Question Number	Scheme	Marks
4(a)	Energy from C to D	
	$mg\frac{l}{4}\sin 30° = \frac{\lambda}{2l}\left(\frac{l}{4}\right)^2$	M1A1A1
	$\lambda = 4mg$ *	A1* **(4)**
(b)	The greatest speed is when the acceleration of B is zero	
	($\nwarrow$) $T = mg\sin 30° = \frac{4mge}{l}$	M1
	$e = \frac{l}{8}$	A1
	Energy: $\frac{1}{2}mv^2 + \frac{4mg}{2l}\left(\frac{l}{8}\right)^2 = mg\frac{l}{8}\sin 30°$	M1A1A1
	$v = \sqrt{\left(\frac{gl}{16}\right)} = \frac{\sqrt{gl}}{4}$	DM1A1 **(7)**
		[11]

	Notes
(a)	
M1	Attempt the energy equation from C to D. Must use a vertical height for PE. EPE must have the form kx^2. Must have 1 PE term and 1 EPE term.
A1	Correct loss of PE
A1	Correct final EPE
A1*	Correct answer correctly obtained
(b)	
M1	Resolve along the plane using HL to find T
A1	Correct value for the extension
M1	Form the energy equation with an extension they have found. **M0** if $l/4$ is used for the extension. Must use a vertical height for PE. EPE must have the form kx^2 Must have 1 PE term, 1 KE term and 1 EPE term.
A1	Two correct terms
A1	Completely correct equation
DM1	Solve for v. Dependent on previous M.
A1	Correct expression for v

4(b) ALT 1	**Using integration**
M1 A1	As above, for finding correct value for e. This may be embedded in a complete method.
M1	Uses F=ma to and attempts to integrate. Must have the correct number of terms and weight resolved, $\int g\sin 30 - \frac{4gx}{l}\mathrm{d}x = \int v\,\mathrm{d}v$ leading to $\frac{gx}{2} - \frac{2gx^2}{l} = \frac{v^2}{2} + c$
A1	Correct integration with at most one slip/error
A1	Completely correct integration but c may be missing
DM1	Find value for c (when $x=\frac{l}{4}$, v=0 gives c=0) **and** sub in e to find an expression for v
A1	Correct expression for v

4(b) **ALT 2** M1 A1 M1 A1 A1 M1 A1	**Using SHM** As above, for finding correct value for e. This may be embedded in a complete method. Correctly uses F=ma to show that the motion is SHM Correct proof of SHM Uses $v = aw$ to find an expression for v Correct expression for v