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Physics Equations & Answers (Quick Study Academic)

BASICS			FUNDAMENTAL PHYSICAL CONSTANTS			CONVERSION FACTORS AND ALTERNATE UNITS	
Base Units	Symbol	Unit	Base Units	Symbol	Unit	Unit	Description
Length	L, l	Meter - m	Mass of electron	m_e	9.11×10^{-31} kg	Angle	degrees $360^\circ = 2\pi$ rad
Mass	m, M	Kilogram - kg	Mass of proton	m_p	1.67×10^{-27} kg	Energy	Eq. $1 \text{ J} = 1 \text{ kg m}^2/\text{s}^2$
Temperature	T	Kelvin - K	Avogadro Constant	N_A	$6.02 \times 10^{23} \text{ mol}^{-1}$	Energy	Eq. $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$
Time	t	Second - s	Elementary charge	e	$1.60 \times 10^{-19} \text{ C}$	Energy	Electron Volt $1 \text{ eV} = 1.60 \times 10^{-19} \text{ J}$
Electric Current	I	Ampere - A, C/s	Faraday constant	F	$96,485 \text{ C/mol}$	Force	Eq. $1 \text{ N} = 1 \text{ kg m/s}^2$
Derived Units	Symbol	Unit	Speed of light	c	$3 \times 10^8 \text{ m/s}$	Volume	Eq. $1 \text{ m}^3 = 10^6 \text{ L}$
Acceleration	a	m/s^2	Molar Gas Constant	R	$8.314 \text{ J mol}^{-1} \text{ K}^{-1}$	Pressure	Eq. $1 \text{ Pa} = 1 \text{ N/m}^2$
Ang. Accel.	α	rad/s^2	Boltzmann Constant	k	$1.38 \times 10^{-23} \text{ J/K}$	Length	Angstrom $1 \text{ \AA} = 10^{-10} \text{ m}$
Ang. Momentum	L	$\text{kg m}^2/\text{s}$	Gravitational Constant	G	$6.67 \times 10^{-11} \text{ m}^3/\text{kg s}^2$		
Ang. Velocity	ω	rad/s	Permeability of Space	μ_0	$4\pi \times 10^{-7} \text{ N/A}^2$		
Angle	θ	radian	Permittivity of Space	ϵ_0	$8.85 \times 10^{-12} \text{ C}^2/\text{N m}^2$		
Capacitance	C	Farad F (C/V)					
Charge	Q, q	Coulomb C (A s)					
Density	ρ	kg/m^3					
Displacement	x, d, s	meter - m					
Electric Field	E	V/m					
Electric Flux	Φ_E	V m					
Electromotive Force (EMF)	$\mathcal{E}$	Volt - V					
Energy	E, U, K	Joule (kg m ² /s ²)					
Entropy	S, k	J/K					
Force	F	Newton - N (kg m/s ²)					
Frequency	f, ν	Hertz - Hz (cycles/s)					
Heat	Q	Joule - J					
Magnetic Field	B	Tesla (N/A m)					
Magnetic Flux	Φ_B	Weber (kg m ² /A s ²)					
Moment	μ	J/T					
Momentum	p	kg m/s					
Power	P	Watt - W (J/s)					
Pressure	P	Pascal - Pa (N/m ²)					
Resistance	R	Ohm (Ω) (V/A)					
Temperature	T	Kelvin - K					
Velocity	v	m/s					
Volume	V	m ³					
Wavelength	λ	meter - m					
Work	W	Joule - J (N m)					

MATHEMATICAL CONCEPTS	
1. Vector Algebra a. Vector: Directed line segment having magnitude and direction. b. Unit vector: A vector of unit length in the direction of a vector A. c. Length of A: $ A = \sqrt{A_x^2 + A_y^2}$ d. Addition of vectors A & B: add components. $A + B = (A_x + B_x, A_y + B_y)$ e. Sample Addition and Length Calculations: $A = 3\hat{i} + 4\hat{j}$, $B = 2\hat{i} + 3\hat{j}$ $A + B = 5\hat{i} + 7\hat{j}$ $ A + B = \sqrt{5^2 + 7^2} = \sqrt{74} \approx 8.6$ f. Subtraction: $A - B = (A_x - B_x, A_y - B_y)$ $A - B = \hat{i} - 1\hat{j} = \hat{i} - \hat{j}$ $ A - B = \sqrt{1^2 + 1^2} = \sqrt{2} \approx 1.4$ g. Dot Product: $A \cdot B = A B \cos\theta$ $A \cdot B = (3\hat{i} + 4\hat{j}) \cdot (2\hat{i} + 3\hat{j}) = 6 + 12 = 18$ $\cos\theta = \frac{A \cdot B}{ A B } = \frac{18}{5 \times \sqrt{13}} \approx 0.8$ $\theta \approx 37^\circ$ h. Cross Product: $A \times B = A B \sin\theta \hat{n}$ $A \times B = (3\hat{i} + 4\hat{j}) \times (2\hat{i} + 3\hat{j}) = 13\hat{k}$ i. Right-hand rule: gives the direction of the cross product.	2. Trigonometry a. Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ b. Cosine rule: $c^2 = a^2 + b^2 - 2ab\cos C$ c. Area of triangle: $\frac{1}{2}ab\sin C$ d. Double angle formulas: $\sin 2\theta = 2\sin\theta\cos\theta$ $\cos 2\theta = \cos^2\theta - \sin^2\theta$ e. Half angle formulas: $\sin \frac{\theta}{2} = \pm \sqrt{\frac{1 - \cos\theta}{2}}$ $\cos \frac{\theta}{2} = \pm \sqrt{\frac{1 + \cos\theta}{2}}$ f. Sum and difference formulas: $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$ $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$ g. Addition of sine waves: $y_1 = A_1 \sin(\omega t + \phi_1)$ $y_2 = A_2 \sin(\omega t + \phi_2)$ $y = A \sin(\omega t + \phi)$ $A = \sqrt{A_1^2 + A_2^2 + 2A_1A_2\cos(\phi_2 - \phi_1)}$ $\phi = \tan^{-1} \frac{A_1 \sin\phi_1 + A_2 \sin\phi_2}{A_1 \cos\phi_1 + A_2 \cos\phi_2}$



Synopsis

Essential tool for physics laws, concepts, variables and equations, including sample problems, common pitfalls and helpful hints.

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This study guide is a nice reference to have in my backpack for physics class. Seeing examples of mathematical concepts and theories really helps me learn the material, and the pamphlet format of these study guides is convenient and accessible for referencing when needed.

BarCharts are a great little reference. I would not recommend them as a study aid, but as a quick reference, they are great! I have used them for Chem, Physics, Electronics and Math. They are great for what they are.

Well made and designed.

GREAT

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