Question number	Scheme	Marks
4 (a)	$2 = 4\sin 2t \Rightarrow \sin 2t = 0.5 \Rightarrow 2t = \frac{\pi}{6} \Rightarrow t = \frac{\pi}{12}$ $\left[\approx 0.26179...\right]$	M1A1 (2)
(b)	$a = \frac{\mathrm{d}v}{\mathrm{d}t} = 8\cos 2t \Rightarrow a = 8\cos\left(2 \times \frac{\pi}{12}\right) = 4\sqrt{3}$ $(6.928...)\left(\mathrm{m/s^2}\right)$	M1dM1 A1cao (3)
(c)	$s = \int 4\sin 2t \ \mathrm{d}t = -2\cos 2t \ (+c)$	M1A1
	$t = \frac{\pi}{4} \Rightarrow 3 = -2\cos\frac{\pi}{2} + c \Rightarrow c = 3$	dM1
	$s = 3 - 2\cos 0 \Rightarrow s = 3 - 2 = 1$ (m)	A1cao (4) [9]

(a)	
M1	Equate v to 2 and solve the equation by any valid method to obtain at least one value of t (not nec the least, but must be radians) Allow degrees only if then changed to radians.
A1	Correct, least value. Can be exact or decimal – 3 sf minimum
(b)	
M1	Differentiate v. $4\sin 2t \to k\cos 2t$, $k = \pm 8$ or ± 4
dM1	Substitute their answer from (a) and obtain a **positive** value for a. Depends on the previous M mark OR: use $\cos 2x = \sqrt{1-\sin^2 2x}$ with their value for $\sin 2x$ from (a)
A1cao	$4\sqrt{3}$ or 6.928... 6.93 (3 sf minimum) Allow all marks here if their answer from (a) is in degrees
(c)	
M1	Integrate v. $4\sin 2t \to k\cos 2t$, $k = \pm 2, \pm 4$. If definite integration ignore limits here.
A1	Correct integration, constant (or limits) not needed
dM1	Substitute $t = \frac{\pi}{4}$ and $s = 3$ to obtain the value of c Definite integration: Substitute correct limits $t = 0, \frac{\pi}{4}$ and $s = 3$ Depends on the previous M mark.
A1cao	s = 1 (m)