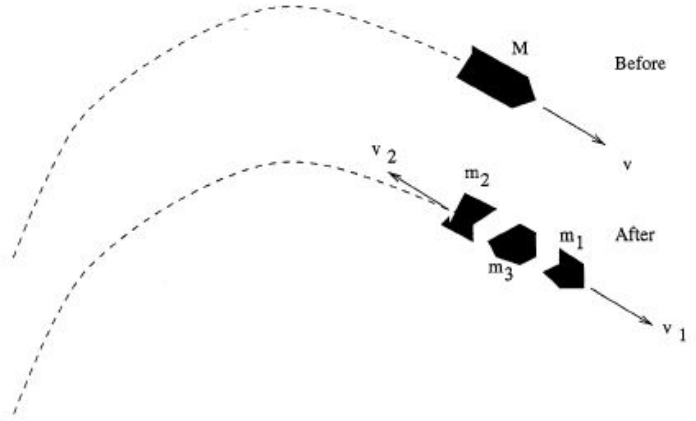
QP30

A projectile of mass M initially travelling with speed v explodes in flight into three fragments (see below). An energy E equal to 5 times the initial kinetic energy of the projectile is released in the explosion, and is transformed into additional kinetic energy of two of the projectiles. One fragment of mass $m_1 = M/2$ travels with speed $v_1 = k_1 v$ in the original direction of the projectile, while the second fragment of mass $m_2 = M/6$ travels in the opposite direction with speed $v_2 = -k_2 v$ and the third fragment of mass $m_3 = M/3$ is at rest the instant after the explosion.



a) (2 points) Write down equations expressing the conservation of momentum and energy in terms of M, k_1, k_2, v and E immediately after the explosion.

b) Find the values of k_1 and k_2.