PHY114 S09 Problem Set 2

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Due Monday Feb 2 2008

1. Determine the magnitude of the electric field at a point midway between a -19.0 μC charge and a 1.2 μC charge which are 8.0 cm apart. (Assume no other charges are nearby.)What is the direction of this electric field?

2. Calculate the electric field (magnitude and direction) at one corner of a square 1.22 m on a side if the other three corners are occupied by 2.05 μC charges. Use as the x-axis one of the sides of the square, and give the direction of the electric field in degrees measured anti-clockwise from this axis.

3. Measurements indicate that there is a small electric field surrounding the Earth. Its magnitude is about 160 NC^{-1} at the Earth's surface and points inward toward the Earth's center.What is the magnitude of the electric charge on the Earth?Is it positive or negative? [Hint: The electric field outside a uniformly charged sphere is the same as if all the charge were concentrated at its center.]

4. Packing material made of pieces of foamed polystyrene can easily become charged and stick to each other. Given that the density of this material is about $35kg\ m^{-3}$, estimate how much charge might be on a 2.3 cm -diameter foamed polystyrene sphere, assuming the electric force between two spheres stuck together is equal to the weight of one sphere.