Useful Tables

Fundamental Constants

Symbol	Quantity	Established value	Value used for calculations in this book
c	speed of light in a vacuum	299 792 458 m/s	3.00×10^{8} m/s
e^-	elementary charge	$1.602\ 176\ 487 \times 10^{-19}$ C	1.60×10^{-19} C
e^1	base of natural logarithms	2.718 2818 28	2.72
ε_0	(Greek *epsilon*) permittivity of a vacuum	$8.854\ 187\ 817 \times 10^{-12}$ $C^2/(N \cdot m^2)$	8.85×10^{-12} $C^2/(N \cdot m^2)$
G	constant of universal gravitation	$6.672\ 59 \times 10^{-11}$ $N \cdot m^2/kg^2$	6.673×10^{-11} $N \cdot m^2/kg^2$
g	free-fall acceleration at Earth's surface	9.806 65 m/s^2	9.81 m/s^2
h	Planck's constant	$6.626\ 068\ 96 \times 10^{-34}$ J•s	6.63×10^{-34} J•s
k_B	Boltzmann's constant (R/N_A)	$1.380\ 6504 \times 10^{-23}$ J/K	1.38×10^{-23} J/K
k_C	Coulomb constant	$8.987\ 551\ 787 \times 10^{9}$ $N \cdot m^2/C^2$	8.99×10^{9} $N \cdot m^2/C^2$
R	molar (universal) gas constant	8.314 472 J/(mol•K)	8.31 J/(mol•K)
π	(Greek *pi*) ratio of the circumference to the diameter of a circle	3.141 592 654	calculator value

Coefficients of Friction (Approximate Values)

	μ_s	μ_k		μ_s	μ_k
steel on steel	0.74	0.57	waxed wood on wet snow	0.14	0.1
aluminum on steel	0.61	0.47	waxed wood on dry snow	—	0.04
rubber on dry concrete	1.0	0.8	metal on metal (lubricated)	0.15	0.06
rubber on wet concrete	—	0.5	ice on ice	0.1	0.03
wood on wood	0.4	0.2	Teflon on Teflon	0.04	0.04
glass on glass	0.9	0.4	synovial joints in humans	0.01	0.003

Useful Astronomical Data

Symbol	Quantity	Value used for calculations in this book
I_E	moment of inertia of Earth	8.03×10^{37} $kg \cdot m^2$
M_E	mass of Earth	5.97×10^{24} kg
R_E	radius of Earth	6.38×10^{6} m
	Average Earth–moon distance	3.84×10^{8} m
	Average Earth–sun distance	1.50×10^{11} m
	mass of the moon	7.35×10^{22} kg
	mass of the sun	1.99×10^{30} kg
yr	period of Earth's orbit	3.16×10^{7} s