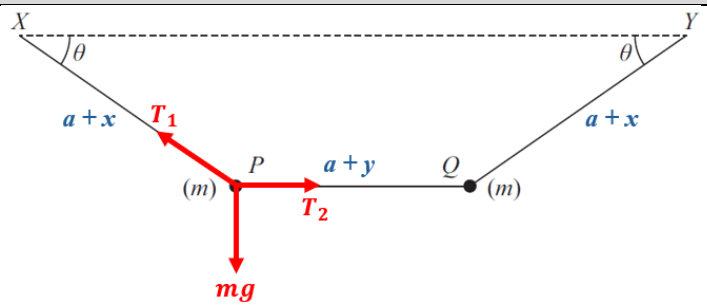
Question Number	Scheme	Marks
2		
	First relevant force equation	M1
	Correct unsimplified equation Relevant force equations: • Horiz $T_1\cos\theta = T_2$ Vert $T_1\sin\theta = mg$ or $2T_1\sin\theta = 2mg$ • // $T_1 = T_2\cos\theta + mg\sin\theta$ Perp $T_2\sin\theta = mg\cos\theta$ $\left(\text{accept } T_2\tan\theta = mg\right)$ • Lami $\dfrac{T_2}{\sin(90+\theta)} = \dfrac{mg}{\sin(180-\theta)} = \dfrac{T_1}{\sin 90}$ $\dfrac{T_2}{\cos\theta} = \dfrac{mg}{\sin\theta} = \dfrac{T_1}{\sin 90}$ It may be useful to note the simplified expressions for tensions are $T_1 = \dfrac{5mg}{3}$, $T_2 = \dfrac{4mg}{3}$ but need not be seen explicitly.	A1
	Second relevant force equation	M1
	Correct unsimplified equation	A1
	Hooke's Law for either tension $T_1 = \dfrac{\frac{20mg}{7}x}{a}$ or $T_2 = \dfrac{\frac{20mg}{7}y}{a}$	B1
	Solve their relevant force equation(s) and HL to find x or y	M1
	$x = \dfrac{7a}{12}$, $y = \dfrac{7a}{15}$	A1 A1
	$\left(XY =\right)\ 2(a+x)\cos\theta + (a+y)$	DM1
	$= 4a$	A1
		(10)
	Notes for question 2	
M1	First relevant force equation. All required forces present with no extras, condone sign errors and sin/cos confusion. M0 if $T_{XP} = T_{PQ}$ or $T_{PQ} = T_{QY}$. Condone W instead of mg.	
A1	Correct unsimplified equation. Condone W instead of mg.	

Question Number	Scheme	Marks
M1	Second relevant force equation.To be relevant, it must be possible to combine with the first force equation to find both T_1 and T_2. All required forces present with no extras, condone sign errors and sin/cos confusion. Condone W instead of mg. M0 if $T_{XP} = T_{PQ}$ or $T_{PQ} = T_{QY}$.	
A1	Correct unsimplified equation. Condone W instead of mg.	
B1	Correct use of Hooke's Law. Accept with extension in terms of the lengths PX and QY. Eg $T_1 = \dfrac{\frac{20mg}{7}(PX - a)}{a}$ $T_2 = \dfrac{\frac{20mg}{7}(QY - a)}{a}$	
M1	Solve their relevant force equation and HL to find the unknown extension (x or y) or length PX or QY in terms of a. HL must be of the form $\dfrac{\lambda x}{ka}$ where k is a constant. If using W, it must be replaced with mg.	
A1	One correct (x or y) or (PX or QY) $PX = \dfrac{19a}{12}$ $QY = \dfrac{22a}{15}$	
A1	Both correct (x and y) or (PX and QY)	
DM1	Dependent on the first two method marks. Complete expression for XY with calculated x and y, condone sin/cos confusion.	
A1	cao	