Permittivity of free space: $\epsilon_0 = 8.854 \times 10^{-12}$ — Proton mass: $1.673 \cdot 10^{-27}$
Elementary charge: $e = 1.602 \cdot 10^{-19}$ — Electron mass: $9.11 \cdot 10^{-31}$
Speed of light: $c = 3 \cdot 10^8$ — Permeability constant: $\mu_0 = 1.26 \times 10^{-6}$
$k = 9 \times 10^9$

$$\lambda = \frac{Q}{L} \quad \eta = \frac{Q}{A} \quad \rho = \frac{Q}{V}$$

Point

$$E = \frac{kq}{r^2} \quad F = qE = \frac{kq_1 q_2}{r^2} \quad V = \frac{kq}{r} \quad U = qV = \frac{kq_1 q_2}{r} \qquad \text{(point)}$$

$$E_{\text{wire}} = \frac{2k|\lambda|}{r} = \frac{2kQr^2}{R^3 L} \quad E_{\text{plane}} = \frac{\eta}{2\epsilon_0} \quad E_{\text{ring}} = \frac{kzQ}{(z^2 + r^2)^{3/2}}$$

$$E_{\text{disk}} = \frac{\eta}{2\epsilon_0}\left(1 - \frac{z}{\sqrt{z^2 + R^2}}\right)$$

Sphere

$$E = \begin{cases} \frac{kQ}{r^2} & \text{for } r >= R \\ \frac{kQr}{R^3} & \text{for } r < R \end{cases}$$

Dipole

$$p = qd \quad E = -\frac{2kp}{r^3}\text{(on axis)} \quad E = -\frac{kp}{r^3}\text{(on bisecting plane)}$$

$$\tau = pE \sin\theta \quad V = -pE\cos\theta$$

Parallel-Plate Capcitor

$$E = \frac{V}{d} = \frac{Q}{\epsilon_0 A}\text{(positive to negative plate)}$$

$$s = \text{distance from negative plate} \quad U = qEs \quad V = \frac{s}{d}\Delta V_C$$

$$\Phi_{\text{enc}} = EA = \frac{Q_{\text{in}}}{\epsilon_0} \quad E_{\text{conductor surface}} = \frac{\eta}{\epsilon_0}$$

$$W = -q\Delta V \quad \Delta V = -Ed \quad V_{\text{sphere}} = \frac{4}{3}\pi r^3 \quad A_{\text{sphere}} = 4\pi r^2$$