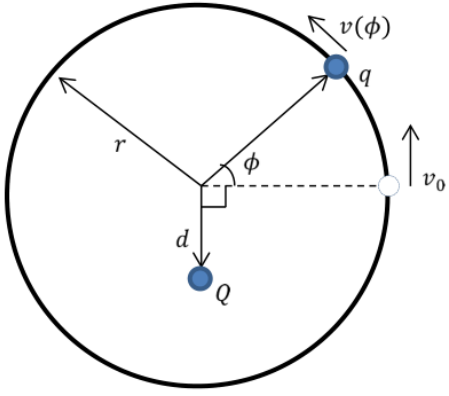
1. CHARGE ON A RING (7 points) — *Andreas Isacsson.* A pointlike particle with mass m and charge q is free to slide without friction along a fixed horizontal circular ring with radius r. In the plane of the ring, another charge Q is placed in a fixed position, at a distance d from the center of the ring, with $d < r$ (see figure).



i) *(3 points)* The particle on the ring is given an initial velocity v_0. Calculate its velocity v as a function of the angle ϕ, $v(\phi)$.

ii) *(2 points)* How large is the force from the ring on the particle, as a function of the angle ϕ?

iii) *(2 points)* Viscous friction can be modelled with a force directed against the velocity, with a magnitude proportional to the speed, i.e. $|F_f| = m\gamma v$, where γ is a positive constant. Assume that this kind of frictional force acts on the particle on the ring. Given an initial v_0, determine the position where the particle comes to rest.