Electric Fields

Answer on a Separate Sheet of Paper

1. What is the force on a +2.5μC charge that is placed in an electric field that has a strength of 500 N/C?

2. A proton "gun" uses an electric field to accelerate a proton from rest. Use a field of $2.0X10^4$ N/C.
   a. What is the force on an individual proton?
   b. What is the acceleration of an individual proton?
   c. What speed would the proton attain if it were in the field for 1.0 cm?

3. A +3.0 μC charge is isolated from all other charges. Point A is 4.0 cm from the charge.
   a. Draw the electric field lines around a +3.0 μC charge.
   b. What is the electric field at point A?
   c. What would the force be on a +5.0 μC charge placed at point A?

4. A +6.0 μC charge is placed in the same region as a – 2.0 μC charge.
   a. Sketch the electric field lines in the region. (Keep track of the number of lines on each charge.)
   b. If the charges are placed 10 cm apart, what is the net electric field halfway between the charges? (Include direction.)

5. Two charges, +1.0 μC and +4.0 μC, are separated by 15.0 cm.
   a. Find the equilibrium point between the two charges.
   b. If you place a positive charge at this position, is the equilibrium stable or unstable? Explain why.

6. Sketch the electric field for a point directly above a very large plate that is positively charged. Explain how you can simplify the individual contributions of different points on the plate into a single field line.