Electrostatic Forces

<u>Answer on a Separate Sheet of Paper</u>

1. An object has a net charge of - 2.0 μC.
    a. Is there an excess or deficiency of electrons?
    b. How many missing or extra electrons are there?

2. Particles A and B are separated by 5.0 cm. A has a net charge of +2.0 μC while B has a net charge of –3.0 μC.
    a. What is the magnitude of the force on each of the particles?
    b. Is each force attractive or repulsive?

3. A +5.0 μC charge experiences a 5.0 N repulsive force when it is held 3.0cm from an unknown charged particle. What is the charge on the unknown particle?

4. Two charges are moved to a separation of 100 cm, causing the force between them to decrease by a factor of 4. What was the initial separation distance?

5. Two +2.0 μC charges are placed 10 cm apart. A -3.0 μC charge is placed on the line directly between them, 5 cm from each.
    a. Find all of the forces acting on each charge.
    b. What is the net force on each of the 2 μC particles?
    b. What is the net force on the –3.0 μC particle?

6. Two +2.0 μC charges are placed 10 cm apart. A +3.0 μC charge is placed on the line directly between them, 5 cm from each.
    a. Find all of the forces acting on each charge.
    b. What is the net force on each of the 2 μC particles?
    b. What is the net force on the 3.0 μC particle?

7. In a hydrogen atom, the electron and the proton are separated by an average of 5.3×10^{-11} m.
    a. What is the electrostatic force between them?
    b. The gravitational force is in the form $F = G\frac{m_1 m_2}{r^2}$, where $G = 6.67 \times 10^{-11}\ \mathrm{Nm^2/kg^2}$. What is the gravitational force between the electron and the proton?
    c. What is the ratio of the electrostatic force to the gravitational force?

8. Three charges are placed on the corners of a square with side lengths 2.0 cm as shown. What is the net force on the –2 μC particle?