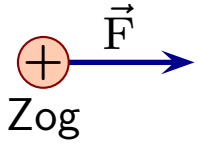
Question 1

A positive charge, Zog, is placed in the vicinity of a collection of source charges. The net force exerted on the positive charge is as illustrated.

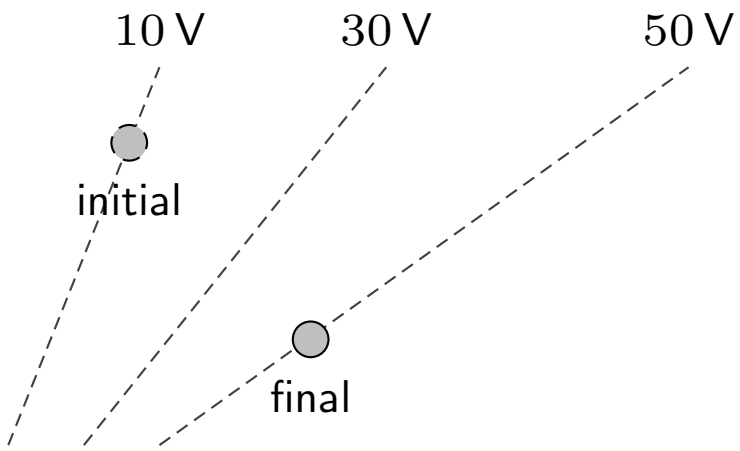


Zog is replaced by another charge, Geraldine, of the same magnitude but of opposite sign. The source charges are unaltered. Which of the following is true regarding the electric field produced by the source charges, $\vec{E}$, and the force on Geraldine, $\vec{F}$, compared to those when Zog was present?

1. $\vec{F}$ same direction, $\vec{E}$ same direction.
2. $\vec{F}$ same direction, $\vec{E}$ reverses direction.
3. $\vec{F}$ reverses direction, $\vec{E}$ same direction.
4. $\vec{F}$ reverses direction, $\vec{E}$ reverses direction.

Question 2

Hidden source charges produce an electric potential which has equipotentials as illustrated. Probe charges moving through the initial location reach the indicated final location

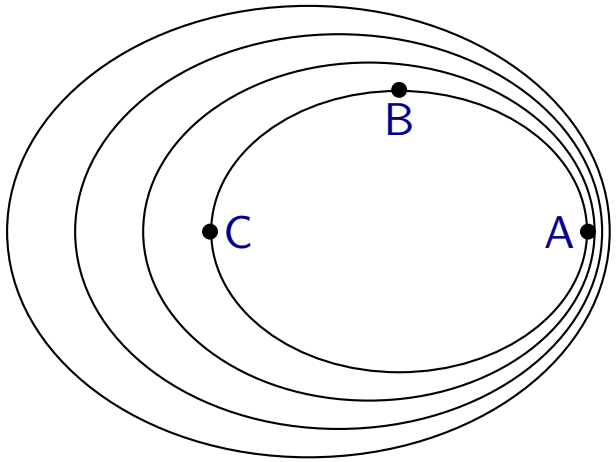


Which of the following is true regarding the probe charge?

1. $\Delta K = 0$ regardless of charge.
2. $\Delta K < 0$ regardless of charge.
3. $\Delta K > 0$ regardless of charge.
4. $\Delta K > 0$ for positive probe, $\Delta K < 0$ for negative probe.
5. $\Delta K < 0$ for positive probe, $\Delta K > 0$ for negative probe.

Question 3

Source charges produce equipotential lines as illustrated.

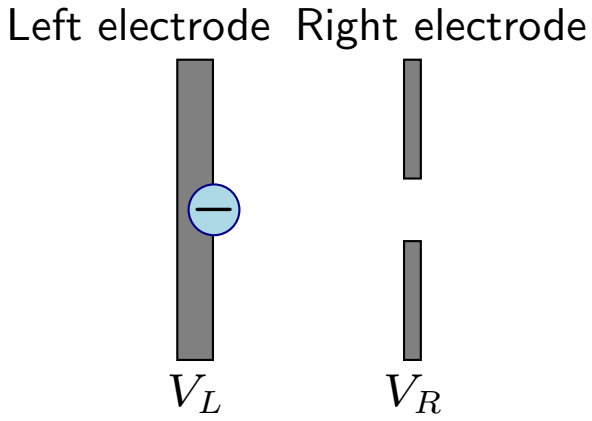


Which of the following represents the rank of the *magnitude* of the electric field at the illustrated points?

1. $E_{\mathrm{A}} = E_{\mathrm{B}} = E_{\mathrm{C}}$
2. $E_{\mathrm{A}} < E_{\mathrm{B}} < E_{\mathrm{C}}$
3. $E_{\mathrm{C}} < E_{\mathrm{B}} < E_{\mathrm{A}}$
4. $E_{\mathrm{B}} < E_{\mathrm{C}} < E_{\mathrm{A}}$
5. $E_{\mathrm{B}} < E_{\mathrm{A}} < E_{\mathrm{C}}$

Question 4

A simple electron gun is configured as illustrated. An electron is at rest on the left electrode. Each electrode is at a fixed electric potential.



The electron must be accelerated from the left to the right electrode. For this to happen which of the followings must be true?

1. $V_L = V_R$
2. $V_L < V_R$
3. $V_L > V_R$