AP Physics C – Table of Friends – Electricity & Magnetism

Name:	symbol:	Units (SI):	Equation(s)
Charge	Q	Coulomb, C	$Q = ne$
Electric Field	E	N/C (or V/m)	$E = F_e/q$ & $E = \frac{kq}{r^2}$
Electric Flux	Φ_E	$N \cdot m^2/C$ or $(V \cdot m)$	$\Phi_E = \oint E \cdot dA = q_{in}/\varepsilon_\circ$
Potential Difference	ΔV	Volts (J/C)	$\Delta V = \frac{\Delta U_e}{q}$ & $\Delta V = k\int \frac{dq}{r}$ & $\Delta V = -Ed$
Capacitance	C	Farad, F (C/V)	$C = \frac{Q}{\Delta V} = \frac{\kappa \varepsilon_\circ A}{d}$ $C_s = \left(\frac{1}{C_1} + \frac{1}{C_2}\right)^{-1}$ & $C_p = C_1 + C_2$
Current	I	Ampere, A (C/s)	$I = \frac{dq}{dt} = nqv_d A$
Resistance	R	Ohms, Ω (V/A)	$\Delta V = IR$ & $R_s = R_1 + R_2$ & $R_p = \left(\frac{1}{R_1} + \frac{1}{R_2}\right)^{-1}$
Resistivity	ρ	Ω·m	$R = \rho \ell / A$
Power (electrical)	P	Watts, W (J/s)	$P = I\Delta V = I^2 R = \frac{(\Delta V)^2}{R}$
Time Constant	τ	sec $(\Omega \cdot F)$ & $\left(\frac{H}{\Omega}\right)$	$\tau = RC$ & $\tau = \frac{L}{R}$ (time for a percentage change of 63.2%)
Magnetic Field	B	Tesla, T $\left(\frac{N}{A \cdot m}\right)$	$F_B = q\vec{v} \times \vec{B} = q\vec{v}\vec{B}\sin\theta$ $F_B = q\vec{\ell} \times \vec{B} = I\vec{\ell}\vec{B}\sin\theta$
Magnetic Flux	Φ_B	Weber, Wb $(T \cdot m^2)$	$\Phi_B = \int \vec{B} \cdot d\vec{A} = \vec{B}\vec{A}\cos\theta$
Inductance	L	Henry, H $(V \cdot s/A)$	$L = \frac{N\Phi_B}{I}$ (solenoid) & $\varepsilon_L = -L\frac{dI}{dt}$ & $U_L = \frac{1}{2}LI^2$

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