Electrostatics Homework Problems:
p. 372: #3, 5, 7, 9, 10

Problems taken from the school's old textbook:
Giancoli, D. (1980). *Physics*, 2nd Ed. Englewood Cliffs, NJ: Prentice Hall.

Helpful constants: rest mass of an electron = 9.11×10^{-31} kg

3. What is the magnitude of the electric force of attraction between an iron nucleus ($q = +26e$) and its innermost electron if the distance between them is 1.0×10^{-12} m? As you know from your reading, e represents the charge of an electron. Refer to the reading to find the magnitude of an electron's charge.

5. What is the magnitude of the force a 10- μC charge exerts on a 3.0-mC charge 2.0 m away? (1 μC = 1×10^{-6} C, 1 mC = 1×10^{-3} C.)

7. How close must two electrons be if the electric force between them is equal to the weight of either at the earth's surface?

9. Particles of charge +86 μC, +48 μC, and -90 μC are placed in a line. The center one (the +48 μC charge) is 1.5 m from each of the others. Calculate the net force on each due to the other two.

10. A charge of 0.0500 C is placed at each corner of a square 15.0 m on a side. Determine the magnitude and direction of the force on each charge. (If this problem seems familiar, it should. We recently did one almost identical to it. For the stamp, nothing short of a complete solution with all supporting work will qualify as an acceptable "attempt" on this problem. Just a word of warning: simple pictures and half-hearted tries with random equations written down aren't going to cut it, at least to earn the stamp.)

ANSWERS:

3. 5.99×10^{-3} N
5. 67.5 N
7. 5.08 m
9. Assuming the +86 μC is on the left
   - the force on the +86 μC charge: 8.77 N to the left
   - the force on the +48 μC charge: 33.79 N to the right
   - the force on the -90 μC charge: 25.02 N to the left
10. By the symmetry in this problem, we see that the force (1.91×10^{5} N) acting on each of the four charges due to the other three will always be directed AWAY from the charge in the opposite corner of the square.