Physics 2145  Homework # 1: Coulomb’s law, vector review

1. A small glass bead has been charged to $+12 \text{ nC}$. A plastic sphere 3cm away from the bead feels an attractive electric force of magnitude 0.024N. Calculate the charge on the sphere.

2. Two small spheres with charge 1 $\mu\text{C}$ are 2.0cm apart.
   a) Find the magnitude of the Coulomb force.
   b) What would be the mass of an object that would experience a weight force of this magnitude on Earth?

3. A glass rod that has been charged to $+10\text{ nC}$ touches a metal sphere; the rod’s charge afterward is $+6\text{nC}$.
   a) What kind of particles have been transferred? Did they move from the rod to the sphere or from the sphere to the rod?
   b) How many charged particles were transferred?

4. For each of the charges in the figure, calculate the magnitude and direction of the net electric force exerted on it by the other two charges.

5. In the figure, the magnitudes of the vectors are $A = 5$ and $B = 2$. The angle $\theta$ equals $36.9^\circ$.
   a) Calculate the vector components $A_x$, $A_y$, $B_x$, $B_y$.
   b) The vector $\vec{C} = \vec{A} + \vec{B}$. Sketch vector $\vec{C}$ in the diagram and calculate its components, magnitude, and direction.