Coulomb's law

$$F = k\frac{qQ}{r^2}$$

Electric Field

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

Field of a point charge

$$E = k\frac{Q}{r^2}$$

Electric field inside a capacitor

$$E = \frac{\eta}{\varepsilon_0}$$

Principle of superposition

$$\vec{E}_{net} = \sum_{i=1}^{N} \vec{E}_i$$

Electric flux

$$\Phi_E = \int \vec{E} \cdot d\vec{A}$$

Gauss's law

$$\Phi_E = \oint \vec{E} \cdot d\vec{A} = \frac{Q_{in}}{\varepsilon_0}$$

Electric potential

$$V = \frac{U}{q}$$

$$\Delta V = V_f - V_i = -\int_i^f \vec{E} \cdot d\vec{s}$$

$$E_x = -\frac{dV}{dx};\ E_y = -\frac{dV}{dy}$$

For a point charge $V(r) = \frac{1}{4\pi\varepsilon_0}\frac{Q}{r}$

For a paralle-plate capacitor

$$V = Es$$

Potential Energy

$$U = qV$$

Two point charges

$$U = k\frac{qQ}{r}$$

Capacitors

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

Parallel-plate $C = \varepsilon_0 \frac{A}{d}$

Capacitors connected in parallel

$$C_{eq} = C_1 + C_2 + \cdots$$

Capacitors connected in series

$$\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2} + \cdots$$

Constants

Proton/Electron charge value

$e = \pm 1.60 \cdot 10^{-19}\ C$

Electron mass

$m = 9.11 \cdot 10^{-31}\ kg$

Proton mass $m = 1.67 \cdot 10^{-27}\ kg$

Permittivity of free space

$$\varepsilon_0 = 8.85 \cdot 10^{-12}\ C^2/Nm^2$$

$$k = 8.99 \cdot 10^{9}\ Nm^2/C^2$$

Kinematic eq-ns with const. accel:

$v(t) = v_{0x} + at$

$x(t) = x_0 + v_{0x}t + (1/2)\,at^2$

$v^2 = v_{0x}^2 + 2a(x - x_0)$

Misc Formulas:

Circumference of a circle = $2\pi R$

Area of a circle = πR^2

Surface Area of a Sphere = $4\pi R^2$

Volume of sphere = $(4/3)\pi R^3$

Volume of cylinder = $\pi R^2 L$

Right triangle:

$\sin\theta = a/c$

$\cos\theta = b/c$

$\tan\theta = a/b$

$c^2 = a^2 + b^2$