10	**(a)**			**M1**	**3.3**	Moments about *A* correct number of terms – condone sign errors and cos/sin confusion	M0 if only using masses or if no sin/cos term with either weight or *T* term
			$0.4\left(0.25g\sin 60\right)+0.8\left(0.5g\sin 60\right)=...$	**B1**	**1.1**	**B1** for lhs	
			$...=T\left(0.4\sin 30\right)$	**B1**	**1.1**	**B1** for rhs	
			Tension is 21.2 (N)	**A1**	**3.4**	(21.2176…)	$T=1.25g\sqrt{3}=\frac{49}{4}\sqrt{3}$
				[4]			
10	**(b)**	**(i)**		**M1***	**3.3**	Resolving horizontally and vertically – correct number of terms allow cos/sin confusion – award this mark if only one stated correctly	Where *X* is the horizontal component of the reaction at *A*
			$\left(X=\right)T\cos 60,\ (Y=)T\sin 60-0.25g-0.5g$	**A1**	**3.3**	(For reference only: *Y* = 11.025 and *X* = 10.6…)	Where *Y* is the vertical component
			$\sqrt{(21.2...\cos 60°)^2+(21.2...\sin 60°-0.75g)^2}$	**M1dep***	**3.1b**	Correct method for finding the magnitude of the contact force (using their value of *T*)	
			$=15.3(\text{N})$	**A1**	**2.2a**	(15.283139… if *T* = 21.2 used)	$\frac{49}{20}\sqrt{39}=15.3002...$
				[4]			
10	**(b)**	**(ii)**	$\tan\theta=\frac{Y}{X}$	**M1**	**3.1b**	Correct method for finding the direction of the contact force at *A*	Dependent on first M mark in **(b)(i)**
			46.1° below the horizontal	**A1**	**3.2a**	oe (e.g. 43.9° to the downward vertical)	46.1021137… or 46.086245… if *T* = 21.2 used
				[2]			
10	**(c)**		• Consider the dimensions of the lamp • Consider the weight of the chain • Model the rod as non-uniform • Friction at the hinge • More accurate value of g used	**B1**	**3.5c**	Any valid improvement	
				[1]			