NAME & ID

PH 102 / LeClair Summer II 2009

Quiz 2: Electrostatics

$$\vec{F}_{12} = k_e \frac{q_1 q_2}{r_{12}^2}\,\hat{\boldsymbol{r}}_{12} = q\vec{E} \quad k_e \approx 9 \times 10^9 \left[\frac{\mathrm{N}\cdot\mathrm{m}^2}{\mathrm{C}^2}\right]$$
$$e = 1.6 \times 10^{-19}\ [\mathrm{C}] \quad m_e = 9.11 \times 10^{-31}\ [\mathrm{kg}]$$

1. An electron (of charge $-e$ and mass m_e) enters a region of uniform electric field $\vec{E} = 200\,\hat{\boldsymbol{x}}$ [N/C] with velocity $\vec{v}_i = 3.0 \times 10^6\,\hat{\boldsymbol{x}}$ [m/s]. What is magnitude the acceleration $|\vec{a}|$ of the electron due to the electric field? Recall $\vec{F} = m\vec{a}$.

2. Two charges of $+1\,\mu$C each are separated by 1 cm. What is the force between them?

3. Two charges of $+1\,\mu$C are separated by 1 cm. What is the magnitude of the electric field halfway between them?