Question	Scheme	Marks	AOs
6 (a)	Attempts to use an appropriate model; e.g. $y = A(3-x)(3+x)$ or $y = A(9-x^2)$	M1	3.3
	e.g. $y = A(9-x^2)$ Substitutes $x=0, y=5 \Rightarrow 5 = A(9-0) \Rightarrow A = \frac{5}{9}$	M1	3.1b
	$y = \frac{5}{9}(9-x^2)$ or $y = \frac{5}{9}(3-x)(3+x)$, $\{-3 \leqslant x \leqslant 3\}$	A1	1.1b
		(3)	
(b)	Substitutes $x = \frac{2.4}{2}$ into their $y = \frac{5}{9}(9-x^2)$	M1	3.4
	$y = \frac{5}{9}(9-x^2) = 4.2 > 4.1 \Rightarrow$ Coach can enter the tunnel	A1	2.2b
		(2)	
(b) Alt 1	$4.1 = \frac{5}{9}(9-x^2) \Rightarrow x = \frac{9\sqrt{2}}{10}$, so maximum width $= 2\left(\frac{9\sqrt{2}}{10}\right)$	M1	3.4
	$= 2.545... > 2.4 \Rightarrow$ Coach can enter the tunnel	A1	2.2b
		(2)	
(c)	E.g. • Coach needs to enter through the centre of the tunnel. This will only be possible if it is a one-way tunnel • In real-life the road may be cambered (and not horizontal) • The quadratic curve *BCA* is modelled for the entrance to the tunnel but we do not know if this curve is valid throughout the entire length of the tunnel • There may be overhead lights in the tunnel which may block the path of the coach	B1	3.5b
		(1)	
		(6 marks)	

Question 6 Notes:

(a)	
M1:	Translates the given situation into an appropriate quadratic model – see scheme
M1:	Applies the maximum height constraint in an attempt to find the equation of the model – see scheme
A1:	Finds a suitable equation – see scheme
(b)	
M1:	See scheme
A1:	Applies a fully correct argument to infer {by assuming that curve *BCA* is quadratic and the given measurements are correct}, that is possible for the coach to enter the tunnel
(c)	
B1:	See scheme