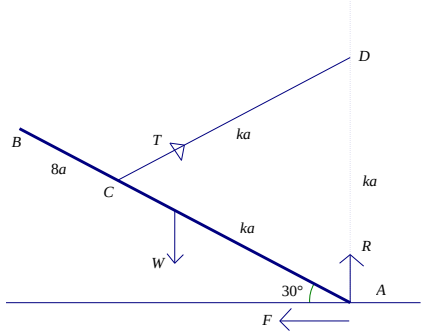
Question Number	Scheme	Marks
5a	 Moments about A: $T\cos 30° \times ka = W \times 4a\cos 30°$ $\Rightarrow T = \dfrac{4W}{k}$ *	M1 A1 **(2)**
5b	$\updownarrow$: $R + T\cos 60° = W$ $\left(R + \dfrac{T}{2} = W\right)$ $\leftrightarrow$: $F = T\cos 30°$ $\left(F = \dfrac{T\sqrt{3}}{2}\right)$ $R = W\left(1 - \dfrac{2}{k}\right)$, $F = \dfrac{2\sqrt{3}W}{k}$ $F = \mu R$: $\dfrac{2\sqrt{3}W}{k} = \dfrac{\sqrt{3}}{2}W\left(1 - \dfrac{2}{k}\right)$ $\left(\dfrac{4}{k} = 1 - \dfrac{2}{k}\right)$ $k = 6$	M1A1 A1 M1 M1 A1
		(6)
5c	Substitute for k to find R or F: $\left(R = \dfrac{2W}{3} \text{ or } F = \dfrac{\sqrt{3}W}{3}\right)$ Use of Pythagoras with their R, F, k: $\sqrt{\dfrac{4W^2}{9} + \dfrac{3W^2}{9}}$ $= \dfrac{\sqrt{7}W}{3}$, $\lambda = \dfrac{\sqrt{7}}{3}$	M1 M1 A1 **(3)** **Total 11**

Notes	
a	
M1	Moments equation. Both sides must have a distance (condone *a* missing on both sides) and trig. It is a show that question, so we need to see the trig before it is cancelled.
A1*	given result from correct equation.
b	
M1	Form a correct resolution/moments equation, including at least one of R/N.
A1	Correct equation. Award for best equation.
A1	Second correct equation, that would allow problem to be solved.
M1	Eliminate *T* from all equations. This might be awarded after the next M mark, but does not depend on 2 equations being used.
M1	Use $F = \mu R$ to form equation in *k* (and possibly *W*). *T* must now be eliminated. They must have used 2 equations, both of which would have scored the first M1.
A1	$k = 6$
	Alternative order of working for last 3 marks: (award marks in order indicated)
	Use of $F = \mu R$: $F = \frac{T\sqrt{3}}{2} = \frac{\sqrt{3}}{2}R \Rightarrow T = R$
	Substitute for *T* in vertical equation: $\frac{3T}{2} = W = \frac{6W}{k}$
	$k = 6$
	Award 5bM2 when T is eliminated and 5bM3 when equation in *k* only is reached
c	
M1	Substitute their *k* to find *R* or *F*.
M1	Use Pythagoras to find magnitude.
A1	$\lambda = \frac{\sqrt{7}}{3}$ Accept any exact equivalent. If no exact answer seen, accept 0.882 or better.

	Other possible equations
M(D)	$W \times 4a\cos 30 = F \times 4ka$
M(W)	$T \times (k-4)a\cos 30 + F \times 4a\sin 30 = R \times 4a\cos 30$
M(C)	$W \times (k-4)a\cos 30 + F \times ka\sin 30 = R \times ka\cos 30$
M(B)	$T \times (8-k)a\cos 30 + R \times 8a\cos 60 = W \times 4a\cos 30 + F \times 8a\cos 60$