

Question			Answer	Marks	AO	Guidance	
14			Let F_G be the frictional force at ground level and R_G the reaction Let F_W be the frictional force at the wall and R_W the reaction Let x be the distance the man can ascend before the ladder slips $F_G = \frac{1}{2} R_G$ and $F_W = \frac{1}{3} R_W$ Resolve horizontally and vertically: $F_G = R_W$ $R_G + F_W = 105g$	B1	2.1	Either on a diagram or in words, B1 is awarded for a clear definition of the force variables used	Or similarly about the top of the ladder
				B1	3.3	Both statements required	
				B1	3.1b	Both resolutions required Accept numerical value of g used	
				M1	1.1	Attempt to solve the 4 equations simultaneously to obtain at least two numerical values for the variables. May be implied by later working	
			$F_W = 15g$ $R_W = 45g = F_G$ $R_G = 90g$ Moments about the foot of the ladder: $35g(3.5 \cos 45) + (70g \cos 45)x = 45g(7 \cos 45)$ $+15g(7 \sin 45)$	B1	3.2a	B1 for either F_W and R_W or F_G and R_G	
				M1	3.3	Allow sign errors and sin/cos confusion	
				A1	3.4	Correct statement	
			$x = 4.25$	A1 [8]	1.1	cao	