Name:_____ Date:_____

Electrostatics Fields WS 5

1. An electric field of 260,000 N/C points due west at a certain spot. What are the magnitude and direction of the force that acts on a charge of -7.0 µC at this spot?

2. A tiny ball (mass = 0.012 kg) carries a charge of -18 µC. What electric field (magnitude and direction) is needed to cause the ball to float above the ground? (Draw a force diagram!)

3. At a distance r_1 from a point charge, the magnitude of the electric field created by the charge is 248 N/C. At a distance r_2 from the charge, the field has a magnitude of 132 N/C. Find the ratio r_2/r_1.

4. Two charges are placed on the x axis. One charge (q_1 = +8.5 µC) is at x_1 = +3.0 cm and the other (q_2 = -21 µC) is at x_2 = +9.0 cm. Find the net electric field (magnitude and direction) at (a) x = 0 cm and (b) x = 6.0 cm.

5. Two charges, -16 µC and +4.0 µC, are fixed in place on a number line. The negative charge is at the origin, and the positive charge is on at +3.0 m. (a) At what spot on the line through the charges is the net electric field zero? *(Hint: the spot does not necessarily lie between the two charges.)* (b) What would be the force on a charge of +14 µC placed at this spot?

6. A 3.0 μC point charge is placed in an external uniform electric field of 1.6×10^4 N/C directed towards the top of the page. Where relative to the charge is the net electric field zero?

7. A small drop of water is suspended motionless in air by a uniform electric field that is directed upward and has a magnitude of 8480 N/C. The mass of the water drop is 3.50×10^{-9} kg. (a) Is the excess charge on the water drop positive or negative? Why? (b) How many excess electrons or protons reside on the drop?

8. Two charges are located on the x axis: $q_1 = +6.0$ μC at $x_1 = +4.0$ cm, and $q_2 = +6.0$ μC at $x_2 = -4.0$ cm. Two other charges are located on the y axis: $q_3 = +3.0$ μC at $y_3 = 5.0$ cm, and $q_4 = -8.0$ μC at $y_4 = +7.0$ cm. Find the net electric field (magnitude and direction) at the origin.

9. A small plastic ball of mass 6.50×10^{-3} kg and charge +0.150 μC is suspended from an insulating thread and hangs between the plates of a capacitor (see diagram). The ball is in equilibrium, with the thread making an angle of 30.0° with respect to the vertical. The area of each plate is 0.0150 m^2. What is the magnitude of the Electric Field between the plates?