Name_____

Phys 2020 (NSCC), Spring 2008
Problem Set #2

1. There are two point charges on the x axis: A $-3.5\,\mu$C charge at $x = -2.0$ cm, and a $5.0\,\mu$C charge at $x = +3.0$ cm.

Find the magnitude of the electric field at the origin.

2. Find the electric potential 1.0×10^{-14} m from a proton. (Take the proton to be a point charge, though it really isn't!)

3. A point charge of 9.00×10^{-9} C is located at the origin. How much work is required to bring a positive charge of 3.00×10^{-9} C from infinity to a distance of 30.0 cm from this charge?

4. How much charge is on each plate of a 4.00-μF capacitor when it is connected to a 12.0-V battery?

5. An air-filled capacitor consists of two parallel plates, each with an area of 7.60 cm^2 and separated by a distance of 1.80 mm. If a 20.0-V potential difference is applied to these plates, find the electric field between the plates.

6. For the capacitor described in Problem 5, find the capacitance of the capacitor and the charge on each plate if there is now some material between the plates with dielectric constant 5.0 (and a 20.0 V potential difference).

7. A parallel-plate capacitor has 9.00-cm^2 plates that are separated by 5.00 mm with air between them. If a 12.0-V battery is connected to this capacitor, how much energy does it store?

8. If a current of 20.0 mA exists in a metal wire, how much charge (in Coulombs) flows past a given cross section of the wire in 5.0 min?