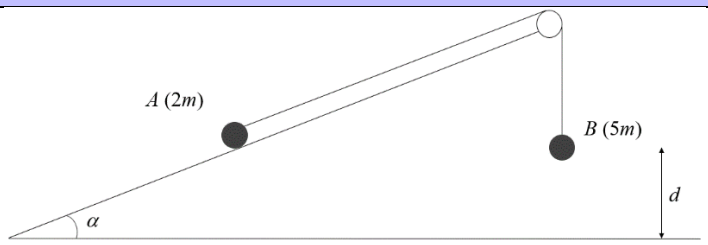
Question number	Scheme	Marks
7		
7(a)	$F = \mu 2mg\cos\alpha$	M1
	Use of WD to give an equation in μ	M1
	$\dfrac{3mgd}{13} = \mu(2mg\cos\alpha)\times d$	A1
	$\mu = \dfrac{1}{8}$	A1
		(4)
7(b)	At least one correct KE term $\dfrac{1}{2}(2m)V^2 \quad \dfrac{1}{2}(5m)V^2$	B1
	At least one correct GPE term $5mgd \quad 2mgd\sin\alpha$	B1
	Work-energy equation	M1
	$\dfrac{3mgd}{13} = (5m)gd - (2m)gd\sin\alpha - \dfrac{1}{2}(2m)V^2 - \dfrac{1}{2}(5m)V^2$	A1
	$V^2 = \dfrac{8gd}{7}$	A1
		(5)
7(c)	**Method 1:** Work-energy equation for A to move the further distance, d to form an equation in w, d, g (with their V substituted).	M1
	$\left(\dfrac{3mgd}{13} = \dfrac{1}{2}(2m)V^2 - \dfrac{1}{2}(2m)w^2 - (2m)gd\sin\alpha\right)$ $\dfrac{3mgd}{13} = \dfrac{1}{2}(2m)\dfrac{8gd}{7} - \dfrac{1}{2}(2m)w^2 - (2m)gd\sin\alpha$ **SC for these two A marks:** uses work energy from start to end to give: $5mgd = 2\left(\dfrac{3mgd}{13}\right) + (2mg)2d\sin\alpha + \dfrac{1}{2}(2m)w^2 + \dfrac{1}{2}(5m)\dfrac{8gd}{7}$	A1 A1
	$w = \sqrt{\dfrac{gd}{7}}$	A1
		(4)

7(c)	**Method 2:** Use F=ma up the plane to find new acceleration **and** then apply *suvat* for second part of motion to form an equation in *w, d, g* (with their *V* substituted*)*. $-F-2mg\sin\alpha=2ma'$ leads to $a'=-\frac{g}{2}$ **And** then apply "$v^2=u^2+2as$ " to get	M1
	$w^2=V^2-2\times\frac{g}{2}\times d\Rightarrow w^2=\frac{8gd}{7}-2\times\frac{g}{2}\times d$	A1A1
	$w=\sqrt{\frac{gd}{7}}$	A1
		(13)
	Notes for question	
(a) M1	Use $F=\mu R$ with $R=2mg\cos\alpha$ Condone sin/cos confusion.	
M1	Use work-done to form an equation in μ . *R* must be in the form $kmg\cos\alpha$ or $kmg\sin\alpha$ Dimensionally correct, all terms required and no extras. Condone sign errors and sin/cos confusion. *d*'s may have been cancelled	
A1	Correct unsimplified equation.	
A1	Correct μ . Accept 0.13, 0.125, $\frac{1}{8}$	
(b) B1	At least one correct KE term	
B1	At least one correct GPE term	
M1	Use work-energy to form an equation for *A* and *B*. Dimensionally correct, all terms required and no extras. Condone sign errors and sin/cos confusion. Correct mass-speed pairings used.	
A1	Correct unsimplified equation	
A1	Correct expression for V^2 Accept 1.1*gd* or better. Answer must be in terms of *g* and *d*	
(c) M1	Complete method to form an equation in *w, d, g* (their *V* must be substituted) **Method 1:** Use work-energy to form an equation for *A* moving a distance *d*. Dimensionally correct, all terms required and no extras. Condone sign errors and sin/cos confusion. Correct mass-speed pairings used **Method 2:** Use N2L for new acceleration **and** *suvat* to find *w* **SC:** Use work-energy to form an equation for *A* moving a distance 2*d*. Dimensionally correct, all terms required and no extras. Condone sign errors and sin/cos confusion. Correct mass-speed pairings used	
A1	Unsimplified equation with at most one error. Allow their *V* (substituted) for this mark. Trig does not need substituting.	
A1	Correct unsimplified equation. Trig does not need substituting. Maybe implied by final answer.	
A1	Correct expression. Accept $0.38\sqrt{gd}$ or better. Answer must be in terms of *g* and *d*	