Question Number	Scheme	Marks
6a)	$F_r = \frac{1}{7}\times 0.4\times 9.8 \ \ (=0.56)(\text{N})$	B1
	$\frac{1}{2}\times 0.4v^2 = \frac{1}{2}\times 0.4(1.8)^2 - 0.8\times "0.56"$	M1A1A1 (ft their F_r)
	$v^2 = 1.00 \Rightarrow v = 1.0$ or 1.00 (m s^{-1})	A1
		(5)
6b)	$\frac{1}{2}\times 0.4(1.0)^2 = 0.56x + \frac{0.6x^2}{2(0.8)}$	M1A1B1
	$0.375x^2 + 0.56x - 0.2 = 0$	DM1
	$x = 0.2977...$	A1
	Total distance = 1.1 (m) (or 1.10)	A1
		(6)
ALT 1	*Work from A to C with total distance as the unknown*	
	$\frac{1}{2}\times 0.4(1.8)^2 = 0.56y + \frac{0.6(y-0.8)^2}{2(0.8)}$	M1A1B1
	$0.375y^2 - 0.046y - 0.408 = 0$	DM1
	$y = 1.0977...$	A1
	y = 1.1 or 1.10	A1
ALT 2	*Work from A to C with distance BC as the unknown*	
	$\frac{1}{2}\times 0.4(1.8)^2 = 0.56(y+0.8) + \frac{0.6y^2}{2(0.8)}$	M1A1B1
	Rest as main scheme	DM1A1A1
6c)	$T = \frac{0.6\times "0.2977"}{0.8} \ \ (=0.223)$	M1A1ft
	$0.223 < 0.56$ Tension less than F_{max}. Therefore particle will not move. cso.*	A1cso*
		(3)
		[14]

(a)		
B1	Correct friction seen. (Might be contained in WD) g or 9.8 acceptable.	
M1	Work-Energy equation with 2 KE terms and their WD by friction. All terms must be dimensionally correct.	
A1A1	One each for the KE terms.	
A1	$v = 1.0$ or 1.00 (2 or 3 sf as g has been used to obtain the speed at B)	
(b)		
M1	Work-Energy equation with KE, WD and EPE. EPE term to be of the form $\frac{\lambda x^2}{k \times \text{natural length}}$ with k = 1 or 2	
B1	Correct EPE term. M mark for the equation not needed for this mark.	
A1ft	Fully correct equation. Follow through their EPE	
DM1	Reducing to a 3 term quadratic in x, terms in any order. Depends on the first M of (b)	
A1	$x = 0.2977...$	
A1	1.1 (m) or 1.10 (m) (2 or 3 sf as g has been used to obtain the speed at B)	
ALT 1		
	First 4 marks as main scheme notes.	
A1A1	Award A1A1 if final answer is correct, from a correct equation. Award A1A0 if answer correct but not rounded.	
ALT 2	Notes as for main scheme.	
(c)		
M1	Use of Hooke's Law for their extension at C.	
A1ft	Correct tension. Follow through their extension. No need to simplify.	
A1cso*	Correct conclusion, from fully correct working including evaluation of tension.	