Question Number	Scheme	Marks
4(a)	$mg\sin\alpha\times\left(\frac{3l}{2}+e\right)=\mu mg\cos\alpha\times\left(\frac{3l}{2}+e\right)+\frac{1}{2}\times\frac{2mg}{l}e^2$	M1B1B1A1
	$\frac{3}{5}\left(\frac{3l}{2}+e\right)=\frac{4\mu}{5}\left(\frac{3l}{2}+e\right)+\frac{e^2}{l}$	
	$\mu=\frac{9l^2+6le-10e^2}{4l(3l+2e)}$ *	dM1A1cso (6)
(b)	$e=l\Rightarrow\mu=\frac{1}{4}$ or 0.25	B1
	$F=\frac{1}{5}mg$	B1ft
	Change in acceleration is due to change of direction of F	
	$F_1=2mg-mg\sin\alpha+F_r\left(=\frac{8}{5}mg\right)$ and $F_2=2mg-mg\sin\alpha-F_r\left(=\frac{6}{5}mg\right)$	M1
	Mag of change in accel $=\frac{F_1-F_2}{m}=\frac{2g}{5}=3.92$ or 3.9 $(\mathrm{m\,s^{-2}})$	M1A1 (5)
		[11]

(a) M1	Attempt a work-energy equation with a GPE term, a single EPE term and the work done against friction. . (Allow $EPE=k\frac{\lambda x^2}{l}$)
B1	Correct EPE at C. (Ignore any extra EPE terms for this mark)
B1	Correct GPE
A1ft	Correct equation. Follow through their EPE and GPE terms providing they are of the correct form
dM1	At least one line of **correct** working to rearrange towards $\mu=$. They do not need to reach $\mu=$ for this mark.
A1cso*	Given result obtained with no errors seen and at least one line of correct rearrangement. Must be exactly as printed on paper.
(b)	
B1	Correct numerical value for μ seen anywhere in (b). This might be implied by later working.
B1ft	Correct value for F, seen anywhere in (b). Follow through their μ but must be dimensionally correct. μ
M1	Attempt 2 equations of motion to find resultant force. (Use of $Change=2F$) would imply this mark.
M1	Subtract and divide by m to obtain the mag of the change in the acceleration.
A1	Must be $\frac{2g}{5}$, or 3.9 or 3.92 (m s^{-2})