Homework, Chapter 1

1) An alpha particle (charge = +2.0e) is sent at high speed toward a gold nucleus (charge = +79e). What is the electrical force acting on the alpha particle when it is $2.0 \times 10^{-14}$ m from the gold nucleus?
2) Three charges are arranged as shown in this figure. Find the magnitude and direction of the electrostatic force on $q_1$, the 6.00-nC charge.

![Diagram with charges $q_1 = 6\text{nC}$, $q_2 = 4\text{nC}$, and $q_3 = -3\text{nC}$ arranged with distances of 5m and 2m between them.]
3) An object with a net charge of 12 \( \mu \text{C} \) is placed in a uniform electric field of 610 N/C, directed vertically as shown in this figure. What is the mass of the object if it "floats" in the electric field? Does the particle have a positive or negative charge?
4) A proton is accelerated by a constant electric field of magnitude 1250 N/C. (a) Find the acceleration of the electron. (b) What is the electron's speed after $1.00 \times 10^{-8}$ s, assuming it starts from rest.
5) A Styrofoam ball covered with a conducting paint has a mass of \(5.0 \times 10^{-3}\) kg and has a charge of 4.0 μC. What electric field directed upward will produce an electric force on the ball that will balance its weight?
6) This figure shows the electric field lines for two point charges. (a) Determine the ratio $q_1 / q_2$ (b) What are the signs of $q_1$ and $q_2$?