

Question Number	Scheme	Marks
7(a)	Whole system: $3000 - 1200g \sin \alpha - 600g \sin \alpha - 2R - R = 1800(0.75)$	M1 A1 A1
	From exact working $R = 60 *$	A1* cso
		(4)
7(b)	Trailer: $T - 600g \sin \alpha - 60 = 600(0.75)$ OR Car: $3000 - 1200g \sin \alpha - 2(60) - T = 1200(0.75)$ (T could be replaced by ($-T$) in either equation, leading to $T = -1000$, so tension is 1000)	M1 A1
	$T = 1000(\text{N})$	A1
		(3)
7(c)	Equation of motion $-60 - 600g \sin \alpha = 600a$ (or $-600a$) $\left[a = -\frac{11}{12} = -0.9166\dots \right]$	M1 A1
	$0 = 12^2 + 2\left(-\frac{11}{12}\right)d$	M1
	$d = 78.5, 79 (\text{m})$	A1
		(4)
		(11)

Notes for question 7

(a) M1	Equation of motion for the whole system (or for car AND trailer with T eliminated) to give an <u>equation in R only</u> . $\sin \alpha$ does not need to be substituted Correct number of terms, forces resolved where appropriate, condone sign errors and sin/cos confusion.
A1	Correct equation with at most one error. $\sin \alpha$ does not need to be substituted
A1	Correct equation. $\sin \alpha$ does not need to be substituted
A1*	Reach the GIVEN answer with at least one intermediate line of working and must come from exact working.
(b) M1	Equation of motion for the trailer or for the car. Correct number of terms, forces resolved where appropriate, condone sign errors and sin/cos confusion. $\sin \alpha$ does not need to be substituted but $R = 60$ does
A1	Correct unsimplified equation. $\sin \alpha$ does not need to be substituted
A1	Correct answer for T
(c) M1	Form an equation of motion for the trailer to find the new acceleration. Correct number of terms, forces resolved where appropriate, condone sign errors and sin/cos confusion. $\sin \alpha$ does not need to be substituted but $R = 60$ does
A1	Correct unsimplified equation. $\sin \alpha$ does not need to be substituted
M1	Complete method, with a calculated acceleration that is not g , to find the distance travelled.
A1	Cao 2 or 3sf Must be positive. N.B. Allow a negative value of d and make positive for the distance.