Section B

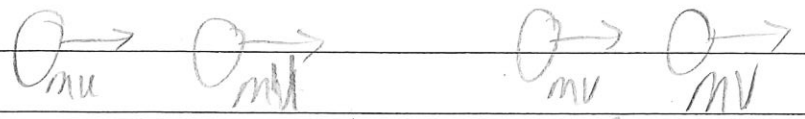
Subject: Date:

7a) Let mass of two particles be m & M

Let velocity of two particles be v & V

Initial momentum of particles = Final momentum

$mu + MU = mv + MV$ —— (1)



Before After

Since collision is elastic, no K.E is lost

$\frac{1}{2}mu^2 + \frac{1}{2}MU^2 = \frac{1}{2}mv^2 + \frac{1}{2}MV^2$

$mu^2 + MU^2 = mv^2 + MV^2$

$mu^2 - mv^2 = MV^2 - MU^2$

$m(u^2 - v^2) = M(V^2 - U^2)$ —— (2)

From (1): $m(u - v) = M(V - U)$ —— (3)

From (2): $m(u+v)(u-v) = M(V+U)(V-U)$ —— (4)

(4)/(3): $u + v = V + U$

$u - U = V - v$

∴ Relative speed of approach = relative speed of separation

7bi) $U = V - V_A$

$V_A = V - U$ —— (1)

Since collision is elastic, no KE lost

$\frac{1}{2}m_A u^2 = \frac{1}{2}m_A V^2 + \frac{1}{2}m_B V_A^2$

$m_A u^2 = m_A V^2 + m_B V_A^2$ —— (2)

Sub (1) into (2): $m_A u^2 = m_A V^2 + m_B (V-U)^2$

$m_A u^2 - m_A V^2 = +m_B (V-U)^2$

$m_A V^2 - m_A u^2 = +m_B (V-U)^2$

$m_A (V^2 - u^2) = +m_B (V-U)^2$

$m_A (V+u)(V-u) = +m_B (V-U)^2$

$m_A V + m_A u = +m_B V + m_B u$

$m_A V + m_B V = m_B u + m_A u$

$V = \frac{m_B u + m_A u}{m_A + m_B}$

$= \frac{2m_A u}{m_A + m_B}$

$m_A u = m_A V - m_A u + m_B V$

$2m_A u = m_A V + m_B V$

$a^2 - b^2 = (a^2 + b$

$m_B - m_A = 2m_A$

$m_B = 3m_A$

$m_B u - m_A u = 2m_A u$

$u(m_B - m_A$

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1d)