Problem

A widget manufacturer has a variable cost of $10 per widget, and the total cost is $2100 when 150 widgets are produced in a month.

a. Find the fix cost of this manufacturer.

b. The manufacturer sells 50 widgets for $2000. Assume that the price for each widget is the same. Find the price for each widget.

c. Find the break-even point of this manufacturer. This means find the number of widgets the manufacturer needs to sell to break-even.

d. How many widgets the manufacturer needs to sell to make $100,000 profit?

a. We have

Total cost = Fixed cost + variable cost × number of items

$\Rightarrow$ $2100 = \text{Fixed cost} + 10 \times 150$

$\Rightarrow$ $\text{Fixed cost} = 2100 - 10 \times 150 = 600$

b. 50 widgets sells for 2000

$\Rightarrow$ 1 widget sells for $\frac{2000}{50} = 40$

c. Let x be the number of widgets needed to sell for break - even.

Revenue: $R(x) = 40x$

Total cost = Fixed cost + variable cost * number of items

$\Rightarrow C(x) = 600 + 10x$

$R(x) = C(x)$ (break-even)

$\Rightarrow 40x = 600 + 10x$

$\Rightarrow 30x = 600$

$\Rightarrow x = 20$

d. We need

$R(x) - C(x) = 100,000$

$\Rightarrow 40x - (600 + 10x) = 100,000$

$\Rightarrow 40x - 600 - 10x = 100,000$

$\Rightarrow 30x - 600 = 100,000$

$\Rightarrow 30x = 100,600$

$\Rightarrow x = \frac{100,600}{30} \simeq 3353.33$

$\Rightarrow$ They should sell 3354 widgets to make 100,000 profit.