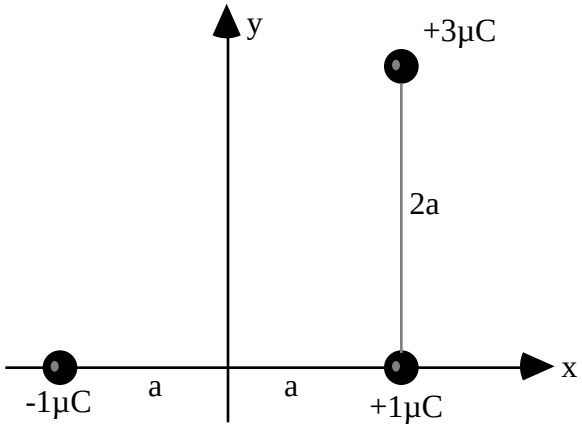
Name:_____

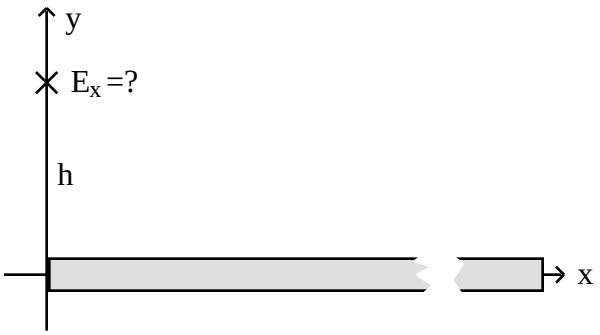
Solve the following problems in the space provided. Use the back of the page if needed. Each problem is worth 20 points. You must show your work in a logical fashion starting with the correctly applied physical principles which are on the last page. Your score will be maximized if your work is easy to follow because partial credit will be awarded.

For full credit you must explain clearly what you are doing especially if your solution involves symmetry arguments or uses Gauss's Law.

1. (a)Find the magnitude and direction of the electric field felt by the 3μC charge. (b)Find the magnitude and direction of the electric force on the 3μC charge (a=5.00cm)



2. A very long wire has a uniform charge density, λ, and has one end at the origin. Find the x-component of the electric field at a distance h directly above the origin.



3. Using the charges as shown in problem 1, find (a)the flux that leaves a sphere centered at the origin with a radius of $\frac{3}{2}$a. (b)Repeat this for the charge distribution of problem 2.

4. The electric field at the surface of a conducting sphere of radius R is E_o. Find (a)the charge on the sphere and (b)the electric field at a distance of 3R from the center.

5. Find (a)the electric potential felt by the 3μC charge in problem 1 and (b)the electric potential energy of this charge.