# Question 1

A positively charged particle (source) is held fixed. Another charged particle, Zog, fired toward the source a long time ago, moves toward the source particle.


Assume that the only force acting on Zog is the electrostatic force due to the positively charged particle. Which of the following is true during this motion?

1. $\Delta U_{\text{elec}} > 0$ regardless of Zog's charge.
2. $\Delta U_{\text{elec}} < 0$ regardless of Zog's charge.
3. $\Delta U_{\text{elec}} > 0$ for positive Zog, $\Delta U_{\text{elec}} < 0$ for negative Zog.
4. $\Delta U_{\text{elec}} < 0$ for positive Zog, $\Delta U_{\text{elec}} > 0$ for negative Zog.

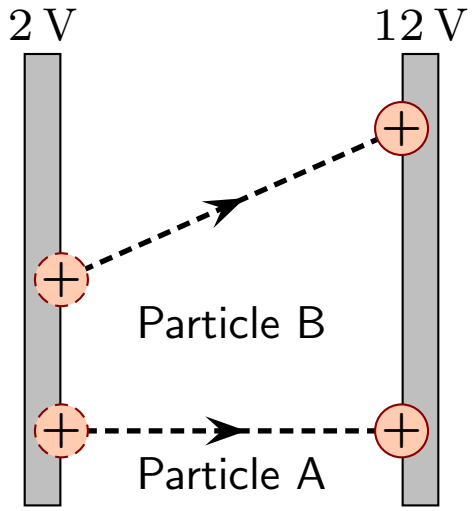
# Warm Up Question 1

An ion is an atom from which charge has been removed or added. Various ions can be accelerated by placing them in a region where there is an electric potential difference provided by charged metal plates. In separate experiments, a sodium ion (a sodium atom with one electron removed) a potassium ion (a potassium atom with one electron removed) are each accelerated from rest through the same electric potential difference. How will the final kinetic energy of the sodium ion compare to that of the potassium ion? Explain your answer.

1. Larger for potassium since $K = \frac{1}{2}mv^2$ and potassium has a larger mass.
2. Same. Potassium will move more slowly.
3. Same. Charge is the same and electric potential difference is the same.

# Question 2

Two metal plates are charged in such a way that the electric potential at each is as indicated. On each plate the electric potential is constant. Separately, two *positively charged* particles move as illustrated. Particle A has a *larger* charge than that of particle B.

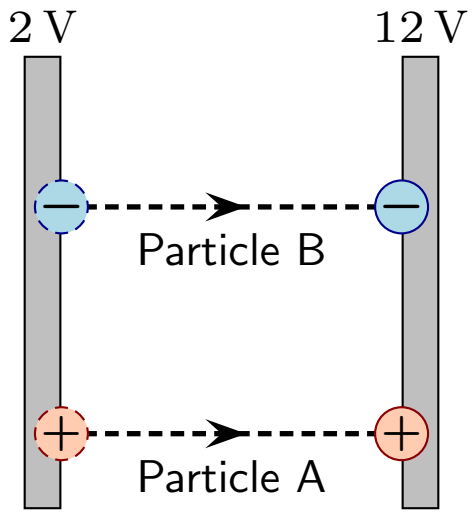



Which of the following is true?

1. $\Delta U_{\text{elec A}} = \Delta U_{\text{elec B}}$ and $\Delta V_{\text{A}} = \Delta V_{\text{B}}$.
2. $\Delta U_{\text{elec A}} < \Delta U_{\text{elec B}}$ and $\Delta V_{\text{A}} = \Delta V_{\text{B}}$.
3. $\Delta U_{\text{elec A}} > \Delta U_{\text{elec B}}$ and $\Delta V_{\text{A}} = \Delta V_{\text{B}}$.
4. $\Delta U_{\text{elec A}} < \Delta U_{\text{elec B}}$ and $\Delta V_{\text{A}} < \Delta V_{\text{B}}$.
5. $\Delta U_{\text{elec A}} = \Delta U_{\text{elec B}}$ and $\Delta V_{\text{A}} < \Delta V_{\text{B}}$.

# Question 3

Two metal plates are charged in such a way that the electric potential at each is as indicated. On each plate the electric potential is constant. Separately, two particles are launched with the same speed from the left plate and move as illustrated. Particle A is positive and particle B is negative.




Which of the following is true concerning the potential energy and the speed with which the particles move when reaching the right?

1. $\Delta U_{\text{elec A}} = \Delta U_{\text{elec B}}$, same speed.
2. $\Delta U_{\text{elec A}} = \Delta U_{\text{elec B}}$, B faster than A.
3. $\Delta U_{\text{elec A}} = \Delta U_{\text{elec B}}$, B slower than A.
4. $\Delta U_{\text{elec A}} < \Delta U_{\text{elec B}}$, B slower than A.
5. $\Delta U_{\text{elec A}} > \Delta U_{\text{elec B}}$, B faster than A.
6. $\Delta U_{\text{elec A}} > \Delta U_{\text{elec B}}$, B slower than A.

# Warm Up Question 2

A negative point charge is held fixed. How does the electric potential at a point further from the charge compare (lower, higher,...) to the electric potential closer to the charge? Explain your answer.

1. Smaller. When $r$ is larger $kq/r$ is smaller.
2. Larger. Negative matters!