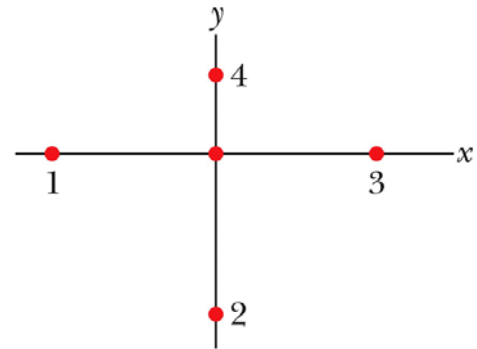


1) Suppose we have five charges arranged along the x- and y-axes of a coordinate system, as shown at right. All of the charges = +0.5 coulomb. The distances of the charges from the coordinate origin are $Q_1 = 3$ m, $Q_2 = 3$ m, $Q_3 = 3$ m, $Q_4 = 2$ m, and Q_5 (at center) = 0. What is the direction and magnitude of the force acting on the center charge?



2) The *positron* is a particle which has the same mass and charge as the electron, except that it has a positive charge rather than a negative one. Suppose I place a positron at the x-y coordinates (+3 nm, +4 nm), and I place an electron at the coordinates (-2 nm, -1 nm). (A nm = 10^{-9} m.)

- What is the magnitude of the dipole moment of this electron-positron pair?
- Suppose I place an electric field of $+4000 \text{ N/C } \mathbf{j}$ across the dipole. What is the potential energy of the dipole?
- How much energy would I need to add to the dipole to bring its potential energy to its maximum possible level?