

Question	Scheme	Marks	AOs
5(a)	Motion of A :	M1	3.4
	$T - 3g \sin \theta = 3a$	A1	1.1b
	Motion of B :	M1	3.4
	$3g - T = 3a$	A1	1.1b
	Complete strategy to find tension	M1	3.1b
	$\Rightarrow T - 3g \sin \theta = 3g - T, \quad 2T = 3g(1 + \sin \theta) = \frac{27g}{7}$ $T = 18.9 \quad (19)$	A1	2.1
		(6)	
(b)	Obtain $a = 3.5$	B1	1.1b
	Speed when B reaches the ground: $v^2 = 2 \times 3.5 \times 0.8 (= 5.6)$	M1	3.3
	Magnitude of the accn. of A when the string is slack: $g \sin \theta$	B1	3.1b
	Extra distance: $0 = 5.6 - 2 \times g \sin \theta \times s \quad (s = 1)$	M1	3.1b
	Total distance 1.8 m	A1	2.2a
		(5)	
(c)	If the rope is not inextensible then cannot assume equal acceleration	B1	3.5b
	The model takes no account of the size of the packages	B1	3.5b
		(2)	
(13 marks)			

Notes:

(a)	M1	Use the model to form equation of motion for A or B . Must include all relevant terms. Condone sign errors and sin/cos confusion
	A1	Correct unsimplified equation
	M1	Use the model to form second equation of motion. Condone a combined equation
	A1	Correct unsimplified equation
	M1	Complete strategy e.g. form simultaneous equations using equations of motion for A and B and solve for T
	A1	2sf or 3sf or $\frac{27g}{14}$.
(b)	B1	Accept $\frac{5g}{14}$ Correct model for motion, seen or implied
	M1	Complete method using <i>suvat</i> to find v or v^2 using $v^2 = 2as$ for their $a \neq g$
	B1	Correct model for motion when the string is slack
	M1	Complete method using <i>suvat</i> to find the additional distance using $a \neq$ their 3.5
	A1	Any equivalent form
(c)	B1 B1	Any 2 independent limitations/consequences of the modelling assumptions e.g Have not considered air resistance which will affect the tension, if the rope is not light then the tension in it is not constant, if the pulley is not smooth then the tension is not the same on either side of the pulley.