6.

P = 100 − 6.25(x − 9)²

P = 80

← here x = £10.79.
} Between
} Here P > 80

answer to (b)   See (b) x = £7.21

Figure 1

A company makes a particular type of children's toy.

The annual profit made by the company is modelled by the equation

$$P = 100 - 6.25(x - 9)^2$$

where P is the profit measured in thousands of pounds and x is the selling price of the toy in pounds.

A sketch of P against x is shown in Figure 1.

Using the model,

(a) explain why £15 is not a sensible selling price for the toy.

(2)

Given that the company made an annual profit of more than £80 000

(b) find, according to the model, the least possible selling price for the toy.

(3)

The company wishes to maximise its annual profit.

State, according to the model,

(c) (i) the maximum possible annual profit,

(ii) the selling price of the toy that maximises the annual profit.

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(2)

(a) With a S.P of £15 $P = 100 - 6.25(-6)^2 = -125 \times 10^3$

So the company makes a loss of £125,000 p.a. which is not sensible!

(b) To get a profit of £80,000, x is given by

$$80 = 100 - 6.25(x-9)^2$$

$$(x-9)^2 = {}^{20}/6.25 = 3.2$$

$$x - 9 = \pm\sqrt{3.2} = \pm 1.79$$

So x = 7.21 or 10.79. The minimum price is £7.21

(c) P is a maximum when the square term is zero (as it is subtracted. So $P_{max} = £100,000$. At this value $(x-a) = 0$

so x = £9.