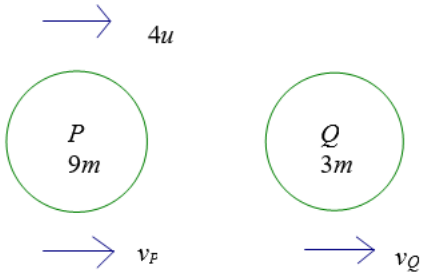
Question Number		Mark	Note
6a			
	Use of CLM	M1	Need all terms. Dimensionally consistent Must be using the correct masses.
	$9m\times 4u = 9mv_P + 3mv_Q$	A1	Correct unsimplified equation
	Impact Law	M1	Used the correct way round $\left(v_{\text{sep}} = e\times v_{\text{app}}\right)$
	$v_Q - v_P = 4ue$	A1	Correct unsimplified equation
	Obtain $\left(v_Q\right) = 3u\left(1+e\right)$ *	A1*	Obtain given answer correctly with at least one line of intermediate working.
		[5]	
6b	$v_P = u\left(3-e\right)\left(=\frac{7}{3}u\right)$ or negative of these	B1	Seen or implied
	KE lost $=\frac{1}{2}.9m.\left(4u\right)^2 - \frac{1}{2}.9m.\left(v_P\right)^2 - \frac{1}{2}.3m.\left(v_Q\right)^2$	M1	Correct form for KE. Need all terms. Condone subtraction the wrong way round i.e. all signs reversed.
	$=\frac{1}{2}.9m.\left(4u\right)^2 - \frac{1}{2}.9m.\left(\frac{7u}{3}\right)^2 - \frac{1}{2}.3m.\left(5u\right)^2$ $(=72mu^2 - 24.5mu^2 - 37.5mu^2)$ $(=18mu^2(1-e^2))$	A1ft	Correct unsimplified expression in *m* and *u* only Follow their v_P
	$(k=)10$	A1	cao
		[4]	

6c	$w = 5uf$ or $-5uf$	B1	Or equivalent. Seen or implied Condone a sign error here.
	$21mu = 3m \times 5u - 3m \times w$ $(w = -2u)$	M1	Impulse momentum equation. Dimensionally correct. Must be using 3*m*. Condone sign error and in terms of e.
	$(f =) \frac{2}{5}$ oe	A1**cso**	
		[3]	
		(12)	