

Break-even point analysis

$$\text{Revenue} = \text{Price}(Q)$$

$$\text{TotalCost} = \text{FixedCost} + \text{VariableCost}(Q)$$

$$\text{Profit} = \text{Revenue} - \text{TotalCost}$$

Exercise 1

How many pieces do I need to sell to break even?

Task	Price
Rent	\$ 30k/month
Raw material	\$ 100/piece
Salaries	\$ 20k/month
Selling price	\$ 700/piece
Manufacturing cost	\$ 300/piece

$$\text{TotalCost} = \text{FixedCost}[30k + 20k] + \text{VariableCost}(Q)[100 + 300]$$

$$\text{TotalCost} = 50,000 + 400Q$$

$$\text{Profit}[0] = \text{Price}(Q)[700Q] - \text{TotalCost}[50,000 + 400Q]$$

$$700Q = 50,000 + 400(Q)$$

$$50,000 + 400Q - 700Q = 0$$

$$50,000 - 300Q = 0$$

$$50,000 = 300Q$$

$$Q = 167 \text{ //it is round to ceil because you cannot produce a fraction of a product}$$

Break even point means the minimum amount of sold pieces required to reach the investment.

Exercise 2

How many pieces do I need to sell to make a 50,000 profit?

$$50,000 = \text{Price}(Q) - (\text{FixedCost} + \text{VariableCost}(Q))$$

$$50,000 = 700Q - (50,000 + 400Q)$$

$$50,000 = 300Q - 50,000$$

$$50,000 + 50,000 = 300Q$$

$$100,000 = 300Q$$

$$Q = 100,000/300 = 334$$

So far, we have assumed that every manufactured piece is sold. However, this ain't generally true. For this example, we are assuming that 15 % of the manufactured pieces won't make it to the market because of quality control stuff.

Exercise 3

How many units do I need to sell to break even?

Task	Price
Rent	\$ 30k/month
Raw material	\$ 100/piece
Salaries	\$ 20k/month
Selling price	\$ 700/piece
Manufacturing cost	\$ 300/piece
Quality control	5%

K : Units you sell

Q : Units you make

$700Q * 0.95 - (50,000 + 400Q) = 0$ //it is multiplied by 0.95 because five percent of the produced items are not sold

$$665Q - 50,000 - 400Q = 0$$

$$265Q = 50,000$$

$$Q = 50,000/265$$

$$Q = 189$$

$$K = 188.67 * 0.95$$

$$K = 180$$

Exercise 4

Now make 80,000 profit

$$700Q * 0.95 - (50,000 + 400Q) = 80,000$$

$$665Q - 50,000 - 400Q = 80,000$$

$$265Q = 130,000$$

$$Q = 130,000/265$$

$$Q = 491$$

$$K = 490.56 * 0.95 = 467$$