Electric Charge

q = electric charge, that which creates electric force of attraction or repulsion
Unit = 1 coulomb or 1 C

$$|\vec{F}_{\text{electric}}| = \frac{k|q_1||q_2|}{r^2}$$

$\vec{F}_{\text{electric}}$ is conservative

Electric Fields

Units: N/C

$$\vec{E} = \frac{kq}{r^2} = \frac{F}{q}$$

Uniform $\vec{E}$ fields:
- All lines parallel
- $|\vec{E}|$ is same everywhere

Line Charge

λ = linear charge density $\lambda = \dfrac{q}{L} = \dfrac{dq}{dL}$

Horizontal Line Charge:

$E_x = 0$

$$E_y = \frac{k\lambda L}{y\sqrt{\frac{L^2}{4} + y^2}} = \frac{kq}{y\sqrt{\frac{L^2}{4} + y^2}}$$