Electrostatics: Charges in Uniform Electric Fields

Classical Mechanics Applied to Tiny Invisible Objects.

1. A proton accelerates from rest to 3.0x107m/s (10% the speed of light) in 5.0s in a uniform electric field.
   1. How far does the proton travel?
   2. What is the magnitude of the field?
2. An electron accelerates from rest to 3.0x107m/s (10% the speed of light) in 5.0s in a uniform electric field.
   1. How far does the electron travel?
   2. What is the magnitude of the field?
3. A 1.00g small metal sphere is suspended between two charged parallel plates. The field between the plates is 1.00x104N/C down.
   1. Is the charge positive or negative?
   2. Which plate is positively charged?
   3. What is the charge on the sphere?
   4. How many electrons has the sphere GAINED or LOST?
4. +

3.0x105m/s

-

5.0cm

A proton is fired horizontally into a region of uniform downward electric field as shown. The speed of the proton as it leaves the plates is 5.0x105m/s. What is the field between the plates?

Consider the plates shown to the right: + -

The magnitude of the field between the plates is 2.5x105N/C B

A

1. Find the work to move an electron from A to B at constant speed.
2. Find the work to move a proton from A to B at constant speed.
3. Find the work to move an electron from B to A at constant speed. 2.0cm
4. Find the work to move a proton from B to A at constant speed.
5. A 2.00g sphere is suspended between two parallel conducting plates. The field between the pates is 3.00x103N/C downward.

a. What is the charge on the sphere?

b. The plates are now placed in an elevator. The elevator accelerates upward at 8.00m/s2. What must the field between the plates be to keep the sphere suspended?

8.00m/s2