Question		Answer	Marks	AO	Guidance	
11	(a)		M1	3.1b	Moments about A to form an equation with the correct number of terms and both the weight and contact force at B resolved - condone $20g$ for the weight of the rod. All relevant values must have been substituted. May take moments about another point (and resolve) but must end up after elimination with an equation in R_B only	Resolved for the weight means either sin or cos with an angle of either 30 or 60 only , and for the contact force at <i>B</i> either sin or cos with an angle of 25 or 35 or 55 or 65 only
		$1.4(20\cos 30) = R_B(2.8\cos 25)$	M1	1.1	One of the two moment terms correct	Must be as part of a two- term moment equation (so dimensionally correct so M0 if 20g for the weight) but the other term need not be resolved (or resolved correctly) e.g. $1.4(20\cos 30) = 2.8R_B$ scores M0 M1
		$R_B = \frac{28\cos 30}{2.8\cos 25} = 9.5555330$ = 9.56 (N) (correct to 3 significant figures)	A1	1.1	AG - correct equation followed by 9.56 scores all 3 marks	Allow awrt 9.56
			[3]			

For reference in parts (a) and (b):

Moments about B: $R_A(2.8\cos 30) = F_A(2.8\sin 30) + 20(1.4\cos 30)$

Moments about the mid-point: $R_A(1.4\cos 30) = F_A(1.4\sin 30) + R_B(1.4\cos 25)$

Question		Answer	Marks	AO	Guidance	
11	(b)		M1*	3.3	Attempt at resolving vertically or horizontally – correct number of terms with the contact force at <i>B</i> resolved (angle must be one of 25, 35, 55 or 65 only) – or taking moments again (see below) (same conditions for taking moments as in part (a)). M0 if using <i>W</i> or <i>mg</i> only for the weight of the rod (must substitute in the given value before awarding this mark – see second guidance column if using 20g)	Allow sign errors, sin/cos confusion and 20g used as the weight for the M mark. Allow R_B instead of the given value of 9.56 for the M mark
		$R_A + 9.56 \sin 35 = 20$ $F_A = 9.56 \cos 35$	A1 A1	1.1 1.1	Correct expression/equation for R_A Correct expression/equation for F_A	$R_A = 20 - 5.48 = 14.5$ $F_A = 7.83$
		$\sqrt{(9.56\cos 35)^2 + (20 - 9.56\sin 35)^2}$	M1dep*	1.1	Correct method for calculating the magnitude of the contact force at <i>A</i> where R_A and F_A are a linear combination of the correct number of terms with 9.56 resolved in both equations (angle must be one of 25, 35, 55 or 65 only)	
		16.5 (N)	A1	2.2a	www awrt 16.5. For reference if using 9.56 for R_B then 16.494179	If using more accurate value for R_B then 16.494698
			[5]			

Question		Answer	Marks	AO	Guidance		
For reference in parts (a) and (b):							
Moments about B: $R_A(2.8\cos 30) = F_A(2.8\sin 30) + 20(1.4\cos 30)$							
Moments about the mid-point: $R_A(1.4\cos 30) = F_A(1.4\sin 30) + R_B(1.4\cos 25)$							