1

General Information

1·1. Symbols and Formulae used in Engineering

(*a*) Roman Numericals

English fig.	*Roman fig.*	*English fig.*	*Roman fig.*
1	I	60	LX
2	II	70	LXX
3	III	80	LXXX
4	IV	90	XC
5	V	100	C
6	VI	200	CC
7	VII	300	CCC
8	VIII	400	CD
9	IX	500	D
10	X	600	DC
20	XX	700	DCC
30	XXX	800	DCCC
40	XL	900	MD
50	L	1000	M

Example 1325 = 1000 + 300 + 25 = MCCCXXV

(*b*) Greek Alphabet

Alpha	A	α	Nu	N	ν
Beta	B	β	Xi	Ξ	ξ
Gamma	Γ	γ	Omicron	O	ο
Delta	Δ	δ	Pi	Π	π
Epsilon	E	ε	Rho	P	ρ
Zeta	Z	ζ	Sigma	Σ	σ
Eta	H	η	Tau	T	τ
Theta	Θ	θ	Upsilon	Y	υ
Tota	I	ι	Phi	Φ	ϕ
Kappa	K	κ	Chi	X	χ
Lambda	Λ	λ	Psi	Ψ	ψ
Mu	M	μ	Omega	Ω	ω

(*c*) **Chemical Symbols of elements**

Name of Element	*Symbol*	*Atomic no.*	*Atomic wt.*	*Melting point, °C*
Aluminium	Al	13	26·97	660
Calcium	Ca	20	40·08	850
Carbon	C	6	12·01	3700
Chlorine	Cl	17	35·457	(–) 101
Copper	Cu	29	63·54	1083
Gold	Au	79	197·2	1063
Hydrogen	H	1	1·008	(–)259
Iodine	I	53	126·92	114
Iron	Fe	26	55·85	1539
Lead	Pb	82	207·21	327
Magnesium	Mg	12	24·32	650
Manganese	Mn	25	54·93	1260
Mercury	Hg	80	200·61	(–) 39
Nickel	Ni	28	58·69	1455
Nitrogen	N	7	14·008	(–) 210
Oxygen	O	8	16·00	(–) 219
Phosphorous	P	15	30·98	—
Potassium	K	19	39·096	63
Silver	Ag	47	107·88	961
Sodium	Na	11	22·997	98
Sulphur	S	16	32·066	—
Tin	Sn	50	118·70	232
Uranium	U	92	238·07	1133
Zinc	Zn	30	65·38	420

(*d*) **Chemical Symbol and Formulae of Common Engineering Materials**

Lime, quick lime (oxide of calcium)	CaO
Slacked lime (Hydraulic oxide of calcium)	$Ca(OH)_2$ or $CaOH_2O$
Cement or lime stone (calcium carbonate)	$CaCO_3$
Water	H_2O
Carbon dioxide	CO_2
Carbon monoxide	CO
Potassium Permangnate	K_2MnO_8
Sulphate of manganese	$MnSO_4$
Oxalic acid	$C_2H_2O_4$
Sulphate of Potassium	K_2SO_4
Sulphuric acid	H_2SO_4

Table contd...

Table contd...

Silica		SiO_2
Alumina		Al_2O_3
Iron oxide		Fe_2O_3
Iron Ore :	Magnetite	Fe_2O_3
	Haemotite	Fe_3O_4
	Limonite	$2Fe_2O_3\ 3H_2O$
	Sidorite	$FeCO_3$
	Basic ferric carbonate	$Fe(OH)CO_3$
	Hydrated ferric oxide	$Fe(OH)_3$
Aluminium :	Bauxite double floride of aluminium and sodium	$AlF_3 3NaF$
Copper :	Copper glance	Cu_2S
	Copper pyrites	$CuFeS_2$
	Malachite	$CuCO_3CuO_2H_2$
	Azurite	$2CuCO_3CuO_2H_2$
Lead :	Galena (lead sulphide)	PbS
Tin :	Tin stone or	SnO_2
Zinc :	Zucite	ZnO
	Calamine	$ZaCO_3$
	Zinc blend	ZnS
Gypsum		$CaSO_4.2H_2O$
Plaster of Paris :	(dehydrated gypsum)	$CaSO_4$
	Common salt	$NaCl$
Paints :	Lead acetate	$Pb(CH_3COO)_2$
	Manganese sulphate	$MnSO_4$
	Verdigris (copper acetate)	$Cu(CH_3COO)_2$
	Vermilion (sulphate of mercury)	HgS
	Zeolite	$Na_2Al(SiO_3)$
	Salammoniac (Aluminium chloride)	NH_4Cl

(*e*) **Abbreviations used in measure**

Length	*l*	*Time*	*t*	*Weight*	(wt.)
Inch	(") in.	Hour	(Hr)	Stone	(st)
Foot	(') Ft.	Minute	(') min.	Grain	(gr.)
Yard	(yd)	Second	(") sec.	Ounce	(oz)
Millimetre	(mm)	**Volume**	(Vol.)	Pound	(lb)
Centimetre	(cm)	Gallons	(galls)	Quarter	(qr)
Metre	(m)	Gram	(grm)	Hundred wt.	(cwt)
Kilometre	(km)	Imperial	(Imp)	Ton	(T)

Table contd...

Square	(sq)	United States	(US)	Maund	(Md)
Cubic	(Cu)	British	(Br)	Seer	(sr.)
Average	(av)	Pint	(pt)	Chhatak	(Chh.)
Acre	(a)	Liquid	(Liq.)	Avoirdopois wt.	(avoir avp.)
Hectare	(ha)	Fluid	(Fl.)	Apothecarius wt.	(ap)
				Troy wt.	(tr)
				Gram	(gm)
				Metric tonne	(MT)
				Millier	(t)
				Quintal (100 kg)	(q)
				Myria gram (10 kg)	mg

(*f*) **Abbreviations used in indices**

Deca	(dk)	10^1	Desi	(d)	10^{-1}
Hecto	(h)	10^2	Centi	(c)	10^{-2}
Kilo	(K)	10^3	Milli	(m)	10^{-3}
Mega	(M)	10^6	Micro	(μ)	10^{-6}
Giga or	(G).		Nano or	(η)	
Kilog mega	KM	10^9	Millimicro	(Mμ)	10^{-9}
Tera or	T		Pico or	(P)	
Mega-mega	(MM)	10^{12}	Micro-micro	(MM)	10^{-12}
Pela	P	10^{15}	Fento	(f)	10^{-15}
Exa	E	10^{18}	Atto	(a)	10^{-18}

(*g*) **Abbreviations used in mathematics**

Plus	(+)	Minus	(−)	Infinity	(∞)
Multiplication	(× or .)	Division	(÷)	Square root	$\sqrt{}$
Equal to	(=)	Not equal to	(≠)	Angle	(∠)
Greater than	(>)	Lesser than	(<)	Sum of	(Σ)
Parallel	(‖)	Not parallel	(∦)	*n* root	$\sqrt[n]{}$
Because or since	(∵)	Rt. angle	⊥	Therefore/hence	(∴)
Area of triangle	Δ	Ratio, is to	(:)	So as	(::)

1·2. Units

(A) Unit Systems

(1) C.G.S. System

Basic Units

Quantity	*Unit*	*Symbol*
Mass	Gram	gm.
Length	Centimetre	cm.

Table contd...

Quantity	*Unit*	*Symbol*
Time	Second	sec.
Temperature	Centigrade	°C
Electric current	Ampere	A
Luminous intensity	Candela	Cd.
Force	Dyne	dyne
(2) M.K.S. System		
Mass	Kilogram	kg
Length	Metre	m
Time	Second	sec.
Temperature	Centigrade	°C
Electric current	Ampere	A
Luminous intensity	Candela	Cd.
(3) S.I. System (International system)		
Basic Units : Mass	Kilogram	kg
Length	Metre	m
Time	Second	sec.
Temperature	Kelvin	K
Electric current	Ampere	A
Luminous intensity	Candela	Cd.
Force	Newton (kg.m/sec^2)	N
Derived units : Area	Sq. m.	m^2
Volume	Cubic metre	m^3
Density	K. gm per cubic metre	kg/m^3 or per m^{-3}
Speed and velocity	metre/sec.	m/s or ms^{-1}
Acceleration	metric/sec./sec.	m/s^2 or ms^{-2}
Momentum	Kg metre per sec.	kgm/sec or kgms^{-1}
Work and energy	Joule	J
Power	Watt	W
Pressure	Pascal	Pa

Unit of force : Force = mass × acceleration

1 Newton = 1 kg × 1 m/sec^2 or 1 N = 1 kg m/sec^2

1 kgf (kg force) = 9·807 N

One Newton (N) is defined as the force required to move a body of mass equal to 1 kg as to generate in it an acceleration equal to 1 m/sec^2.

Unit of Stress or Pressure. Stress or pressure is the force per unit area. S.I. unit of pressure is Newton/m^2 (N/m^2) and is known as **Pascal (Pa)**.

1 kg/cm^2 = 98·07 kN/m^2 or 100 KPa = 1·02 kg/cm^2

Unit of Energy. When the applied force of 1 Newton displaces a body by 1 m in

the direction of application of force, the work done is said to be equal to 1 Newton metre (1 N-m), called 1 Joule (J) and has the dimension of N.m *i.e.* kg.m/sec^2.m.

$$1 \text{ Joule} = 1 \text{ Nm} = 1 \text{ kg m}^2/\text{sec}^2$$

$$1 \text{ kg m of energy} = 9{\cdot}807 \text{ Joule}$$

Unit of Power. Power is the rate of doing work *i.e.* energy per sec. Its M.K.S. unit is kg.m/sec. (kgfm/sec). The S.I. unit is Joule/sec (J/sec) or Nm/sec and this called as watt.

$$1 \text{ watt} = 1 \text{ J/sec} = 1 \text{ Nm/sec}$$

$$1 \text{ kg/sec} = 9{\cdot}807 \text{ W}$$

For convenience 1 kg may be taken equal to 10 Newton *i.e.* 0·01 kN.

$$1 \text{ N/mm}^2 = 10^6 \text{ Pascals} = \text{MPa (Mega Pascal)}$$

$$1 \text{ H.P. (metric)} = 75 \text{ kg.m/sec} = 75 \times 9{\cdot}807 \text{ W} = 735 \text{ watts}$$

$$1 \text{ H.P. (F.P.S.)} = 550 \text{ H lb/sec} = 550 \times 0{\cdot}138 \times 9{\cdot}807 \text{ watts} = 746 \text{ watts}$$

Unit of temperature. In S.I. units, it is Kelvin (K) and is equal to temperature interval corresponding to 1°C (C + 273° = K).

(4) **F.P.S. System**

Mass	Pound	lb
Length	Foot	ft.
Time	Second	sec.
Temperature	Fahrenheit	°F
Electric current	Ampere	A
Luminus intensity	Candela	Cd.
Force	Poundal	Pdl.

(B) **Units of Measure**

Length

English or U.S.		*Metric*	
12 in	= 1 ft.	10 mm	= 1 centimetre
3 ft.	= 1 yard	10 cm	= 1 decimetre
5½ yard	= 1 rod, pole or perch	10 d.m.	= 1 metre
220 yds	= 1 Furlong	10 metre	= 1 deca metre
8 Furlong	= 1 mile (statute)	1 dkm.	= 1 hecta metre
1 mile (statute)	= 5280 ft.	1 h.m.	= 1 kilometre
1 Nautical mile	= 1/3 league = 6075·5 ft.	10 km	= 1 myria metre
1 Fathom	= 6 ft.	1852 m	= 1 Nautical mile
120 Fathom	= 1 Cable	1·83 m	= 1 Fathom
Nautical mile is an arc of one min. at equator of longitude at sea surface. International mile = 6076·12 ft., 1 knot = speed of one nautical mile/Hr.		0·22 km	= 120 Fathom

Table contd...

Table contd...

English or U.S.		*Metric*	
Surveyor's measure (land)			
7·92 in	= 1 link	1 Engineer link	= 12″
25 links	= 1 pole	100 links	= 1 Engineer's chain
100 links	= 1 chain (66 ft Gunter)	1 Cheshin pole	= 8 yards
10 Gunter's chain	= 1 Furlong	2027 yds	= 1 Admiralty km
8 Furlong	= 1 Mile	69·04 Miles	= 1° lat. at equator
3 miles	= 1 League	69·16 Miles	= 1° long. at equator

Area

English or U.S.		*Metric*	
30·25 sq. yds	= 1 sq. rod, pole, perch	100 sqm	= 1 Arc
40 sq. rods	= 1 rood	100 Arc	= 1 hectare
4 roods	= 1 Acre (4840 sq. yds)	100 hectare	= 1 sq. km.
	= 10 sq. chains of 66 ft.		
640 Acres	= 1 sq mile		
5 Acres	= 8 Bighas		
20 invansi	= 1 kachvansi		
20 kachvansi	= 1 Bisvansi		
20 Bisvansi	= 1 Biswa		
20 Biswa	= 1 Bigha (English) (55 yds × 55 yds)		

Volume (Capacity)

English		*U.S.*		
1 litre	= 1·76 Pints (Imp.)	**Dry—**	2 Pints	= 1 quart
	= 0·22 gallons (Imp.)		3 quart	= 1 Peck
2 Pint	= 1 quart		4 pecks	= 1 Bushel
4 quart	= 1 gal (Imp.)		1 Barrel	= 7056 in^3
2 gallons	= 1 pack			
4 Packs	= 1 Bushel (1284 cft.)			
8 Bushels	= 1 quarter			
1 Barrel	= 31·5 gallons (Imp.)			
	= 42 U.S. gallons (for Petroleum)			
1 Ferkin	= 1·444 cft.	**Liquid—**	60 minims	= 1 dram
1 U.S. gallon	= 3·785 litres		8 dram	= 1 ounce

Table contd...

Table contd...

English		*U.S.*	
1 Imp. gallon	= 1·2 U.S. gallon	4 ounces	= 1 gill
	= 8 Pints	4 gills	= 1 pint
	= 160 Fluid ounces		
	= 10 lb of water		
	= 4·546 litres		
1 cft.	= 6·24 Imp. gal		
	= 7·48 U.S. gal		
	= 28·32 litres		
	= 62·3 lb of water		
60 minims	= 1 dram (draehm)		
8 dram	= 1 ounce (Eng. fluid)		
20 ounces	= 1 Pint (0·568 lits.)		
	= 4 gills		
One tea spoon full	= 1/8 Fluid ounces		
One glass full	= 12 fluid ounces		

Angle

1 Degree	= 60 minutes = 0·0175 radians = $\pi/180$ rad.
1 min.	= 60 seconds
1 Rad	= 57·2960 = $180/\pi$ Degrees ; $180° = \pi$ radians
100 grades	= 90^g (French)

Note : 1 radian is defined as the angle between two radii of a circle which cut off on the circumference an arc equivalent to length of the radius of the circle.

Money

New—	1 Rupee	= 100 paise	**Old—**	Rupee	= 16 Annas
	1 Pound English (£)	= 12 Shilling		1 Anna	= 12 pies (4 Paise old)
	1 Shilling	= 8 Pens		1 Paisa old	= 2 Dhelas = 4 Chhadams

Weight

English		*Metric*	
(*a*) **Avoirdupois Units** (for common use)			
27·344 gram	= 1 dram	1 gm (wt. of 1 cm^3 of water at 4°C)	= 1000 m. gm.
16 drams	= 1 ounce	1 kg	= 1000 gm
	= 0·911 ounce troy	10 kg	= 1 myria gm
16 ounces	= 1 lb	10 myria gm	= 1 quintal
	= 1·215 lb troy	10 qunital	= 1 tonne (Millier)
	= 14·583 ounces troy	200 milli gms	= 1 metric carat (c)
	= 7000 grains	1 kg	= 2·2046 pounds (avp)
28 lb	= 1 quarter		

Table contd...

Table contd...

English		*Metric*	
4 qr	= 1 hundred weight (cwt)		
20 cwt	= 1 ton		
14 lbs	= 1 stone		
Note : One shipping (merchandise) is 42 cft. in Britain and 40 cft. in U.S.			
(*b*) **Troy Units** (use out of date)		**Carat Weight**	
480 grams	= 1 ounce = 1·097 oz.avp	(used for weighing precious metal)	
12 ounces	= 5760 grains = 1 pound	1 carat (metric)	= 3·086 grains
	= 13·166 oz (avp)		= 0·200 gram
	= 0·823 lb (avp)	**Note :** It has different values at different places. It is also used to express the purity of gold. Pure gold is known as 24 carat fine standard gold is 22 carat.	
175 lbs	= 140 lbs (avp)		
100 lbs	= 82 lbs (avp)		
Note : An avp pound is heavier than troy and avp ounce is lighter than troy.			
(*c*) **Apothecary Units** (used for compounding medicines)			
20 grains	= 1 scuple (scr)	**Old Indian** (Out of date)	
3 scuples	= 60 grains	8 Rattis	= 1 masha
	= 1 drachm	12 mashas	= 1 tola
	= 2·194 dram (avp)	5 tola	= 1 chhatak
8 drachms	= 480 grams	16 chhatak	= 1 seer
	= 1 ounce	40 seers	= 1 Mound
12 ounces	= 5760 grains	1 Mound	= 0·373242 quintal
	= 1 pound	9 lbs	= 350 tola (exact)
		1 Tola	= 11·6638 grams
(*d*) **U.S. Units**			
1 U.S. cwt.	= 100 pound (avp)		
20 U.S. cwt.	= 1 U.S. ton (short)		
1000 pounds avp	= 1 Kip		
1 U.S. quintal	= 0·4536 metric quintal		
Note : U.S. ton is called as short ton			
Br. ton is called as long ton			
1 U.S. ton	= 0·9072 metric tonne		
	= 0·8929 Br. Ton.		

Density

English or U.S.		*Metric*	
(*a*) **Linear or superficial**			
lb ft.	(lb.ft.)	Kg metre	(kg.m)
or lb ft. squared	(lb ft^2)	Kg metre squared	(kg m^2)

Table contd...

Table contd...

English or U.S.		*Metric*	
(*b*) **Cubical**			
lb ft. cubed	($lb.ft^3$)	Kg m cubed	($kg.m^3$)
Moment of Inertia			
(*a*) **Dynamical**			
lb.ft squared	($lb\ ft^2$)	Kg metre squared	($kg.m^2$)
(*b*) **Geometrical**			
$Foot^4$	(ft^4)	$metre^4$	(m^4)
Modulus of section			
Ft. cubed	(ft^3)	metre cubed	(m^3)
Bending Moment			
Foot-pound	ft.lb	Kilogram-metre	(kg-m)
Stress Pressure or Head			
1 Atmosphere	= 14·696 lb/m^2	1 Atmosphere	= 1·0333 kg/cm^2
	= 29·921 in of mercury		= 760 mm of mercury
	= 34 ft. of water		= 10 metre of water
1 lb/sq. ft.	= 6·944 × 10^{-3} lb/sq in	1 gm/sq cm^2	= 10 kg/sq m.

Force

English or U.S. :

Poundal—A force applied to a body of mass one pound develops an acc. of one ft./sec^2 (g)

Pound force—A force applied to a body of mass one pound develops an acc. of 32·17 ft/sec^2 (g)

1 pound force = 32·17 poundal

Metric :

Dyne (dyn)—A force applied to a body of mass one gram develops an acc. of 1cm/sec^2.

Sthene (Sn)—A force applied to a body having a mass of one tonne develops with an acc. of one metre/sec^2 = 10^8 dynes.

Newton—A force applied to a body having a mass of one kg. develops in it an acc. of one metre/sec^2 = 10^5 dynes.

Kilogram force—A force applied to a body having a mass of one kg. gives an acc. of 9·80 metre/sec^2 = 980 dynes.

Work Power and Energy

British System

Foot Poundal—Work done when point of application of one poundal is displaced by one foot in the direction of the force applied.

Metric

Erg—Work done when point of application of one dyne is displaced by one centimetre in the direction of the force applied (1 erg = 10^{-7} joule = 1 dyn-cm.)

Joule—Work done when point of application of one newton is displaced by one metre in the direction of force applied.

Table contd...

Table contd...

English or U.S.		*Metric*	
1 British H.P.	= 550 ft lbs/sec	1 Metric H.P.	= 75 kg m/sec
	= 33000 ft lbs/min	1 KW/sec	= 737·56 ft lb/sec
	= 1·014 metric H.P.	Power	= $\frac{\text{Work}}{\text{Time}}$
	= 10·70 kg cal/min	1 watt	= 1 joule/sec
	= 76·040 kg/m/sec	1 K.W.h	= 3600 kilo joules
	= 42·44 B.Th.units/min		= 3,67,098 kg m
	= 746 watts		= 2,654,200 ft lbs
	= 0·746 Kilo watts		= 8,54,29000 ft. poundal
1 H.P./Hr.	= 550 × 60 × 60	1 M.H.P./Hr.	= 2,70,000 kg m
	= 19,80,000 ft lbs = 641·19 kg cal		= 6,32,527 kg cal
	= 2,73,745 kg m		= 0·7355 kWH
	= 6,37,05,000 ft. poundal		
	= 2,544 B.Th. Us		

Heat

English System

1 B.Th.U—Quantity of heat required to raise the temperature of one pound of water by one degree Fahrenheit at N.T.P.

1 B.Th.U = 251·9960 Calories

Metric System

Calorie—Quantity of heat required to raise the temperature of one gram of water by one degree centigrade at N.T.P. (Normal temperature and pressure).

Illumination

English System		*Metric System*	
Foot candle	= 1 lumen/sq. ft.	Lux (lx)	= one lumen/m^2
lumen is luminous flux incident		Phot	= one lumen/cm^2
		1 phot	= 10^4 lux

Brightness

Brightness is the luminous intensity of unit area. The international unit of brightness is "stilb" (Sb).

A **stilb** is a luminance of one Candela/cm^2

A Lambert is the brightness of a perfectly diffusing surface giving out one lumen/cm^2

1 stilb	= 3·1416 lambert
1 lambert	= 0·3183 stilb
1 ft lambert	= 1 lumen/ft^2
1 candela/in^2	= 452·390 ft. lambert
1 ft. lambert	= 0·002210 candela/in^2.

Table contd...

(C) Conversion Factors

Metric to British		*British to Metric*	
Length			
1 cm	= 0·39371 in	1 in	= 2·539998 cm
	= 0·0328 ft.	1 ft	= 0·3048 m
1 meter	= 39·370113 in	1 yard	= 0·9144 m
	= 3·280843 ft. = 1·0936 yds	1 furlong	= 0·2012 km
	= 0·1988 rod	1 mile	= 1·609343 km
1 km	= 0·621372 mile		= 0·869 nautical mile
(app. 5/8 mile)	= 1093·6110 yds	1 nautical mile	= 1·852 km
	= 0·539 nautical mile	1 mile U.K.	= 1·0006 nautical mile
1 nautical mile	= 1·1508 mile	1 rod	= 5·0292 mile
	= 0·9994 nautical mile (U.K)		
Area of superficial			
1 sq. cm.	= 0·15500 sq in	1 sq. in.	= 6·451589 sq. cm.
1 sq. meter	= 10·763929 sq. ft.	1 sq. ft.	= 0·092903 sq. m.
	= 1·195992 sq. yd.	1 sq. yd.	= 0·836126 sq. m.
1 sq. km	= 0·386103 sq. mile	1 sq. mile	= 2·589984 sq. km.
1 Hectare	= 2·471058 acres	1 acre	= 0·404685 hectare
	= 11959·920720 sq. yd.		= 4,046 sq. m.
Volumetric or Cubical (capacity)			
1 c. cm	= 0·061024 c. in	1 cu. in	= 16·387021 c. cm.
	= 0·0352 fluid oz U.K.	1 cu. ft.	= 0·028317 c.m.
	= 0·0338 fluid oz U.S.		= 28·3161 litre
1 c.m.	= 35·31475 c.ft.	1 cu. yd.	= 0·764553 c.m.
	= 1·307954 c. yd.	1 acre ft.	= 0·1233 ha.m.
	= 27·4962 bushel U.K.	1 imp. gal	= 4·545963 lit.
	= 28·3774 bushel U.S.	1 U.S. gal	= 3·7878 lit.
	= 6·2898 barrel U.S. liquid	1 imp. gal	= 0·004546 c.m.
	= 219·973823 imp gal	1 pint	= 0·568245 lits.
1 lit	= 0·219974 imp gal (or 2·2 lb of water)	1 quart	= 1·136491 lits.
		1 U.S. bushel	= 0·1590 cu. m. (liquid)
	= 0·264 U.S. gal		
	= 0·0353147 c ft.	1 U.K. gill	= 0· 1421 lit.
	= 1·759803 pints	1 U.S. gill	= 0·1183 lit.
	= 0·879902 quarter	1 U.S. fluid oz.	= 29·5737 cu. cm.
1 hectare metre	= 8·1071 acre ft.		
Weight or Mass			
1 gm	= 15·432356 grains	1 gram	= 0·064799 gm
	= 0·035274 oz	1 oz	= 28·349527 gm

Table contd...

Table contd...

1 kg	= 2·204622 lbs	1 Pound	= 0·453592 kg
1 tonne (milliar)	= 0·984206 ton	1 ton	= 1·016047 tonne
	= 2204·62 lbs		= 984·206 kg
Density			
1 gm/cu.cm	= 0·0361 lb/c in	1 lb/cu. in.	= 27·6799 gm/c. cm
	= 62·4280 lbs/c.ft.		= $2·7680 \times 10^4$ kg/cm
1 kg/cu.m	= 0·0624 lbs/c.ft.	1 lb/c.ft.	= 16·0185 kg/c.m^3
	= $3·6127 \times 10^{-5}$ lb per cu in		= 0·0160 g/m^3
Stress, pressure and load			
1 gm/sq.cm.	= 2·0481 lb/sq.ft.	1 lb/ft^2	= 0·4875 gm/cm^2
1 kg/sq. m.	= ·2048 lb/sq. ft.		= 4·8804 kg/m^2
	= 14·2230 lb/sq. in.	1 lb/m^2	= 0·070307 kg/cm^2
1 tonne/m^2	= 0·0914 ton/ft^2	1 ton/m^2	= 1·5749 kg/mm^2
1 kg/sq. mm	= 0·6350 ton/m^2	1 ton/ft^2	= 1·0937 kg/cm^2
1·6 m head of water	= 0·01421 lb/m^2	1 tonne head of water	= 0·0025 kg/cm^2
1 cm head of mercury	= 0·19299 lb/m^2	1 tonne head of mercury	= 0·0343 kg/cm^2
Power, Work and Energy			
1 kg m/sec	= 7·2330 ft.lb/sec	1 ft.lb/sec	= 0·1383 kg.m/sec
1 kW	= 737·5620 ft.lb/sec	1 H.P.	= 76·0402 kg.m/sec
	= 1·3410 H.P.		= 1·0139 metric H.P
1 M.H.P.(75 kg m/sec)	= 542·4760 ft.lb./sec		= 0·7457 kw
	= 0·9863 H.P. (British) (550 ft. lbs/sec)	1 Poundal	= 14·10 dynes (g = 980·7 dynes)
1 kg.m	= 7·2330 ft.lbs		= 13826 dynes
1 kW.H	= 1·3410 H.P.-Hr (kW.-H)	1 British H.P.	= 1·014 metric H.P.
1 Joule	= 0·7376 ft. lbs	1 kW	= 1·341 metric H.P
1 dyne	= $1·020 \times 10^{-3} \times$ g poundals (g = 0·0709 poundals)		
	= $7·2330 \times 10^{-5}$ poundals		
Metric to British		*British to metric*	
Moment of Inertia			
(*a*) **Dynamic**			
1 kg m^2	= 23·7304 lb.ft^2	1 lb.ft^2	= 0·0421 kg.m^2
	= 3417·17 lb.m^2	1 lb.m^2	= 0·000293 kg.m^2
(*b*) **Geometrical**			
1 cm^4	= 0·0240 in^4	1 in^4	= 41·6231 cm^4
1 m^4	= 115·8620 ft^4	1 ft^4	= 0·086 m^4

Table contd...

Table contd..

Section Modulus			
1 cm^3	= 0·0610 m^3	1 in^3	= 16·3871 cm^3
1 m^3	= 35·3147 ft^3	1 ft^3	= 0·283 m^3
Bending Moment			
1 kg.m	= 7·2330 ft.lb	1 ft.lb	= 0·1383 kg-m
1 kg.cm	= 0·0723 ft.lb		= 13·8255 kg-m
	= 0·8680 in.lbs	1 in-lb	= 1·1521 kg-cm
Velocity			
1 m/sec	= 3·28 ft./sec	1 ft/sec	= 0·348 m/sec
	= 2·2369 mile/hr		= 1·0973 km/hr
1 km/hr	= 0·9113 ft/sec	1 mile/hr	= 0·4470 m/sec
	= 0·6214 m.p.hr.		= 1·6093 km/hr
1 nautical mile/hr (U.K.)	= 1·1508 m.p.hr	1 nautical mile	= 1·0006 mile/hr (U.K.)
(International)	= 0·9994 m.p.H.		= 1·8532 mile/hr (International)
Discharge			
1 cumec	= 35·1348 cusec	1 cusec	= ·0283 cumec
	= 220 Imp.gal/sec		= 28·317 lits/sec
	= 264 US gal/sec		= 375 gals/min
Viscosity			
1 poise (dyne sec/cm^2)	= 2·083 × 10^{-3} ft. units	1 ft. unit	= 479 poise lb.sec/ft^2
Kinemetric Viscosity			
1 stoke cm^2/sec	= 1·076 ft.unit	1 ft. unit	= 929 stokes ft^2/sec
Heat and Temperature			
1 k cal	= 3·968 B.Th.u	1 B.Th.u	= 0·252 k cal
1 m.kg	= ·00929 B.Th.u	1 B.Th.u	= 107·6 m.kg
1 k cal/m^2	= ·3683 B.Th.u/ft^2	1 B.Th.u/ft^2	= 2·7126 k cal/m^2
T°C = 5/9 (T°F − 32°)		T°F = 9/5 T°C + 32	
T°A − 273 = C°		= 9/5 (T°A − 273) + 32	
Fuel Consumption			
1 lit./km	= 0·3540 Imp. gal/mile	1 Imp. gal/mile	= 2·8247 lit/km
1 km/lit.	= 2·8247 mile/Imp. gal	1 mile/Imp. gal	= 0·3540 km/lit.
Illumination			
1 Lux	= 0·0929 ft. candle	1 ft. candle	= 10·7639 lux
1 Phot	= 929·0304 ft. candle		= 0·001076 phot
Brightness			
1 Lambert	= 2·0536 cd/sq.in	1 candela/m^2	= 0·4870 lambert
	= 929·0304 ft. lambert		= 0·1550 stilb (sb)
1 Stilb (sb)	= 2918·6500 ft.lambert	1 ft. lambert	= 0·001076 lambert
	= 6·4516 cd/m^2		= 0·000343 stilb

(D) Convertion Tables (Minor)

Inches to Decimal of Ft.

In	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"	12"
Ft.	0·0833'	0·1666'	0·250'	0·3333'	0·4166'	0·500'	0·5833'	0·6666'	0·750'	0·8333'	0·9166'	1·000'

Inches to mm

Inch	**1/16**	**1/8**	**3/16**	**1/4**	**5/16**	**3/8**	**7/16**	**1/2**
mm	1·587	3·175	4·762	6·350	7·937	9·525	11·112	12·70
Inch	**9/16**	**5/8**	**11/16**	**3/4**	**13/16**	**7/8**	**15/16**	**1**
mm	14·20	15·87	17·46	19·05	20·64	22·22	23·81	24·40

Inch	0·01	0·02	0·03	0·04	0·05	0·06	0·07	0·08	0·09	0·10
mm	0·254	0·508	0·762	0·016	1·270	1·524	1·778	2·032	2·286	2·540

°C to °F $\quad °F = \frac{9°C}{5} + 32 \quad °C = \frac{5(°F - 32)}{9}$

°C	*°F*	*°C*	*°F*	*°C*	*°F*	*°C*	*°F*
35·0	95·0	37·1	98·8	39·2	102·6	41·3	106·3
35·1	95·2	37·2	99·0	39·3	102·7	41·4	106·5
35·2	95·4	37·3	99·1	39·4	102·9	41·5	106·7
35·3	95·5	37·4	99·3	39·5	103·1	41·6	106·9
35·4	95·7	37·5	99·5	39·6	103·3	41·7	107·1
35·5	95·9	37·6	99·7	39·7	103·5	41·8	107·2
35·6	96·1	37·7	99·9	39·8	103·6	41·9	107·4
35·7	96·3	37·8	100·0	39·9	103·8	42·0	107·6
35·8	96·4	37·9	100·2	40·0	104·0	42·1	107·8
35·9	96·6	38·0	100·4	40·1	104·2	42·2	108·0
36·0	96·8	38·1	100·6	40·2	104·4	42·3	108·1
36·1	97·0	38·2	100·8	40·3	104·5	42·4	108·3
36·2	97·2	38·3	100·9	40·4	104·7	42·5	108·5
36·3	97·3	38·4	101·1	40·5	104·9	42·6	108·7
36·4	97·5	38·5	101·3	40·6	105·1	42·7	108·9
36·5	97·7	38·6	101·5	40·7	105·3	42·8	109·0
36·6	97·9	38·7	101·7	40·8	105·4	42·9	109·2
36·7	98·1	38·8	101·8	40·9	105·6		
36·8	98·2	38·9	102·0	41·0	105·8		
36·9	98·4	39·0	102·2	41·1	106·0		
37·0	98·6	39·1	102·4	41·2	106·2		

Note :
1. Normal temp. of human body = 98·4 °F = 37°C
2. Boiling point of pure water = 100°C = 212°F
3. Melting point of ice = 0°C = 32°C
4. Water has max. density at 4°C

Fractions, Decimals and Percentage

Fractions	1	7/8	3/4	2/3	5/8	1/2	3/8	1/3	1/5	1/8	1/10	1/40	1/80	1/240
Decimals	1·00	0·875	0·750	0·66	0·625	0·5	0·375	0·3333	0·20	0·125	0·1	0·025	0·0125	0·004
Percentage	100	87·5	75	66·66	62·5	50	37·5	33·33	20·0	12·5	10·0	2·5	1·25	0·416

1·3. VALUES OF MATHEMATICAL FUNCTIONS

(a) Exponential values of e		*(b) Functions of Log*	
e	= 2·71828	$\log_e 2$	= 0·693147
e^2	= 7·38905	$\log_e 3$	= 1·098612
$e^{0.5}$	= 1·64872	$\log_e 10$	= 2·302585
e^{π}	= 23·14069	$\log_e \pi$	= 1·144729

(c) Functions of π

π	= 22/7 = 3·14159265358979323846264338327950		
π^2	= 9·869604	$180/\pi$	= 57·296
$\sqrt{2}\,\pi$	= 4·44288	$1/\pi^2$	= 0·1013212
$\sqrt{(2/\pi)}$	= 0·7978846	$1/\pi^3$	= 0·032252
$\pi/180$	= 0·01745328	$\pi/\sqrt{2}$	= 2·2214415
$\sqrt{(\pi/2)}$	= 1·2533	π^3	= 31·006277
$1/\sqrt{\pi}$	= 0·5651896	$\sqrt{\pi}$	= 1·7725
$\sqrt[3]{\pi}$	= 1·464022	$\log \pi$	= 0·4971499
$\sqrt{2}/\pi$	= 0·4501582		

(d) **Roots of Nos.**		**Cube Roots of Nos.**		**Reciprocal of Nos.**	
$\sqrt{2}$	1·414213	$\sqrt[3]{2}$	1·2599	1/2	0·50
$\sqrt{3}$	1·732050	$\sqrt[3]{3}$	1·4422	1/3	·33333
$\sqrt{4}$	2·000	$\sqrt[3]{3}$	1·5874	1/4	·250
$\sqrt{5}$	2·2361	$\sqrt[3]{5}$	1·7100	1/5	2·000
$\sqrt{6}$	2·4495	$\sqrt[3]{6}$	1·8171	1/6	·16667
$\sqrt{7}$	2·6458	$\sqrt[3]{7}$	1·9129	1/7	·14286
$\sqrt{8}$	2·8284	$\sqrt[3]{8}$	2·000	1/8	·12500
$\sqrt{9}$	3·000	$\sqrt[3]{9}$	2·0801	1/9	·1111
$\sqrt{10}$	3·162217	$\sqrt[3]{10}$	2·544	1/10	·1000

Table contd..

Table contd...

(*e*) **Functions of g (acc. due to gravity) Standard at Madras**

	F.P.S.		*Metric*	
g	32·2	m/sec^2 (32·1740′/sec^2)	9·81	m/sec^2 (9·80665 m/sec^2)
$\sqrt{g}$	5·6745	sec^2	3·1321	sec^2
$\sqrt{2g}$	8·025	sec^2	4·4295	sec^2
log g	1·50786	sec^2	0·99167	sec^2
log 2g	1·80889	sec^2	1·2927	sec^2
g^2	1036·84	sec^2	96·236	sec^2
$\log\sqrt{g}$	0·75393	sec^2	0·49583	sec^2
$\log\sqrt{2}\,g$	0·90444	sec^2	0·64635	sec^2
1/g	0·031056	sec^2	0·10194	sec^2
1/2 g	0·15528	sec^2	0·050967	sec^2
$1\sqrt{g}$	0·17622	sec^2	0·31928	sec^2
$1/\sqrt{2}\,g$	0·12461	sec^2	0·22575	sec^2
g^3	33386·248	sec^2	944·08	sec^2

1·4. GENERAL—Tables and Appendices

(*a*) **Table of Daily Wages**

Rs./month	*28 day*	*29 days*	*30 days*	*31 days*
0·25	0·01	0·01	0·01	0·01
0·50	0·02	0·02	0·02	0·02
0·75	0·03	0·03	0·03	0·02
1·0	0·04	0·03	0·03	0·03
2·0	0·07	0·07	0·07	0·06
3·0	0·11	0·10	0·10	0·10
4·0	0·14	0·14	0·13	0·13
5·0	0·18	0·17	0·17	0·16
6·0	0·21	0·21	0·20	0·18
7·0	0·25	0·24	0·23	0·23
8·0	0·29	0·28	0·27	0·26
9·0	0·32	0·31	0·30	0·29
10·0	0·36	0·34	0·33	0·32
15·0	0·54	0·52	0·50	0·48
20·0	0·71	0·69	0·67	0·68
25·0	0·89	0·86	0·83	0·81
30·0	1·07	1·03	1·00	0·97
35·0	1·25	1·21	1·17	1·13
40·0	1·43	1·38	1·33	1·29

Table contd...

Table contd...

Rs./month	*28 day*	*29 days*	*30 days*	*31 days*
45·0	1·61	1·55	1·50	1·45
50·0	1·79	1·72	1·67	1·61
55·0	1·96	1·90	1·83	1·77
60·0	2·14	2·07	2·00	1·94
65·0	2·32	2·24	2·17	2·10
70·0	2·50	2·41	2·33	2·26
75·0	2·68	2·52	2·50	2·42
80·0	2·86	2·76	2·67	2·58
85·0	3·04	2·93	2·83	2·74
90·0	3·21	3·10	3·00	2·90
95·0	3·39	3·28	3·17	3·06
100·0	3·57	3·45	3·33	3·23
200·0	7·14	6·90	6·67	6·45
300·0	10·71	10·34	10·00	9·68
400·0	14·29	13·80	13·33	12·96
500·0	17·86	17·24	16·67	16·13
600·0	21·43	20·69	20·00	19·36
700·0	25·00	24·14	23·33	22·58
800·0	58·58	27·60	26·67	25·80
900·0	32·14	31·02	30·00	29·03
1000·0	35·71	34·48	33·33	32·26

Appendix 1-A

Conversion Table

Metres to Feet and Inches

Metres→	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
	ft. in. 0	*ft. in.* 3 3	*ft. in* 6 7	*ft. in* 9 10	*ft. in* 13 1	*ft. in* 16 5	*ft. in* 19 8	*ft. in* 23 0	*ft. in* 20 3	*ft. in* 29 0
Metres→ ↓	*0*	*10*	*20*	*30*	*40*	*50*	*60*	*70*	*80*	*90*
	ft. in.	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*
0	0	32 10	05 7	98 5	101 3	164 1	196 10	229 8	202 6	295 3
100	328 1	360 11	393 8	426 6	459 4	492 2	524 11	557 9	590 7	623 4
200	656 2	689 0	721 9	754 7	787 5	820 3	853 0	885 10	918 8	951 6
300	984 3	1017 1	1049 10	1082 8	1115 6	1148 3	1181 1	1213 11	1246 9	1279 6
400	1312 4	1345 2	1377 11	1410 9	1443 7	1476 5	1509 2	1542 0	1574 10	1607 7
500	1040 5	1673 3	1706 0	1738 10	1771 8	1804 6	1837 3	1870 1	1902 11	1935 8
600	1468 6	2001 4	2034 1	2066 11	2090 9	2132 7	2165 4	2198 2	2231 0	2203 9
700	2296 7	2329 5	2362 2	2395 0	2427 10	2460 8	2493 5	2526 3	2559 1	2591 10
800	2624 8	2637 6	2690 3	2723 1	2755 11	2788 9	2821 6	2854 4	2887 2	2919 11
900	2952 9	2985 7	3018 4	3051 2	3084 0	3116 10	3149 7	3182 5	3215 3	3248 0
1000	3280 10	3313 8	3346 5	3379 3	3412 1	3441 11	3477 8	3510 6	3543 4	3576 1

Illustrative Example. To find the equivalent of 276 metres in feet and inches, obtain first the equivalent of 270 metres in feet and inches which is 885 feet 10 inches given at the intersection of the row corresponding to 200 metres and column corresponding to 70 metres. Then obtain the eqivalent of 6 metres in feet and inches which is 19 feet 8 inches at the intersection of the first row and column corresponding to 6 metres. The equivalent of 276 metres in feet and inches is obtained by adding these two equivalent *i.e.* 885 ft. 10 in. + 19 ft. 8 in. = 905 ft. 6 in.

Yards, Feet and Inches to Metres

Yards→ ↓	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
	m	*m*	*m*	*m*	*m*	*m*	*m*	*m*	*m*	*m*
0	0	0·914	1·829	2·743	3·658	4·572	5·956	6·401	7·315	8·230
0	9·144	10·058	10·973	11·887	12·802	13·710	14·630	15·545	16·459	17·374
20	18·288	19·202	20·117	21·031	21·946	22·860	23·774	24·689	25·693	26·518
30	27·432	28·346	29·261	30·175	31·099	32·004	32·918	33·833	34·747	35·862
40	36·576	37·490	38·405	39·319	40·234	41·148	42·062	42·977	43·891	44·806
50	45·720	46·034	47·549	48·463	49·378	50·292	51·206	52·121	53·035	53·950
60	54·864	55·778	58·645	57·607	58·522	59·436	60·350	61·265	62·179	63·094
70	64·008	64·922	65·837	66·751	67·666	68·580	69·494	70·409	71·323	72·238
80	73·152	74·066	74·981	75·895	76·810	77·724	78·638	79·553	80·467	81·882
90	82·298	83·210	84·125	85·039	85·954	86·808	87·782	88·697	89·611	90·526
100	91·440	92·354	93·269	94·183	95·098	96·012	96·926	97·841	98·755	99·670

Inches→	0	1	2	3	4	5	6	7	8	9	10	11
Feet ↓	m	m	m	m	m	m	m	m	m	m	m	m
0	0	0·025	0·051	0·076	0·102	0·127	0·152	0·178	0·203	0·229	0·254	0·279
1	0·305	0·330	0·350	0·381	0·406	0·432	0·457	0·483	0·506	0·533	0·559	0·584
2	0·610	0·635	0·660	0·686	0·711	0·737	0·762	0·878	0·813	0·838	0·864	0·889

Illustrative Example. To find the metre equivalent of 57 yards 2 feet and 6 inches, obtain first the metre equivalent of 57 yards, which is 52·121 given at the intersection of the row corresponding to 50 yards and the column corresponding to 7 yards. Then obtain the metre equivalent of 2 feet and 6 inches which is 0·762 given at the intersection of the row corresponding to 2 feet and the column corresponding to 6 inches. The metre equivalent of 57 yards 2 feet and 6 inches is obtained by adding the two metre equivalents thus obtained *i.e.*, 52·121 m + 0·762 m to 52·883 m.

Kilometres to Miles and Furlongs

Kilo-metres→	*0*		*1*		*2*		*3*		*4*		*5*		*6*		*7*		*8*		*9*	
	M	*f*	*M*	*f*	*M*	*f*	*M*	*f*	*M*	*f*	*M*	*f*	*M*	*f*	*M*	*f*	*M*	*f*	*M*	*f*
	0		*0*	*5*	*1*	*2*	*1*	*7*	*2*	*4*	*3*	*1*	*3*	*6*	*4*	*3*	*5*	*0*	*5*	*5*

Kilo-metres→	*0*		*10*		*20*		*30*		*40*		*50*		*60*		*70*		*80*		*90*	
	M	*f*	*M*	*f*	*M*	*f*	*M*	*f*	*M*	*f*	*M*	*f*	*M*	*f*	*M*	*f*	*M*	*f*	*M*	*f*
0	0		6	2	12	3	18	5	24	7	31	1	37	2	43	4	49	6	55	7
100	62	1	68	3	74	5	80	6	87	0	93	2	99	3	105	5	111	7	118	0
200	124	2	130	4	136	6	142	7	149	1	155	3	161	4	167	6	174	0	180	2
300	186	3	192	5	198	7	205	0	211	2	217	4	223	6	229	7	236	1	242	3
400	248	4	254	6	261	0	267	2	273	3	279	5	285	7	292	0	298	2	304	4
500	310	5	316	7	323	1	329	3	335	4	341	6	348	0	354	1	360	3	366	5
600	372	7	379	0	385	2	391	4	397	5	403	7	410	1	416	3	422	4	428	6
700	435	0	441	1	447	3	453	5	459	7	466	0	472	2	478	4	484	5	490	7
800	497	1	503	2	509	4	515	6	522	0	528	1	534	3	540	5	546	6	553	0
900	559	2	565	4	571	5	577	7	584	1	590	2	596	4	602	6	609	0	615	1
1000	621	3	627	5	633	6	640	0	646	2	652	4	658	5	664	7	671	1	677	2

Illustration Example. To find the equivalent of say 545 kilometres in miles and furlong, obtain 1st the equivalent of 540 kilometres in miles and furlong which is 335 miles and furlongs given at the intersection of the row corresponding to 500 kilometers and column corresponding to 40 kilometres. Then obtain the equivalent of 5 kilometres which is 3 miles/furlong given at the intersection of the 1st row and the column corresponding to 5 kilometres. The equivalent of 545 kilometres in miles and furlongs is obtained by adding these two equivalent *i.e.* 335 miles 4 furlongs + 3 miles/furlong = 338 miles 5 furlongs.

Miles and Furlongs to Kilometres

Miles→ ↓	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
	km 0	*km* 1·609	*km* 3·219	*km* 4·828	*km* 0·437	*km* 8·047	*km* 9·656	*km* 11·265	*km* 12·875	*km* 14·484
Miles→ ↓	*0*	*10*	*20*	*30*	*40*	*50*	*60*	*70*	*80*	*90*
	km	km	km	km	km	km	km	km	km	km
0	0	16·093	32·187	48·280	64·374	80·467	96·561	112·654	128·748	144·841
100	160·934	177·028	103·121	209·215	225·398	241·402	257·495	273·588	289·682	305·775
200	321·869	[illegible]·962	354·056	370·149	386·243	402·336	418·429	434·523	450·616	466·710
300	482·803	[illegible]·897	514·990	531·084	547·177	563·270	579·364	595·457	611·551	627·644
400	643·738	[illegible]·831	675·924	692·018	708·111	724·205	740·298	756·392	772·485	788·579
500	804·672	820·765	836·859	852·952	869·046	885·139	901·233	917·326	933·420	949·513
600	965·606	[illegible]·700	997·793	1013·887	1029·980	1046·074	1062·167	1078·260	1094·354	1110·447
700	1126·541	1142·634	1158·728	1174·821	1190·915	1207·008	1223·101	1239·195	1255·288	1271·382
800	1287·475	1303·569	1319·662	1335·756	1351·849	1367·942	1384·036	1400·129	1416·223	1482·316
900	1448·410	1464·503	1480·596	1496·690	1512·783	1528·877	1544·970	1561·664	1577·157	1593·251
1000	1609·344	1625·437	1641·531	1657·694	1673·718	1689·811	1705·905	1721·098	1738·092	1754·185
Fur-longs →	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	
	km 0	km 0·201	km 0·402	km 0·604	km 0·805	km 1·006	km 1·207	km 1·408	km 1·609	

Illustrative Example. To find the kilometre equivalent to say 475 miles 6 furlongs obtain 1st the kilometre equivalent of 470 miles which is 756-392 given at the intersection of the row corresponding to 400 miles and column corresponding to 70 miles. Then obtain the kilometre equivalent of 5 miles which is 8·047 given at intersection of the 1st row and column corresponding to 5 miles. Lastly obtain the kilometre equivalent of 6 furlongs which is 1·207 given at the intersection of the last row and the column corresponding to 6 furlongs. The kilometre equivalent of 475 miles and 6 furlongs is obtained by adding the three kilometre. equivalent thus obtained *i.e.* 756·392 km + 8·047 km + 1·207 km = 765·646 km.

Sq. Feet and Sq. Yards to Sq. Metres (Area)

IS : 1020—1957

Sq. Ft. →	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
	sq. m 0	*sq. m* 0·09	*sq. m* 0·19	*sq. m* 0·28	*sq. m* 0·37	*sq. m* 0·46	*sq. m* 0·56	*sq. m* 0·65	*sq. m* 0·74	*sq. m* 0·84
Sq. Yds→	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
	sq. m 0	*sq. m* 0·84	*sq. m* 1·67	*sq. m* 2·51	*sq. m* 3·34	*sq. m* 4·18	*sq. m* 5·02	*sq. m* 5·85	*sq. m* 6·69	*sq. m* 7·53
Sq. Yds→ ↓	0 sq. m	1 sq. m	2 sq. m	3 sq. m	4 sq. m	5 sq. m	6 sq. m	7 sq. m	8 sq. m	9 sq. m
0	0	8·36	16·72	25·08	33·45	41·81	50·17	58·53	66·89	75·25
100	83·61	91·97	100·34	108·70	117·06	125·42	133·78	142·14	150·50	158·86
200	107·23	175·59	183·95	192·31	200·67	209·03	217·39	225·75	234·12	242·48
300	250·84	259·20	267·56	275·92	284·28	292·84	301·01	309·37	317·73	326·09
400	334·45	342·81	351·17	359·53	367·90	376·26	384·62	392·98	401·34	409·70
500	418·06	426·42	436·79	443·15	451·51	459·87	468·23	476·59	484·95	443·32
600	501·68	510·04	518·40	526·76	535·12	543·48	551·84	560·21	568·57	576·93
700	585·29	593·63	602·01	610·37	618·73	627·10	635·46	643·82	652·18	660·54
800	668·90	677·26	685·62	693·99	702·35	710·71	719·07	727·43	735·79	744·15
900	752·51	760·88	769·24	777·60	785·96	794·32	802·68	811·04	819·40	827·77
1000	836·13	844·49	852·85	861·21	869·57	877·93	886·30	894·66	903·02	911·38

Illustrative Example. To find the sq. m. equivalent of say 444 sq. yards and 5 sq. ft., obtain 1st sq. m. equivalent of 440 sq. yards which is 3670·90 given at the intersection of row corresponding to 400 sq. yards and column corresponding to 40 sq. yards. Then obtain the square metre equivalent of 4 sq. yards which is 3·34 given in the column corresponding to 4 sq. yards. Lastly obtain the square metre equivalent of 5 sq. feet wherein 0·46 given in the column corresponding to 5 sq. ft. The square metre equivalent of 446 sq. yards 5 sq. ft. is obtained by adding then three equivalent *i.e.* 369·69 sq. m + 3·34 sq. m + 0·46 sq. m = 371·70 sq. metre.

Square Metres to Sq. Yards and Sq. Feet

Sq.→ Metre	*0*		*1*		*2*		*3*		*4*		*5*		*6*		*7*		*8*		*9*	
	sq. yd.	*sq. yd.*	*sq. yd.*	*sq. yd.*	*sq. yd.*	*sq. yd.*	*sq. yd.*	*sq. yd.*	*sq. yd.*	*sq. yd.*	*sq. yd.*	*sq. yd.*	*sq. yd.*	*sq. yd.*	*sq. yd.*	*sq. yd.*	*sq. yd.*	*sq. yd.*	*sq. yd.*	*sq. yd.*
	0	*0*	*1*	*2*	*2*	*4*	*3*	*5*	*4*	*7*	*6*	*0*	*7*	*2*	*8*	*3*	*9*	*5*	*10*	*7*

Sq.→ Metre	*0*		*10*		*20*		*30*		*40*		*50*		*60*		*70*		*80*		*90*	
	sq. yd.	*sq. ft.*	*sq. yd.*	*sq. ft.*	*sq. yd.*	*sq. ft.*	*sq. yd.*	*sq. ft.*	*sq. yd.*	*sq. ft.*	*sq. yd.*	*sq. ft.*	*sq. yd.*	*sq. ft.*	*sq. yd.*	*sq. ft.*	*sq. yd.*	*sq. ft.*	*sq. yd.*	*sq. ft.*
0	0		12	0	23	8	35	8	47	8	59	7	71	7	83	6	95	6	107	6
100	119	5	131	5	143	5	155	4	167	4	179	4	191	3	203	3	215	3	227	2
200	239	2	251	1	263	1	275	1	287	0	299	0	311	0	322	8	334	8	346	8
300	358	7	370	7	382	6	394	6	406	6	418	5	430	5	442	5	454	4	466	4
400	478	4	490	3	502	3	574	2	526	2	538	2	550	1	562	1	574	1	586	0
500	598	0	610	0	621	8	633	8	645	8	657	7	669	7	681	0	693	0	705	6
600	717	5	720	3	741	5	753	4	765	4	777	4	789	3	801	3	813	2	825	2
700	837	2	849	1	861	1	873	1	885	0	897	0	909	0	920	8	932	8	944	7
800	956	7	968	7	980	6	992	6	1004	6	1016	5	1028	5	1040	5	1052	4	1064	4
900	1076	4	1088	3	1100	3	1112	2	1124	2	1136	2	1148	1	1166	1	1172	1	1184	0
1000	1196	0	1208	0	1219	8	1231	8	1243	7	1255	7	1267	7	1279	6	1291	6	1303	6

Illustrative Example. To find the equivalent of say 423 sq. m in sq. yds. and sq. ft., obtain 1st the equivalent of 420 sq. m. in sq. yds. and sq. ft. which is 502 sq. yds., 3 sq. ft. given at the intersection of the row corresponding to 400 sq. metres and column corresponding to 20 sq. metres. Then obtain the equivalent of 38 sq. metres, which is 3 sq. yds., 5 sq. ft. given at the intersection of the 1st row and the column corresponding to 3 sq. metres. The equivalent of 423 sq. m. in sq. yds and sq. ft. is obtained by adding these equivalents *i.e.* 502 sq. yds. 3 sq. ft. + 3 sq. yds. 5 sq. ft. = 505 sq. yds., 8 sq. ft.

Acres to Hectares

Acres→	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
	ha	*ha*	*ha*	*ha*	*ha*	*ha*	*ha*	*ha*	*ha*	*ha*
	0	0·4	0·81	1·21	1·62	2·02	2·43	2·83	3·24	3·64

Acres→ ↓	0	10	20	30	40	50	60	70	80	90
	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha
0	0	4·05	8·09	12·14	16·19	20·23	24·28	28·33	32·37	36·42
100	40·47	44·52	48·56	52·61	56·66	60·70	64·75	68·80	72·84	76·89
200	80·94	84·98	89·03	93·08	97·12	101·17	105·22	109·27	113·31	117·36
300	121·41	125·45	129·50	133·55	137·59	141·64	145·69	149·73	153·78	157·83
400	161·87	165·92	169·97	174·01	178·06	182·11	186·16	190·20	194·25	198·30
500	202·34	206·39	210·44	214·48	218·53	222·58	226·62	230·67	234·72	238·76
600	242·81	246·86	250·91	254·95	259·00	263·05	267·09	271·14	275·19	279·23
700	283·28	287·33	291·37	295·42	299·47	303·51	307·56	311·61	315·66	319·70
800	323·75	327·80	331·84	335·89	339·94	343·98	348·93	352·08	356·12	360·17
900	364·22	368·26	372·12	376·36	380·40	384·45	388·50	392·55	396·59	400·64
1000	404·69	408·73	412·78	416·83	420·87	424·92	428·97	433·01	437·06	441·11

Illustrative Example. To find the hectare equivalent of say 684 acres, obtain first the hectare equivalent of 680 acres which is 275·19 given at the intersection of the row corresponding to 600 acres and column corresponding to 80 acres. Then obtain the hectare equivalent of 4 acres, which is 1·62 given inthe first row in the column corresponding to 4 acres. The hectare equivalent of 684 acres is obtained by adding these two equivalents, *i.e.*, 275·19 ha + 1·62 ha = 276·81 ha.

Hectare to Acres and Square Yards

Sq.→	*0*		*1*		*2*		*3*		*4*		*5*		*6*		*7*		*8*		*9*	
Metre	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*
	0	*0*	*2*	*2284*	*4*	*4560*	*7*	*2000*	*9*	*4280*	*12*	*1770*	*14*	*3999*	*17*	*1439*	*19*	*3719*	*22*	*1159*
Sq.→	*0*		*10*		*20*		*30*		*40*		*50*		*60*		*70*		*80*		*90*	
Metre	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*	*Acre*	*sq. yd.*
0	0	0	24	3439	49	2030	74	637	98	4076	123	2675	148	1274	172	4713	197	3312	222	1911
100	247	510	271	3949	296	2548	321	1147	345	4586	370	3185	395	1784	420	383	444	3822	469	2421
200	494	1020	518	4459	543	3058	568	1657	593	256	617	3693	642	2294	667	893	691	4332	716	2931
300	141	1530	766	129	790	3568	845	2167	840	766	864	4203	889	2804	914	1403	939	2	963	3441
400	988	2040	1013	639	1037	4078	1062	2617	1087	1276	1111	4715	1136	3314	1161	1913	1186	512	1210	3951
500	1235	2850	1260	1149	1284	4588	1309	3187	1334	1786	1359	385	1383	3824	1408	2423	1433	1022	1457	4461
600	1482	3060	1507	1659	1532	258	1556	3697	1581	2296	1606	893	1630	4334	1655	2933	1680	1532	1705	131
700	1729	3570	1754	2169	1779	768	1803	4207	1828	2806	1853	1405	1878	4	1902	3443	1927	2042	1953	641
800	1976	4080	2001	2679	2026	1278	2050	4717	2075	3316	2100	1915	2125	574	2149	3953	2974	2552	2199	1151
900	2223	4590	2248	3189	2273	1788	2298	387	2322	3826	2347	2425	2378	1024	2396	4463	2421	3062	2446	1661
1000	2471	280	2495	3699	2520	2293	2545	897	2569	4336	2594	2935	2619	1534	2644	133	2668	2572	2693	2171

Illustrative Example. To find the equivalent of say 854 hectares in acres and sq. yds. obtain first the equivalent of 850 hectares and column. Corresponding to 50 hectares. Then obtain the equivalent of 4 hectares which is 9 acres 4280 sq. yds. given at the intersection of the first row and column corresponding to 4 hectares. The equivalent of 854 hectares in acres and sq. yds. is obtained by adding these two equivalents *i.e.* 2100 acres 1915 acres 1915 sq. yds. + 9 acres 4280 sq. yds. = 2110 acres 1355 sq. yds.

Ounces to Grams

Pounds→	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
	g	*g*	*g*	*g*	*g*	*g*	*g*	*g*	*g*	*g*
0	0	28·350	56·694	85·049	113·398	141·748	170·097	198·447	226·796	155·146
110	283·495	311·845	340·194	368·544	396·893	425·243	453·592			

Pounds to Kilograms

Pounds→ ↓	0	1	2	3	4	5	6	7	8	9
	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg
	0	0·454	0·907	1·361	1·814	2·268	2·722	3·175	3·629	4·082
10	4·536	4·990	5·443	5·897	6·350	6·804	7·257	7·711	8·165	8·618
20	9·072	9·529	9·979	10·433	10·886	11·340	11·793	12·247	12·701	13·154
30	13·608	14·061	14·515	14·969	15·422	15·876	16·329	16·783	17·286	17·690
40	18·144	18·597	19·051	19·504	19·958	20·412	20·865	21·319	21·772	22·225
50	22·680	23·133	21·587	24·040	24·494	24·948	25·401	25·855	25·038	26·762
60	27·216	27·669	28·123	28·576	29·030	29·483	29·937	30·391	30·844	31·298
70	31·751	32·205	32·659	33·112	33·566	34·019	34·473	34·927	35·380	35·834
80	36·287	36·741	37·195	37·648	38·102	38·555	39·009	39·463	39·916	41·370
90	40·823	41·277	41·730	42·184	42·638	43·091	43·505	43·998	44·452	44·906
100	45·359	45·813	46·266	46·720	47·174	47·627	48·081	48·534	48·980	49·442
110	49·894	50·349	50·802							

Illustrative Example. These conversions can be read directly from the corresponding tables. For example 13 ounces is equivalent to 368·544 grams and is given in the table for ounces to grams at the intersection of the corresponding row to 10 ounces and column corresponding to 3 ounces. Similarly 92 pounds is equivalent to 41·730 kilograms given in the table for pounds to kilograms at the intersection of the row corresponding to 90 pounds and column corresponding to 2 pounds.

Kilograms to Pounds and Ounces

Kilo-grams→	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
	lb oz	*lb oz*	*lb oz*	*lb oz*	*lb oz*	*lb oz*	*lb oz*	*lb oz*	*lb oz*	*lb oz*
	0	*2 3*	*4 7*	*8 19*	*8 13*	*11 0*	*13 4*	*15 7*	*17 10*	*19 13*
Kilo-Metre→	*0*	*10*	*20*	*30*	*40*	*50*	*60*	*70*	*80*	*90*
	lb oz	*lb oz*	*lb oz*	*lb oz*	*lb oz*	*lb oz*	*lb oz*	*lb oz*	*lb oz*	*lb oz*
0	0	22 1	44 1	66 2	88 3	110 4	132 4	154 5	176 6	198 7
100	220 7	242 8	264 9	286 10	308 10	330 11	352 12	374 13	396 13	418 14
200	440 15	463 0	485 0	507 1	529 2	551 2	573 3	595 4	617 5	639 5
300	661 6	683 7	705 8	727 8	749 9	771 10	793 11	815 11	837 12	859 13
400	881 14	903 14	925 15	948 0	970 0	992 1	1014 2	1036 3	1058 4	1080 4
500	1102 5	1124 6	1146 6	1168 7	1190 8	1212 9	1234 9	1256 10	1278 11	1300 12
600	1322 12	1344 13	1366 14	1388 15	1410 15	1433 0	1455 1	1477 2	1499 2	1521 3
700	1543 4	1565 4	1587 5	1609 6	1631 7	1653 7	1675 8	1697 9	1719 10	1741 10
800	1763 11	1785 12	1807 13	1829 13	1851 14	1873 15	1896 0	1918 0	1940 1	1962 2
900	1984 3	2006 3	2028 4	2050 5	2072 6	2094 7	2116 7	2138 8	2160 8	2182 9
1000	2204 10	2226 11	2248 11	2270 12	2292 13	2314 14	2236 14	2358 15	2381 0	2403 1

Illustrative Example. To find the equivalent of say 597 kilograms in pounds and ounces, obtain first the equivalent of 590 kilograms in poiunds and ounces which is 1300 pounds 12 ounces given at the intersection of the row corresponding to 500 kilograms and column corresponding to 90 kilograms. Then obtain the equivalent of 7 kilograms which is 15 pounds 7 ounces given at the intersection of the first row and column corresponding to 7 kilograms. The equivalent of 597 kilograms in pounds and ounces is obtained by adding these two equivalents, *i.e.* 1300 pounds 12 ounces + 15 pounds 7 ounces = 1316 pounds 3 ounces.

Hundred weights to Kilograms and Tons to Metric Tonnes

Hundred → weights	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
	kg	*kg*	*kg*	*kg*	*kg*	*kg*	*kg*	*kg*	*kg*	*kg*
0	0	50·802	101·605	152·407	203·209	254·012	304·814	355·616	406·419	457·221
10	508·024	558·826	609·628	660·43	711·233	762·035	812·838	863·640	914·442	965·245
20	1016·047									

Tons to Metric Tonnes

Tons→ ↓	0	1	2	3	4	5	6	7	8	9
	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes
	0	1·016	7·032	3·048	4·064	5·080	6·096	7·112	8·128	9·144
10	10·160	11·177	12·193	13·209	14·225	15·241	16·257	17·273	18·284	19·305
20	20·321	21·337	22·353	23·369	24·385	25·401	26·417	27·433	28·449	20·465
30	30·481	31·498	32·514	33·530	34·546	35·562	36·578	37·594	38·610	39·626
40	40·642	41·658	42·674	43·690	44·706	45·722	46·738	47·754	48·770	49·786
50	50·802	51·818	52·834	53·850	54·867	55·883	56·899	57·915	58·931	59·947
60	60·963	61·979	62·495	64·011	65·027	66·043	67·059	68·075	69·491	70·107
70	71·123	72·139	73·155	74·171	75·187	76·204	77·220	78·236	79·252	80·208
80	81·284	82·300	83·316	84·332	85·348	86·364	87·380	88·396	89·412	90·428
90	91·444	92·460	93·476	94·492	96·508	96·524	97·541	98·557	99·573	100·584
100	101·605	102·621	103·687	104·653	105·669	106·683	107·701	108·717	109·733	110·749

Illustrative Examples. These equivalent can be read directly from the corresponding tables. For example 15 hundred weights is equivalent to 762·035 kilograms and is given in the table for hundred weights to kilograms at the intersection of row corresponding to 88·396 metric tonnes and is give in the table for tons to metric tonnes at the intersection of the row corresponding to 80 tons and column corresponding to 7 tons.

Metric Tonnes to Tons and Hundred Weights

Tonnes→ ↓	*0*		*1*		*2*		*3*		*4*		*5*		*6*		*7*		*8*		*9*	
	tons	*cwt*	*tons*	*cwt*	*tons*	*cwt*	*tons*	*cwt*	*tons*	*cwt*	*tons*	*cwt*	*tons*	*cwt*	*tons*	*cwt*	*tons*	*cwt*	*tons*	*cwt*
	0		1	0	1	19	2	19	3	18	4	18	5	18	6	18	7	17	8	17
10	9	17	10	17	11	16	12	16	13	16	14	15	15	15	16	15	17	14	18	14
20	19	14	20	13	21	13	22	13	23	12	24	12	25	12	26	11	27	11	28	11
30	29	11	30	10	31	10	32	10	33	9	34	9	35	9	36	8	37	8	38	8
40	38	7	40	7	41	7	42	6	43	6	44	6	45	5	46	5	47	5	48	5
50	49	4	50	4	51	4	52	3	53	3	54	3	55	2	56	2	57	2	58	1
60	59	1	60	1	61	0	62	0	63	0	63	19	64	19	65	19	66	19	67	18
70	68	18	69	18	70	17	71	17	72	17	73	16	74	16	75	16	76	15	77	15
80	78	15	79	14	80	14	81	14	82	13	83	13	84	13	85	13	86	12	87	12
90	88	12	89	11	90	11	91	11	92	10	93	10	94	10	95	9	96	9	97	9
100	98	8	99	8	100	8	101	7	102	7	103	7	104	7	105	6	106	6	107	6

Illustrative Example. To find the equivalent of say 63 metric tonnes in tons and hundred weights, turn to the row corresponding to 60 metric tonnes and column corresponding to 3 metric tonnes. The intersection of the row and column gives the figure 62 tons 0 hundred weight which is the equivalent of 63 metric tonnes.

Tolas to grams (weight) IS : 1020-1957

Tolas→	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
	g	*g*	*g*	*g*	*g*	*g*	*g*	*g*	*g*	*g*
0	0	11·664	23·328	34·991	46·655	58·319	69·983	81·647	93·310	104·974
10	116·638	128·302	139·966	151·629	163·293	174·957	186·621	198·285	209·948	221·613
20	233·276	244·940	256·604	268·267	279·931	291·595	303·259	314·923	326·587	338·250
30	349·914	361·578	373·242	384·906	396·569	408·233	419·897	431·581	443·225	454·888
40	466·552	478·216	489·881	501·544	513·207	524·871	536·535	548·199	559·863	571·526
50	583·190	594·854	806·518	618·182	629·845	841·509	653·173	664·837	676·501	688·164
60	699·828	711·492	723·156	734·820	746·483	758·147	769·811	781·473	793·139	804·802
70	816·466	828·130	839·794	851·458	863·121	874·783	886·449	848·113	909·777	921·441
80	933·104									

Tolas→	*1/2*	*1/4*	*1/8*	*1/16*	*1/32*	*1/64*
	g	*g*	*g*	*g*	*g*	*g*
	5·832	2·916	1·458	0·724	0·364	0·182

Illustrative Example. To find oiut the gram equivalent of say 68¼ tolas, first obtainb 84 gram equivalent of 68 tolas, which is 793·139 given at the intersection of the row corresponding to 60 tolas and column corresponding to 8 tolas, then obtain the equivalent of ¼ tola, which is 2·916 grams given under ¼ tola. The given equivalent of 68¼ tolas is obtained by adding the two gram equivalents *i.e.* 793·139 grams to 2·916 grams = 796·055 grams.

Gallons (IMP) to Litres (Capacity) IS : 1020—1957

Gallons →	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
	l	*l*	*l*	*l*	*l*	*l*	*l*	*l*	*l*	*l*
0	0	4·546	9·092	13·838	18·184	22·730	27·276	31·822	36·368	40·914
10	45·460	50·006	54·552	59·097	63·643	68·189	72·735	77·281	81·827	86·373
20	90·919	95·465	100·011	104·5571	109·103	113·649	118·195	122·741	127·287	131·833
30	136·379	140·925	145·471	150·017	154·563	154·109	163·655	168·201	192·746	177·292
40	184·838	186·384	190·930	105·476	200·022	204·568	209·114	213·660	218·206	222·252
50	227·298	231·844	230·390	240·936	225·482	250·028	254·574	259·120	263·886	268·212
60	272·750	277·304	281·850	286·395	290·941	295·407	300·033	304·579	308·125	313·671
70	318·271	322·763	327·304	331·855	376·401	340·947	345·493	350·034	354·588	359·131
80	363·677	368·223	372·769	377·315	381·861	388·407	390·953	395·499	400·044	404·590
90	409·136	413·682	418·228	428·774	427·320	431·866	436·412	440·958	445·504	450·050
100	454·596	459·142	463·688	468·234	472·78-	477·326	481·873	486·418	490·964	495·510

Illustrative Example. To find the litre equivalent of say 67 gallons, turn to the row corresponding to 60 gallons and coloumn corresponding to 7 gallons. The intersection of the row and column gives the figure 304·574, which is the litre equivalent of 67 gallons.

Litres to Gallons (Imp) and Pints

Litres→ ↓	*0*		*1*		*2*		*3*		*4*		*5*		*6*		*7*		*8*		*9*	
	gal.	*pints*	*gal.*	*pints*	*gal.*	*pints*	*gal.*	*pints*	*gal.*	*pints*	*gal.*	*pints*	*gal.*	*pints*	*gal.*	*pints*	*gal.*	*pints*	*gal.*	*pints*
0	0	0	0	2	0	4	0	5	0	7	1	1	1	3	1	4	1	6	2	0
10	2	2	2	3	2	5	2	7	0	1	3	2	3	4	3	6	4	0	4	1
20	4	3	4	5	4	7	5	0	5	2	5	4	5	6	6	0	6	1	6	3
30		5	6	7	7	0	7	2	7	4	7	6	7	7	8	1	8	3	8	5
40	8	6	9	0	9	2	9	4	9	5	9	7	10	1	10	3	10	4	10	6
50	11	0	11	2	11	4	11	5	11	7	12	1	12	3	12	4	12	6	13	0
60	13	2	13	3	13	5	13	7	14	1	14	2	14	4	14	6	15	0	15	1
70	15	3	15	5	15	7	16	0	16	2	16	4	16	6	17	0	17	1	17	3
80	17	5	17	7	18	0	18	2	18	4	18	6	18	7	19	1	19	3	19	5
90	19	6	20	0	20	2	20	4	20	5	20	7	21	1	21	3	21	4	21	6
100	22	0	22	2	22	3	22	5	22	7	23	1	23	2	23	4	23	6	24	0

Illustrative Example. To find out the equivalent of say 47 litres to gallons (Imp) and pints, turn to the row corresponding to 40 litres and the column corresponding to 7 litres. The intersection of the row and column gives the fig 10 gallons 3 pints, which is the equivalent of 47 litres in gallons and pints.

Appendix 1-B (Mathematical Tables)

Table 1. Powers, Roots and Reciprocals

n	n^2	n^3	$\sqrt{n}$	$\sqrt[3]{n}$	$\sqrt{10\,n}$	$\sqrt[3]{10\,n}$	$\sqrt[3]{100\,n}$	$\frac{1}{n}$
1	1	1	1	1	3·1623	2·1544	4·6416	1
2	4	8	1·4142	1·2599	4·4721	2·7144	5·8480	·50000
3	9	27	1·7321	1·4422	5·4772	3·1072	6·6943	·33333
4	16	64	2·000	1·5874	6·3246	3·4200	7·3681	·25000
5	25	125	2·2361	1·7100	7·0711	3·6840	7·9370	·20000
6	36	216	2·4495	1·8171	7·7460	3·9149	8·4343	·16667
7	49	343	2·6458	1·9129	8·3666	4·1213	8·8790	·14286
8	64	512	2·8284	2·000	8·9443	4·3089	9·2832	·12500
9	81	729	3·000	2·0801	9·4868	4·4814	9·6549	·11111
10	100	1000	3·1623	2·1544	10·000	4·6416	10·0000	·10000
11	121	1331	3·3166	2·2240	10·4881	4·7914	10·3228	·090909
12	144	1728	3·4641	2·2894	10·9545	4·9324	10·6266	·083333
13	169	2197	3·6056	2·3513	11·4018	5·0658	10·9139	·076923
14	196	2744	3·7417	2·4101	11·8322	5·1925	11·1869	·071429
15	225	3375	3·8730	2·4662	12·2474	5·3133	11·4471	·066667
16	256	4096	4·000	2·5198	12·6491	5·4288	11·6961	·062500
17	289	4913	4·1231	2·5713	13·0384	5·5397	11·9348	·058824
18	324	5832	4·2426	2·6207	13·4164	5·6462	12·1644	·055556
19	361	6859	4·3589	2·6684	13·7840	5·7489	12·3856	·052632
20	400	8000	4·4721	2·7144	14·1421	5·8480	12·5992	·05000
21	441	9261	4·5826	2·7589	14·4912	5·9439	12·8058	·047619
22	484	10648	4·6904	2·8020	14·8324	6·0368	13·0059	·045455
23	529	12167	4·7958	2·8439	15·1658	6·1269	13·2001	·043478
24	576	13824	4·8990	2·8845	15·4919	6·2145	13·3887	·041667
25	625	15625	5·000	2·9240	15·8114	6·2996	13·5721	·04000
26	676	17576	5·0990	2·9625	16·1245	6·3825	13·7507	·038462
27	729	19683	5·1962	3·0000	16·4317	6·4633	13·9248	·037037
28	784	21952	5·2915	3·0366	16·7332	6·5421	14·0946	·035714
29	841	24389	5·3852	3·0723	17·0294	6·6191	14·2604	·034483
30	900	27000	5·4772	3·1072	17·3205	6·6943	14·4225	·033333
31	961	29791	5·5678	3·1414	17·6068	6·7679	14·5810	·032258
32	1024	32768	5·6569	3·1748	17·8885	6·8399	14·7361	·031250
33	1089	35937	5·7446	3·2075	18·1659	6·9104	14·8881	·030303
34	1156	39304	5·8310	3·2396	18·4391	6·9795	15·0369	·029412
35	1225	42875	5·9161	3·2711	18·7083	7·0473	15·1829	·028571
36	1296	46656	6·000	3·3019	18·9737	7·1138	15·3262	·027778
37	1369	50653	6·0828	3·3322	19·2354	7·1791	15·4668	·027027
38	1444	54872	6·1644	3·3620	19·4936	7·2432	15·6049	·026316
39	1521	59319	6·2450	3·3912	19·7484	7·3061	15·7406	·025641
40	1600	64000	6·3246	3·4200	20·000	7·3681	15·8740	·02500
41	1681	68921	6·4031	3·4482	20·2485	7·4290	16·0052	·024390
42	1764	74088	6·4807	3·4760	20·4939	7·4889	16·1343	·023810
43	1849	79507	6·5574	3·5034	20·7364	7·5478	16·2613	·023256
44	1936	85184	6·6332	3·5503	20·9762	7·6059	16·3864	·022727
45	2025	91125	6·7082	3·5569	21·2132	7·6631	16·5096	·022222
46	2116	97336	6·7823	3·5830	21·4476	7·7194	16·6310	·021739
47	2209	103823	6·8557	3·6088	21·6795	7·7750	16·7507	·021277
48	2304	110592	6·9282	3·6342	21·9089	7·8297	16·8687	·020833
49	2401	117649	7·000	3·6593	22·1359	7·8837	16·9850	·020408
50	2500	125000	7·0711	3·6840	22·3607	7·9370	17·0998	·02000

Powers, Roots and Reciprocals (contd.)

n	n^2	n^3	$\sqrt{n}$	$\sqrt[3]{n}$	$\sqrt{10\,n}$	$\sqrt[3]{10\,n}$	$\sqrt[3]{100\,n}$	$\frac{1}{n}$
51	2601	132651	7·1414	3·7084	22·5832	7·9896	17·2130	·019608
52	2704	140608	7·2111	3·7325	22·8035	8·0415	17·3248	·019231
53	2809	148877	7·2801	3·7563	23·0217	8·0927	17·4351	·018868
54	2916	157464	7·3485	3·7798	23·2379	8·1433	17·5441	·018519
55	3025	166375	7·4162	3·8030	23·4521	8·1932	17·6517	·018182
56	3136	175616	7·4833	3·8259	23·6643	8·2426	17·7581	·017857
57	3249	185193	7·5498	3·8485	23·8747	8·2913	17·8632	·017544
58	3364	195112	7·6158	3·8709	24·0832	8·3396	17·9670	·017241
59	3481	205379	7·6811	3·8930	24·2899	8·3872	18·0697	·016949
60	3600	216000	7·7460	3·9149	24·4949	8·4343	18·1712	·016667
61	3721	226981	7·8102	3·9365	24·6982	8·4809	18·2716	·016393
62	3844	238328	7·8740	3·9579	24·8998	8·5270	18·3709	·016129
63	3969	250047	7·9373	3·9791	25·0998	8·5726	18·4691	·015873
64	4096	262144	8·000	4·000	25·2982	8·6177	18·5664	·015625
65	4225	274625	8·0623	4·0207	25·4951	8·6624	18·6626	·015385
66	4356	287496	8·1240	4·0412	25·6905	8·7066	18·7578	·015152
67	4489	300763	8·1854	4·0615	25·8844	8·7503	18·8520	·014925
68	4624	314432	8·2462	4·0817	26·0768	8·7937	18·9454	·014706
69	4761	328509	8·3066	4·1016	26·2679	8·8366	19·0378	·014493
70	4900	343000	8·3666	4·1213	26·4575	8·8790	19·1293	·014286
71	5041	357911	8·4261	4·1408	26·6458	8·9211	19·2200	·014085
72	5184	373248	8·4853	4·1602	26·8328	8·9628	19·3098	·013889
73	5329	389017	8·5440	4·1793	27·0185	9·0041	19·3988	·013699
74	5476	405224	8·6023	4·1983	27·2029	9·0450	19·4870	·013514
75	5625	421875	8·6603	4·2172	27·3861	9·0856	19·5743	·013333
76	5776	438976	8·7178	4·2358	27·5681	9·1258	19·6610	·013158
77	5929	456533	8·7750	4·2543	27·7489	9·1657	19·7468	·012987
78	6084	474552	8·8318	4·2727	27·9285	9·2052	19·8319	·012821
79	6241	493039	8·8882	4·2908	28·1069	9·2443	19·9163	·012658
80	6400	512000	8·9443	4·3089	28·2843	9·2832	20·0000	·012500
81	6561	531441	9·0000	4·3267	284605	9·3217	20·0830	·012346
82	6724	551368	9·0554	4·3445	28·6356	9·3599	20·1653	·012195
83	6889	571787	9·1104	4·3621	28·8097	9·3978	20·2469	·012048
84	7056	592704	9·1652	4·3795	28·9828	9·4354	20·3279	·011905
85	7225	614125	9·2195	4·3968	29·1548	9·4727	20·4083	·011765
86	7396	636056	9·2736	4·4140	29·3258	9·5097	20·4880	·011628
87	7569	658503	9·3274	4·4310	29·4958	9·5464	20·5671	·011494
88	7744	681472	9·3808	4·4480	29·6648	9·5828	20·6456	·011364
89	7921	704969	9·4340	4·4647	29·8329	9·6190	20·7235	·011236
90	8100	729000	9·4868	4·4814	30·000	9·6549	20·8008	·011111
91	8281	753571	9·5394	4·4979	30·1662	9·6905	20·8776	·010989
92	8464	778688	9·5917	4·5144	30·3315	9·7259	20·9538	·010870
93	8649	804357	9·6437	4·5307	30·4959	9·7610	21·0294	·010753
94	8836	830584	9·6954	4·5468	30·6594	9·7959	21·1045	·010638
95	9025	857375	9·7468	4·5629	30·8221	9·8305	21·1791	·010526
96	9216	884736	9·7980	4·5789	30·9839	9·8648	21·2532	·010417
97	9409	912673	9·8489	4·5947	31·1448	9·8990	21·3267	·010309
98	9604	941192	9·8995	4·6104	31·3050	9·9329	21·3997	·010204
99	9801	970299	9·9499	4·6261	31·4643	9·9666	21·4723	·010101
100	10000	1000000	10·000	4·6416	31·6228	10·000	21·5443	·0100

Table 2. Degrees to Radians

Degrees	0′ 0°·0	6′ 0°·1	12′ 0°·2	18′ 0°·3	24 0°·4	30′ 0°·5	36′ 0°·6	42′ 0°·7	48′ 0°·8	54′ 0°·9	Mean Difference 1	2	3	4	5
0	·00000	00175	00349	00524	00698	00873	01047	01222	01396	01571	29	58	87	116	145
1	·01745	01920	02094	02269	02443	02618	02793	02967	03142	03316	29	58	87	116	145
2	·03491	03665	03840	04014	04189	04363	04538	04712	04887	05061	29	58	87	116	145
3	·05236	05411	05585	05760	05934	06109	06283	06458	06632	06807	29	58	87	116	145
4	·06981	07156	07330	07505	07679	07854	08029	06203	08378	08552	29	58	87	116	145
5	·08727	08901	09076	09250	09425	09599	09774	09948	10123	10297	29	58	87	116	145
6	·10472	10647	10821	10996	11170	11345	11519	11694	11868	12043	29	58	87	116	145
7	·12217	12392	12566	12741	12915	13090	13264	13439	13614	13788	29	58	87	116	145
8	·13963	14137	14312	14486	14661	14835	15010	15184	15359	15533	29	58	87	116	145
9	·15708	15882	16057	16232	16406	16581	16755	16930	17104	17279	29	58	87	116	145
10	·17453	17628	17802	17977	18151	18326	18500	18675	18850	19024	29	58	87	116	145
11	·19199	19373	19548	19722	19897	20071	20246	20420	20595	20769	29	58	87	116	145
12	·20944	21118	21293	21468	21622	21817	21991	22166	22340	22515	29	58	87	116	145
13	·22689	22864	23038	23213	23387	23562	23736	23911	24086	24260	29	58	87	116	145
14	·24435	24609	24784	24958	25133	25307	25482	25656	25831	26005	29	58	87	116	145
15	·26180	26354	26529	26704	26878	27053	27227	27202	27576	27751	29	58	87	116	145
16	·27925	28100	38274	28449	28623	28798	28972	29147	29322	29496	29	58	87	116	145
17	·29671	29845	30020	30194	30369	30543	30718	30892	31067	31241	29	58	87	116	145
18	·31416	31590	31765	31940	32114	32289	32463	32638	32812	32987	29	58	87	116	145
19	·33161	33336	33510	33685	33859	34034	34208	34383	34558	34732	29	58	87	116	145
20	·34907	35081	35256	35430	35605	35779	35954	36128	36303	36477	29	58	87	116	145
21	·36652	36826	37001	37176	37350	37525	37699	37174	38048	38223	29	58	87	116	145
22	·38397	38572	38746	38121	39095	39270	39444	39119	39794	39968	29	58	87	116	145
23	·40143	40317	40492	40666	40841	41015	41190	41364	41539	41713	29	58	87	116	145
24	·41888	42062	42237	42411	42586	42761	42935	43110	43284	43459	29	58	87	116	145
25	·43633	43808	43982	44157	44331	44506	44680	44855	45029	45204	29	58	87	116	145
26	·45379	45553	45728	45902	46077	46251	46426	46600	46775	46949	29	58	87	116	145
27	·47124	47298	47473	47647	47822	47997	48171	48346	48520	48695	29	58	87	116	145
28	·48869	49044	49218	49393	49567	49742	49916	50091	50265	50440	29	58	87	116	145
29	·50615	50789	50964	51138	51313	51487	51662	51836	52011	52185	29	58	87	116	145
30	·52360	52524	52709	52883	53058	53233	53407	53582	53756	53931	29	58	87	116	145
31	·54105	54280	54454	54629	54803	54978	55152	55327	55501	55676	29	58	87	116	145
32	·55851	56025	56200	56374	56549	56723	56898	57072	57247	57421	29	58	87	116	145
33	·57596	57770	57945	58119	58294	58469	58643	58818	58992	59167	29	58	87	116	145
34	·59341	59516	59690	59865	60039	60214	60388	60563	60737	60912	29	58	87	116	145
35	·61087	61261	61436	61610	61785	61959	62134	62308	62483	62657	29	58	87	116	145
36	·62832	63006	63181	63355	63530	63705	63879	64054	64228	64403	29	58	87	116	145
37	·64577	64752	64926	65101	65275	65450	65624	65799	65973	66148	29	58	87	116	145
38	·66323	66497	66672	66846	67021	67195	67370	67544	67719	67893	29	58	87	116	145
39	·68068	68242	68417	68591	68766	68941	69115	69290	69464	69639	29	58	87	116	145
40	·69813	69988	70162	70337	70511	70686	70860	71035	71209	71384	29	58	87	116	145
41	·71558	71733	71908	72082	72257	72431	72606	72780	72955	73129	29	58	87	116	145
42	·73304	73478	73653	73827	74002	74176	74351	74526	74700	74875	29	58	87	116	145
43	·75049	75224	75398	75573	75747	75922	76096	76271	76445	76620	29	58	87	116	145
44	·76794	76969	77144	77318	77793	77667	77842	78016	78191	78365	29	58	87	116	145
45	·78540	78714	78889	79063	79280	79412	79587	79762	79936	80111	29	58	87	116	145

Degrees to Radians (contd.)

Degrees	0′ 0°·0	6′ 0°·1	12′ 0°·2	18′ 0°·3	24′ 0°·4	30′ 0°·5	36′ 0°·6	42′ 0°·7	48′ 0°·8	54′ 0°·9	Mean Difference 1	2	3	4	5
45	·78540	78714	78889	79603	79238	79412	79587	79762	79936	80111	29	58	87	116	145
46	·80285	80460	80634	80809	80983	81158	81332	81507	81681	81856	29	58	87	116	145
47	·82030	82205	82380	82554	82729	82903	83078	83252	83427	83601	29	58	87	116	145
48	·83776	83950	84125	84299	84474	84648	84823	84998	85172	85347	29	58	87	116	145
49	·85521	85696	85870	86045	86219	86394	86568	86743	86917	87092	29	58	87	116	145
50	·87266	87441	87616	87790	87965	88139	88314	88488	88663	88837	29	58	87	116	145
51	·89012	89186	89361	89535	89710	89884	90059	90234	90408	90583	29	58	87	116	145
52	·90757	90932	91106	91281	91455	91630	91804	91979	92153	92328	29	58	87	116	145
53	·92502	92677	92852	93026	93201	93375	93550	93724	93899	94073	29	58	87	116	145
54	·94248	94422	94597	94771	94946	95120	95120	95470	95644	95819	29	58	87	116	145
55	·95993	96168	96342	96517	96691	96866	97040	97215	97389	97564	29	58	87	116	145
56	·97738	97913	98088	98262	98437	98611	98786	98960	99135	99309	29	58	87	116	145
57	·99484	99658	99833	1·00007	1·00182	1·00356	1·00531	1·00706	1·00880	1·01055	29	58	87	116	145
58	1·01229	01404	01578	01753	01927	02102	02276	02451	02625	02800	29	58	87	116	145
59	1·02974	03149	03323	03498	03673	03847	04022	04196	04371	04545	29	58	87	116	145
60	1·04720	04894	05069	05243	05418	05592	05767	05941	06116	06291	29	58	87	116	145
61	1·05465	06640	06814	06989	07163	07338	07512	07687	07861	08036	29	58	87	116	145
62	1·08210	08385	08559	08734	08909	09083	09258	09432	09607	09781	29	58	87	116	145
63	1·09956	10130	10305	10479	10654	10828	11003	11177	11352	11527	29	58	87	116	145
64	1·11701	11876	12050	12225	12399	12574	12748	120923	13097	13272	29	58	87	116	145
65	1·13446	13621	13795	13970	14145	14319	14494	14668	14843	15017	29	58	87	116	145
66	1·15192	15366	15541	15715	15890	16064	16239	16413	16588	16763	29	58	87	116	145
67	1·16937	17112	17286	17461	17635	17810	17984	18159	18333	18508	29	58	87	116	145
68	1·18682	18857	19031	19206	19381	19555	19730	19904	20079	20253	29	58	87	116	145
69	1·20428	20602	20777	20951	21126	21300	21475	21649	21824	21999	29	58	87	116	145
70	1·22173	22348	22522	22697	22871	23046	23220	23395	23569	23744	29	58	87	116	145
71	1·23918	24093	24267	24442	24617	24791	24966	25140	25315	25489	29	58	87	116	145
72	1·25664	25838	26013	26187	26362	26536	26711	26885	27060	27234	29	58	87	116	145
73	1·27409	27584	27758	27933	28107	28282	28456	28631	28805	28980	29	58	87	116	145
74	1·29154	29329	29503	29678	29852	30027	30202	30376	30551	30725	29	58	87	116	145
75	1·30900	31074	31249	31423	31598	31772	31947	32121	32296	32470	29	58	87	116	145
76	1·32645	32820	32994	33169	33343	33518	33792	33867	34041	34216	29	58	87	116	145
77	1·34390	34565	34739	34914	35088	35263	35438	35612	35787	35961	29	58	87	116	145
78	1·36136	36310	36485	36659	36834	37008	37183	37351	37532	37706	29	58	87	116	145
79	1·37881	38056	38230	38405	38579	38754	38928	39103	39277	39452	29	58	87	116	145
80	1·39626	39801	39975	40150	40324	40499	40674	40448	41023	41197	29	58	87	116	145
81	1·41372	41546	41721	41895	42070	42244	42419	42593	42768	42942	29	58	87	116	145
82	1·43117	43292	43466	43641	43815	43990	44164	44339	44513	44688	29	58	87	116	145
83	1·44862	45037	45211	45386	45560	45735	45910	46084	46259	46433	29	58	87	116	145
84	1·46608	46782	46957	47131	47306	47480	47655	47829	48004	48178	29	58	87	116	145
85	1·48353	48528	48702	48877	49051	49226	49400	49575	49749	49924	29	58	87	116	145
86	1·50098	50273	50447	50622	50796	50971	51146	51320	51495	51669	29	58	87	116	145
87	1·51844	52018	52193	52367	52542	52716	52891	53065	53240	53414	29	58	87	116	145
88	1·53589	53764	53938	54113	54287	54462	54636	54811	54985	55160	29	58	87	116	145
89	1·55334	55509	55683	55858	56032	56207	56381	56556	56731	56905	29	58	87	116	145

Table 3. Areas of Circles (diameters advancing by tenths)

Diameter	0·0	0·1	0·2	0·3	0·4	0·5	0·6	0·7	0·8	0·9
0	0·0	0·0078	0·0314	0·0706	0·1256	0·1963	0·2827	0·3848	0·5027	0·6362
1	0·78540	0·95033	1·1310	1·3273	1·5394	1·7671	2·0106	2·2698	2·5447	2·8353
2	3·1416	3·4636	3·8013	4·1548	4·5239	4·9087	5·3093	5·7255	6·1575	6·6052
3	7·0686	7·5477	8·0425	8·5530	9·0792	9·6211	10·179	10·752	11·341	11·946
4	12·566	13·0202	13·854	14·522	15·205	15·904	16·619	17·349	18·096	18·857
5	19·635	20·428	21·237	22·062	22·902	23·758	24·630	25·518	26·421	27340
6	28·274	29·225	30·191	31·172	32·170	33·183	34·212	35·257	36·317	37·393
7	38·0485	39·592	40·715	41·854	43·008	44·179	45·365	46·566	47·784	49·017
8	50·266	51·530	52·810	52·106	55·418	56·745	58·088	59·447	60·821	62·211
9	63·617	65·039	66·476	67·929	69·398	70·882	72·382	73·898	75·430	76·977
10	78·540	80·118	81·713	83·323	84·949	86·590	88·247	89·920	91·609	93·313
11	95·033	96·769	98·520	100·29	102·07	103·87	105·68	107·51	109·36	111·22
12	113·10	114·99	116·90	118·82	120·76	122·72	124·69	126·68	128·68	130·70
13	132·73	134·78	136·85	138·93	141·03	143·14	145·27	147·41	149·57	151·75
14	153·94	156·14	158·37	160·61	162·86	165·13	167·41	169·72	172·03	174·37
15	176·71	179·08	181·46	183·85	186·26	188·69	191·13	193·59	196·07	198·56
16	201·06	203·58	206·12	208·67	211·24	213·82	216·42	219·04	221·67	224·32
17	226·98	229·66	232·35	235·06	237·79	240·53	243·28	246·06	248·85	251·65
18	254·47	257·30	260·15	263·02	265·90	268·80	271·72	274·65	277·59	280·55
19	283·53	286·52	289·53	292·55	295·59	298·65	301·72	304·80	307·91	311·02
20	314·16	317·31	320·47	323·65	326·85	330·06	333·29	336·53	339·79	343·07
21	346·36	349·67	352·99	356·33	359·68	363·05	366·43	369·84	373·25	376·68
22	380·13	383·60	387·08	390·57	394·08	397·61	401·15	404·71	408·28	411·87
23	415·48	419·10	422·73	426·38	430·05	433·74	437·43	441·15	444·88	448·63
24	452·39	456·17	459·96	463·77	467·59	471·43	475·29	479·16	483·05	486·95
25	490·87	494·81	498·76	502·73	506·71	510·71	514·72	518·75	522·79	526·85
26	530·93	535·02	539·13	543·25	547·39	551·55	555·72	559·90	564·10	568·32
27	572·56	576·80	581·07	585·35	589·65	593·96	598·28	602·63	606·99	611·36
28	615·75	620·16	624·58	629·02	633·47	637·94	642·42	646·92	651·44	655·97
29	660·52	665·08	669·66	674·26	678·87	684·49	688·13	692·79	697·46	702·15
30	706·86	711·58	716·31	721·07	725·83	730·62	733·41	740·23	745·06	749·91
31	754·77	759·64	764·54	769·45	774·37	779·35	784·27	789·24	794·23	799·23
32	804·25	809·28	814·33	819·40	824·48	829·58	834·69	839·82	844·96	850·12
33	855·30	860·49	865·70	870·92	876·16	881·41	886·68	891·97	897·27	902·59
34	907·92	913·27	918·63	924·01	929·41	934·82	940·25	945·69	951·15	956·62
35	962·11	967·60	973·14	978·68	984·23	989·80	995·38	1000·98	1006·6	1012·2
36	1017·9	1023·5	1029·2	1034·9	1040·6	1046·3	1052·1	1057·8	1063·6	1069·4
37	1075·2	1081·0	1086·9	1092·7	1098·6	1104·5	1110·4	1116·3	1122·2	1128·1
38	1134·1	1140·1	1146·1	1152·1	1158·1	1164·2	1170·2	1176·3	1182·4	1188·5
39	1194·6	1200·7	1206·9	1213·0	1219·2	1225·4	1231·6	1237·9	1244·1	1250·4
40	1256·6	1262·9	1269·2	1275·6	1281·9	1288·2	1294·6	1301·0	1307·4	1313·8
41	1320·3	1326·7	1333·2	1339·6	1346·1	1352·6	1359·2	1365·7	1372·3	1378·8
42	1385·4	1392·0	1398·7	1405·3	1412·0	1418·6	1425·3	1432·0	1438·7	1445·4
43	1452·2	1459·0	1465·7	1472·5	1479·3	1486·2	1493·0	1499·9	1506·7	1513·6
44	1520·5	1527·4	1534·4	1541·3	1548·3	1553·3	1562·3	1569·3	1576·3	1583·4
45	1590·4	1597·5	1604·6	1611·7	1618·8	1626·0	1633·1	1640·3	1647·5	1654·7
46	1661·9	1669·1	1676·4	1683·6	1690·9	1698·2	1705·5	1712·9	1720·2	1727·6
47	1734·9	1742·3	1749·7	1757·2	1764·6	1772·0	1779·5	1787·0	1794·5	1802·0
48	1809·6	1817·1	1824·7	1832·2	1839·8	1847·4	1855·1	1862·7	1870·4	1878·0
49	1885·7	1893·4	1901·2	1908·9	1916·6	1924·4	1935·2	1940·0	1947·8	1955·6
50	1963·5	1971·0	1979·2	1987·1	1995·0	2003·0	2010·9	2018·9	2026·8	2034·8

Areas of Circles (contd.)

Diameter	0·0	0·1	0·2	0·3	0·4	0·5	0·6	0·7	0·8	0·9
51	2042·8	2050·8	2058·9	2066·9	2075·0	2083·1	2091·3	2099·3	2107·4	2115·6
52	2123·7	2131·9	2140·1	2148·3	2156·5	2164·7	2173·0	2181·3	2189·6	2197·9
53	2206·2	2214·5	2222·9	2231·2	2239·6	2248·0	2256·4	2264·8	2273·3	2281·7
54	2290·2	2298·7	2307·2	2315·7	2324·3	2332·8	2341·4	2350·0	2358·6	2367·2
55	2375·8	2384·5	2393·1	2401·8	2410·5	2419·2	2428·0	2436·7	2445·4	2454·2
56	2463·0	2471·8	2480·6	2489·5	2498·3	2507·2	2516·1	2525·0	2533·0	2542·8
57	2551·8	2560·7	2569·7	2578·7	2587·7	2596·7	2605·7	2614·8	2623·9	2633·0
58	2642·1	2651·2	2660·3	2669·5	2678·6	2687·8	2697·0	2706·2	2715·5	2724·7
59	2734·0	2743·2	2752·5	2761·8	2771·2	2780·5	2789·9	2799·2	2808·6	2818·0
60	2827·4	2836·9	2846·3	2855·8	2865·3	2874·7	2884·3	2893·8	2903·3	2912·9
61	2922·5	2932·1	2941·7	2951·3	2960·9	2970·6	2980·2	2989·9	2999·6	3009·3
62	3019·1	3028·8	3038·6	3048·4	3058·1	3068·0	3077·8	3087·6	3097·5	3107·4
63	3117·2	3127·1	3137·1	3147·0	3157·0	3166·9	3176·9	3186·9	3196·9	3206·9
64	3217·0	3227·1	3237·1	3247·2	3257·3	3267·4	3277·6	3287·7	3297·9	3308·1
65	3318·3	3328·5	3338·8	3349·0	3359·3	3369·6	3379·8	3390·2	3400·5	3410·8
66	3412·2	3431·6	3442·0	3452·4	3462·8	3473·2	3483·7	3494·1	3504·6	3515·1
67	3525·7	3536·2	3546·7	3557·3	3567·9	3578·5	3589·1	3599·7	3610·3	3621·0
68	3613·7	3642·4	3653·1	3663·8	3674·5	3685·3	3696·1	3706·8	3717·6	3728·4
69	3739·3	3750·1	3761·0	3771·9	3782·8	3793·7	3804·6	3815·5	3826·5	3837·5
70	3848·5	3859·4	3870·5	3881·5	3892·6	3903·6	3914·7	3925·8	3936·9	3948·0
71	3959·2	3970·3	3981·5	3992·7	4003·9	4015·1	4026·4	4037·6	4048·9	4060·2
72	4071·5	4082·8	4094·2	4105·5	4116·9	4128·2	4139·6	4151·1	4162·5	4173·9
73	4185·4	4196·9	4208·3	4219·9	4231·4	4242·9	4254·5	4266·0	4277·6	4289·2
74	4300·8	4312·5	4324·1	4335·8	4347·5	4359·2	4370·9	4382·6	4394·3	4406·1
75	4417·9	4429·6	4441·5	4453·3	4465·1	4477·0	4488·8	4500·7	4512·6	4524·5
76	4536·5	4548·4	4560·4	4572·3	4548·3	4596·3	4608·4	4620·4	4632·5	4644·5
77	4656·6	4668·7	4680·8	4693·0	4705·1	4717·3	4729·5	4741·7	4753·9	4766·1
78	4778·4	4790·6	4802·9	4815·2	4827·5	4839·8	4852·2	4864·5	4876·9	4889·3
79	4901·7	4914·1	4926·5	4939·0	4951·4	4963·9	4976·4	4988·9	5001·4	5014·0
80	5026·6	5039·1	5051·7	5064·3	5076·9	5089·6	5102·2	5114·9	5127·6	5140·3
81	5153·0	5165·7	5178·5	5191·2	5204·0	5216·8	5229·6	5242·4	5255·3	5268·1
82	5281·0	5293·9	5306·8	5319·7	5332·7	5345·6	5358·6	5371·6	5384·6	5397·6
83	5410·6	5423·6	5436·7	5449·8	5462·9	5476·0	5489·1	5502·3	5515·4	5528·6
84	5541·8	5555·0	5568·2	5581·4	5594·7	5607·9	5621·2	5634·5	5647·8	5661·2
85	5674·5	5687·9	5701·2	5714·6	5728·0	5741·5	5754·9	5768·3	5781·8	5795·3
86	5808·8	5822·3	5835·8	5849·4	5863·0	5876·6	5890·1	5903·7	5917·4	5931·0
87	5944·7	5958·3	5972·0	5985·7	5999·5	6013·2	6027·0	6040·7	6054·5	6068·3
88	6082·1	6096·0	6109·8	6123·7	6137·5	6151·7	6165·3	6179·3	6193·2	6207·2
89	6221·1	6235·1	6249·1	6263·1	6277·2	6291·2	6305·3	6319·4	6333·5	6347·6
90	6361·7	6375·9	6390·0	6404·2	6418·4	6432·6	6446·8	6461·1	6475·3	6489·6
91	6503·9	6518·2	6532·5	6546·8	6561·2	6575·6	6589·9	6604·3	6618·7	6633·2
92	6647·6	6662·1	6676·5	6691·0	6705·5	6720·1	6734·6	6749·1	6763·7	6778·3
93	6792·9	6807·5	6822·2	6836·8	6851·5	6866·1	6880·8	6895·6	6910·3	6925·0
94	6939·8	6954·6	6969·3	6984·1	6999·0	7013·8	7028·7	7043·5	7058·4	7073·3
95	7088·2	7103·1	7118·1	7133·1	7148·0	7163·0	7178·0	7193·1	7208·1	7223·2
96	7238·2	7253·3	7268·4	7283·5	7298·7	7313·8	7329·0	7344·2	7359·4	7374·6
97	7389·8	7405·1	7420·3	7435·6	7450·9	7466·2	7481·5	7496·9	7512·2	7527·6
98	7543·0	7558·4	7573·8	7589·2	7604·7	7620·1	7635·6	7651·1	7666·6	7682·1
99	7697·7	7713·2	7728·8	7744·4	7760·0	7775·6	7791·3	7806·9	7822·6	7838·3
100	7854·0	7869·7	7885·7	7901·2	7919·9	7932·7	7948·5	7964·3	7980·1	7996·0