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Physics Equations & Answers (Quick Study Academic)

BASICS			FUNDAMENTAL PHYSICAL CONSTANTS			CONVERSION FACTORS AND APPROXIMATE VALUES	
Base Units	Symbol	Unit	Base Units	Symbol	Unit	Unit	Description
Length	L	Meter (m)	Mass of electron	m_e	9.1×10^{-31} kg	Angle	Radians $180^\circ = \pi$ rad
Mass	M	Kilogram (kg)	Mass of proton	m_p	1.67×10^{-27} kg	Energy	Erg $1 \text{ erg} = 10^{-7} \text{ J}$
Temperature	T	Kelvin (K)	Avogadro Constant	N_A	$6.02 \times 10^{23} \text{ mol}^{-1}$	Energy	Erg $1 \text{ erg} = 10^{-7} \text{ J}$
Time	t	Second (s)	Elementary charge	e	$1.602 \times 10^{-19} \text{ C}$	Energy	Electron Volt $1 \text{ eV} = 1.602 \times 10^{-19} \text{ J}$
Theory Constant	ϵ	Ampere (A) (C/s)	Faraday constant	F	$96,485 \text{ C/mol}$	Force	Dyne $1 \text{ dyne} = 10^{-5} \text{ N}$
Derived Units	Symbol	Unit	Speed of light	c	$3 \times 10^8 \text{ m/s}$	Force	Dyne $1 \text{ dyne} = 10^{-5} \text{ N}$
Acceleration	a	m/s^2	Molar Gas Constant	R	$8.314 \text{ J/mol}^\circ\text{K}$	Pressure	Dyn $1 \text{ dyn} = 10^{-5} \text{ Pa}$
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	$8.85 \times 10^{-12} \text{ F/m}$		
Capacitance	C	Farad (F) (C/V)					
Charge	Q	Coulomb (C) (A s)					
Density	ρ	kg/m^3					
Displacement	s	meter (m)					
Electric Field	E	V/m					
Electric Flux	Φ_E	$\text{N m}^2/\text{C}$					
Electromotive Force (EMF)	\mathcal{E}	Volt (V)					
Energy	E	Joule (J) (kg m ² /s ²)					
Entropy	S	J/K					
Force	F	Newton (N) (kg m/s ²)					
Frequency	f	Hertz (Hz) (s ⁻¹)					
Heat	Q	Joule (J)					
Magnetic Field	B	Tesla (T) (N/A m)					
Magnetic Flux	Φ_B	Weber (Wb) (T m ²)					
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)					
Volume	V	m ³					
Wavelength	λ	meter (m)					
Work	W	Joule (J) (N m)					

MATHEMATICAL CONCEPTS	
1. Vector Algebra a. Vector: Directed line segment (starting at i , ending at j) b. Vector: $\vec{A} = A_x \hat{i} + A_y \hat{j} + A_z \hat{k}$ c. Length of $\vec{A} = \sqrt{A_x^2 + A_y^2 + A_z^2}$ d. Addition of vectors: $\vec{A} + \vec{B} = (A_x + B_x)\hat{i} + (A_y + B_y)\hat{j} + (A_z + B_z)\hat{k}$ e. Sample Addition and Length Calculations: $\vec{A} = 3\hat{i} + 4\hat{j}$, $\vec{B} = 2\hat{i} + 3\hat{j}$ $\vec{A} + \vec{B} = 5\hat{i} + 7\hat{j}$ $ \vec{A} + \vec{B} = \sqrt{5^2 + 7^2} = \sqrt{74} \approx 8.6$ f. Dot product: $\vec{A} \cdot \vec{B} = A_x B_x + A_y B_y + A_z B_z$ g. Angle between \vec{A} and \vec{B} : $\cos \theta = \frac{\vec{A} \cdot \vec{B}}{ \vec{A} \vec{B} }$ h. Cross product: $\vec{A} \times \vec{B} = (A_y B_z - A_z B_y)\hat{i} + (A_z B_x - A_x B_z)\hat{j} + (A_x B_y - A_y B_x)\hat{k}$ i. Right-hand rule: gives the direction of $\vec{A} \times \vec{B}$	2. Trigonometry a. Sine: $\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$ b. Cosine: $\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$ c. Tangent: $\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$ d. Pythagorean Identity: $\sin^2 \theta + \cos^2 \theta = 1$ e. Sum and Difference Formulas: $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$ $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$ f. Double Angle Formulas: $\sin 2\theta = 2 \sin \theta \cos \theta$ $\cos 2\theta = \cos^2 \theta - \sin^2 \theta$ g. Half Angle Formulas: $\sin \frac{\theta}{2} = \pm \sqrt{\frac{1 - \cos \theta}{2}}$ $\cos \frac{\theta}{2} = \pm \sqrt{\frac{1 + \cos \theta}{2}}$ h. Area of Triangle: $A = \frac{1}{2} ab \sin C$ i. Law of Sines: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ j. Law of Cosines: $c^2 = a^2 + b^2 - 2ab \cos C$



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.

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pricey though.

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