Field:

A field of force exists in a region of space when an appropriate object placed at any point in the field experiences a force.

Electric Field:

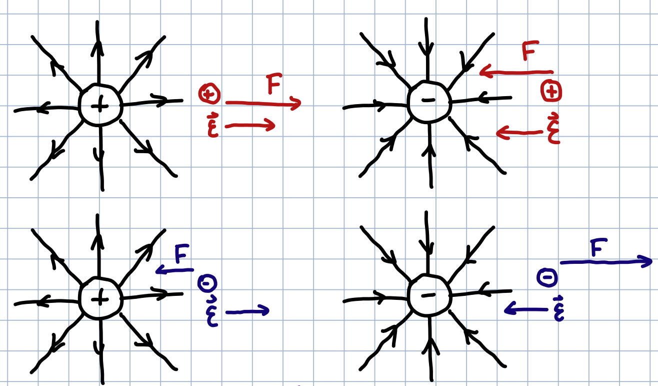
A region of space around a charged object that causes another charged object to experience a force within that space.

Electric field strength: $\vec{\varepsilon}$

Predict: What happens if you drop a point charge within the field of another charged object?

a) positive point charge $+$

b) negative point charge $-$



$\vec{\varepsilon}$:

$\vec{\varepsilon} = \frac{F}{q} \quad \left(\frac{N}{C}\right)$

charge dropped into the field

units

$\vec{\varepsilon} = \dfrac{\frac{k q_1 q_{field}}{r^2}}{q}$

charge of object generating field

distance from field source

$\vec{\varepsilon} = \frac{k q_{field}}{r^2}$

$\vec{\varepsilon} = \frac{kq}{r^2}$

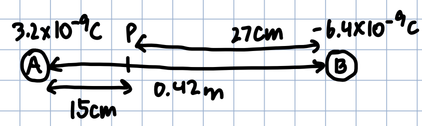
Example 1:

a) What is the electric field 0.6m away from a small sphere with a positive charge of 1.2x10^-8 C

$$\vec{E} = \frac{kq}{r^2} = \frac{9\times10^9 \cdot 1.2\times10^{-8}}{0.6^2} = 300\ \frac{N}{C}$$

Example 2:

Two charges, one 3.2x10^-9 C, the other -6.4x10^-9 C are 42 cm apart. Calculate the net electric field at point p, 15 cm from the positive charge, on the line connecting the charges.



$$\vec{E}_{AP} = \frac{kq_A}{r_{AP}} = \frac{9\times10^9(3.2\times10^{-9})}{0.15^2} = 1280\ \frac{N}{C}\ [R]$$

$$\vec{E}_{Bp} = \frac{kq_B}{r_{Bp}} = \frac{9\times10^9(6.4\times10^{-9})}{0.27^2} = 790.12\ \frac{N}{C}\ [R]$$

$$\vec{E}_{Netp} = \vec{E}_{AP} + \vec{E}_{Bp} = 2070.12\ \frac{N}{C}\ [R]$$

Example 3:

A positive charge of 2x10^-8 C experiences an electric force of magnitude 1.5N [L]. What is the electric field at that point?

$q = 2\times10^{-8} C$

$F = 1.5N\ [L]$

$$\vec{E} = \frac{F}{q} = \frac{1.5}{2\times10^{-8}} = 7.5\times10^{7}\ \frac{N}{C}\ [L]$$

Capacitor: