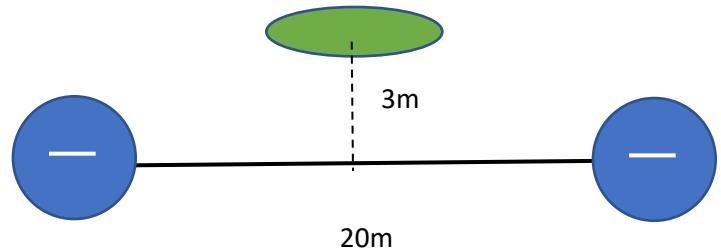


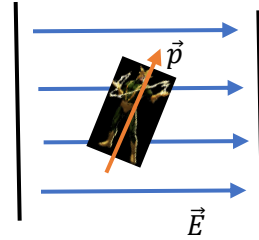
Discussion Week 2 Problem 1

Due to poor rating and no one paying for CBS All Access, *Star Trek: The Final Generation* was canceled, but don't despair you have now been hired as the science consultant for *Spider-Man 4: Electric Charge* (featuring the long-awaited return of Tobey Maguire)! In the opening, we see Peter Parker conducting a physics experiment with a charge source of $-3 \times 10^{22}e$ at ESU for his thesis. At the other end of the 20 meter lab, Peter's undergraduate lab assistant is generating a charge $-3 \times 10^{22}e$ using anti-protons. Suddenly Peter's spider-sense goes off as 100 kg electrical repairman Max Dillon is electrocuted and falls through the ceiling at the midpoint of the room. The charged-up Max hovers 3 meters above the ground. What is the electric field from the 2 experiments at Max Dillon's location? How much charge should Peter report was absorbed by Max Dillon when the paramedics arrive?



Discussion Week 2 Problem 2

Later at the hospital, the 1.5-meter-tall Max Dillon's eyes open. Charged up and wanting composition (he did get electrocuted on the job), he storms off to rob a bank, generating a vertical 2-meter in radius ring of negligible charge about himself. At the bank, Electro runs into Spider-Man, who throughout the fight pieces together that Electro's 100kg body is behaving like a dipole with a dipole moment of $8 \times 10^2 \text{ C}\cdot\text{m}$. Wishing to neutralizing Electro without harming him, Spider-Man leads him to an electrical plant that creates a horizontal electric field. Caught in the electric field, Electro spins uncontrollably with an angular acceleration of 113.33 rad/s^2 and passes out. Spider-Man webs him up and swings off to hurry to his wedding rehearsal. As he swings off the camera pans to a sign that says "Danger Electric Field of ____" how much?



Discussion Week 2 Problem 3

Unable to sleep due to a stressful combo of a thesis deadline, rent passed due, and wedding the next day, 80kg Peter swings to ESU to try to make a cure for Electro. Meanwhile, Electro learns from a mysterious figure that the grad student in charge of the experiment and Spider-Man are the same person. Electro crashes Peter's wedding and zaps him giving Peter a charge of -80×10^1 C that dissipates at -8×10^{-1} C/s. The fight carries on for the next 10 minutes, and which point Electro throws Peter into a vertical E-field of 30N/C with a speed of 20m/s. If Peter was thrown at an angle 45 degrees from the horizontal and was in the E-Field for 0.15 seconds, what is Peter's final velocity? (Note you can consider Peter's charge to be constant for those 0.15 seconds.)