

**APPENDIX A - METRIC CONVERSIONS**

MULTIPLY	BY	TO OBTAIN	MULTIPLY	BY	TO OBTAIN
acre feet	43,560	cubic feet	cubic yards	0.7646	cubic meters
acres	43,560	square feet	cubic yards	202.0	gallons
acres	4,047	square meters	cubic yards per min	0.45	cubic feet per sec
acres	$1.562 \times 10^3$	square miles	cubic yards per min	3.367	gallons per sec
acres	5,645.38	square varas			
acres	4,840	square yards	decigrams	0.1	grams
atmospheres	76.0	cm of mercury	deciliters	0.1	liters
atmospheres	29.92	inches of mercury	decimeters	0.1	meters
atmospheres	33.90	feet of water	degrees (angle)	60	minutes
atmospheres	14.70	pounds per sq in	degrees (angle)	0.01745	radians
			degrees (angle)	3,600	seconds
barrels	31.5	gallons	dekagrams	10	grams
board feet	144 sq in x 1 in	cubic inches	dekaliters	10	liters
BTU	0.2520	kilogram calories	dekameters	10	meters
BTU	778.2	foot pounds	drams	1.772	grams
BTU	$2.928 \times 10^4$	kilowatt hours	drams	0.0625	ounces
BTU per min	0.02356	horsepower			
BTU per min	0.01757	kilowatts	ergs	$9.486 \times 10^{11}$	BTU
BTU per min	17.57	watts			
bushels	1.244	cubic feet	fathoms	6	feet
			feet	03048	meters
centares	1	square meters	feet	0.36	varas
centigrams	0.01	grams	feet	0333	yards
centiliters	0.01	liters	feet of water	04335	lb per sq in
centimeters	0.3937	inches	feet per min	0.5080	cm per sq in
centimeters	0.01	meters	feet per min	0.01667	feet per sec
centimeters	393.7	mils	feet per min	0.01136	miles per hour
centimeters	10	millimeters	feet per sec	1.097	km per hour
centimeter grams	$1 \times 10^5$	meter kilograms	feet per sec	0.5921	knots per hour
centimeter grams	$7.233 \times 10^5$	pound feet	feet per sec	18.29	meters per min
cm of mercury	0.01316	atmospheres	feet per sec	0.6818	miles per hour
cm of mercury	0.4461	feet of water	feet per 100 feet	1	percent grade
cm of mercury	136.0	kg of sq meters	foot pounds	$1.286 \times 10^3$	BTU
cm of mercury	27.85	pounds per sq ft	foot pounds	$1.356 \times 10^7$	ergs
cm of mercury	0.1934	pounds per sq in	foot pounds	$5.050 \times 10^7$	horsepower hours
cm per second	0.6	meters per mm	foot pounds	$3.241 \times 10^4$	kilogram calories
circular mils	0.7854	square mils	foot pounds	$3.766 \times 10^7$	kilowatt hours
cord feet	4 ft x 4 ft x 1 ft	cubic feet	foot pounds per min	$1.286 \times 10^3$	BTU per min
cords	8 ft x 4 ft x 4 ft	cubic feet	foot pounds per min	$3.030 \times 10^5$	horsepower
cubic cm	$6.102 \times 10^2$	cubic inches	foot pounds per min	$3.241 \times 10^4$	kg calories per min
cubic cm	$1 \times 10^6$	cubic meters	foot pounds per min	$2.260 \times 10^5$	kilowatts
cubic cm	$2.642 \times 10^4$	gallons	furlongs	40	rods
cubic cm	$10^{-3}$	liters			
cubic feet	$2.832 \times 10^4$	cubic cm	gallons	3,785	cubic cm
cubic feet	1,728	cubic inches	gallons	0.1337	cubic feet
cubic feet	0.02832	cubic meters	gallons	231	cubic inches
cubic feet	0.03704	cubic yards	gallons	$3.785 \times 10^3$	cubic meters
cubic feet	7.481	gallons	gallons	$4,951 \times 10^3$	cubic yards
cubic feet	28.32	liters	gallons per min	$2.228 \times 10^3$	cubic feet per sec
cubic feet per min	472.0	cubic cm per sec	gills	0.1183	liters
cubic feet per min	0.1247	gallons per sec	grains (troy)	1	grains (av)
cubic feet per min	0.4720	liters per sec	grains (troy)	0.06480	grams
cubic feet per min	62.4	lb of water per min	grains (troy)	0.04167	penny weights (troy)
cubic inches	16.39	cubic cm	grams	980.7	dynes
cubic inches	$5.787 \times 10^4$	cubic feet	grams	15.43	grains (troy)
cubic inches	0.01732	quarts (liquid)	grams	$10^3$	kilograms
cubic meters	$1 \times 10^6$	cubic cm	grams	$10^9$	milligrams
cubic meters	35.31	cubic feet	grams	0.03527	ounces
cubic meters	1.308	cubic yards	grams	0.03215	ounces (troy)
cubic meters	264.2	gallons	grams	$2.205 \times 10^3$	pounds
cubic yards	27	cubic feet	gram calories	$3.968 \times 10^3$	BTU

**METRIC CONVERSIONS (continued)**

MULTIPLY	BY	TO OBTAIN	MULTIPLY	BY	TO OBTAIN
gram centimeters	2.344 x 10 <sup>6</sup>	kilogram calories	kilometers per hour	0.5396	knots per hour
gram centimeters	10 <sup>5</sup>	kilogram meters	kilowatts	56.92	BTU per min
grams per cm	5.600 X 10 <sup>-3</sup>	pounds per inch	kilowatts	4.425 x 10 <sup>4</sup>	ft pounds per min
grams per cu cm	62.43	pounds per cu ft	kilowatts	1.341	horsepower
			kilowatt hours	3,415	BTU
hectares	2.471	acres	kilowatt hours	2.655 X 10 <sup>6</sup>	foot pounds
hectares	1.076 X 10 <sup>5</sup>	square feet	knots	1.853	kilometers per hour
hectograms	100	grams	knots	1.152	miles per hour
hectoliters	100	liters	links (engineer's)	12	inches
hectometers	100	meters	links (surveyor's)	7.92	inches
hectowatts	100	watts	liters	10 <sup>3</sup>	cubic centimeters
horsepower	42.44	BTU per min	liters	0.2642	gallons
horsepower	33,000	ft pounds per min	liters	1.057	quarts (liquid)
horsepower	550	ft pounds per sec	liters per minute	5.885 x 10 <sup>4</sup>	cubic feet per sec
horsepower	1.014	horsepower (metric)	liters per minute	4.403 x 10 <sup>3</sup>	gallons per sec
horsepower	10.70	kg calories per min			
horsepower	0.7457	kilowatts	meters	100	centimeters
horsepower	745.7	watts	meters	3.2808	feet
			meters	39.37	inches
inches	2.540	centimeters	meters	10 <sup>-3</sup>	kilometers
inches	10 <sup>3</sup>	mils	meters	10 <sup>3</sup>	millimeters
inches	0.03	varas	meters	1.0936	yards
inches	0.03342	atmospheres	meters	10 <sup>6</sup>	meters
inches of mercury	1.133	feet of water	microns	5,280	feet
inches of mercury	70.73	pounds per sq ft	miles	1.6093	kilometers
inches of water	0.002458	atmospheres	miles	1,760	yards
inches of water	0.07355	inches of mercury	miles per hour	1.467	feet per second
inches of water	0.5781	ounces per sq in	miles per hour	1.6093	kilometers per hour
inches of water	5.204	pounds per sq ft	miles per hour	0.8684	knots per hour
inches of water	0.03613	pounds per sq in	milliers	10 <sup>3</sup>	kilograms
			milligrams	10 <sup>-3</sup>	grams
joules	9.486 x 10 <sup>-4</sup>	BTU	milliliters	10 <sup>-3</sup>	liters
joules	10 <sup>7</sup>	ergs	millimeters	0.1	centimeters
joules	0.7376	foot pounds	millimeters	0.03937	inches
joules	2.390 x 10 <sup>-4</sup>	kilogram calories	millimeters	39.37	mils
joules	0.1020	kilogram meters	millimeters	0.002540	centimeters
joules	2.778 x 10 <sup>-4</sup>	watt hours	mils	10 <sup>3</sup>	inches
			minutes (angle)	2.909 x 10 <sup>4</sup>	radians
kilograms	980,665	dynes	minutes (angle)	60	seconds (angle)
kilograms	1 x 10 <sup>3</sup>	grams	myriagrams	10	kilograms
kilograms	2.2046	pounds	myriameters	10	kilometers
kilograms	1.102 x 10 <sup>3</sup>	tons (short)	myriawatts	10	kilowatts
kilogram calories	3.968	BTU			
kilogram calories	3,088	foot pounds	nautical miles	1.152	miles
kilogram calories	1.588 x 10 <sup>3</sup>	horsepower hours	nautical miles	2.027	yards
kilogram calories	1.162 x 10 <sup>3</sup>	kilowatt hours			
kilogram calories per min	0.06972	kilowatts	ounces	8	drams
kilogram meters	9.302 x 10 <sup>3</sup>	BTU	ounces	437.5	grams
kilogram meters	9.807 x 10 <sup>7</sup>	ergs	ounces	28.35	grams
kilograms per cubic meter	1 x 10 <sup>3</sup>	grams per cu cm	ounces	0.0625	pounds
kilograms per cubic meter	0.06243	pounds per cu ft	ounces (fluid)	1.805	cubic inches
kilograms per sq meter	9.678 x 10 <sup>-5</sup>	atmospheres	ounces (troy)	480	grams (troy)
kilograms per sq meter	3.281 x 10 <sup>-3</sup>	feet of water	ounces (troy)	31.10	grams
kilograms per sq meter	2.886 x 10 <sup>-3</sup>	inches of mercury	ounces (troy)	20	pennyweights (troy)
kilograms per sq meter	0.2048	pounds per sq ft	ounces (troy)	0.08333	pounds (troy)
kilograms per sq meter	1.422 x 10 <sup>-3</sup>	pounds per sq in			
kiloliters	10 <sup>3</sup>	liters	perches (masonry)	24.75	cubic feet
kilometers	10 <sup>5</sup>	centimeters	pints (dry)	33.60	cubic inches
kilometers	3,281	feet	pints (liquid)	28.87	cubic inches
kilometers	10 <sup>3</sup>	meters	pounds	444,823	dynes
kilometers	0.6214	miles			

**METRIC CONVERSIONS (continued)**

MULTIPLY	BY	TO OBTAIN	MULTIPLY	BY	TO OBTAIN
pounds	453.6	grams	square meters	1.196	square yards
pounds	16	ounces	square miles	640	acres
pounds	32.17	poundals	square miles	$27.88 \times 10^5$	square feet
pound feet	$1.356 \times 10^7$	centimeter dynes	square miles	2.590	square kilometers
pound feet	13,825	centimeter grams	square miles	3,613,040.45	square varas
pounds feet	0.1383	meter kilograms	square miles	$3.098 \times 10^8$	square yards
pounds of water	0.01602	cubic feet	square yards	$2.066 \times 10^4$	acres
pounds of water	27.68	cubic inches	square yards	9	square feet
pounds of water	0.1198	gallons	square yards	0.8361	square meters
pounds per cubic foot	16.02	kg per cubic meter	square yards	$3.228 \times 10^{-7}$	square miles
pounds per cubic inch	27.68	grams per cu cm	square yards	1.1664	square varas
pounds per foot	1.488	kilograms per meter	steradians	0.1592	hemispheres
pounds per square foot	0.01602	feet of water	steres	$10^3$	liters
pounds per square foot	4.882	kilograms per sq meter	temperature (deg C) + 273	1	absolute temp (deg C)
pounds per square inch	0.06804	atmospheres	temperature (deg C) + 17.8	1.8	temperature (deg F)
pounds per square inch	2.307	feet of water	temperature (deg F) + 460	1	absolute temp (deg F)
pounds per square inch	2.038	inches of mercury	temperature (deg F) - 32	0.555	temperature (deg C)
pounds per square inch	703.1	kg per square meter	tons (long)	1,016	kilograms
pounds per square inch	144	pounds per sq ft	tons (long)	2,240	pounds
quadrants (angle)	90	degrees	tons (metric)	$10^3$	kilograms
quadrants (angle)	5,400	minutes	tons (metric)	2,205	pounds
quadrants (angle)	1.571	radians	term (short)	907.2	kilograms
quarts (dry)	67.20	cubic inches	tons (short)	2,000	pounds
quarts (liquid)	57.75	cubic inches	tons (short) per sq ft	9,765	kg per sq meter
radians	57.30	degrees	tons (short) per sq ft	13.89	pounds per sq in
radians	3,438	minutes	tons (short) per sq ft	$1.406 \times 10^8$	kg per sq meter
radians	0.0637	quadrants	tons (short) per sq in	2,000	pounds per sq in
reams	500	sheets	varas	2.7777	feet
revolutions	360	degrees	watts	0.05692	BTU per min
revolutions	4	quadrants	watts	$10^7$	ergs per second
revolutions	6,283	radians	watts	44.26	foot pounds per min
revolutions per minute	6	degrees per second	watts	$1.341 \times 10^{-3}$	horsepower
revolutions per minute	0.1047	radians per sec	watts	$10^2$	kilowatts
revolutions per minute	0.01667	rev per second	watt hours	3.415	BTU
revolutions per min per min	$1.745 \times 10^3$	radians per sec per sec	weeks	168	hours
revolutions per min per min	0.01667	rev per min per sec	yards	91.44	centimeters
revolutions per min per min	$2.778 \times 10^4$	rev per sec per sec	yards	3	feet
revolutions per second	360	degrees per second	yards	36	inches
revolutions per second	6.283	radians per second	yards	0.9144	meters
rods	16.5	feet			
seconds (angle)	$4.848 \times 10^{-6}$	radians			
square centimeters	0.1550	square inches			
square centimeters	100	square millimeters			
square feet	$2.296 \times 10^5$	acres			
square feel	0.09290	square meters			
square feet	$3.587 \times 10^{-8}$	square miles			
square feet	0.1296	square varas			
square feet	0.111	square yards			
square inches	6.452	square centimeters			
square inches	$6,944 \times 10^3$	square feet			
square kilometers	247.1	acres			
square kilometers	$10.76 \times 10^9$	square feet			
square kilometers	$1 \times 10^8$	square meters			
square kilometers	0.3861	square miles			
square kilometers	$1.196 \times 10^6$	square yards			
square meters	$2.47 \times 10^4$	acres			
square meters	10.764	square feet			
square meters	$3.861 \times 10^{-7}$	square miles			

**METRIC CONVERSIONS (continued)**

One unit (below) equals →	mm	cm	m	km
Millimeters (mm)	1	0.1	0.001	0.000001
Centimeters (cm)	10	1	0.01	0.00001
Meters (m)	1,000	100	1	0.001
Kilometers (km)	1,000,000	100,000	1,000	1

One unit (below) equals →	g	kg	Metric ton
Grams (g)	1	0.001	0.000001
Kilograms (kg)	1,000	1	0.001
Metric tons	1,000,000	1,000	1

**Units of centimeters**

Cm	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
Inch	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.31	0.35	0.39

**Fractions of an inch**

Inch	1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2
Cm	0.16	0.32	0.48	0.64	0.79	0.95	1.11	1.27
Inch	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
Cm	1.43	1.59	1.75	1.91	2.06	2.22	2.38	2.54

**Weight**

Ounces	→ g					
g	← Ounces					
Pounds	→ kg			← Pounds		
kg	← Pounds			← Ounces		
Short ton	→ Metric ton		← Short ton			
Metric ton	← Short ton		← Ounces			
Qty	↓	↓	↓	↓	↓	↓
1	1.10	0.91	2.20	0.45	0.04	28.4
2	2.20	1.81	4.41	0.91	0.07	56.7
3	3.31	2.72	6.61	1.36	0.11	85.0
4	4.41	3.63	8.82	1.81	0.14	113.4
5	5.51	4.54	11.02	2.27	0.18	141.8
6	6.61	5.44	13.23	2.72	0.21	170.1
7	7.72	6.35	15.43	3.18	0.25	198.4
8	8.82	7.26	17.64	3.63	0.28	226.8
9	9.92	8.16	19.84	4.08	0.32	255.2
10	11.02	9.07	22.05	4.54	0.35	283.5
20	22.05	18.14	44.09	9.07	0.71	567.0
30	33.07	27.22	66.14	13.61	1.06	850.5
40	44.09	36.29	88.18	18.14	1.41	1,134.0
50	55.12	45.36	110.23	22.68	1.76	1,417.5
60	66.14	54.43	132.28	27.22	2.12	1,701.0
70	77.16	63.50	154.32	31.75	2.47	1,984.5
80	88.18	72.57	176.37	36.29	2.82	2,268.0
90	99.21	81.65	198.42	40.82	3.17	2,551.5
100	110.20	90.72	220.46	45.36	3.53	2,835.0

**Length**

Inches	→ cm							
cm	← Inches							
Feet	→ m				← Feet			
m	← Feet				← Yards			
Yards	→ m		← Yards					
m	← Yards		← Miles					
Miles	← km		← Miles					
km	← Miles		← Yards					
Qty	↓	↓	↓	↓	↓	↓	↓	↓
1	0.62	1.61	1.09	0.91	3.28	0.30	0.39	2.54
2	1.24	3.22	2.19	1.83	6.56	0.61	0.79	5.08
3	1.86	4.83	3.28	2.74	9.84	0.91	1.18	7.62
4	2.49	6.44	4.37	3.66	13.12	1.22	1.57	10.16
5	3.11	8.05	5.47	4.57	16.40	1.52	1.97	12.70
6	3.73	9.66	6.56	5.49	19.68	1.83	2.36	15.24
7	4.35	11.27	7.66	6.40	22.97	2.13	2.76	17.78
8	4.97	12.87	8.75	7.32	26.25	2.44	3.15	20.32
9	5.59	14.48	9.84	8.23	29.53	2.74	3.54	22.86
10	6.21	16.09	10.94	9.14	32.81	3.05	3.93	25.40
20	12.43	32.19	21.87	18.29	65.62	6.10	7.87	50.80
30	18.64	48.28	32.81	27.43	98.42	9.14	11.81	76.20
40	24.85	64.37	43.74	36.58	131.23	12.19	15.75	101.60
50	31.07	80.47	54.68	45.72	164.04	15.24	19.68	127.00
60	37.28	96.56	65.62	54.86	196.85	18.29	23.62	152.40
70	43.50	112.65	76.55	64.00	229.66	21.34	27.56	177.80
80	49.71	128.75	87.49	73.15	262.47	24.38	31.50	203.20
90	55.92	144.84	98.42	82.30	295.28	27.43	35.43	228.60
100	62.14	160.94	109.36	91.44	328.08	30.48	39.37	254.00

**Volume**

Cu meters	→ cu ft		← cu yd		
cu yd	← cu ft		← cu meters		
cu ft	→ cu yd	← cu meters			
Qty	↓	↓	↓	↓	↓
1	0.037	0.028	27.0	0.76	35.3
2	0.074	0.057	54.0	1.53	70.6
3	0.111	0.085	81.0	2.29	105.9
4	0.148	0.113	108.0	3.06	141.3
5	0.185	0.142	135.0	3.82	176.6
6	0.212	0.170	162.0	4.59	211.9
7	0.259	0.198	189.0	5.35	247.2
8	0.296	0.227	216.0	6.12	282.5
9	0.333	0.255	243.0	6.88	317.8
10	0.370	0.283	270.0	7.65	353.1
20	0.741	0.566	540.0	15.29	706.3
30	1.111	0.850	810.0	22.94	1,059.4
40	1.481	1.133	1,080.0	30.58	1,412.6
50	1.852	1.416	1,350.0	38.23	1,765.7
60	2.222	1.700	1,620.0	45.87	2,118.9
70	2.592	1.982	1,890.0	53.52	2,472.0
80	2.962	2.265	2,160.0	61.16	2,825.2
90	3.333	2.548	2,430.0	68.81	3,178.3
100	3.703	2.832	2,700.0	76.46	3,531.4