Question Number	Scheme	Marks
5(a)	$\frac{1}{2}mU^2 - \frac{1}{2}mV^2 = mg\left(a + \frac{a}{4}\sin\theta\right)$	M1A1A1
	$V^2 = U^2 - \frac{ag}{2}(4 + \sin\theta)$*	A1*
		(4)
5(b)	Equation of motion towards the peg	M1
	$T + mg\sin\theta = m\frac{V^2}{\left(\frac{a}{4}\right)}$	A1
	Eliminate V^2 $T + mg\sin\theta = \frac{4m}{a}(U^2 - \frac{ag}{2}(4 + \sin\theta))$	DM1
	$T = \frac{4mU^2}{a} - 8mg - 3mg\sin\theta$	A1
		(4)
5(c)	Substitute $U = \sqrt{\frac{19ag}{8}}$ and $T = 0$ in their equation of motion and solve for $\sin\theta$ $\frac{4m}{a}\left(\sqrt{\frac{19ag}{8}}\right)^2 - mg(8 + 3\sin\theta) = 0 \quad \Rightarrow \quad \sin\theta = ...$	M1
	$\sin\theta = \frac{1}{2} \Rightarrow \text{height} = \frac{1}{8}a$	A1
		(2)
		(10)
	Notes for question 5	
5(a)		
M1	Energy equation with the correct number of terms (2KE, GPE). All terms dimensionally correct and with the correct structure. Condone sign errors and sin/cos confusion. Must include *m* in each term.	
A1	Correct unsimplified equation with at most one error	
A1	Correct unsimplified equation	
A1*	Answer obtained from complete and correct working. There must be at least one line of working or simplification between the initial equation and the given answer. Accept $V^2 = U^2 - \frac{ag}{2}(\sin\theta + 4)$, $V^2 = U^2 - \frac{1}{2}ag(4 + \sin\theta)$, $V^2 = U^2 - \frac{1}{2}ag(\sin\theta + 4)$	
5(b)		
M1	Equation of motion towards the peg. Must have all required terms and no extras. Condone sin/cos confusion and sign errors. Accept any form of acceleration, condone '*a*' for acceleration for the method mark only.	

Question Number	Scheme	Marks
A1	Correct equation using the form $\frac{v^2}{r}$ for acceleration where $r=\frac{a}{4}$	
DM1	Dependent on the first M. Use the given answer from (a) to eliminate V^2 from their equation of motion and form an equation in T, m, g , u, a and θ. Condone a slip when transferring the expression for V^2 as long as the intention to use the expression given in (a) is clear.	
A1	A correct expression for T with $\sin\theta$ terms collected. ISW once the correct expression is seen with collected terms.	
5(c)		
M1	Substitute $U^2=\frac{19ag}{8}$ and $T=0$ in their equation of motion to find a value for $\sin\theta$. M0 for using $V=0$.	
A1	Correct answer, accept $0.13a$ and $0.125a$	