

Question Number	Scheme	Marks
1(a)	<p style="text-align: center;"> $\xrightarrow{4u}$ \xrightarrow{u} $P (m)$ \bigcirc \bigcirc $Q (2m)$ \xrightarrow{v} $\xrightarrow{4v}$ </p>	
	CLM: $4mu + 2mu = mv + 2m \times 4v$	M1 A1
	$4v = \frac{8u}{3}$ (2.7u or better)	A1
		(3)
(b)	$\pm m(v - 4u)$ OR $\pm 2m(4v - u)$	M1 A1ft
	$\frac{10mu}{3}$ (3.3mu or better)	A1
		(3)
(c)	Opposite to the direction of motion	B1
		(1)
		(7)
	Notes for Question 1	
1(a)	M1 Correct number of terms, dimensionally correct, condone sign errors Allow even if they assume that both are moving with the same speed after the collision.	
	A1 Correct equation, allow cancelled m 's or consistent extra g 's	
	A1 Correct answer (must be positive as it's a speed) and a single term.	
1(b)	M1 Dimensionally correct imp-momentum equation (M0 if g is included), with correct terms, condone sign errors, but must be a difference of momenta and must be using EITHER m and $4u$ and their v_P OR $2m$ and u and their v_Q	
	A1ft Correct expression, in terms of m and u , follow their v_P or v_Q A0ft if they assume that both move with the same speed after the collision	
	A1 cao Must be positive as it's a magnitude	
1(c)	B1 Any clear equivalent	