AP Physics Cheat Sheet*

Mechanics

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

$$a_\mathrm{c} = \frac{4\pi^2 r}{T^2}$$

$$v_\mathrm{escape} = \sqrt{\frac{2Gm_1}{r_\mathrm{i}}}$$

Electricity

$$E_\mathrm{sheet} = \frac{\sigma}{2\varepsilon_0}$$

$$E_\mathrm{rod} = \frac{\lambda}{2\pi\varepsilon_0 r}$$

Magnetism

$$B = \frac{\mu_0}{4\pi}\frac{qv}{r^2}\sin\theta$$

$$B_\mathrm{int} = \frac{\mu_0 I}{2\pi r}$$

$$\mathcal{E}_\mathrm{motion} = B\ell v$$

$$L = \frac{N\Phi}{I}$$

RC circuit (charging)

$$\tau = RC$$

$$V = V_\mathrm{f}\left(1 - e^{-t/\tau}\right)$$

$$Q = Q_\mathrm{f}\left(1 - e^{-t/\tau}\right)$$

$$I = I_\mathrm{i}\, e^{-t/\tau}$$

RL circuit (closing switch)

$$\tau = \frac{L}{R}$$

$$V = V_\mathrm{i}\, e^{-t/\tau}$$

$$I = I_\mathrm{f}\left(1 - e^{-t/\tau}\right)$$

LC circuit

$$\omega = \frac{1}{\sqrt{LC}}$$

$$Q = Q_\mathrm{i}\cos(\omega t)$$

$$T = 2\pi\sqrt{LC}$$

Units

$\mathrm{N} = \mathrm{kg\,m/s^2}$

$\mathrm{J} = \mathrm{N\,m} = \mathrm{kg\,m^2/s^2}$

$\mathrm{W} = \mathrm{J/s} = \mathrm{kg\,m^2/s^3}$

$\mathrm{C} = \mathrm{A\,s}$

$\mathrm{A} = \mathrm{C/s}$

$\mathrm{V} = \mathrm{J/C} = \mathrm{kg\,m^2\,s^{-3}\,A^{-1}}$

$\Omega = \mathrm{V/A} = \mathrm{kg\,m^2\,s^{-3}\,A^{-2}}$

$\mathrm{F} = \mathrm{C/V} = \mathrm{s^4\,A^2\,m^{-2}\,kg^{-1}}$

$\mathrm{T} = \mathrm{N/A/m} = \mathrm{kg\,s^{-2}\,A^{-1}}$

$\mathrm{Wb} = \mathrm{T\,m^2} = \mathrm{kg\,m^2\,s^{-2}\,A^{-1}}$

$\mathrm{H} = \mathrm{Wb/A} = \mathrm{kg\,m^2\,s^{-2}\,A^{-2}}$