

4. In 1997 the average CO₂ emissions of new cars in the UK was 190 g/km.

In 2005 the average CO₂ emissions of new cars in the UK had fallen to 169 g/km.

Given A g/km is the average CO₂ emissions of new cars in the UK n years after 1997 and using a linear model,

- (a) form an equation linking A with n .

(3)

In 2016 the average CO₂ emissions of new cars in the UK was 120 g/km.

- (b) Comment on the suitability of your model in light of this information.

(3)

4. A tree was planted in the ground.

Its height, H metres, was measured t years after planting.

Exactly 3 years after planting, the height of the tree was 2.35 metres.

Exactly 6 years after planting, the height of the tree was 3.28 metres.

Using a linear model,

- (a) find an equation linking H with t .

(3)

The height of the tree was approximately 140 cm when it was planted.

- (b) Explain whether or not this fact supports the use of the linear model in part (a).

(2)

6.

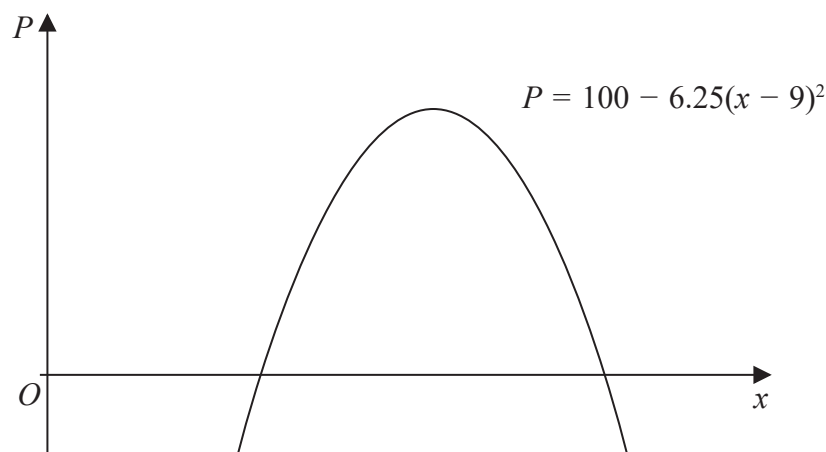


Figure 1

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.

(2)

9. A company started mining tin in Riverdale on 1st January 2019.

A model to find the total mass of tin that will be mined by the company in Riverdale is given by the equation

$$T = 1200 - 3(n - 20)^2$$

where T tonnes is the total mass of tin mined in the n years after the start of mining.

Using this model,

- (a) calculate the mass of tin that will be mined up to 1st January 2020, (1)
- (b) deduce the maximum total mass of tin that could be mined, (1)
- (c) calculate the mass of tin that will be mined in 2023. (2)
- (d) State, giving reasons, the limitation on the values of n . (2)