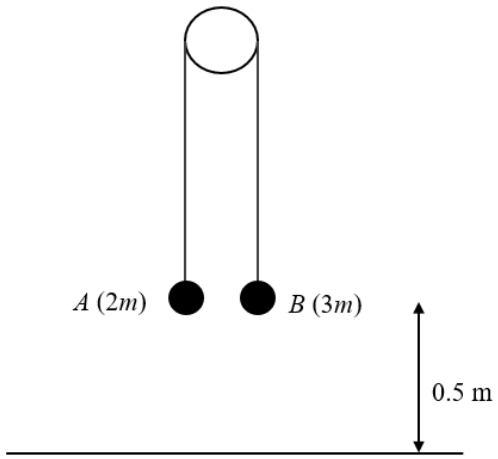
QUESTION NUMBER	SCHEME	MARKS
7		
7(a)	First equation of motion for either particle or whole system. For *A:* $T - 2mg = 2ma$ For *B*: $3mg - T = 3ma$ For system: $3mg - 2mg = 5ma$	M1 A1
	Second equation of motion for either particle or whole system.	M1 A1
	$T = \frac{12mg}{5}$ or $2.4mg$	A1
		(5)
7(b)	Acceleration = $\frac{g}{5}$ oe (must be used in (b))	B1
	$v^2 = 0^2 + 2 \times their\ a \times (0.5)$	M1
	$v^2 = 2 \times \frac{g}{5} \times 0.5 \quad (=1.96)$	A1
	$v = 1.4$ (m s^{-1})	A1
		(4)
7(c)	Equation for time to travel the first 0.5m e.g $0.5 = 0 + \frac{1}{2}\left(\frac{g}{5}\right)t^2$ **OR** $0.5 = \left(\frac{0+1.4}{2}\right)t$	M1 A1
	Equation for time for which *A* is moving under gravity $0.06 = '1.4't + \frac{1}{2}(-g)t^2$	M1 A1**ft**

	$t = 0.0525069\ldots \quad \left(\frac{5-\sqrt{10}}{35}\right)$	A1
	Total time = 0.05250. + 0.71428.. = 0.77 or 0.767 (s)	A1
		(6)
		(15)
	Notes for Question 7	
7(a)	**N.B.** If *m*'s consistently missing, award M marks only.	
M1	Form an equation of motion for a particle or the whole system. Correct no. of terms, dimensionally correct, condone sign errors. For *A:* $T - 2mg = 2ma$ For *B*: $3mg - T = 3ma$ For system: $3mg - 2mg = 5ma$	
A1	Correct equation.	
M1	Form second equation of motion. Correct no. of terms, dimensionally correct, condone sign errors.	
A1	Correct equation.	
A1	Correct expression for tension **N.B.** must be *kmg*	
7(b)		
B1	Correct acceleration.	
M1	Complete method to find an equation in *v* only. Must use their acceleration. M0 if they assume that $a = 9.8$	
A1	Correct equation in *v* only.	
A1	Cao **N.B.** 7/5 is A0.	
7(c)		
M1	Complete method to find an equation for the time taken to travel first 0.5m. Must use their acceleration for the pulley system.	
A1	Correct equation in *t* only. Note that solving this equation gives $t = 0.71$ or 0.714 (5/7)	
M1	Complete method to find an equation in *t* (time to move a distance 0.06 m) only, using *g* for acceleration. Allow M1 if 0.56 m used but M0 for any other distance or if they use $u = 0$ or $v = 0$.	
A1ft	Correct equation in *t* only, ft on answer to (b).	
A1	If they stop here, then it must be $t = 0.053$ or 0.0525 (If seen, 0.233 should be rejected.) However, this A mark can be implied by a correct final answer.	
A1	Complete the solution to find the correct total time 2/3 sf	

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