Chapter 14 - Fields + Forces

§14-1 Laws of Force

Coulomb found that $F_Q \propto q_1$

$F_Q \propto q_2$

$F_Q \propto \frac{1}{r^2}$ ← inverse squared relationship (like for F_g)

Combine: $F_Q \propto \frac{q_1 q_2}{r^2}$

$$F_Q = \frac{k q_1 q_2}{r^2}$$

where F_Q is the electrostatic force (N)

q_1 and q_2 are electric charges (C) (magnitude) ↑ coulomb

r is the separation (m)

k is $9.0 \times 10^9 \frac{N \cdot m^2}{C^2}$ (coulomb's Law constant)

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$q_1 = -8.0 \mu C$ (10^{-6})

$q_2 = 5.0 \mu C$ (± ??)

$F_Q = 0.50 N$ (attractive)

$r = ?$

a) the sign of q_2 must be + since there is an attractive force

b) $F_Q = \frac{k q_1 q_2}{r^2}$

$r^2 = \frac{k q_1 q_2}{F_Q}$

do not put signs on charges.

$r^2 = \frac{\left(9.0 \times 10^9 \frac{N \cdot m^2}{C^2}\right)\left(8.0 \times 10^{-6} C\right)\left(5.0 \times 10^{-6}\right)}{0.50 N}$

$r^2 = 0.72$

$r \doteq 0.85 m$

TO DO

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