

Question Number	Scheme	Marks
2(a)	$\text{For } P: \quad \frac{33}{5}mu = 2m(-v_p - -4u)$ $v_p = 0.7u \quad \text{due E}$	M1 A1 dM1 A1 (4)
(b)	$\text{For } Q: \quad \frac{33}{5}mu = 3m(v_Q - -u)$ $v_Q = 1.2u \quad \text{due E}$	M1 A1 dM1 A1 (4)
Notes		
2(a)	(c)	
2(b)	First M1 for attempt at impulse = difference in momenta, for Q only, (i.e. must be using $3m$ and u). M0 if g's are included on RHS First A1 for either $\frac{33}{5}mu = 3m(v_Q - -u)$ or $\frac{33}{5}mu = 3m(-v_Q - -u)$ oe Second dM1 for answer $\frac{c}{5}u$, where c is an integer, oe Second A1 for $1.2u$ oe due E (or 'reversed' or 'original direction of P) But A0 if just 'changed' or 'to the right' or 'in positive direction'	
2(b) ALT	First M1 for attempt at CLM equation, with correct no. of terms, dimensionally correct, with their v_P substituted. Allow consistent extra g's and cancelled m 's and sign errors but masses and velocities must be correctly matched. First A1 for $2m.4u - 3mu = 2m.0.7u + 3m v_Q$ oe or $2m.4u - 3mu = 2m.0.7u - 3m v_Q$ oe Second dM1 for answer $\frac{c}{5}u$, where c is an integer, oe Second A1 for $1.2u$ oe due E	
2(a) ALT	They may find v_Q first, then First M1 for attempt at CLM equation, with correct no. of terms, dimensionally correct, with their v_Q substituted. Allow consistent extra g's and cancelled m 's and sign errors but masses and velocities must be correctly matched. First A1 for $2m.4u - 3mu = 2mv_P + 3m \times 1.2u$ oe or $2m.4u - 3mu = -2mv_P + 3m \times 1.2u$ oe Second dM1 for answer $\frac{k}{10}u$, where k is an integer, oe Second A1 for $0.7u$ oe due E (or unchanged)	