Physics Quiz Equation Sheet

Electrostatics

$$F = k\,\frac{q_1 q_2}{r^2}$$

$$E = \frac{F}{q}$$

$$E = k\,\frac{q}{r^2} \qquad \text{(point charge)}$$

$$E = \frac{\sigma}{\varepsilon_0}, \qquad \sigma = \frac{q}{A} \qquad \text{(parallel-plate capacitor)}$$

$$\Phi_E = \sum_{\text{faces}} E_i A_i \cos\theta_i \;=\; \frac{q_{\text{enc}}}{\varepsilon_0}$$

Electric Potential / Energy

$$\Delta V = \frac{\Delta U}{q} \;=\; -\frac{W}{q}$$

$$\Delta U = k\,\frac{q_1 q_2}{r}$$

$$\Delta V = k\,\frac{q}{r} \qquad \text{(point charge)}$$

$$E = -\frac{\Delta V}{\Delta x}$$

Capacitors

$$C = \frac{q}{\Delta V}$$

$$C = \frac{\kappa \epsilon_0 A}{d}$$

$$\text{Energy} = \frac{1}{2} q \Delta V = \frac{1}{2} C \Delta V^2 = \frac{1}{2}\frac{q^2}{C}$$

$$P = \frac{\text{Energy}}{t}$$

Constants

$$e = 1.6 \times 10^{-19}\,\text{C}$$

$$k = 9 \times 10^{9}\,\text{N}\,\text{m}^2/\text{C}^2 \;=\; \frac{1}{4\pi\varepsilon_0}$$

$$\varepsilon_0 = 8.85 \times 10^{-12}\,\text{C}^2/(\text{N}\,\text{m}^2)$$