Astronomical Data

Planetary body	Mean distance from sun (m)	Mass (kg)	Mean radius (m)
Sun	—	1.99×10^{30}	6.96×10^{8}
Moon	3.84×10^{8}*	7.36×10^{22}	1.74×10^{6}
Mercury	5.79×10^{10}	3.18×10^{23}	2.43×10^{6}
Venus	1.08×10^{11}	4.88×10^{24}	6.06×10^{6}
Earth	1.50×10^{11}	5.98×10^{24}	6.37×10^{6}
Mars	2.28×10^{11}	6.42×10^{23}	3.37×10^{6}
Jupiter	7.78×10^{11}	1.90×10^{27}	6.99×10^{7}
Saturn	1.43×10^{12}	5.68×10^{26}	5.85×10^{7}
Uranus	2.87×10^{12}	8.68×10^{25}	2.33×10^{7}
Neptune	4.50×10^{12}	1.03×10^{26}	2.21×10^{7}

*Distance from earth

Typical Coefficients of Friction

Material	Static μ_s	Kinetic μ_k	Rolling μ_r
rubber on concrete	1.00	0.80	0.02
steel on steel (dry)	0.80	0.60	0.002
steel on steel (lubricated)	0.10	0.05	
wood on wood	0.50	0.20	
wood on snow	0.12	0.06	
ice on ice	0.10	0.03	

Melting/Boiling Temperatures and Heats of Transformation

Substance	T_m (°C)	L_f (J/kg)	T_b (°C)	L_v (J/kg)
water	0	3.33×10^{5}	100	22.6×10^{5}
nitrogen (N_2)	−210	0.26×10^{5}	−196	1.99×10^{5}
ethyl alcohol	−114	1.09×10^{5}	78	8.79×10^{5}
mercury	−39	0.11×10^{5}	357	2.96×10^{5}
lead	328	0.25×10^{5}	1750	8.58×10^{5}

Properties of Materials

Substance	ρ (kg/m^3)	c (J/kg K)
air at STP*	1.2	
ethyl alcohol	790	2400
gasoline	680	
glycerin	1260	
mercury	13,600	140
oil (typical)	900	
seawater	1030	
water	1000	4190
aluminum	2700	900
copper	8920	385
gold	19,300	129
ice	920	2090
iron	7870	449
lead	11,300	128
silicon	2330	703

*Standard temperature (0°C) and pressure (1 atm)

Molar Specific Heats of Gases

Gas	C_P (J/mol K)	C_V (J/mol K)
Monatomic Gases		
He	20.8	12.5
Ne	20.8	12.5
Ar	20.8	12.5
Diatomic Gases		
H_2	28.7	20.4
N_2	29.1	20.8
O_2	29.2	20.9

Indices of Refraction

Material	Index of refraction
vacuum	1 exactly
air	1.0003
water	1.33
glass	1.50
diamond	2.42

#1

365 days
T = seconds to go around the sun

r = 150 million kilometers

$$V = \frac{2\pi r}{T}$$

#4

$\text{mass}_{\text{of sun}} = 1.99 \times 10^{30}$ kg

r = 150 million km

$\text{mass}_{\text{of earth}} = 5.975 \times 10^{24}$ kg

$6.674 \times 10^{-11}\ N \cdot m^2 \cdot kg^{-2}$