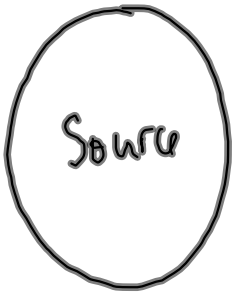
Fields near point sources

Electric force $F_Q = \frac{kq_1q_2}{r^2}$ (Coulomb's Law)

Electric Field Intensity $|\vec{E}| = \left|\frac{\vec{F_Q}}{q}\right|$

Imagine a source charge, q, and a test charge, q_t



q_t ⊕ test

$F_Q = \frac{kqq_t}{r^2}$

$|\vec{E_Q}| = \frac{|\vec{F_Q}|}{q}$ ← q_t

$|\vec{E_Q}| = \frac{\frac{kqq_t}{r^2}}{q_t}$

magnitude only →

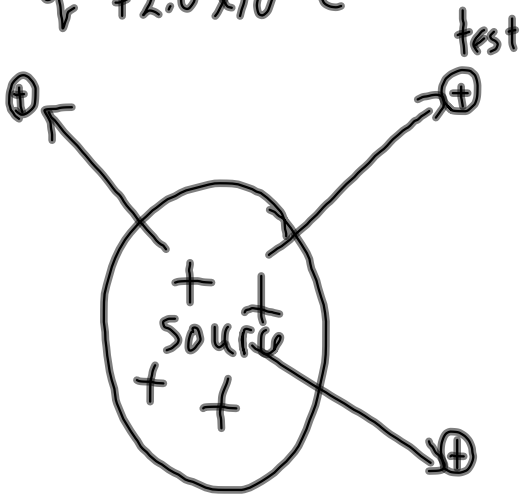
*direction will be the same as the force acting on a + test charge

$|\vec{E_Q}| = \frac{kq}{r^2}$ ← the source charge

MP 652

$r = 30.0\,cm$

$q = +2.0 \times 10^{-6}\,C$



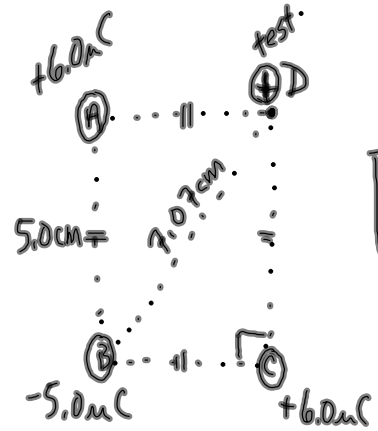
$$|\vec{E}| = \frac{kq}{r^2}$$

$$|\vec{E}| = \frac{\left(9.0\times10^{9}\,\frac{N\cancel{m}^2}{\cancel{C}^2}\right)(2.0\times10^{-6}\,\cancel{C})}{(0.300\,\cancel{m})^2}$$

$$|\vec{E}| = 2.0\times10^{5}\,\frac{N}{C}$$

The electric field intensity is 2.0×10^5 N/C [radially outwar

MP|653



$$|\vec{E}_A| = \frac{kq_A}{r^2}$$

$$|\vec{E}_A| = \frac{\left(9.0\times10^9\ \frac{N\cdot m^2}{C^2}\right)(6.0\times10^{-6}C)}{(0.050m)^2}$$

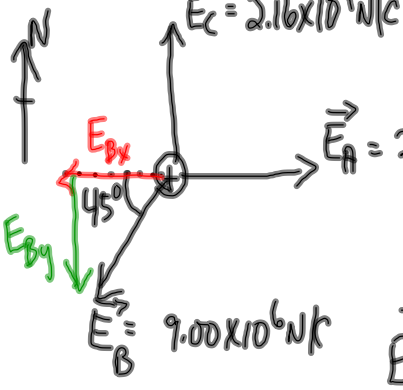
$$|\vec{E}_A| = 2.16\times10^7\ N/C$$

$$|\vec{E}_C| = 2.16\times10^7\ N/C$$

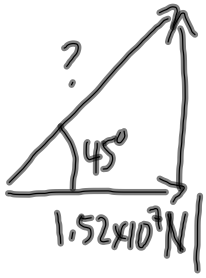
$$|\vec{E}_B| = \frac{\left(9.0\times10^9\ \frac{N\cdot m^2}{C^2}\right)(5.0\times10^{-6}C)}{(0.0707m)^2}$$

$$|\vec{E}_B| = 9.00\times10^6\ N/C$$

DRAW A FBD



	x	y
E_A	$+2.16\times10^7\ N/C$	0
E_B	$-9.00\times10^6\ N/C\ (\cos45°)$	$-9.00\times10^6\ N/C\ (\sin45°)$
E_C	0	$+2.16\times10^7\ N/C$
E_{Net}	$+1.52\times10^7\ N/C$	$1.52\times10^7\ N/C$



$$\vec{E} = 2.15\times10^7\ N/C\ [E\ 45°\ N]$$

Jan 6-2:23 PM

Gravitational Force: $F_g = \frac{Gm_1m_2}{r^2}$ (Newton's Law of Universal Grav)

Gravitational Field Intensity: $|\vec{g}| = \frac{|\vec{F_g}|}{m}$ $(F_g = mg)$

$$|\vec{g}| = \frac{\frac{Gmm_t}{r^2}}{m_t}$$

magnitude only →

direction is ALWAYS radially inward

$$|\vec{g}| = \frac{Gm}{r^2}$$ ← source mass

TO DO

① PP|655

② mp|657 + PP|658