

Question			Answer	Marks	AO	Guidance	
12	(a)		$0.5T_C + (4 - 0.7)T_D = 20g\bar{x}$ (moments about A)	M1*	3.3	Moments (with correct number of terms) about A, C, D, B or com	$\bar{x}$ is the centre of mass of the rod from A Allow g to be absent
			$(\bar{x} - 0.5)(20g) = (4 - 1.2)T_D$ (moments about C)				
			$(4 - 1.2)T_C = 20g(4 - 0.7 - \bar{x})$ (moments about D)	A1FT	1.1	Follow though their T_C and T_D (allow just T) and allow W for $20g$	
			$0.7T_D + (4 - 0.5)T_C = 20g(4 - \bar{x})$ (moments about B)				
			$(\bar{x} - 0.5)T_C = (4 - 0.7 - \bar{x})T_D$ (moments about com)	B1	3.3	Correct relationship(s) for the tensions at C and D (soi) Equation in $\bar{x}$ only, e.g., $W = 4T$ and any one mom. eq. $4T = 20g$ and any one mom. eq. $W = 20g$ and any two mom. eq.	
			$T_C = 3T_D$ or $T_C = 3T$ and $T_D = T$				
$T_C = 147 (= 15g)$ and/or $T_D = 49 (= 5g)$ (from $T_C + T_D = 20g$) used in relevant moment equation(s)	M1dep*	1.1		M0 if tension used are the same in both ropes			
$\bar{x} = 1.2$ (m)							
				A1	2.2a	Must be 1.2 as question asks for com from A	Alternative: B1 as main scheme (soi), then M1 for splitting 2.8 in the ratio 1: 3 or 3:1 then A1 for correct 1:3 then B2 for $0.5 + 0.25(2.8) = 1.2(\text{m})$
				[5]			
12	(b)		$0.7mg = 20g(4 - \bar{x} - 0.7)$ (moments about D)	M1	3.1b	Moments about D (oe) – correct number of terms – if taking moments about another point then must set $T_C = 0$ and $T_D = 20g + mg$	Allow g to be absent
			$20g(\bar{x} - 0.5) + 3.5mg = (4 - 0.5 - 0.7)(20g + mg)$ (moments about C)				
			$m = 60$	A1	2.2a		
				[2]			