

Physics 40S – Equation Chart

Mechanics

$$\vec{v} = \frac{\Delta \vec{d}}{\Delta t}$$

$$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$$

$$\vec{v}_f = \vec{v}_i + \vec{a}t$$

$$\vec{d} = \left(\frac{\vec{v}_i + \vec{v}_f}{2} \right) \cdot t$$

$$\vec{d} = \vec{v}_i t + \frac{1}{2} \vec{a} t^2$$

$$\vec{v}_f^2 = \vec{v}_i^2 + 2\vec{a}\vec{d}$$

$$\sum \vec{F} = m\vec{a}$$

$$\vec{F}_g = m\vec{g}$$

$$\vec{F}_f = \mu \vec{F}_N$$

$$\vec{F}_c = \frac{m\vec{v}^2}{r}$$

$$\vec{v} = \frac{2\pi r}{T}$$

$$a = \frac{v^2}{R}$$

$$W = \vec{F}\vec{d} \cdot \cos \theta$$

$$E_k = \frac{1}{2} m v^2$$

$$E_g = mgh$$

$$E_s = \frac{1}{2} kx^2$$

$$\vec{F}_s = -k\vec{x}$$

Fields

$$\vec{F}_g = \frac{GMm}{r^2}$$

$$\vec{g} = \frac{Gm_{Earth}}{r^2}$$

$$E_g = -\frac{GMm}{r}$$

$$\vec{F}_e = \frac{kQq}{r^2}$$

$$\vec{F}_e = q\vec{E}$$

$$\vec{E} = \frac{kQ}{r^2}$$

$$\vec{E} = \frac{\Delta V}{d}$$

$$E_e = \frac{kQq}{r}$$

$$V = \frac{E_e}{q}$$

$$E_e = q\vec{E}\Delta d$$

$$V = \frac{kQ}{r}$$

$$\vec{F}_m = \vec{B}I l \cdot \sin \theta$$

$$\vec{F}_m = qv\vec{B} \cdot \sin \theta$$

Electricity

$$Q = I \cdot t$$

$$q = N \cdot e$$

$$V = IR$$

$$R_s = R_1 + R_2 + \dots \quad \frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$$

$$P = \frac{W}{t}$$

$$P = IV = \frac{V^2}{R} = I^2 R$$

$$R = \rho \frac{L}{A}$$

$$\Phi = BA \cos \theta$$

$$\frac{I_p}{I_s} = \frac{V_s}{V_p} = \frac{N_s}{N_p}$$

$$V = -\frac{N\Delta\Phi}{\Delta t}$$

Physics 40S Data Tables

Table of Constants

Gravitational Constant	$G = 6.67 \times 10^{-11} \text{ N} \cdot \text{m}^2 / \text{kg}^2$
Gravitational Acceleration	$g = 9.8 \text{ m/s}^2$
Coulomb's Constant	$k = 9 \times 10^9 \text{ N} \cdot \text{m}^2 / \text{C}^2$
Elementary Charge	$e = 1.60 \times 10^{-19} \text{ C}$
Mass of an Electron	$m_e = 9.11 \times 10^{-31} \text{ kg}$
Mass of a Proton	$m_p = 1.67 \times 10^{-27} \text{ kg}$

Prefixes Table

Factor	Prefix	Symbol
10^9	giga	G
10^6	mega	M
10^3	kilo	k
10^2	centi	c
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p

Solar System Data Table

Object	Mass (kg)	Radius of Object (m)	Orbital Radius (m)	Orbital Period (s)
Sun	1.98×10^{30}	6.95×10^8	NA	NA
Mercury	3.28×10^{23}	2.57×10^6	5.79×10^{10}	7.60×10^6
Venus	4.83×10^{24}	6.31×10^6	1.08×10^{11}	1.94×10^7
Earth	5.98×10^{24}	6.38×10^6	1.49×10^{11}	3.16×10^7
Mars	6.37×10^{23}	3.43×10^6	2.28×10^{11}	5.94×10^7
Jupiter	1.90×10^{27}	7.18×10^7	7.78×10^{11}	3.74×10^8
Saturn	5.67×10^{26}	6.03×10^7	1.43×10^{12}	9.30×10^8
Uranus	8.80×10^{25}	2.67×10^7	2.87×10^{12}	2.66×10^9
Neptune	1.03×10^{26}	2.48×10^7	4.50×10^{12}	5.20×10^9
Pluto	6.00×10^{23}	3.00×10^6	5.90×10^{12}	7.82×10^9
Moon	7.34×10^{22}	1.74×10^6	3.80×10^8	2.36×10^6