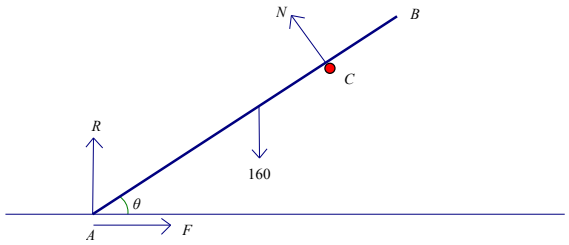
Q	Scheme	Marks	Notes
4a			
	Take moments about A	M1	Or a complete alternative method to form an equation in N. Dimensionally correct. Condone sin/cos confusion.
	$3N = 2\cos\theta \times 160$	A1	Correct unsimplified equation
	$3N = 2\times\frac{3}{4}\times 160 = 240,\quad N = 80$ (newtons) **(Given answer)**	A1	Deduce **given answer** correctly. Must see evidence of fully substituted equation
		(3)	
4b			Two independent equations needed. Mark in the order seen.
	Resolve horizontally	M1	Form one equation in F and/or R
	$F = N\sin\theta \left(= 80\times\frac{\sqrt{7}}{4} = 52.9.....\right)$	A1	Correct unsimplified equation
	Resolve vertically	M1	Form a second equation in F and/or R
	$R + N\cos\theta = 160 \quad \left(R = 160 - 60 = 100\right)$	A1	Correct unsimplified equation
	Use $F = \mu R$ to obtain μ	DM1	Dependent on two previous M marks
	$\mu = \frac{20\sqrt{7}}{100} = \frac{\sqrt{7}}{5}$	A1	0.53 or better (0.52915...)
		(6)	
	Alternative equations:		
	Resolving parallel to the rod: $R\sin\theta + F\cos\theta = 160\sin\theta$		
	Resolving perpendicular to the rod: $N + R\cos\theta = F\sin\theta + 160\cos\theta$		
	M(C): $3R\cos\theta = 3F\sin\theta + 160\cos\theta$		
	M(midpt): $2R\cos\theta = 2F\sin\theta + N$		
		[9]	