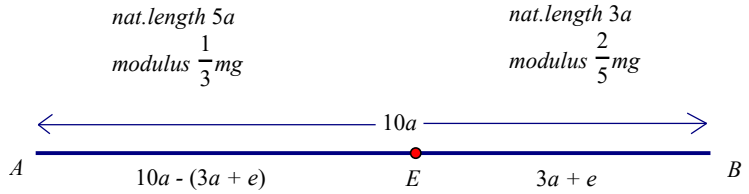
Question Number	Answer	Mark
7(a)		
	Equate the tensions	M1
	Correct equation with unknown extensions that sum to $2a$ e.g. $$\frac{\frac{2}{5}mge}{3a}=\frac{\frac{1}{3}mg(7a-e-5a)}{5a}$$	A1
	Solve their equation correctly with working that leads $(EB=)\frac{11a}{3}$ *	A1*
		(3)
7(b)	N2L for general position using difference of tensions $\pm(T_A-T_B)=-m\ddot{x}$	M1
	Correct equation e.g. • $\frac{\frac{mg}{3}\left(\frac{19a}{3}+x-5a\right)}{5a}-\frac{\frac{2mg}{5}\left(\frac{11a}{3}-x-3a\right)}{3a}=-m\ddot{x}$	A1
	• $\frac{\frac{mg}{3}\left(\frac{4a}{3}+x\right)}{5a}-\frac{\frac{2mg}{5}\left(\frac{2a}{3}-x\right)}{3a}=-m\ddot{x}$	A1
	Reach given conclusion from complete and correct working. This must include all of: • at least one step between the initial N2L equation in x and the conclusion • reaching the correct form $\ddot{x}=-\frac{g}{5a}x$ • concluding SHM e.g. $\ddot{x}=-\frac{g}{5a}x$ Hence SHM *	A1*
		(4)
7(c)	Use of periodic time $=\frac{2\pi}{\omega}$	M1
	$=2\pi\sqrt{\frac{5a}{g}}$ *	A1*
		(2)
7(d)	Correct method $$x=\frac{2}{3}a\sin\sqrt{\frac{g}{5a}}t=\frac{1}{3}a$$	M1

	$t = \frac{\pi}{6}\sqrt{\frac{5a}{g}}$	A1
	$(S =)\, 4t = \frac{2\pi}{3}\sqrt{\frac{5a}{g}}$	A1
		(3)
7(d) ALT	Correct method $x = \frac{2}{3}a\cos\sqrt{\frac{g}{5a}}t = \frac{1}{3}a$	M1
	$t = \frac{\pi}{3}\sqrt{\frac{5a}{g}}$	A1
	$(S =)\, 2\pi\sqrt{\frac{5a}{g}} - 4t = \frac{2\pi}{3}\sqrt{\frac{5a}{g}}$	A1
		(3)
		(12)
	Notes for Question 7	
(a)		
M1	Equate the tensions in each string. Dimensionally correct. Tensions must have the form $\frac{\frac{1}{3}mg\,(x)}{5a}$ and $\frac{\frac{2}{5}mg\,(y)}{3a}$ M0 if extensions are assumed to be equal.	
A1	Correct unsimplified equation with extensions that are unknown and sum to $2a$.	
A1*	Solve their equation correctly and use to obtain given answer from complete and correct working.	
(b)		
M1	N2L at a general point. Dimensionally correct. Both tensions present. Condone sign errors but must be a difference in tensions. Accept acceleration as a for the method mark only. M0 if tensions are at a fixed point. M0 if extensions are assumed to be equal. M0 if resultant force is never used with $m\ddot{x}$	
A1	Unsimplified equation with at most one error. (if acceleration is not $\ddot{x}$, this is one error)	
A1	Correct unsimplified equation	
A1*	Reach given conclusion from complete and correct working. This must include all of: • at least one step between the initial N2L equation in x and the conclusion • reaching the correct form $\ddot{x} = -\frac{g}{5a}x$ • conclude: SHM	
(c)		
M1	Use of $\frac{2\pi}{\omega}$ with their ω or the correct ω substituted	
A1*	Given answer obtained using the correct ω	

(d)		
M1	Correct method using $x = \pm a \sin \omega t$ to find a relevant time. Must use $x = \frac{1}{3}a$ and amplitude $\frac{2}{3}a$ but no need to substitute for ω e.g. $x = \frac{2}{3}a \sin \omega t = \frac{1}{3}a$	
A1	Correct value for a relevant time.	
A1	Correct answer in exact form.	
(d) ALT		
M1	Correct method using $x = \pm a \cos \omega t$ to find a relevant time. Must use $x = \frac{1}{3}a$ and amplitude $\frac{2}{3}a$ but no need to substitute for ω e.g. $x = \frac{2}{3}a \cos \omega t = \frac{1}{3}a$	
A1	Correct value for a relevant time.	
A1	Correct answer in exact form.	