$$\vec{F} = \frac{k q_1 q_2}{r_{12}^2} \hat{r}_{12} = \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r_{12}^2} \hat{r}_{12}$$

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

$$\oint \vec{E} \cdot d\vec{A} = \frac{Q_{encl}}{\epsilon_0}$$

$$E_S = -dV/ds$$

$$V = W/q$$

$$V_{pt\,chg} = \frac{kq}{R}$$

$$\vec{F} = \int_{vol} \frac{k q\, dQ}{r^2} dr\, \hat{r}$$

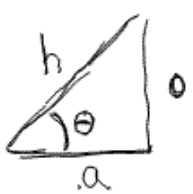
$$V = \int_{vol} \frac{k\, dQ}{r}$$

Sphere: $A = 4\pi r^2$

$V = 4/3\, \pi r^3$

cylinder: $A = 2\pi r L + 2\pi r^2$

$V = \pi r^2 L$



$\sin\theta = O/h$

$\cos\theta = a/h$

$\tan\theta = O/a$

Const. Accel.

$$\begin{cases} v = v_0 + at \\ x = x_0 + v_0 t + \frac{1}{2} a t^2 \\ v^2 = v_0^2 + 2a(x - x_0) \\ x^2 = x_0 + \frac{1}{2}(v_0 + v)\, t \end{cases}$$

$$a_c = \frac{mv^2}{R}$$

$$S = R\theta$$

$$KE = \frac{1}{2} m v^2$$

$$PE_{spring} = \frac{1}{2} k x^2$$

$$\int u^n du = \frac{u^{n+1}}{n+1}$$

$$\int \frac{du}{u} = \ln|u|$$

$$\int e^u du = e^u$$

$$\int \frac{x\, dx}{\sqrt{x^2 + a^2}} = \sqrt{x^2 + a^2}$$