CM Spring 98B

A relativistic particle of rest mass m_1 and velocity v_1 collides with a stationary particle of rest mass m_2 and is absorbed by it. All velocities here and below are measured relative to the rest frame of m_2.

(a) Find the rest mass M and the velocity V of the resultant particle in terms of the above parameters.

(b) Find the velocity V_{cm} of the center of mass.

(c) Suppose instead that the collision results in the production of two particles with rest masses m_3 and m_4. Find the threshold (i.e. minimum) kinetic energy of the incident particle m_1 required for the production of these particles.