Question			Answer	Marks	AO		Guidance	
12	(i)	(a)	$R = mg\cos 30$	**B1**	**3.3**	E	Resolving perpendicular to the plane	
			$T = \frac{1}{4}mg$	**B1**	**1.1**	E	Resolving vertically for B	
				M1	**3.3**	E	Resolving parallel to the plane – three terms – allow signs and sin/cos confusion	
			$T + F - mg\sin 30 = 0$	**A1**	**1.1**	C		
			$F = \mu(mg\cos 30)$	**M1**	**3.3**	E	Use of $F = \mu R$	
			$\frac{1}{4}mg + \mu\left(\frac{mg\sqrt{3}}{2}\right) - \frac{1}{2}mg = 0 \Rightarrow \mu = ...$	**M1**	**2.1**	A	Deriving equation in μ (and m and g) and attempt to solve for μ – dependent on previous M marks and second B mark	
			$\mu = \frac{\sqrt{3}}{6}$	**A1**	**2.2a**	A		
				[7]				
12	(i)	(b)	$F = mg\sin 30 - \lambda mg\,(>0)$	**M1**	**3.1a**	A	Resolving parallel to the plane with λmg	
			$F > 0 \Rightarrow \lambda < \frac{1}{2}$	**A1**	**2.2a**	A		
				[2]				
12	(ii)		$T - F - mg\sin 30 = m\left(\frac{1}{4}g\right)$	**M1**	**3.3**	C	N, II parallel to the plane – four terms	Allow a
			$2mg - T = 2m\left(\frac{1}{4}g\right)$	**B1**	**3.3**	C	N, II for B	Allow a
			$2mg - F - mg\sin 30 = \frac{3}{4}mg$	**A1**	**1.1**	C	Correct method for eliminating T	
			$2mg - \mu(mg\cos 30) - mg\sin 30 = \frac{3}{4}mg$	**A1**	**2.1**	A	Correct use of $F = \mu R$ and $R = mg\cos 30$	
			$\mu = \frac{\sqrt{3}}{2}$	**A1**	**2.2a**	A		
				[5]				