Mathematical Tripos Part IA   E.J. Hinch

Dynamics (C8)   January 1998

Data Sheet

Speed conversion	$1\,\mathrm{mph}$	$=\quad 0.447$	ms^{-1}
Mean gravity on Earth	g	$=\quad 9.81$	ms^{-2}
Gravitational constant	G	$=\quad 6.67 \times 10^{-11}$	$\mathrm{Nm}^2\mathrm{kg}^{-2}$
Mass of Earth	M_E	$=\quad 5.97 \times 10^{24}$	kg
Mass of Sun	M_O	$=\quad 1.99 \times 10^{30}$	kg
Mass of Moon		$=\quad 7.32 \times 10^{22}$	kg
Mean radius of Earth	R_E	$=\quad 6.37 \times 10^6$	m
Mean distance from Sun to Earth	$1\,\mathrm{AU}$	$=\quad 1.495 \times 10^{11}$	m
Mean distance from Moon to Earth		$=\quad 3.84 \times 10^8$	m
Electrical force constant	$\dfrac{1}{4\pi\epsilon_0}$	$=\quad 8.99 \times 10^9$	$\mathrm{Nm}^2\mathrm{C}^{-2}$
Electron charge	e	$=\quad 1.60 \times 10^{-19}$	C
Mass of electron	m_e	$=\quad 9.11 \times 10^{-31}$	kg
Atomic mass unit	$1\,\mathrm{amu}$	$=\quad 1.66 \times 10^{-27}$	kg
Velocity of light	c	$=\quad 2.998 \times 10^8$	ms^{-1}
Planck constant	$\hbar$	$=\quad 1.05 \times 10^{-34}$	Js
Electron-volt	$1\,\mathrm{ev}$	$=\quad 1.60 \times 10^{-19}$	J
Calorie	$1\,\mathrm{Cal}$	$=\quad 4.2 \times 10^3$	J

Air drag on a sphere of radius a m moving at velocity $v\,\mathrm{ms}^{-1}$ is

$$0.87a^2v^2 + 3.1 \times 10^{-4}av \quad \mathrm{N}.$$

Problems with numerical data

The mathematical way of tackle problems with numerical data is to first solve the abstract problem with symbols, and to substitute the values of the numerical data only into the expression for the final answer.

Please notify all errors to `E.J.Hinch@damtp.cam.ac.uk`.