gal	3.785 L	4 qt
Liter	L	.001 m^3	1.057 qt
Ounce, fluid (UK)	oz	.028 L	.96 oz
Ounce, fluid (US)	oz	.02957 L	2 tbs
Pint (UK)	pt	1.2 pt (US)	19.2 oz
Pint (US)	pt	.833 pt (UK)	16 oz
Quart	qt	.946 L	2 pt

*A Barrel may be recognized by different liquid sizes in different states and for different substances. Sizes may be stated in gallons, cubic inches or weight. See notes on page 2.

VOLUME (DRY)

Unit	Abbr	SI/Metric	Imperial
Cubic centimeter	cm^3	1000 mm^3	.061 in^3
Cubic foot	ft^3	.02832 m^3	1728 in^3
Cubic inch	in^3	16.387 cm^3	-
Stere (cubic meter)	ST	1 m^3	1.3 yd^3
Cubic yard	yd^3	.7646 m^3	27 ft^3

WEIGHT

Unit	Abbr	SI/Metric	Imperial
Dram (avdp)	dr (avdp)	1.772 g	.0625 oz
Grain	gr	.0648 g	.00229 oz
Gram	g	.001 kg	.03527 oz
Kilogram	kg	1000 g	2.2 lb
Milligram	mg	.001 g	.00003 oz
Ounce (avdp)	oz	.0280 kg	.0625 lb
Ounce (troy)	oz tr	.03 kg	1.0971 oz
Pennyweight	dwt	1.555 g	.05486 oz
Pound (avdp)	lb	.454 kg	16 oz
Stone	st	6.35 kg	14 lb
Ton (long or British)	lt	1016 kg	2240 lb
Tonne (metric)	mt	1000 kg	2204.6 lb
Ton (short)	sh t	907.18 kg	2000 lb

NUMERICAL PREFIXES

1/10	Deci
1/2	Semi, hemi, demi
1	Uni
2	Bi, di
3	Tri, ter
4	Tetra, tetr, quadri
5	Penta, quint
6	Sex, hex, hexa
7	Hept, sept, septo
8	Oct, octo
9	Non, ennea
10	Dec, deca, deka
11	Hendeca, undeca
12	Dodeca
15	Quindeca

SI PREFIXES

Factor	Prefix	Symbol
10^{24}	yotta-	Y
10^{21}	zetta-	Z
10^{18}	exa-	E
10^{15}	peta-	P
10^{12}	tera-	T
10^{9}	giga-	G
10^{6}	mega-	M
10^{3}	kilo-	k
10^{2}	hecto-	h
10	deka-	da
10^{-1}	deci-	d
10^{-2}	centi-	c
10^{-3}	milli-	m
10^{-6}	micro-	μ or r
10^{-9}	nano-	n
10^{-12}	pico-	p
10^{-15}	femto-	f
10^{-18}	atto-	a
10^{-21}	zepto-	z
10^{-24}	yocto-	y

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CONVERSION FORMULAS

LENGTH

Centimeters & Inches
cm x .394 = in
in x 2.54 = cm

Centimeters & Millimeters
cm x 10 = mm
mm x .1 = cm

Centimeters & Picas
cm x 2.371 = picas
picas x .4233 = cm

Centimeters & Points
cm x 28.4528 = points
points x .0351 = cm

Millimeters & Inches
mm x .0394 = in
in x 25.4 = mm

Millimeters & Micrometers (Microns)
mm x 1000 = μ
μ x .001 = mm

Meters & Chains (G)
m x .04971 = ch
ch x 20.117 = m

Meters & Fathoms
m x .547 = fm
fm x 1.83 = m

Meters & Feet
m x 3.281 = ft
ft x .305 = m

Meters & Yards
m x 1.094 = yd
yd x .914 = m

Meters & Furlongs
m x .005 = fur
fur x 201.17 = m

Chains (G)* & Feet
ch x 66 = ft
ft x .015 = ch

Chains (G)* & Rods
ch x 4 = rd
rd x .25 = ch

Chains (G)* & Yards
ch x 22 = yd
yd x .455 = ch

Fathoms & Feet
fa x 6 = ft
ft x .167 = fa

Kilometers & Feet
km x 3280.84 = ft
ft x (3.048×10^{-4}) = km

Kilometers & Yards
km x 1093.6 = yd
yd x .00091 = km

Kilometers & Statute Miles
km x .621 = mi
mi x 1.609 = km

Kilometers & Nautical Miles
km x .540 = n mi
n mi x 1.852 = km

Nautical Miles & Statute Miles
n mi x 1.15 = s mi
s mi x .869 = n mi

*(G) = Gunter's or surveyor's chain

AREA

Sq. Centimeters & Sq. In.
$cm^2 \times .155 = in^2$
$in^2 \times 6.452 = cm^2$

Sq. Meters & Sq. Chains (G)*
$m^2 \times .0025 = ch^2$
$ch^2 \times 404.686 = m^2$

Sq. Rods & Sq. Chains (G)*
$rd^2 \times 625 = ch^2$ (G)
$ch^2 \times 16 = rd^2$

Sq. Chains & Acres
ch^2(G) x .1 = A
A x 10 = ch^2(G)

Sq. Chains (G)* & Sq. Feet
ch^2(G) x 4356 = ft^2
ft^2 x .00023 = ch^2(G)

Hectares & Sq. Miles
ha x .0039 = mi^2
mi^2 x 258.999 = ha

Hectares & Acres
ha x 2.471 = A
A x .405 = ha

Acres & Sq. Miles
A x .00156 = mi^2
mi^2 x 640 = A

Sq. Kilometers & Sq. Miles
$km^2 \times .386 = mi^2$
$mi^2 \times 2.590 = km^2$

Sq. Meters & Acres
$m^2 \times .000247$ = A
A x 4046.856 = m^2

Sq. Meters & Hectares
$m^2 \times .0001$ = ha
ha x 10,000 = m^2

Sq. Meters & Sq. Feet
$m^2 \times 10.764 = ft^2$
$ft^2 \times .093 = m^2$

Sq. Meters & Sq. Yards
$m^2 \times 1.196 = yd^2$
$yd^2 \times .836 = m^2$

Sq. Meters & Sq. Rods
$m^2 \times .03954 = rd^2$
$rd^2 \times 25.293 = m^2$

Sq. Yards & Sq. Feet
$yd^2 \times 9 = ft^2$
$ft^2 \times .1111 = yd^2$

*(G) = Gunter's or surveyor's Chain

LIQUID CAPACITY

UK & US Gallons
UK gal x 1.201 = US gal
US gal x .833 = UK gal

UK & US Quarts
UK qt x 1.201 = US qt
US qt x .833 = UK qt

UK & US Pints
UK pt x 1.201 = US pt
US pt x .833 = UK pt

UK & US Ounces
UK oz x .961 = US oz
US oz x 1.041 = UK oz

UK Gallons & Liters
UK gal x 4.546 = L
L x .220 = UK gal

UK Quarts & Liters
UK qt x 1.137 = L
L x .880 = UK qt

UK Pints & Liters
UK pt x .568 = L
L x 1.760 = UK pt

UK Ounces & Milliliters
UK oz x 28.413 = ml
ml x .035 = UK oz

US Gallons & Liters
US gal x 3.785 = L
L x .264 = US gal

US Quarts & Liters
US qt x .947 = L
L x 1.056 = US qt

US Pints & Liters
US pt x .473 = L
L x 2.113 = US pt

US Ounces & Liters
US oz x .03 = L
Liter x 33.8 = US oz

US Ounces & Milliliters
US oz x 29.572 = ml
ml x .034 = US oz

Gills (US) & Ounces (US)
gi x 4 = oz
oz x .25 = gi

Gills (US) & Cubic Centimeters
gi x 118.29 = cc
cc x .00845 = gi

Gills (UK) & Cubic Centimeters
gi x 142.065 = cc
cc x .00704 = gi

DRY CAPACITY

Cubic centimeters & Cubic inches
$cm^3 \times .061 = in^3$
$in^3 \times 16.387 = cm^3$

Cubic inches & Cubic feet
$in^3 \times .000579 = ft^3$
$ft^3 \times 1728 = in^3$

Cubic feet & Cubic yards
$ft^3 \times .037 = yd^3$
$yd^3 \times 27 = ft^3$

Cubic meters & Cubic yards
$m^3 \times 1.308 = yd^3$
$yd^3 \times .765 = m^3$

Cubic meters & Cubic feet
$m^3 \times 35.315 = ft^3$
$ft^3 \times .028 = m^3$

Pints & Quarts
pt x .5 = qt
qt x 2 = pt

Quarts & Pecks
qt x .125 = pk
pk x 8 = qt

Pecks(US) & Bushels(US)
pk x .25 = bu
bu x 4 = pk

Bushels (US) & Barrels (US)*
bu x .0305 = bbl
bbl x 3.281 = bu

Bushels (UK) & Bushels (US)
bu (US) x .969 = bu (UK)
bu (UK) x 1.032 = bu (US)

* A barrel is not the same container as a steel *drum*, which typically holds 55 gallons (US).

Barrels come in different sizes based on their contents as defined by various statutes.

Oil = 42 gal
Beer = 31 gal (US)
Beer = 50 liters (Europe)
Dry Goods = 7056 in^3
Cranberries = 5826 in^3
Flour = 196 lbs.
Cornmeal = 200 lbs.
Cement = 376 lbs.
Lime = 280 lbs.

WEIGHT

Grains(gr) & Grams(g)
gr x .065 = g
g x15.432 = gr

Drams(avdp)* & Ounces(avdp)
dr(avdp) x .062 = oz(avdp)
oz(avdp) x 16 = dr(avdp)

Pennyweight & Grams
dwt x 1.5552 = g
g x .643 = dwt

Grams & Ounces (US)
g x .035 = oz
oz x 28.349 = g

Ounces (troy) & Grains
oz tr x 480 = gr
gr x .00208 = oz tr

Ounces (troy) & Grams
oz tr x 31.103 = g
g x .032 = oz tr

Ounces (troy) & Ounces (avdp)
oz tr x 1.097 = oz (avdp)
oz (avdp) x .911 = oz tr

Ounces (avdp)& Pounds (avdp)
oz (avdp) x .0625 = lb (avdp)
lb (avdp) x 16 = oz (avdp)

Milligrams & Grains
mg x .015 = gr
gr x 64.799 = mg

Grains & Carats
gr x .32399 = c
c x 3.0865 = gr

Grams & Carats (metric)
g x 5 = c (metric)
c (metric) x .2 = g

Milligrams & Carats (metric)
mg x .005 = c (metric)
c (metric) x 200 = mg

Pounds & Kilograms
lb x .454 = kg
kg x 2.205 = lb

Tons (long) & Pounds (avdp)
lt x 2240 = lbs (avdp)
lbs (avdp) x .0004464 = lt

Tons (short) & Pounds (avdp)
sht x 2000 = lbs (avdp)
lbs (avdp) x .0005 = sht

Tonnes (metric) & Pounds (avdp)
t x 2204.62 = lbs (avdp)
lbs (avdp) x .0004536 = t

*avdp = avoirdupois (from French) meaning "goods of weight"

KITCHEN LIQUID MEASURES

1 gal	4 qt	8 pt	16 cups	128 fl oz	3.79L		
½ gal	2 qt	4 pt	8 cups	64 fl oz	1.89L		
¼ gal	1 qt	2 pt	4 cups	32 fl oz	.95L		
	½ qt	1 pt	2 cups	16 fl oz	.47L		
	¼ qt	½ pt	1 cup	8 fl oz	.24L		
			½ cup	4 fl oz	.12L	8 Tbs	24 tsp
			¼ cup	2 fl oz	.06L	4 Tbs	12 tsp
			⅛ cup	1 fl oz	.03L	2 Tbs	6 tsp
				½ fl oz	.015L	1 Tbs	3 tsp

KITCHEN DRY MEASURES

1 cup	8 fl oz	16 Tbs	48 tsp	237 ml
¾ cup	6 fl oz	12 Tbs	36 tsp	177 ml
⅔ cup	5⅓ fl oz	10⅔ Tbs	32 tsp	158 ml
½ cup	4 fl oz	8 Tbs	24 tsp	118 ml
⅓ cup	2 ⅔ fl oz	5⅓ Tbs	16 tsp	79 ml
¼ cup	2 fl oz	4 Tbs	12 tsp	59 ml
⅛ cup	1 fl oz	2 Tbs	6 tsp	30 ml
1⁄16 cup	½ fl oz	1 Tbs	3 tsp	15 ml
1⁄48 cup	⅙ fl oz	⅓ Tbs	1 tsp	5 ml