

Measurements



Multiplication Chart

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	- 84
8	8	16	24	32	40	48	56	64	72	80	88	%
. 9	9	18	27	36	45	54	63	72	81	90	9 9	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144
13	13	26	39	52	65	78	91	104	117	130	143	156
14	14	28	42	56	70	84	9 8	112	126	140	154	168
15	15	30	45	60	75	90	105	120	135	150	165	180



Think logically... Act it out if you can... Be a smart estimator... Always test your answer.

Order of Operation / Symbols

ģ	Do operations within parentheses.	()	< Is smaller than
F	De nouvers (execonents)		> Is greater than
2	and roots.	2 √	= Is equal to
2	Do multiplication and division	v	≈ Approximate
F	' in order from left to fight.	× ·	\leq is smaller or equal
Ø	Do addition and subtraction in order from left to right.	+ -	\geq Is greater or equal

Fractions, Decimals, Percentages

<u>3</u> – numerator		1 = 1.0 = 100%
5 – denominator		1/2 = 0.5 = 50%
To add or subtract different		$1/3 = 0.\overline{3} = 33.\overline{3}\%$
fractions, first obtain a com- mon denominator:	,	1/4 = 0.25 = 25%
$\frac{1}{2} + \frac{2}{5} = \frac{5}{15} + \frac{6}{15} = \frac{11}{15}$		1/5 = 0.2 = 20%
2 2 12 12 12		$1/6 = 0.1\overline{6} = 16.\overline{6}\%$
To multiply:		1/8 = 0.125 = 12.5%
$\frac{1}{3} \times \frac{2}{5} = \frac{1}{3} \times \frac{2}{5} = \frac{2}{15}$		$1/9 = 0.\overline{1} = 11.\overline{1}\%$
To divide multiply the first		1/10 = 0.1 = 10%
with the reciprocal of the		$1/12 = 0.08\overline{3} = 8.\overline{3}\%$
second fraction:		$2/3 = 0.\overline{6} = 66.\overline{6}\%$
$\frac{2}{3} \div \frac{1}{6} = \frac{2}{3} \times \frac{9}{1} = 4$		3/4 = 0.75 = 75%
	1	

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Squares and Square Roots

n	n²	√n	n	n²	√n	n, [°]	n²	√n
1	1	1	7	49	2.646	 15	225	3.873
2	4	1.414	8	64	2.828	20	400	4.472
3	9	1.732	9	81	3	25	625	5
4	16	2	10	100	3.162	100	10,000	10
5	25	2.236	11	121	3.317	1/2	1/4	0.707
6	36	2.449	12	144	3.464	1/4	1/16	1/2
		-						

Metric System / Conversions

1,000	100	10	1	.1	.01	.001
kilo	hecto	deca		deci	centi	milli
km	hm	dam	m	dm	cm	mm
kg	hg	dag	g	dg	cg	mg
kl	hl	dal	i	dl	cl	[°] ml .
Metric system English	1 m² 1 hec 1 km² 1 met	tare (ha) ric ton (t)	= 10,0 = 10,0 = 100 = 1,00	00 cm² 00 m² ha 0 kg	Tem FAHRENHE 230 - 220 - 210 - 200 -	
1 foot (ft) 1 yard (yc) 1 mile (m 1 tablespo 1 cup (c) 1 pint (pt 1 quart (c 1 gallon (1 ft ² 1 yd ² 1 acre	$= 12 i$ $= 12 i$ $= 12 i$ $= 13 fe$ $= 17 i$ $= 16^{2} i$ $= 2 c$ $= 16^{2} i$ $= 2 c$ $= 12 i$ $= 2 c$ $= 12 i$ $= 2 c$ $= 14i$ $= 9 fi$ $= 4.8$	nches (in) 1' tet 50 yards taspoons (t) T t t 4 in ² 2' 40 yd ²	= 12" = 36 inc = 5,280 = 8 fluid = 4 c	ches feet ounces (floz) = 32 fl oz	190- 180- 180- 170- 160- 150- 140- 120- 110- 100- 90- 80- 70- 70-	
LENG [®] to go from	TH / AREA to multiply	by to go	IGHT / (from to	CAPACITY multiply b	60 50 40	
$\begin{array}{c} cm \rightarrow \\ in \rightarrow \\ m \rightarrow \\ ft \rightarrow \\ km \rightarrow \\ mi \rightarrow \end{array}$	in 0.393 cm 2.54 ft 3.280 m 0.304 mi 0.62 km 1.609	5/ 9 07 08 kg 18 lb 14 t 0 T		2 0.0353 28.35 s 2.2046 g 0.4536 1.1023 0.9072	30 20 10	-10 -10 -20
$ \begin{array}{c} m^2 \rightarrow \\ ft^2 \rightarrow \\ km^2 \rightarrow \\ mi^2 \rightarrow \end{array} $	ft ² 10.70 m ² 0.092 mi ² 0.386 km ² 2.59	5 m 29 fl 51 l ga	$ \begin{array}{c} \rightarrow f \\ oz \rightarrow m \\ \rightarrow g \\ al \rightarrow l \end{array} $	oz 0.0338 nl 29.575 al 0.2642 3.785	nx n-1 b	$C \rightarrow ^{\circ}F:$ 1.8; add 32 $PF \rightarrow ^{\circ}C:$ 32; multiply y 0.5555

Common Units used with the International System

UNITS OF MEAS.	ABBREV.	RELATION	UNITS OF MEAS.	ABBREV.	RELATION
meter*	m	length	degree Celsius	°C	temperature
hectare	ha	area	kelvin	К	thermodynamic temp.
tonne	t	mass	pascal	Pa	pressure, stress
kilogram	ko	mass	joule	J	energy, work
nautical mile	M	distance (navigation)	newton	N	force
knot	kn	speed (navigation)	watt	W	power, radiant flux
liter*		volume or capacity	ampere	A	electric current
second		time	volt	l v	electric potential
hertz	H7	frequency	ohm	Ω	electric resistance
candela	od od	luminous intensity	coulomb		electric charge
Canucia		numinous intensity		Ľ.	
Canadian prefe	erred spe	elling: metre, litre.			e la

APPENDIX 7 Table for length conversion

Unit	mm	cm	m	km	in	ft	yd	mi
1 millimeter 1 centimeter 1 meter 1 kilometer 1 inch 1 foot 1 yard 1 mile	$ \begin{array}{r} 1 \\ 10 \\ 1000 \\ 10^{6} \\ 25.4 \\ 304.8 \\ 914.4 \\ 1.61 \times 10^{6} \\ \end{array} $	$\begin{array}{c} 0.1 \\ 1 \\ 100 \\ 10^{5} \\ 2.54 \\ 30.48 \\ 91.44 \\ 1.01 \times 10^{5} \end{array}$	$\begin{array}{c} 0.001 \\ 0.01 \\ 1 \\ 1000 \\ 0.0254 \\ 0.3048 \\ 0.9144 \\ 1.61 \times 10^3 \end{array}$	$ \begin{array}{r} 10^{-6} \\ 0.0001 \\ 0.001 \\ 1 \\ 2.54 \times 10^{-5} \\ 3.05 \times 10^{-4} \\ 9.14 \times 10^{-4} \\ 1.6093 \\ \end{array} $	0.0397 0.3937 39.37 39,370 1 12 36 63,360	0.00328 0.0328 3.281 3281 0.0833 1 3 5280	0.00109 0.0109 1.094 1093.6 0.0278 0.333 1 1760	6.21×10^{-7} 6.21×10^{-6} 6.21×10^{-4} 0.621 1.58×10^{-5} 1.89×10^{-4} 5.68×10^{-4} 1

APPENDIX 8

Table for area conversion

Unit	cm²	m²	km²	ha	in ²	ft ²	yd²	mi ²	ас
1 sq. centimeter 1 sq. meter 1 sq. kilometer 1 hectare 1 sq. inch 1 sq. foot 1 sq. yard 1 sq. mile 1 acre	$\begin{array}{c} 1 \\ 10^4 \\ 10^{10} \\ 10^8 \\ 6.452 \\ 929 \\ 8361 \\ 2.59 \times 10^{10} \\ 4.04 \times 10^7 \end{array}$	$\begin{array}{c} 0.0001 \\ 1 \\ 10^6 \\ 10^4 \\ 6.45 \times 10^{-4} \\ 0.0929 \\ 0.8361 \\ 2.59 \times 10^6 \\ 4047 \end{array}$	$10^{-10} \\ 10^{-6} \\ 1 \\ 0.01 \\ 6.45 \times 10^{10} \\ 9.29 \times 10^{-8} \\ 8.36 \times 10^{-7} \\ 2.59 \\ 4.047 \times 10^{-3} \\ 10^{-3} \\ 10^{-10} \\ 1$	$ \begin{array}{r} 10^{-8} \\ 10^{-4} \\ 100 \\ 1 \\ 6.45 \times 10^{-8} \\ 9.29 \times 10^{-6} \\ 8.36 \times 10^{-5} \\ 259 \\ 0.4047 \\ \end{array} $	$\begin{array}{c} 0.155\\ 1550\\ 1.55\times10^9\\ 1.55\times10^7\\ 1\\ 144\\ 1296\\ 4.01\times10^9\\ 6.27\times10^6\\ \end{array}$	$1.08 \times 10^{-3} \\ 10.76 \\ 1.076 \times 10^{7} \\ 1.076 \times 10^{5} \\ 6.94 \times 10^{-3} \\ 1 \\ 9 \\ 2.79 \times 10^{7} \\ 43,560 \\ \end{bmatrix}$	$1.2 \times 10^{-4} \\ 1.196 \times 10^{6} \\ 1.196 \times 10^{4} \\ 7.7 \times 10^{-4} \\ 0.111 \\ 1 \\ 3.098 \times 10^{6} \\ 4840$	$\begin{array}{c} 3.86 \times 10^{-11} \\ 3.86 \times 10^{-7} \\ 0.3861 \\ 3.861 \times 10^{-10} \\ 3.49 \times 10^{-10} \\ 3.587 \times 10^{-8} \\ 3.23 \times 10^{-7} \\ 1 \\ 1.562 \times 10^{-3} \end{array}$	2.47×10^{-8} 2.47×10^{-4} 247.1 2.471 1.574×10^{-5} 2.07×10^{-4} 640 1

APPENDIX 9

Table for volume conversion

Unit	mL	liters	m³	in ³	ft ³	gal	ac-ft	million gal
1 milliliter 1 liter 1 cu. meter 1 cu. inch 1 cu. foot 1 U.S. gallon 1 acre-foot 1 million gallons	$ \begin{array}{r} 1 \\ 10^{3} \\ 10^{6} \\ 16.39 \\ 28,317 \\ 3785.4 \\ 1.233 \times 10^{9} \\ 3.785 \times 10^{9} \\ \end{array} $	$\begin{array}{c} 0.001 \\ 1 \\ 1000 \\ 1.64 \times 10^{-2} \\ 28.317 \\ 3.785 \\ 1.233 \times 10^{6} \\ 3.785 \times 10^{6} \end{array}$	$10^{-6} \\ 0.001 \\ 1 \\ 1.64 \times 10^{-5} \\ 0.02832 \\ 3.78 \times 10^{-3} \\ 1233.5 \\ 3785 \\ \end{array}$	0.06102 61.02 61,023 1 1728 231 75.27 × 10 ⁶ 2.31 × 10 ⁸	$\begin{array}{c} 3.53 \times 10^{-5} \\ 0.0353 \\ 35.31 \\ 5.79 \times 10^{-4} \\ 1 \\ 0.134 \\ 43,560 \\ 1.338 \times 10^{5} \end{array}$	$\begin{array}{c} 2.64 \times 10^{4} \\ 0.264 \\ 264.17 \\ 4.33 \times 10^{-3} \\ 7.48 \\ 1 \\ 3.26 \times 10^{5} \\ 10^{6} \end{array}$	$\begin{array}{c} 8.1 \times 10^{-10} \\ 8.1 \times 10^{-7} \\ 8.1 \times 10^{-4} \\ 1.218 \times 10^{-8} \\ 2.296 \times 10^{-5} \\ 3.069 \times 10^{-6} \\ 1 \\ 3.0684 \end{array}$	$\begin{array}{c} 2.64 \times 10^{-10} \\ 2.64 \times 10^{-7} \\ 2.64 \times 10^{-4} \\ 4.329 \times 10^{-9} \\ 7.48 \times 10^{6} \\ 10^{6} \\ 0.3260 \\ 1 \end{array}$

APPENDIX 10

Table for time conversion

Unit	sec	min	hours	days	years
1 second 1 minute 1 hour 1 day 1 year	1 60 360 8.64 × 10 ⁴ 3.15 × 10 ⁷	$ \begin{array}{r} 1.67 \times 10^{-2} \\ 1 \\ 60 \\ 1440 \\ 5.256 \times 10^{5} \end{array} $	$2.77 \times 10^{-4} \\ 1.67 \times 10^{-2} \\ 1 \\ 24 \\ 8760$	$ \begin{array}{r} 1.157 \times 10^{-5} \\ 6.94 \times 10^{-4} \\ 4.17 \times 10^{-2} \\ 1 \\ 365 \end{array} $	$3.17 \times 10^{-8} 1.90 \times 10^{-6} 1.14 \times 10^{-4} 2.74 \times 10^{-3} 1$

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Appendix 9.A. Continued Velocity

			Equivalent ^{1,2}		
Unit	feet per day	kilometers per hour	feet per second	miles per hour	meters per second
feet per day	1	1.27×10^{-5}	1.157 × 10 ⁻⁵	7.891 × 10-6	3.528 × 10-6
kilometers per hour	7.874 × 10 ⁴	ţ	0.9113	0.6214	0.2778
feet per second	8.64 × 10 ⁴	1.097	1	0.6818	0.3048
miles per hour	1.267×10^{5}	1.609	1.467	1	0.447
meters per second	2.835 × 10 ⁵	3.6	3.281	2.237	-

Mass

				Equivalent ^{1.}				
1			kilogram	i i	Ĭ	short toe	metric tom	hong tea
ounce	-	6.25×10-2	2.835 × 10 - 2	2.891 × 10-3	1.943×10 ⁻³	3.125×10 ⁻⁵	2.835 × 10 - 5	2.79 × 10 ⁻⁵
punoa	91	-	0.4536	4.625 × 10 ⁻²	3.108×10-2	5×10-4	4.536 × 10 ⁻⁴	4.464 × 10 ⁻⁴
kilogram	35.28	2.205	_	0.102	6.852×10 ⁻²	1.102 × 10 ⁻³	0.001	9.842×10 ⁻⁴
metric slug	345.9	21.62	9.807	_	0.6721	92.51	9.807 × 10 ⁻³	9.651 × 10 ⁻³
Stug	514.7	32.17	14.59	1.49	-	62.17	1.459 × 10 ^{- 2}	1.436×10 ⁻²
not	3.2 × 10 ⁴	2,000	907.2	92.51	62.16	-	0.907	0.8929
metric ton	3.528 × 10 ⁴	2.205	000'1	102	68.52	1.103		0.9842
long non	3.584 × 10 ⁴	2,240	1.016	103.7	69.63	1.12	1.016	1

Force

ĥ

		Equ	ivalent ^{1.2}	
Unit	dyne	newton	pound	kilogram _{torre}
dynes	1	1 × 10-5	2.248 × 10-6	1.02 × 10-6
newtons	1×10^{5}	1	0.2248	0.102
pound	4.448 × 10 ⁵	4.448	1	0.4536
kilogram _{force}	9.807×10^{5}	9.807	2.205	1

Density

Ч.

			Equivalent ^{1,2}		
Ciek	pounds per cubic inch	pounds per cubic feet	pounds per gallon	grams per cubic centimeter	grams per liter
pounds per cubic inch	1	1,728	231	27.68	2.768 × 10'
pounds per cubic feet	5.787 × 10-4	1	0.1337	1.6×10 ⁻²	16.02
pounds per gallon	4 .33 × 10 ⁻³	7.481	1	0.1198	119.8
grams per cubic centimeter	3.61 × 10 ⁻²	62.43	8.345		1,000
grams per liter	3.61 × 10 ⁻³	6.24 × 10 ⁻²	8.35 × 10 ⁻³	0.001	1

Length						c
4			Equiva	lent 1.2		
	millimeters	inches	feet *	meters	kilometers	miles
millimeters	-	3.937×10^{-2}	3.281 × 10 ⁻³	r -01 × 1	+-01×1	6.214×10-7
inches	25.4	1	8.33 × 10 ⁻²	2.54 × 10-2	2.54 × 10 ⁻⁵	1.578 × 10 - 5
feet	304.8	12	-	0.3048	3.048 × 10-4	1.894 × 10 - 4
meters	1,000	39.37	3.281	-	r-01×1	6.214 × 10-4
kilometers	1×10	3.937 × 10*	3,281	1,000	-	0.6214
miles	1.609 × 10 ⁶	6.336 × 104	5,280	1,609	1.609	-

Area

				Equivalent ^{1,2}			
t'ait	square inches	square fect	separate meters	BCTES	hectarrs	square kilisquaters	apuare miles
solution inches	-	6.944×10-3	6.452 × 10 - 4	1.594×10-5	6.452 × 10-8	6.452 × 10 - 10	2.491 × 10 - 10
square feet	Ŧ	_	9.29×10-2	2.296×10-5	9.29×10-9	9.29 × 10 ⁻¹	3.587×10-8
square meters	1.550	10.76	-	2.471 × 10-4	1 × 10-4	1 × 10-6	3.861 × 10-7
acres	6.273×10 ⁶	4.356×10 ⁴	4.047	-	0.4047	4.047 × 10-3	1.563×10 ⁻³
hectares	1.55 × 10 ⁷	1.076 × 105	1×10	2.471	-	0.01	3.861 × 10 ⁻³
squarc							
kilometers	1.55 × 10°	1.076×10 ⁷	901×1	247.1	001	-	0.3861
square miles	4.014×10°	2.788 × 10 ⁷	2.59 × 106	640	259	2.59	1

Volume

4				JOHNAMAN			
5	cubic inches	liters	guitoes	cable feet	cebic yards	cubic meters	acrt-ft
cubic inches	-	1.639×10 ⁻²	4.329 × 10-3	5.787×10-4	2.143 × 10-5	1.639 × 10 ⁻⁵	1.329 × 10 ⁻⁸
liters	61.02	-	0.2642	3.531 × 10-2	1.308 × 10-3	0.001	8.106×10-7
gallons	231.0	3.785	1	0.1337	4,951 × 10 ⁻³	3.785 × 10-3	3.068 × 10-6
cubic feet	1.728	28.32	7.481	-	3.704 × 10-2	2.832×10 ⁻³	2.296 × 10 ⁻⁵
cubic yards	4.666×10 ⁴	764.6	202.0	27	-	0.7646	6.198×10-4
cubic meters	6.102 × 10 ⁴	1,000	264.2	35.31	306.1	1	8.106×10 ⁻⁴
acre-ft	7.527 × 10 ⁷	1.233 × 10 ⁶	3,259 × 10 ⁵	4.356 × 10 ⁴	1.613	1.233	-

Discharge (flow rate, volume/time)

			Equivalent ^{1,2}		
Unit	gaftons per minste	liters per second	actre-feet per day	cablic feet per account	cubic moters per day
gallons per minute	-1	6.309 × 10-2	4.419×10 ⁻³	2.228 × 10 ⁻³	5.45
second second	15.85	1	7.005 × 10-2	3.531 × 10 ⁻²	86.4
per day	226.3	14.28	1	0.5042	1,234
per second	448.8	28.32	1.983		2,447
per day	1.369 × 10°	8.64×10^{7}	6.051 × 10°	3.051 × 10*	1.

APPENDIX 9.A. Conversion Tables

Parameter	English	SI	Conversion	Dimensional
	Unit	Unit	Factor	Formula
Force Mass Length Time Density Specific weight Pressure Dynamic viscosity	pound (lb) slug foot (ft) second (s) slug/ft ³ lb/ft ³ lb/ft ² lb-s/ft ²	newton (N) kilogram (kg) meter (m) second kg/m ³ N/m ³ N/m ² N·s/m ²	1 lb = 4.448 N 1 slug = 14.594 kg 1 ft = 0.3048 m 1 s = 1 s 1 slug/ft ³ = 515.4 kg/m ³ 1 lb/ft ³ = 157.1 N/m ³ 1 lb/ft ² = 47.88 N/m ² 1 lb-s/ft ² = 47.88 N·s/m ²	ML/T ² M L M/L ³ M/L ² T ² M/LT ² M/LT ²

Equations for areas and volumes

Circumference of circle = $3.1416 \times \text{dia} = 6.2832 \times \text{radius}$ Area of circle = $0.7854 \times (dia)^2 = 3.1416 \times (radius)^2$ Area of sphere = $3.1416 \times (dia)^2$ Volume of sphere = $0.5236 \times (dia)^3$ Area of triangle = $0.5 \times base \times height$ Area of trapezoid = $0.5 \times \text{sum of the two parallel sides} \times \text{height}$ Area of square, rectangle, or parallelogram = base \times height Volume of pyramid = area of base \times 1/3 height Volume of cone = $0.2618 \times (\text{dia of base})^2 \times \text{height}$ Volume of cylinder = $0.7854 \times \text{height} \times (\text{dia})^2$

Pressure											
·····						Equivalent	1,2				
Unit	pounds per square inch	pounds per square feet	atmospheres	kilograms per square centimeter	kilograms per square meter	inches of water (68°F) ³	feet of water (68°F) ³	inches of mercury (32°F) ⁴	millimeters of mercury (32°F) ⁴	bars	kilo Pascals
ounds per square inch	1	144	6.805 × 10-2	7.031 × 10-2	703.1	27.73	2.311	2.036	51.72	6.895×10-2	6.895
ounds per square feet	6.945 × 10 ⁻³	1	4.73×10⁻⁴	4.88×10 ⁻⁴	4.882	0.1926	1.605 × 10 ⁻²	1.414×10 ⁻²	0.3591	4.79 × 10 ⁻⁴	4.79 × 10 ⁻²
tmospheres	14.7	2,116	1	1.033	1.033×10^{4}	407.5	33.90	29.92	/00	1.015	101.5
ilograms per square centimeter	14.22	2,048	0.9678	1	1 × 104	394.4	32.87	28.96	735.6	0.9807	98.07
ilograms per square meter	1.422 × 10-3	0.2048	9.678×10-3	0.001	1	3.944 × 10 ⁻²	3.287 × 10-3	2.896×10-3	7.356 × 10 ⁻²	9.807 × 10-5	9.807 × 10-
nches of water (68°F) ³	3.609 × 10-2	5.197	2.454 × 10-3	2.53×10-3	25.38	1	8.333×10-2	7.343 × 10-2	1.865	2.49×10-3	0.249
eet of water (68°F)	0.4328	62.32	2.945 × 10-2	3.043 × 10-2	304.3	12	1	0.8812	22.38	2.984 × 10-2	2.984
nches of mercury (32°F)'	0.4912	70.73	3.342 × 10 ⁻²	3.453 × 10-2	345.3	13.62	1.135	1	25.4	3.386 × 10 ⁻²	3.386
nillimeters of mercury (32°) ⁴	1.934×10-2	2.785	1.316×10-3	1.36×10-3	13.6	0.5362	4.468×10-2	3.937 × 10-2	1	1.333 × 10-3	0.1333
Cars .	14.5	2,089	0.9869	1.02	1.02 × 104	402.2	33.51	29.53	750.1	1	100 -
kilo Pascals	0.145	20.89	9.869 × 10-3	1.02 × 10 ⁻²	102	4.022	0.3351	0.2953	7.501	0.01	1.

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Manual of Field Geology

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4		Sumo.	1.03493	1.0.455	1.03312	1.03252	1.03192	1.05132	7/0011	1.00012		1.02622	1.02773	1 02713	1.02653	1.02593	1.02533	1.02474	1.02355	Tang	\$ °
4		June 1	96625	12005	96794	.96850	-0690J		NUCK.			50116A	01710	97359	.97416	.97472	97629	97643	00226.	Cotang	4
		k	~	NM	-	ŝ	9	~	0	2	2		4 14	•	9	9	~	× 6	8		

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APPENDIX 8. EQUIVALENCE OF SOME UNITS OF WEIGHT AND MEASURE

Underlined figures are exact; others are rounded off. Condensed from Letter Circular 1035 (Jan., 1960) of the U.S. Department of Commerce, National Bureau of Standards, Washington 25, D.C.

1 in. = 0.08333 ft; 0.02778 yd; 2.54 cm. 1 ft = 12 in.; 0.6061 rods; 0.3048 m; 0.0001894 mi 1 yd = $3 t_{12}$ ft; 0.9144 m; 0.1818 rods; 0.0005682 mi

 $1 \text{ m} = \overline{1000 \text{ mm}}; 100 \text{ cm}; 10 \text{ cm}; 10 \text{ decimeters} 0.1 \text{ dekameters}; 0.01 \text{ hectometers};$ 0.001 km

m = 39.37 in.; 3.2808 ft; 1.0936 yd; 0.0006214 mi

fathom = $\frac{6}{198}$ ft; 1.8288 m rod = $\frac{198}{198}$ in: 16.5 ft; 5.5 yd chain = 100 links; 66 ft; 0.0125 mi; 20.117 m;

sq in. = 6.4516 sq cm; 0.00694 sq ft

sq ft = 144 sq in.; 0.1111 sq yd; 0.0929 sq m

sq yd = 1296 sq in.; 9 sq ft; 0.8361 sq m

sq m = 1551 sq in.; 10.76 sq ft; 1.196 sq yd

acre = 43560 sq ft; 4840 sq yd; 0.405 hectares; 0.00156 sq mi

sq mi = 640 acres; 259 hectares

 $cu \ cm = \overline{0.0610} \ cu \ in.; \ 0.000001 \ cu \ m$

cu ft = 1728 cu in.; 0.03704 cu yd; 0.0283 cu m; 7.480 gal (U.S.) cu in. = 0.0005787 cu ft; 16.387 cu cm

cu yd = $\frac{46656}{46656}$ cu in.; 27 cu ft; 0.7645 cu m cu m = 35.315 cu ft; 1.3079 cu yd

gal (U.S.) = $\underline{231}$ cu in; $\underline{128}$ fl oz; 0.1337 cu ft; 3.785 liters

liter = 61.025 cu in.; 0.2642 gal (U.S.); 0.0353 cu ft

acre ft = 43560 cu ft; 325851 gal (U.S.); 1233.5 cu m

oz (avoir.) = 437.5 grains; 28.350 grams; 0.0625 lbs (avoir.)

gram = 15.432 grains, 0.03527 oz (avoir.); 0.002205 lbs (avoir.) short (net) ton = 2000 lbs; 0.9072 metric ton; 0.8929 long (gross) ton

361

<u>A</u>	В	С	Α	В	С
Length -			Hydraulic conduct	ivity —	
inch .	meter	2.540E-2	gal/day/ft ²	cm/sec	4.716E-5
feet	meter	.3048	gal/day/ft ²	ft/day	.1337
yard	meter	.9144	gal/day/ft ²	meter/day	4.075E-2
mile	kilometer	1.609	gal (UK)/day/ft ²	meter/day	4.893E-2
inch	centimeter	2.540	ft/yr	cm/sec	9.665E-7
			ft/yr	meter/day	8.351E-4
Area —			darcy (atm/cm)	cm/sec	8.584E-4
sqinch	sq centimeter	6.452	darcy	ft/day	2.433
sq feet	sq meter	9.290E-2	darcy	meter/day	.7416
sq yard	sq meter	.8361	•	•	
sq mile	sq kilometer	2.590	Tranemissiuir		
acre	sq kilometer	4.047E-3	ransmissivity -	an motor/day	1 3435 4
acre	hectare	.4047	gal (UV) (down for	sq meter/day	1.242E-2
Valuena			gai (UK)/day/it	sq meter/day	1.492E-2
volume –			sy it/sec	sq meter/day	8.027E3
cu ieet	cu meter	2.832E-2	sy it/day	sq meter/day	9.290E-2
cu yard	cu meter	.7646			
cu inch	cu centimeter	1.639E1	Force and pressure	:	
quart	liter	.9464	pound (f)	newton	4.448
gallon	liter	3.785	poundal	newton	.1383
gallon (UK)	liter	4.546	pounds/sg in.	pascal	6.895E3
barrel (petr.)	liter	1.590E2	lb/sa ft	pascal	4.788E1
acre-feet	cu meter	1.234E3	poundal/so ft	pascal	1.488
million gal	cu meter	3.785E3	atmosphere	pascal	1 013F5
gallon (UK)	gallon (US)	1.200	inches of Hø	pascal	3.386F3
Masa -			millibar	pascal	1.000F2
mass —	h:1	1831	DSi	kg/cm^2	7.0316-1
pouna (ID)	Kliogram	.4536	ft of H ₂ O (4°C)	nsi	4225
ounce .	gram	2.835E1		P.31	
ton, snort	tonne (metric)	.9072			
ton, long	tonne	1.016	Work, energy and	heat —	
Velocity and grad	dient		horsepower (US)	horsepower (CV)	1.014
feet/sec	meter/can	3049	horsepower (US)	kW-hr	.7457
mile/hour	meter/sec	4470	ft-lb/sec	kW	1.356E-3
feet/mile	meter/bm	1204	BTU	kW-hr	2.930E-4
	meter/km	.1074	gpm/100' lift	kW	1.884E-2
Flow rate –			ft-lb	joule	1.356
gal/min	liter/sec	6.309E-2	ft-poundal	joule	4.214E-2
gal/min	cu meter/dav	5.300	BTU	joule	1.055E-3
gal (UK)/min	liter/sec	7.577E-2	calorie	joule	4.187
10 ⁶ gal/day	liter/sec	4 381E1			
10 ⁶ gal/day	cu meter/dav	3.785F-3	Temperature -		
cu ft/sec (cfs)	liter/sec	2 832F1	Fahrenheit	Celsins	5(F-32)/
acre-feet/day	liter/sec	1 4588-1	Celsius	Fahrenheit	$18(C) \pm 2$
al/dav	acrefest /ur	1 1205-2	Kelvin	Celeine	K-172 1
Barl aay	acie-ieci/yi	1.1206 3	12014111	Crisius	A 213.2

Notes: (1) The "E" notation indicates exponentiation: $2.540E-2=2.540 \cdot 10^{-2}$. (2) Unless otherwise noted, all gallons are U.S. gallons. (3) The darcy is a unit of permeability (L²), not of hydraulic conductivity (L/T). (4) A Newton (force) = kg · m/s²; A Pascal (pressure) = kg/m · s²; Joule (energy) = kg · m²/s²; each is a unit in SI. (5) Under "Temperature," entries are formulae, not multipliers.

Vir

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DEOMETRIC FORMULAS



Right Triangle



Any Triangle

Area

Triangles

Pythagorean Theorem

 $A = \frac{1}{2}bh$

 $a^2 + b^2 = c^2$



Circles Area Circumference

 $A = \pi r^2$ $C = 2\pi r$



• Cylinders Surface Area Volume

 $S = 2\pi r^2 + 2\pi rh$ $V = \pi r^2 h$





Cones Surface Area Volume

 $S = \pi r^2 + \pi r \sqrt{r^2 + h^2}$ $V = \frac{1}{3}\pi r^2 h$

Spheres Surface Area Volume

 $S = 4\pi r^2$ $V = \frac{4}{3}\pi r^3$

I. Angular Measurement

- a. Angular Measurement (based on circle)
 - i. Full Circle = 360 degrees
 - 1. 1 degree = 1/360 th of circle
 - (1) Subdivisions of Degree
 - (a) 1 degree = 60 minutes
 - (b) 1 minute = 60 seconds
 - (c) 1 degree = 60 min x 60 sec/min = 3600 sec
 - (2) Famous Angular Measurements
 - (a) Right Angle = 90 degrees
 - (b) (Straight Angle) Line = 180 degrees
 - (c) Circle = 360 degrees
 - (d) Acute Angle < 90 degrees
 - (e) Obtuse Angle: between 90-180 degrees
 - (f) Complementary Angles two angles add up to 90 degrees
- 2. Radians unit of angular measurement based on the length of an arc circumscribed by a circle
 - a. Circumference of Circle = $2\pi r$, where π = circumference of circle / radius of circle = 3.14, and r = radius of circle
 - b. Circle = 360 degrees = 2π radians; 180 degrees = π radians