

2. The two particles are subject to repulsive electric forces \mathbf{F}_{e1} and \mathbf{F}_{e2} , which are equal and opposite. The motion of particle 1 creates a magnetic field but this is zero at particle 2, so it exerts no force on particle 2. The motion of particle 2 creates a magnetic field that is nonzero at particle 1, and this exerts a magnetic force $\mathbf{F}_{m1} = q\mathbf{v} \times \mathbf{B}$ on particle 1. The total force on particle 1 is $\mathbf{F}_1 = \mathbf{F}_{e1} + \mathbf{F}_{m1}$, while that on particle 2 is $\mathbf{F}_2 = \mathbf{F}_{e2}$. These total forces are not equal and opposite. An explanation lies beyond the scope of the exam, but lies in the fact that the fields contain linear momentum that is changing as the particles move. It has nothing to do with relativistic effects, nor with radiation.

