## Electrostatics Review

1. a. Describe the process to charge an object to $+2 q$ through friction. Draw diagrams and indicate what happens to the charges.
b. Describe the process to charge an object to $+2 q$ through conduction. Draw diagrams and indicate what happens to the charges.
2. $\mathrm{A}+3 \mu \mathrm{C}$ is held close to $\mathrm{a}+6 \mu \mathrm{C}$ charge. Draw the electric field lines in this region.
3. A $-9 \mu \mathrm{C}$ charge is held a distance of 20 cm from a $-1 \mu \mathrm{C}$ charge.
a. What is the net electric field (include direction) directly between the charges, 10 cm from each charge?
b. What is the force on a $+2 \mu \mathrm{C}$ charge when it is placed directly between the charges, 10 cm from each charge? (Include direction)
c. Which direction would you have to move the $+2 \mu \mathrm{C}$ charge in order to get a net force of zero on it? (Hint: Where is the equilibrium point?)
4. Three charges are placed along a straight line as shown below. The distance from A to B is 5 cm . The distance from B to C is 15 cm .

a. Find the magnitude of each of the six forces on the diagram.
b. Find the net force on each of the charges. Include directions.
c. Find the electric potential 5 cm from charge A .
d. Find the electric potential 15 cm from charge C .
e. How much potential energy does charge $B$ have due to charges $A$ and $C$ ?
5. A constant electric field points to the right and has a magnitude of $5000 \mathrm{~N} / \mathrm{C}$. The distance between points A and B is 5 cm .

a. What direction would a proton travel if placed in the field?
b. What direction would an electron travel if placed in the field?
c. What is the force on a $+4 \mu \mathrm{C}$ charge that is placed in the field?
d. What is the electric potential difference between points A and B ?
e. What would the magnitude of the change in potential energy be for $\mathrm{a}+4 \mu \mathrm{C}$ charge that moves from point A to point B ?
