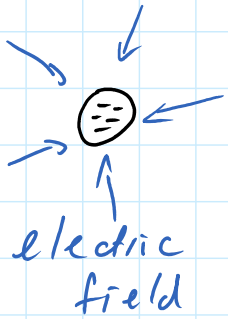
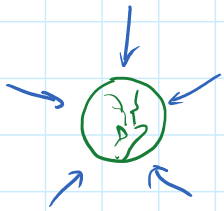
Electric Field and Force

Wednesday, November 29, 2017 9:05 AM



electric field



grav. field

$g = \frac{Gm}{r^2}$ $\quad 6.67\times10^{-11}\ \frac{N\cdot m^2}{kg^2}$ $\quad N/kg$

$\bar{E} = \frac{kQ}{r^2}$

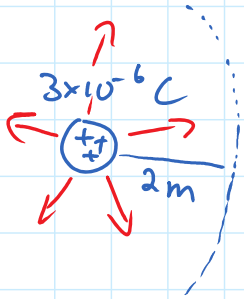
Units N/C

K - Coulomb's constant $= 9\times10^9\ \frac{N\cdot m^2}{C^2}$

Q - charge on the object

r - distance from charge

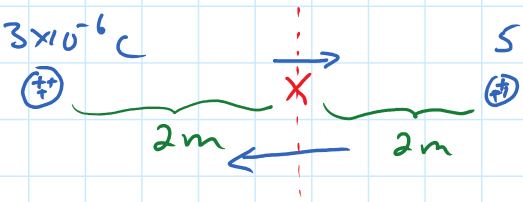
Ex



$\bar{E} = \frac{kQ}{r^2} = \frac{(9\times10^9\ \frac{N\cdot m^2}{C^2})(3\times10^{-6}\ C)}{2^2\ m^2}$

$= 6.75\times10^3\ N/C$

Ex



Find the $\bar{E}$ field at X.

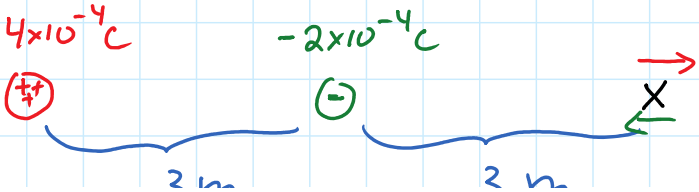
$\bar{E}_1 = 6.75\times10^3\ N/C$ (right)

$E_2 = \frac{(9\times10^9)(5\times10^{-6})}{2^2} = 11.25\times10^3\ N/C = 1.125\times10^4\ N/C$ (left)

$11.25\times10^3 - 6.75\times10^3$

$4.5\times10^3\ N/C$ (left)

Ex



Find $\bar{E}$ Field at X

$E = \frac{(9\times10^9)(4\times10^{-4})}{6^2}$

$= 1\times10^{+5}\ N/C$

$E_2 = \frac{(9\times10^9)(2\times10^{-4})}{3^2}$

$= 2\times10^5\ N/C$

$1\times10^5\ N/C$ (left)

3 km

3×10^3 m

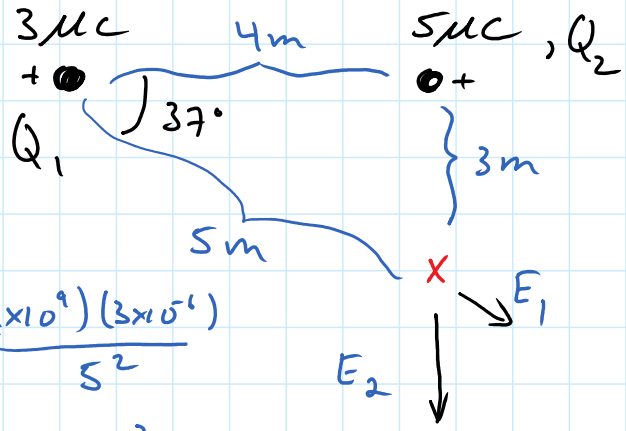
3×10^{-2} m

3 cm

5×10^{-6} C

μ

Ex



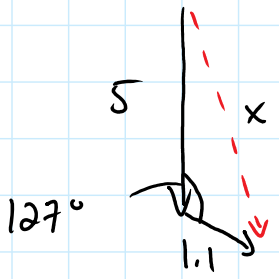
E field at x

$E_1 = \frac{(9\times10^9)(3\times10^{-6})}{5^2}$

$= 1.08\times10^3\ N/C$

$E_2 = \frac{(9\times10^9)(5\times10^{-6})}{3^2}$

$= 5.0\times10^3\ N/C$



$x^2 = (1.1)^2 + 5^2 - 2(1.1)(5)\cos 127$

$=$

$x = 5.73\times10^3\ N/C$