Question	Scheme	Marks	AOs
12 (a)	$y = ax^2 + c$ $x = 0,\ y = 4 \Rightarrow c = 4$	M1	3.3
	$x = 50,\ y = 24 \Rightarrow 24 = a(50)^2 + 4 \Rightarrow a = \frac{20}{50^2} = \frac{1}{125}$ or 0.008	M1	3.4
	$y = \frac{1}{125}x^2 + 4 \quad \{-50 \leqslant x \leqslant 50\}$	A1	1.1b
		(3)	
(a) **Alt 1**	$y = ax^2 + bx + c$ $x = 0,\ y = 4 \Rightarrow c = 4$ $x = 50,\ y = 24 \Rightarrow 24 = 2500a + 50b + 4$ $x = -50,\ y = 24 \Rightarrow 24 = 2500a - 50b + 4$	M1	3.3
	$0 = 100b \Rightarrow b = 0$ $24 = 2500a + 4 \Rightarrow a = \frac{20}{2500} = \frac{1}{125}$ or 0.008	M1	3.4
	$y = \frac{1}{125}x^2 + 4 \quad \{-50 \leqslant x \leqslant 50\}$	A1	1.1b
		(3)	
(b)	$x = 50 - 19 = 31 \Rightarrow y = \frac{1}{125}(31)^2 + 4$	M1	3.4
	$y = 11.688\ \{< 12\} \Rightarrow$ Lee can safely inspect the defect	A1	2.2b
		(2)	
(b) **Alt 1**	$12 = \frac{1}{125}x^2 + 4 \Rightarrow 8 = \frac{1}{125}x^2 \Rightarrow x = \sqrt{1000}$	M1	3.4
	$x = 31.6227766... \Rightarrow$ Distance from tower $= 50 - 31.6227766...$ $= 18.3772234...\ \{< 19\} \Rightarrow$ Lee can safely inspect the defect	A1	2.2b
		(2)	
(c)	E.g. • The thickness/diameter of the cable has not been incorporated into the current model • Weather conditions (e.g. strong winds) may affect the shape of the curve • Walkway may not be completely horizontal	B1	3.5b
		(1)	
			(6 marks)

Question 12 Notes:	
(a)	
M1:	Attempts to use a model of the form $y = ax^2 + c$ **(containing no *x* term)**
M1:	Uses the constraints $x = 0,\ y = 4$ and $x = 50,\ y = 24$ (or $x = -50,\ y = 24$) to find the values for their *c* and for their *a*
A1:	$y = \frac{1}{125}x^2 + 4$ (Ignore $-50 \leqslant x \leqslant 50$)
(a)	
Alt 1	
M1:	Attempts to use a model of the form $y = ax^2 + bx + c$ **and** finds or deduces that $b = 0$
M1:	Uses the constraints $x = 0,\ y = 4;\ x = 50,\ y = 24$ and $x = -50,\ y = 24$ to find the values for their *c*, for their *b* and for their *a*
A1:	$y = \frac{1}{125}x^2 + 4$ (Ignore $-50 \leqslant x \leqslant 50$)
(b)	
M1:	Substitutes $x = 50 - 19\ \{= 31\}$ or $x = -50 + 19\ \{= -31\}$ into their quadratic model
A1:	Obtains $y =$ awrt 11.7 and infers from the model that Lee can safely inspect the defect
(b)	
Alt 1	
M1:	Substitutes $y = 12$ into their quadratic model and rearranges to find $x = ...$
A1:	Obtains distance from tower as awrt 18.4 and infers from the model that Lee can safely inspect the defect
(c)	
B1:	See scheme