Question Number	Scheme	Marks
3(a)	$v\dfrac{\mathrm{d}v}{\mathrm{d}x}=\dfrac{3\sqrt{x+1}}{4}$	M1
	$\dfrac{1}{2}v^2=\dfrac{1}{2}(x+1)^{\frac{3}{2}}\ \ (+C)$	M1A1
	$x = 15$, $v = 8$ => $C = 0$ so $v=(x+1)^{\frac{3}{4}}$ *	A1* (4)
3(b)	$\dfrac{\mathrm{d}x}{\mathrm{d}t}=(x+1)^{\frac{3}{4}}$	M1
	$4(x+1)^{\frac{1}{4}}=t\ \ (+C)$	M1A1
	$x = 15$, $t = 0$ => $C = 8$ so $4v^{\frac{1}{3}}=t+8$	M1
	$t=4v^{\frac{1}{3}}-8$	A1 (5)
	OR	
	$\dfrac{\mathrm{d}v}{\mathrm{d}t}=\dfrac{3}{4}v^{\frac{2}{3}}$	M1
	$3v^{\frac{1}{3}}=\dfrac{3}{4}t\ \ (+C)$	M1A1
	$t = 0$, $v = 8$ => $C = 6$ so $3v^{\frac{1}{3}}=\dfrac{3}{4}t+6$	M1
	$t=4v^{\frac{1}{3}}-8$	A1 (5)
		(9)
	Notes for question 3	
3(a)		
M1	Set up a differential equation in v and x only M0 if acceleration is $\frac{dv}{dx}$ or $\frac{dv}{dt}$ M0 if there is no differential equation eg starting with $\frac{1}{2}v^2=\int\frac{3\sqrt{x+1}}{4}\,dx$	
M1	Clear attempt to separate variables and integrate acceleration in terms of v and x. At least one of the powers must increase by 1.	
A1	Correct integration, condone missing + C	
A1*	Given answer obtained from complete and correct working. Must include use of the boundary conditions and the initial differential equation. A0 if +C is not dealt with correctly eg If +C is only considered *after* the square root.	
3(b)		
M1	Set up a differential equation in x and t only. Using the given answer in (a).	
M1	Clear attempt to separate the variables and integrate in terms of x and t. At least one of the powers must increase by 1	
A1	Correct integration, condone missing + C	
M1	Use of boundary conditions in an integrated equation and use of (a) to form an equation in v and t. M0 if boundary conditions are not used.	
A1	Correct answer	
	OR	
M1	Set up a differential equation in v and t only	

Question Number	Scheme	Marks
M1	Clear attempt to separate the variables and integrate in terms of v and t. At least one of the powers must increase by 1	
A1	Correct integration, condone missing + C	
M1	Use of boundary conditions in an integrated equation to form an equation in v and t. M0 if boundary conditions are not used.	
A1	Correct answer	