AP Physics 2: Algebra-Based Cheat Sheet

Practice AP Physics

Unit 1: Fluids

- **Density:** $(rho = \frac{m}{V})$ m = mass, V = volume
- **Pressure:** P = $(\frac{F}{A})$ F = force, A = area
- **Pascal's Principle:** $P_1 = P_2$ (Pressure applied at any point in an incompressible fluid is transmitted undiminished)
- **Continuity Equation:** ($A1v_1 = A2v_2$)A = cross-sectional area, v = fluid velocity
- **Bernoulli's Equation:** $(P_1 + \frac{1}{2}\rho v_1^2 + \rho g h_1 = P_2 + \frac{1}{2}\rho v_2^2 + \rho g h_2)$
- **Archimedes' Principle:** Fb = pfluid .$V_{aisrespect}$. g
- F_6 = buoyant force

Additional Notes:

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Unit 2: Thermodynamics

- **Temperature Conversion:** T(K)=T(°C)+273.15
- **Ideal Gas Law:** PV=nRTP = pressure, V = volume, n = number of moles, R = ideal gas constant, T = temperature
- **Kinetic Theory:** $(frac32k_BT = \frac{1}{2}mv_{rms}^2)$
- **First Law of Thermodynamics:** ΔU = Q - WQ = heat added, W = work done by the system
- **Heat Transfer:** Q=mcΔTQ = heat, m = mass, c = specific heat, ΔT = change in temperature
- **Heat Engine Efficiency:** $(\eta = \frac{W_{out}}{Q_{in}})$

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Unit 3: Electric Force, Field, and Potential

- **Coulomb's Law:** $(F_e = k_e \frac{|q_1 q_2|}{r^2})$
- ke = 8.9 x 1109x Mcm2
- **Electric Field:** $(E = \frac{F_e}{q} = k_e \frac{|q|}{r^2})$
- **Electric Potential Energy:** $(U = k_e \frac{q_1 q_2}{r})$
- **Electric Potential:** $(V = \frac{U}{q} = k_e \frac{q}{r})$
- **Capacitance:** $(C = \frac{Q}{V})$
- Q = charge, V = voltage
- **Parallel Plate Capacitor:** $(C = \frac{\epsilon_0 A}{d})$
- ϵ_0 = permittivity of free space, A = area, d = separation between plates

Additional Notes:

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Unit 4: Circuits

- **Ohm's Law:** V = IRV = voltage, I = current, R = resistance
- **Resistors in Series:** $R_eq = R_1 + R_2 + ...$
- **Resistors in Parallel:** $(\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots)$
- **Power:** $(P = IV = I^2R = \frac{V^2}{R})$
- **Kirchhoff's Rules:Junction Rule:** $\Sigma I_{in} = \Sigma_{out}$
- **Loop Rule:** $\Sigma\Delta v = 0$
- **Capacitors in Series:** $(\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2} + \cdots)$
- **Capacitors in Parallel:** $C_eq = C_1 + C_2 + ...$

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Unit 5: Magnetism & Electromagnetic Induction

- **Magnetic Force on a Charge:** F_8 = qvBsinθ

  q = charge, v = velocity, B = magnetic field

- **Magnetic Force on a Wire:** F_8 = ILBsinθ

  I = current, L = length of wire, B = magnetic field

- **Ampère's Law:** $(\oint \vec{B} \cdot d\vec{l} = \mu_0 I_{enc})$
- **Faraday's Law:** $(\mathcal{E} = -\frac{d\Phi_B}{dt})$

  Φ_6 = magnetic flux

- **Lenz's Law:** The induced emf always opposes the change in magnetic flux
- **Inductance:** $(V = L\frac{dI}{dt})$

Additional Notes:

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Unit 6: Geometric & Physical Optics

- **Snell's Law:** $n_1 \sin\theta_1 = n_2 \sin\theta_2$
- **Lens/Mirror Equation:** $(\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i})$
- **f =** focal length**, do =** object distance**, di =** image distance
- **Magnification:** $(M = -\frac{d_i}{d_o})$
- **Critical Angle:** $(\sin\theta_c = \frac{n_2}{n_1})(fortotalinternalreflection)$
- **Young's Double-Slit Experiment:** $(x = \frac{\lambda L}{d})$
- **x =** fringe spacing**, λ =** wavelength, **L** = distance to screen, **d** = slit separation
- **Diffraction Grating:** $d\sin\theta = m\lambda d$
- mmm = order of diffraction

Additional Notes:

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Unit 7: Quantum, Atomic, & Nuclear Physics

- **Photon Energy:** $(E = hf = \frac{hc}{\lambda})$
- $(h = 6.626 \times 10^{-34}) J \cdot s (Planck's constant)$
- **Photoelectric Effect:** K_{max} = hf - θ
- **de Broglie Wavelength:** $(\lambda = \frac{h}{p})$

  ppp = momentum
- **Heisenberg Uncertainty Principle:** $(\Delta x \cdot \Delta p \geq \frac{h}{4\pi})$
- **Radioactive Decay:** $N(t) = N_0 e^{-yT}$
- λ=decay constant
- **Mass-Energy Equivalence:** $E = mc^2$

Additional Notes: