0 K	= -273.15°C = -459.67°F
Standard "g"	= 9.806 65 m/s^2
Density of earth	= 5522 g/L or kg/m^3
D.of Hg at 0°C	= 13596 g/L or kg/m^3
D(max) of H_2O	= 999.973 kg/m^3
D.of air at STP	= 1.2929 g/L or kg/m^3
H.fusion H_2O	= 3.3373 E+5 J/kg
H.vapor. H_2O	= 2.25899 E+6 J/kg
Sp. Heat H_2O	= 4.186 E+3 J/kg°C
SP. Heat Metal	≈ 2.5 E+4/ GFW J/kg°C
Speed of sound 0°C	= 331.36 m/s +(.59m/s/°C)
Electron Mass (e)	= 9.109 E-31 kg
Atomic Mass Unit (p,n)	= 1.661 E-27 kg
Electron Volt	= 1.603 E-19 J

R = Rydberg	= 1.097 E+7 1/m
c = velocity of light	= 2.998 E+8 m/s
k = Boltzmann	= 1.381 E-23 J/K
h = Planck	= 6.626 E-34 J·s
G = Univ. grav.	= 6.673 E-11 N·m^2/kg^2
K = Coulomb = $1/(4\pi\varepsilon_0)$	= 8.988 E+9 N·m^2/C^2
σ = Stefan Boltzmann	= 5.670 E-8 W/m^2·K^4
μ_o = Permeability	= 4π E-7 T·m/A
ε_0 = Permittivity = $1/(\mu_0 c^2)$	= 8.854 E-12 C^2/N·m^2
N_A = Avogadro's Number	= 6.023 E+23 particles/mole
e = elem. charge (p^+,e^-)	= 1.60 E-19 C

$ax^2 + bx + c = 0$ quadratic eq.: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

VECTORS $\vec{a} = a_x\hat{\$} + a_y\hat{\$} + a_z\hat{\$}$

dot $\vec{a} \bullet \vec{b} = (a_x b_x + a_y b_y + a_z b_z) = (ab)\cos\theta$

cross $\vec{a} \times \vec{b} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ a_x & a_y & a_z \\ b_x & b_y & b_z \end{vmatrix} = ab\sin\theta$

GEOMETRY circle $C = \pi D = 2\pi r$ $A = \pi r^2$

sphere $A = 4\pi r^2$ $V = (4/3)\,\pi r^3$

cone $A = \pi r\,(r^2+h^2)^{1/2}$ $V = (1/3)a{\cdot}h$

1 radian = 57.295 779 5° =360/(2π)

π = 3.141 592 653 590 **e = 2.718 281 828**

PHYSICS NERD CARD

LOGS $a^y = x$ $y = \log_a x$

$\log_a(xy) = \log_a x + \log_a y$ $\log_a(x/y) = \log_a x - \log_a y$

$\log_a x^n = n{\cdot}\log_a x$

ln x = (ln 10)(log x) = 2.3026 log x

db = 10 log (P_1/P_2) = 20 log (V_1/V_2)

Doubling time = 69.315 / (% growth per time)

TRIG $\tan A = \sin A/\cos A$ $\sin^2 A + \cos^2 A = 1$

$\sec A = 1/\cos A$ $\csc A = 1/\sin A$

SOHCAHTOA $\sin(A \pm B) = \sin A\cos B \pm \cos A\sin B$

sin=O/H $\cos(A \pm B) = \cos A\cos B \mp \sin A\sin B$

cos=A/H $\sin(A/2) = \pm\,((1-\cos A)/2)^{1/2}$

tan=O/A $\cos(A/2) = \pm\,((1+\cos A)/2)^{1/2}$

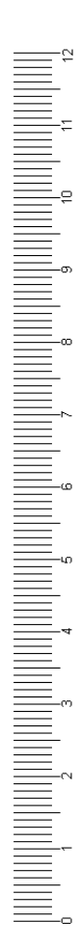
$\sin A \pm \sin B = 2\sin\frac{1}{2}(A \pm B)\cos\frac{1}{2}(A \mp B)$

$\cos A + \cos B = 2\cos\frac{1}{2}(A+B)\cos\frac{1}{2}(A-B)$

law of sines : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

law of cosines : $c^2 = a^2 + b^2 - 2ab{\cdot}\cos C$

1 yr	=	365.242 days	1 yr	=	31 556 925 s
1 m	=	3.281 ft	1 m	=	39.37 in
1 cm	=	0.3937 in	1 in	=	2.54 cm
1 km	=	0.6214 mi	1 mi	=	1.61 km
1 m^2	=	10.76 ft^2	1 m^2	=	1550 in^2
1 acre	=	43 560 ft^2	1 acre	=	4046.9 m^2
1 hectare = (hm)^2		= 10 000 m^2	= 2.471 acre		
1 mL	=	0.203 tsp	1 mL	=	0.061 02 in^3
1 L	=	1.057 qt	1 L	=	61.02 in^3
1 m^3	=	35.31 ft^3	= 1057 qt	= 264.2 gal	
1 g	=	0.035 27 oz	1 oz	=	28.35 g
1 kg	=	2.205 lb	1 lb	=	453.6 g
1 m/s	=	3.6 km/h	1 m/s	=	2.237 mph
1 cm/s	=	0.0328 ft/s	1 km/h	=	0.6214 mph
1 N	=	0.2248 lbf	1 lbf	=	4.448 N
1 dyn	=	1 E-5 N	1 dyn	=	2.25 E-6 lbf
1 Pa	=	1 N/m^2	1 psi	=	6894.76 Pa
1 erg	=	1 E-7 J	1 cal	=	4.186 J
1 BTU	=	1055 J	1 eV	=	1.602 E-19 J
1 W	=	0.001 34 hp	1 hp	=	745.7 W
1 C	=	6.2415 E+18 e	1 e	=	1.602 E-19 C
C°	=	(F° +40)(5/9)-40	F°	=	(C°+40)(9/5)-40



alpha	A	α	E+24	yotta	Y
beta	B	β	E+21	zetta	Z
gamma	Γ	γ	E+18	exa	E
delta	Δ	δ	E+15	peta	P
epsilon	E	ε	E+12	tera	T
zeta	Z	ζ	E+ 9	giga	G
eta	H	η	E+ 6	mega	M
theta	Θ	θ	E+ 3	kilo	k
iota	I	ι	E+ 2	hecto	h
kappa	K	κ	E+ 1	deka	da
lambda	Λ	λ			
mu	M	μ		unit	
nu	N	ν			
xi	Ξ	ξ	E -1	deci	d
omicron	O	ο	E -2	centi	c
pi	Π	π	E -3	milli	m
rho	P	ρ	E -6	micro	μ
sigma	Σ	σ	E -9	nano	n
tau	T	τ	E -12	pico	p
upsilon	Y	υ	E -15	femto	f
phi	Φ	φ	E -18	atto	a
chi	X	χ	E -21	zepto	z
psi	Ψ	ψ	E -24	yocto	y
omega	Ω	ω			

kinematics $s = s_0 + v_0 t + {}^1/_2\,at^2$ $v^2 = v_0^2 + 2as$

SHM $x_{(t)} = x_m\cos(\omega t+\varphi)$ $\omega = ({}^k/_m)^{1/2} = ({}^g/_l)^{1/2}$

E&M $V = {}^u/_q = IR$ $E = {}^F/_q$ $F = qv \times B$ or $Il \times B$

	Radius (m)	Mass (kg)	Orbit Radius (m)	Period (s)
Mercury	2.42 E+6	3.58 E+23	5.79 E+10	7.61 E+6
Venus	6.16 E+6	4.90 E+24	1.08 E+11	1.94 E+7
Earth	6.37 E+6	5.98 E+24	1.496E+11	3.16 E+7
Moon	1.74 E+6	7.34 E+22	3.84 E+8	2.36 E+6
Mars	3.33 E+6	6.58 E+23	2.38 E+11	5.93 E+7
Jupiter	6.99 E+7	1.90 E+27	7.78 E+11	3.74 E+8
Saturn	5.75 E+7	4.40 E+27	1.43 E+12	9.30 E+8
Uranus	2.57 E+7	3.83 E+26	2.87 E+12	2.65 E+9
Neptune	2.49 E+7	3.59 E+26	4.50 E+12	5.20 E+9
Pluto	1.14 E+6	1.27 E+22	5.91 E+12	7.84 E+9

Sun Radius = 6.96 E+8 m Mass = 1.987 E+30 kg

Light year = 9.47 E+15 m

Parsec = 3.262 light yr. = 3.09 E+16m

PHYSICS NERD CARD

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Force	= ma	: newtons (N)	
Pressure	= F/A	: pascals(Pa)	
Work	= Fd	: joules (J)	= N·m = (kg·m^2)/s^2
Power	= w/t	: watts (W)	= J/s = (kg · m^2)/s^3
Current	= q/t	: amperes (A)	= C/s
E. pot.	= w/q	: volts (V)	= J/C
E. field	= F/q	: N/C	= (kg·m)/(s^2·C)
B. field		: tesla(T)	= N / (A·M)