Exemplar P2 Q9

9. A manufacturer is asked to design an open-ended shelter, as shown:

The frame of the shelter is to be made of rods of two different lengths:
- $x$ metres for top and bottom edges;
- $y$ metres for each sloping edge.

The total length, $L$ metres, of the rods used in a shelter is given by:

$$L = 3x + \frac{48}{x}$$

To minimise production costs, the total length of rods used for a frame should be as small as possible.

(a) Find the value of $x$ for which $L$ is a minimum.

The rods used for the frame cost £8.25 per metre.
The manufacturer claims that the minimum cost of a frame is less than £195.

(b) Is this claim correct? Justify your answer.

Answers

(a) $a = 4\text{cm}$

(b) No (£198 > £195)