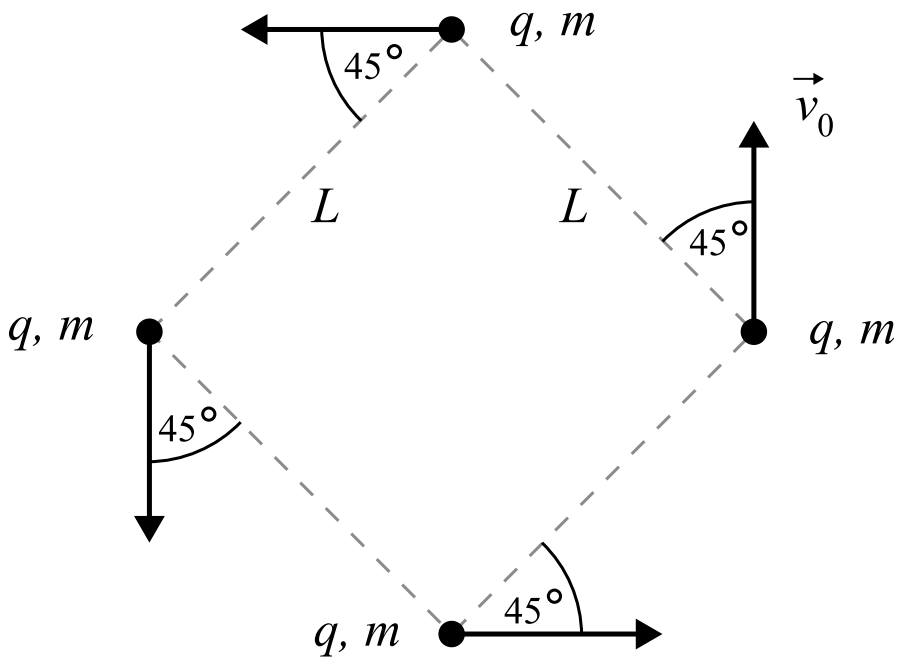
1. Four charges (7 points) — *Päivo Simson, Jaan Kalda.*

Four identical particles are initially in the corners of a square, as shown in the figure below. All particles have the same charge q, mass m, and the same magnitude of initial velocity v_0. The directions of the initial velocities are indicated in the figure. You can assume $v << c$ and ignore gravity.



i) *(2 points)* After a long time has passed, what is the magnitude of the final velocity v_f of the particles with respect to the center of mass of the system?

ii) *(5 points)* What is the angle between the initial velocity $\vec{v}_0$ and the final velocity $\vec{v}_f$ of a particle?