

Question Number	Scheme	Marks
2.		
2(a)	$2m \times 3u = 2mv + 4m \times 2u$ OR $I = 4m \times 2u$ and $-I = 2m(v - 3u)$ AND add to eliminate I $v = -u$ so speed is u	M1A1 A1 (3)
2(b)	Opposite to its original direction, reversed, in opposite direction, direction QP , opposite direction to Q Direction changed is B0	DB1 (1)
2(c)	$R = 4mg$ $F = 4ma$; OR $-Ft = 4m(0 - 2u)$ $4mg\mu = 4ma$ (their calculated a or unknown a) $-\mu 4mgt = 4m(0 - 2u)$	B1 M1 A1
	$0^2 = (2u)^2 - 2a\left(\frac{6u^2}{g}\right)$ (their <u>calculated</u> a or an unknown a) OR $\frac{6u^2}{g} = \frac{(0 + 2u)}{2}t$ (their <u>calculated</u> t or an unknown t)	M1A1 (6)
	$\mu = \frac{1}{3}$ correctly obtained	A1 (10)
Notes for question 2		
2(a)	M1 Complete method to give equation in m , u and v only, dimensionally correct, correct no. of terms, condone sign errors and consistent cancelled m 's or extra g 's	
	A1 Correct equation	
	A1 u ; must be positive	
2(b)	DB1 Dependent on an answer of $+u$ or $-u$ in (a)	
2(c)	B1 cao Seen anywhere, e.g. on a diagram	
	M1 Equation of motion (Allow F for friction at this stage) OR Impulse-momentum equation	
	A1 Correct equation with F substituted	
	M1 Use of suvat to obtain an equation in u and a only OR Use of impulse-momentum to obtain an equation in u and t only	
	A1 Correct equation ; equations must be consistent to earn both A marks.	
	A1 Accept 0.33 or better	