Question Number	Scheme				Marks
1	Slant height = $5a$				B1
		Hemisphere	Cone	Total	
	Mass	$2\pi\left(4a\right)^2 k\lambda$	$\pi\times 4a\times 5a\times\lambda$	$32\pi a^2 k\lambda + 20\pi a^2\lambda$	B1
	Mass ratio(m)	$8k$	5	$8k+5$	
	Distance from vertex (y)	$5a$	$2a$	$4a$	B1
	my	$40ka$	$10a$	$4a\left(8k+5\right)$	
	$40ka+10a=4a\left(8k+5\right)$				M1A1
	$k=1.25$ oe				A1
					[6]
	Alternatives for the moments equation:				
ALT 1	Moments about the centre of mass (G) of the toy:				
	Distances: (-)a $2a$ 0 (Accept a provided the minus appears in the equation)				B1
	Equation: $-8ka+10a=0$				M1A1
ALT 2	Moments about the lowest point of the hemisphere:				
	Distances: $2a$ $5a$ $3a$				B1
	Equation: $16ka-5a=a\left(8k+5\right)$				M1A1
ALT 3	Moments about the centre of the circular base of the conical shell/hemispherical shell				
	Distances: $2a$ (-)a a				B1
	Equation: $16ka+25a=3a\left(8k+5\right)$				M1A1

B1	Slant height = $5a$ seen anywhere (could be on diagram)	
B1	Correct masses/mass ratio for hemisphere, cone and combined shape.	
B1	Correct distances seen. If using Alts 1 or 3 minus signs not needed here.	
M1	Moments equation attempted with all 3 terms (2 terms if about G). Condone inconsistent mass dimensions, if they are clearly using what they consider to be a mass. The equation can be formed using actual masses or a ratio of masses.	
A1	Correct moments equation, with actual masses or a ratio of masses and all signs correct.	
A1	Correct value for k. 1.25, $\frac{5}{4}$, $1\frac{1}{4}$ or any other equivalent fraction.	