

Quiz 1C

PHYSICS 208, WINTER 2016

SECTION:

NAME:

Directions: Consider the following scenarios and *carefully* read each question. You are encouraged to write legible and organized solutions on a clean sheet of paper. Note that *vectors must have a direction and all answers must have appropriate units* and $\frac{1}{4\pi\epsilon_0} \approx 9 \times 10^9 \text{ Nm}^2/\text{C}^2$.

Consider three point charges lying in the xy plane in vacuum. Charge $q_1 = 2 \text{ C}$ is located three centimeters to the left of the origin along the x-axis. Charge $q_2 = 4 \text{ C}$ is located six centimeters to the right of q_1 along the x-axis. Finally, charge $q_3 = -6 \text{ C}$ is located four centimeters above the origin along the y-axis.

(3 points) What is the *net* electric field at the origin?

(3 points) What is the *net* electric force on q_3 ?

(2 points) Suppose charges q_1 and q_2 combine to form a new charge q_{12} at the origin so that q_{12} is equal and opposite to q_3 . What is the magnitude of the electric dipole moment formed by q_{12} and q_3 ? What is the net *force* on the dipole if it were placed in a uniform electric field of magnitude $E = 5.0 \times 10^5 \text{ N/C}$?

Conceptual Question (2 points) Two lightweight metal spheres are each suspended by an insulating thread. If one sphere has a net positive charge, and the other is neutral, explain what happens if they are close together but do not touch.