Question			Answer	Marks	AO	Guidance	
10	(a)			M1*	3.3	Attempt N2L for P and Q – three terms, mass required, condone sign errors	**M0** for $a = 0$ or $\pm g$
			$3g - T = 3a$ $T - 2g = 2a$	A1	1.1	Both equations correct	
			$3g - T = 3\left(\frac{T-2g}{2}\right) \Rightarrow T = ...$	M1dep*	3.4	Eliminate a and attempt to solve for T	Or eliminate T to find a first and substitute back numerical a to evaluate T $(a = \frac{1}{5}g = 1.96)$
			$T = 23.52$ (N)	A1	1.1	Accept 23.5 or $\frac{12}{5}g$	
				[4]			
10	(b)		$v^2 = 4.2^2 + 2('1.96')(4)$	M1	3.4	$v^2 = u^2 + 2as$ with $u = 4.2$, $s = 4$ and their a (which must be positive but not g)	May have s = - 4 and their a is negative (but not -g)
			$v = 5.77$ to 3 sf	A1	1.1	5.772347876…	$\frac{7\sqrt{17}}{5}$
				[2]			

APPENDIX : We were looking for the idea that the accelerations would be different or that they would not be constant.

Exemplar responses for Q10(b)

Response	Mark
Acceleration would not be constant	**B1**
Acceleration would vary	**B1**
Acceleration would be variable	**B1**
The acceleration of these two balls would be different	**B1**
The acceleration of these two balls would not be equal	**B1**
The acceleration of one ball is greater than the other	**B1**
The acceleration of these two balls would be greater/increase	**B0**
The acceleration of these two balls would be lower/decrease	**B0**
The acceleration of these two balls would be less	**B0**

Question			Answer	Marks	AO	Guidance	
10	(c)		$'5.77\ldots' = 4.2 + ('1.96')t_1$	M1	3.3	Correctly uses $v = u + at$ with $u = 4.2$ and their v and a where $a \neq 0$ or g. (Or uses $s = ut + \frac{1}{2}at^2$ with $u = 4.2$, $s = 4$ and their calculated value for a Or uses $s = \frac{1}{2}(u + v)t$ with $s = 4$, u =4.2 and their v)	Where t_1 is the time for P to move 4 m Must be using a consistent sign convention to earn **M1**
			$t_1 = 0.801$ ... or 0.802 ...	A1	1.1		0.802218304… $\frac{-15+5\sqrt{17}}{7}$
			$0 = '5.77\ldots' + (-9.8)t_2$	M1	3.4	Correct use of $v = u + at$ with $v = 0, a = -g$ and their positive u from part (b) (If correct: $t_2 = \frac{\sqrt{17}}{7}$ =0.5890150894…)	Where t_2 is the time from P hitting the ground until Q comes to rest
			1.39 (s) to 3sf	A1	2.2a	Allow awrt 1.39	1.391233393… $\frac{-15+6\sqrt{17}}{7}$
				[4]			
10	(d)		If this string is not inextensible, then the acceleration of P and the acceleration of Q would not have equal magnitude	B1	3.5a	**B0** for inextensible $\Rightarrow$ accelerations same See appendix for exemplars	**B0** for any incorrect extras
				[1]			