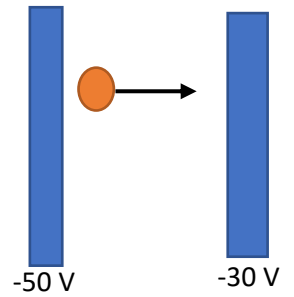


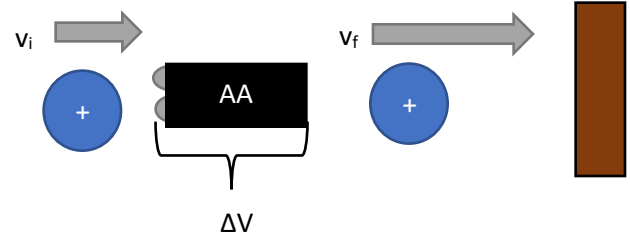
Discussion Week 4 and the Adventure of the Electric Potential 0

After writing the discussion, I came across a problem I really liked, and am adding it as question 0. A charged particle of charge magnitude e is moving towards a charge plate at an initial speed of 90 km/s (which is decreasing) towards a plate with -30 V from a plate of -50 V from a distance of 2 mm . What type of particle is the charged particle? What is the speed of the particle as it reaches the other plate?



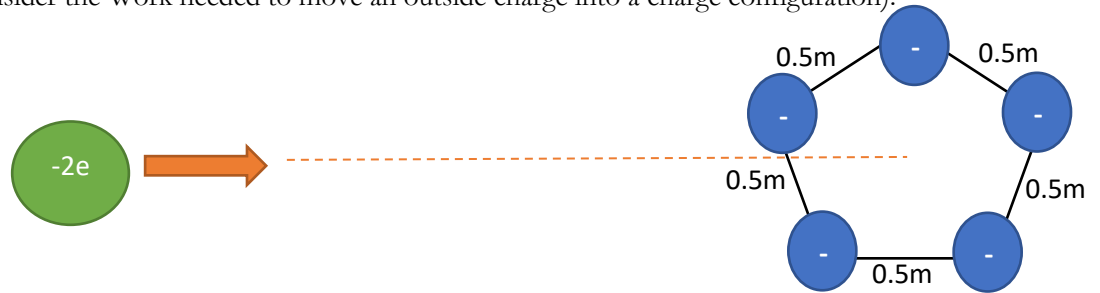
Discussion Week 4 and the Adventure of the Electric Potential 1

While you are walking on your way to your next job interview, you come across a very dead looking 20kg anthropomorphized proton embedded in a wall with 10^{19} as much charge as a normal proton. You quickly look around and see a suspicious looking anthropomorphized 6 ft. 6 in AA battery jump into its black Chevy Volt and speed away. Soon the police arrive to interview you and 1 other witness. The police gather that earlier in the day, Mr. Proton was walking on the sidewalk at a pace of 5m/s when evil Double A ambushed him and accelerated him through his long body shooting him towards the wall. As everyone knows, it is not the speed that kills you, but the force. From security footage we know that it took Mr. Proton 0.5 seconds to decelerate to rest when he hit the wall. What was the force from the wall applied on Mr. Proton by the wall?



Discussion Week 4 and the Adventure of the Electric Potential 2

Evil Double A has struck again! He has captured five 10.9 gram anthropomorphized electrons and arranged them in the shape of a pentagon with a side length of 0.5 meters and will only release them if he is given the secret of eternal battery life, or he will blow up all the electrons in the world! Double A has left the instructions to find him in the center of the pentagon. It's up to you to tell the intelligence agency the speed at which they need to launch their 21.8 gram agent Double Charge e^- into the center of the pentagon from a near infinite distance away. (Hint: Consider the Work needed to move an outside charge into a charge configuration).



Discussion Week 4 and the Adventure of the Electric Potential 3

You are bought on as a consultant for one final physics mystery. A dead charge of $20e^-$ was found at the end of a semi-circular arc of length 20 meters and angle of $2\pi/3$. It is known that the charged traveled through an electric field of $\vec{E}(x, y) = Q(2(x^2 + y^2))^{-1}K$ where K is Coulomb's constant and Q is a source charge of 50 kC. What was the change in electric potential the dead charge experienced as it traveled its final arc?

