11. A company is trying to determine the most profitable selling price for a new toy.

Given that

- if the selling price of each toy is £30, the company expects to sell 1500 toys in one year
- if the selling price of each toy is £50, the company expects to sell 300 toys in one year

Using a **linear** model, with y being the expected number of toys sold in one year and x pounds being the selling price of the toy,

(a) find an equation for y in terms of x.

(3)

Given that

- the cost of making each toy is £10
- the company has additional costs of £8 000 per year

(b) show that, according to the model, the yearly profit, P, in **thousands** of pounds, is given by

$$P = -0.06x^2 + 3.9x - 41$$

(3)

Use the model given in part (b) to answer parts (c), (d) and (e).

Given that the company wishes to make a profit on sales of the toy,

(c) find the range of possible selling prices of the toy.

(2)

(d) Hence, or otherwise, deduce the selling price of the toy that maximises the profit.

(1)

In one particular year, the company sold the toy for £35 and made £21 750 profit.

(e) Use this information to evaluate the suitability of the model.

(2)