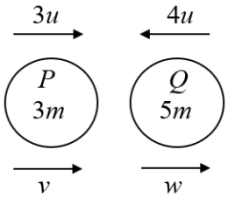
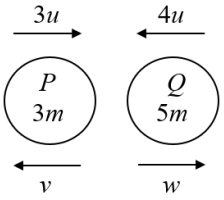
Question Number	Scheme		Marks
1			
(i)	Impulse equation for P		M1
	$-\frac{33}{2}mu = 3m(v-3u)$	$-\frac{33}{2}mu = 3m(-v-3u)$	A1
	Speed of $P = \frac{5}{2}u$		A1
(ii)	Impulse equation for Q or CLM		M1
	Impulse: $\frac{33}{2}mu = 5m(w--4u)$ or CLM: $3m(3u)+5m(-4u) = 3m\left(-\frac{5}{2}u\right)+5mw$		A1
	Speed of $Q = \frac{7}{10}u$		A1
			(6)
	Notes for Question 1		
	Allow parts (i) and (ii) to be answered in either order.		
1(i)			
M1	Relevant equation to find the speed of P. Impulse-momentum equation using $\frac{33}{2}mu$, $3m$ and $3u$. Dimensionally correct, correct no. of terms, condone sign errors. If speed of Q is found first, may use CLM with their velocity of Q and correct mass-velocity pairs. M0 if g is used in Impulse equation but condone consistent g in CLM.		
A1	Correct equation for P. If speed of Q is found first, CLM equation is: $3m(3u)+5m(-4u) = 3m(\pm v)+5m\left(-\frac{7}{10}u\right)$		
A1	Correct speed of P, must be positive.		
1(ii)			
M1	Relevant equation to find the speed of Q. Impulse-momentum equation using $\frac{33}{2}mu$, $5m$ and 4u or CLM with v replaced and mass-velocity paired correctly. Dimensionally correct, correct no. of terms, condone sign errors. M0 if g is used in Impulse equation but condone consistent g in CLM.		
A1	Correct unsimplified equation. CLM note: there is no follow through for incorrect velocity of P		
A1	Correct speed of Q, must be positive.		