QUESTION NUMBER	SCHEME	MARKS
3(a)	A to B : $s=\left(\frac{u+v}{2}\right)t$: $400=\left(\frac{u+28}{2}\right)20$ Other possible equations: $28=u+20a$ $400=20u+\frac{1}{2}a\times 20^2$ $28^2=u^2+2\times 400a$ $400=(28\times 20)-\frac{1}{2}a\times 20^2$	M1
	$u=12$ *	A1* cso
		(2)
3(b)	A to B : Any of the above equations with u = 12 e.g. $v=u+at$ $28=12+20a$ (leads to $a=0.8$)	M1 A1
	A to midpoint: $200=12t+\frac{1}{2}0.8t^2$ **OR:** find v and use it to find t e.g. $v^2=12^2+(2\times 0.8\times 200)$ => $v=\sqrt{464}$ and then one of : $\sqrt{464}=12+0.8t$ $200=\left(\frac{12+\sqrt{464}}{2}\right)t$ $200=\sqrt{464}t-\frac{1}{2}\times 0.8t^2$	M1 A1
	$t=12$ (s) or better $(11.9258..)$, $5\sqrt{29}-15$	A1
		(5)
3(c)	$D-260=1200(0.8)$	M1A1ft
	D=1220 (N)	A1
		(3)
		(10)

	Notes for question 3	
(a)		
M1	Complete method to find the value of u. (they may use two equations, eliminate a and solve for u)	
A1*	Correctly reaches the given answer. **N.B**. If they use 2 equations, we need to see a eliminated and u found correctly for this A mark. **N.B.** No marks if they use u =12 in (b) to find a and then use it in (a) to show that u = 12.	
(b)		
M1	**Relevant *suvat* equation to find acceleration. This could be found in (a) or in (c) to earn these marks, but not necessarily used in (b).**	
A1	Correct equation(s).	
M1	Complete method to find an equation in t only. (they may find v (21.54065..) first). Must use their calculated acceleration and 12.	
A1	Correct unsimplified equation in t only.	
A1	Correct answer, t = 12 or better, t = 11.9258... If seen, the negative value for t (– 41.9258..) must be rejected.	
(c)		
M1	Use of $F=ma$. Correct no. of terms, dimensionally correct, a does not need to be substituted, condone sign errors. M0 if they use $a = g$.	
A1ft	Correct unsimplified equation, ft on their a.	
A1	Accept 1200 (N)	