

Question	Scheme	Marks	AOs
6 (a)	Attempts $P = 100 - 6.25(15 - 9)^2$	M1	3.4
	$= -125 \therefore$ not sensible as the company would make a loss	A1	2.4
		(2)	
(b)	Uses $P > 80 \Rightarrow (x - 9)^2 < 3.2$ or $P = 80 \Rightarrow (x - 9)^2 = 3.2$	M1	3.1b
	$\Rightarrow 9 - \sqrt{3.2} < x < 9 + \sqrt{3.2}$	dM1	1.1b
	Minimum Price = £7.22	A1	3.2a
		(3)	
(c)	States (i) maximum profit = £100 000 and (ii) selling price £9	B1	3.2a
		B1	2.2a
		(2)	

(7 marks)

(a)

M1: Substitutes $x = 15$ into $P = 100 - 6.25(x - 9)^2$ and attempts to calculate. This is implied by an answer of -125 . Some candidates may have attempted to multiply out the brackets before they substitute in the $x = 15$. This is acceptable as long as the function obtained is quadratic. There must be a calculation seen or implied by the value of -125 .

A1: Finds $P = -125$ or states that $P < 0$ and explains that (this is not sensible as) the company would make a loss.

Condone $P = -125$ followed by an explanation that it is not sensible as the company would make a loss of £125 rather than £125 000. An explanation that it is not sensible as "the profit cannot be negative", "the profit is negative" or "the company will not make any money", "they might make a loss" is incomplete/incorrect. You may ignore any misconceptions or reference to the price of the toy being too cheap for this mark.

Alt: **M1:** Sets $P = 0$ and finds $x = 5, 13$ **A1:** States $15 > 13$ and states makes a loss

(b)

M1: Uses $P \dots 80$ where ... is any inequality or " $=$ " in $P = 100 - 6.25(x - 9)^2$ and proceeds to $(x - 9)^2 \dots k$ where $k > 0$ and ... is any inequality or " $=$ "

Eg. Condone $P < 80$ in $P = 100 - 6.25(x - 9)^2 \Rightarrow (x - 9)^2 < k$ where $k > 0$ If the candidate attempts to multiply out then allow when they achieve a form $ax^2 + bx + c = 0$

dM1: Award for solving to find the two positive values for x . Allow decimal answers

FYI correct answers are $\Rightarrow 9 - \sqrt{3.2} < x < 9 + \sqrt{3.2}$ Accept $\Rightarrow x = 9 \pm \sqrt{3.2}$

Condone incorrect inequality work $100 - 6.25(x - 9)^2 > 80 \Rightarrow (x - 9)^2 > 3.2 \Rightarrow x > 9 \pm \sqrt{3.2}$

Alternatively award if the candidate selects the lower of their two positive values $9 - \sqrt{3.2}$

A1: Deduces that the minimum Price = £7.22 (£7.21 is not acceptable)

(c)

(i) **B1:** Maximum Profit = £100 000 with units. Accept 100 thousand pound(s).

(ii) **B1:** Selling price = £9 with units

SC 1: Missing units in (b) and (c) only penalise once in these parts, withhold the final mark.

SC 2: If the answers to (c) are both correct, but in the wrong order score SC B1 B0

If (i) and (ii) are not written out score in the order given.