PHYSICAL AND ASTRONOMICAL CONSTANTS

for use in all Physics and Astronomy examinations

Quantity	Symbol	Numerical value	Units
speed of light in vacuum	c, c_0	299 792 458	m s^{-1}
magnetic constant	μ_0	$4\pi \times 10^{-7}$	N A^{-2}
		$= 12.566\,370\,614... \times 10^{-7}$	H m^{-1}
electric constant $1/\mu_0 c^2$	ϵ_0	$8.854\,187\,817... \times 10^{-12}$	F m^{-1}
elementary charge	e	$1.602\,176\,565(35) \times 10^{-19}$	C
Faraday constant $N_A e$	F	96 485.3365(21)	C mol^{-1}
Planck constant	h	$6.626\,069\,57(29) \times 10^{-34}$	J s
$h/2\pi$	$\hbar$	$1.054\,571\,726(47) \times 10^{-34}$	J s
unified atomic mass unit $\frac{1}{12}m(^{12}C)$	u	$1.660\,538\,921(73) \times 10^{-27}$	kg
electron mass	m_e	$9.109\,382\,91(40) \times 10^{-31}$	kg
proton mass	m_p	$1.672\,621\,777(74) \times 10^{-27}$	kg
neutron mass	m_n	$1.674\,927\,351(74) \times 10^{-27}$	kg
electron charge to mass quotient	$-e/m_e$	$-1.758\,820\,088(39) \times 10^{11}$	C kg^{-1}
molar gas constant	R	8.314 4621(75)	J mol^{-1} K^{-1}
Avogadro constant	N_A, L	$6.022\,141\,29(27) \times 10^{23}$	mol^{-1}
Boltzmann constant R/N_A	k	$1.380\,6488(13) \times 10^{-23}$	J K^{-1}
molar volume of ideal gas RT/p			
$T = 273.15$ K, $p = 100$ kPa	V_m	$22.710\,953(21) \times 10^{-3}$	m^3 mol^{-1}
Stefan-Boltzmann constant			
$(\pi^2/60)k^4/\hbar^3c^2$	σ	$5.670\,373(21) \times 10^{-8}$	W m^{-2} K^{-4}
Rydberg constant $\alpha^2 m_e c/2h$	R_∞	10 973 731.568 539(55)	m^{-1}
Bohr radius $4\pi\epsilon_0\hbar^2/m_e e^2$	a_0	$0.529\,177\,210\,92(17) \times 10^{-10}$	m
Bohr magneton $e\hbar/2m_e$	μ_B	$927.400\,968(20) \times 10^{-26}$	J T^{-1}
nuclear magneton $e\hbar/2m_p$	μ_N	$5.050\,783\,53(11) \times 10^{-27}$	J T^{-1}
electron magnetic moment	μ_e	$-928.476\,430(21) \times 10^{-26}$	J T^{-1}
proton magnetic moment	μ_p	$1.410\,606\,743(33) \times 10^{-26}$	J T^{-1}
Newtonian constant of gravitation	G	$6.673\,84(80) \times 10^{-11}$	m^3 kg^{-1} s^{-2}
standard acceleration of gravity	g_n	9.806 65	m s^{-2}
Earth mass	M_E	5.974×10^{24}	kg
Earth radius (volumetric mean)	R_E	6.371×10^6	m
solar luminosity	$L_\odot$	3.846×10^{26}	W
solar mass	$M_\odot$	1.989×10^{30}	kg
solar radius (volumetric mean)	$R_\odot$	6.960×10^8	m
Jupiter mass	M_J	1.899×10^{27}	kg
Jupiter radius (volumetric mean)	R_J	6.991×10^7	m
astronomical unit	au	$1.495\,979 \times 10^{11}$	m
parsec	pc	$3.085\,678 \times 10^{16}$	m