	M1	For finding a value of x using their value for AC and BCA or BAC The processing must be correct for this mark and they must be finding the square root of x for this mark.
	A1	For awrt 1.85

Question	Scheme	Marks
3(a)(i)	$v = 6t^2 - 16t + c$	M1
	$t = 0, \quad v = 12$	A1
	$v = \dfrac{6t^2}{2} - 16t + 12 = \left[3t^2 - 16t + 12\right]$	M1
(ii)	$s = \dfrac{3t^3}{3} - \dfrac{16t^2}{2} + 12t + k$	A1
	$\left[t = 0, \quad s = 0\right] \Rightarrow k = 0$	[4]
	$s = t^3 - 8t^2 + 12t$	
(b)	At the origin, $s = 0$ $t^3 - 4t^2 + 12t = 0$	M1
	$\Rightarrow t(t-2)(t-6) = 0$	dM1
	$\Rightarrow t = 2, 6, (0)$	A1
	P first returns to the origin when $t = 2$ seconds	[3]
		Total 7 marks

Part	Mark	Notes
(a)(i)	M1	For integrating the given expression. (+c) not required for this mark See General Guidance for the definition of an attempt. No term to be differentiated.
	A1	Finds the value of c **and** the correct expression for v
(ii)	M1	For an acceptable attempt to integrate **their** v. See General Guidance for the definition of an attempt. (+k) not required for this mark. No term to be differentiated.
	A1	For the correct expression for the distance, which must have come from establishing **explicitly** that $k = 0$ from the integration. Without + k in their integration this mark is automatically lost.
(b)	M1	For setting their expression [which must be a cubic] for $s = 0$
	dM1	For solving the cubic Minimally acceptable attempt is $\Rightarrow t(t \pm A)(t \pm B) = 0$ where $\lvert AB \rvert = 12$ or also allow $(t \pm A)(t \pm B) = 0$ where $\lvert AB \rvert = 12$ as candidates are told that one value of $t = 0$ Any method to solve the quadratic is acceptable. Formula or completing the square. This is a dependent mark. <u>Use of a calculator</u> If there is no working seen and either their values of t are incorrect or their s is incorrect, only award this mark if a correct method is used/seen to solve the equation.
	A1	For the correct value of $t = 2$ explicitly stated.