BEP

BREAK EVEN ANALYSIS (BEA)

The BEA helps in understanding the relationship between revenues and costs of a firm in relation to its volume of sales. It helps in determining the volume at which the firm's cost and revenue are in equilibrium.

It is a technique which helps to analyze the effect of change in the level of production and total profit of a company. The BEA establishes the relationship between cost, volume and profits. Hence it is also known as "Cost-Volume-Profit analysis".
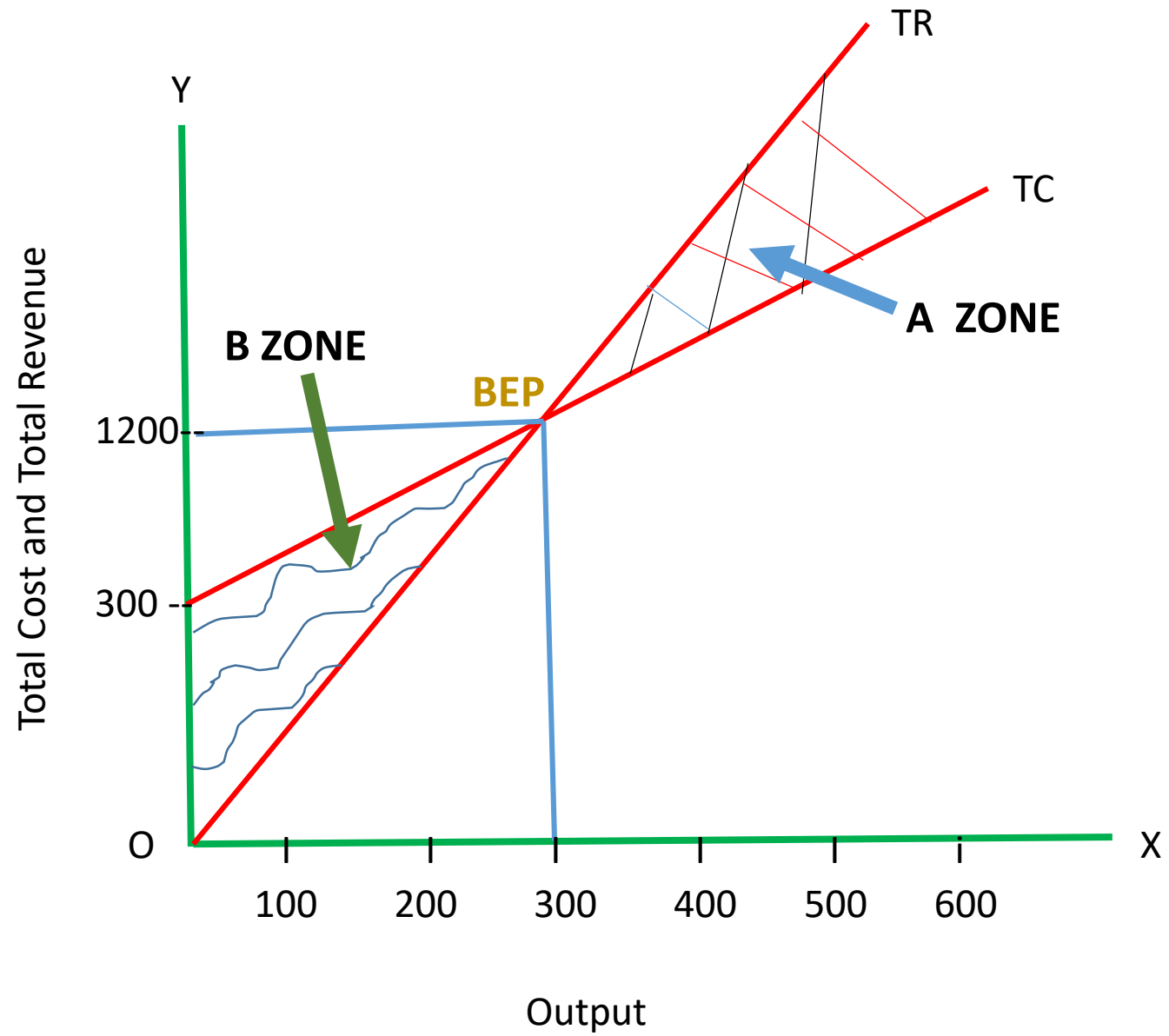
In BEA more prominence to identify the Break Even Point (BEP), BEP refers to that level of sales volume at which there is neither profit nor loss, Costs being equal to its sales value and the contribution is equal to fixed costs.
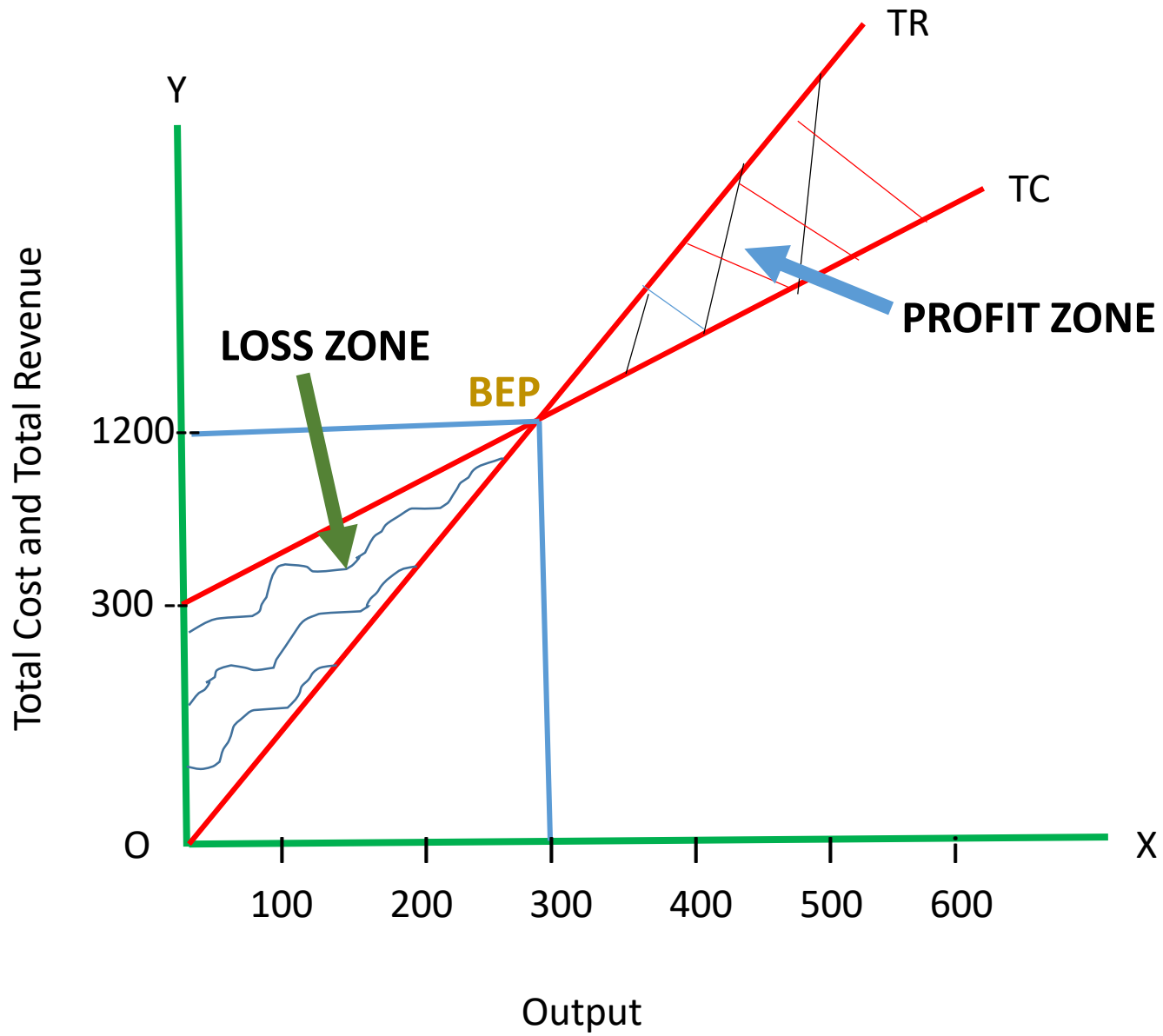
BEP is defined as "that level of sales at which the total revenue is equal to total costs and the net income is equal to zero.

Break even chart and diagrammatic representation

Selling Price is Rs. 4 per unit

Output (Q)	Total Revenue (TR)	Total Cost (TC)
0	0	300
100	400 (100 x 4)	600
200	800 (200 x 4)	900
300	1200 (300 x 4)	1200
400	1600 (400 x 4)	1500
500	2000 (500 x 4)	1800
600	2400 (600 x 4)	2100

Y

Total Cost and Total Revenue

TR

TC

B ZONE

A ZONE

BEP

1200

300

O

Output

X

100   200   300   400   500   600

Y

Total Cost and Total Revenue

TR

TC

LOSS ZONE

BEP

PROFIT ZONE

1200

300

O

X

100   200   300   400   500   600

Output

Methods of calculation of BEP

1) BEP in terms of physical units

2) BEP in terms of sales value

CALCULATION OF BREAK EVEN POINT

Formula for calculating BEP in terms of physical units

$$\text{Now, BEP} = \frac{\text{TFC}}{\text{CM}}$$

CM= Selling Price (P) – Variable cost per unit.(VC)

CALCULATION OF BREAK EVEN POINT

Illustration for calculating BEP in terms of physical units

Selling Price Rs. 15 per engg component
Variable cost Rs. 10 per engg component
Total Fixed cost (TFC)   Rs. 1,50,000

First step is to calculate Contribution Margin (CM)

CM= Selling Price (P) – Variable cost per unit.(VC)
Rs. 15 – Rs. 10 = Rs. 5 is the CM

$$\text{Now, BEP} = \frac{\text{TFC}}{\text{CM}} = \frac{\text{Rs. 1,50,000}}{\text{Rs. 5}} = 3,0000 \text{ Units}$$

Hence, the firm reaches BEP by producing 3,0000 units

Formula for calculating BEP in terms of sales value

Now BEP = $\dfrac{TFC}{CR}$

=

CR = $\dfrac{TR - TVC}{TR}$

Illustration for calculating BEP in terms of sales value

This method is useful for a firm producing multi products

Total Sales Value   Rs. 10,000   (TR)
Total Variable Costs Rs. 6,000   (TVC)
Total Fixed Cost   Rs. 3,000   (TFC)

First step is to calculate Contribution Ratio (CR)

$$CR = \frac{TR - TVC}{TR} = \frac{Rs.\ 10,000 - Rs.\ 6,000}{Rs.\ 10,000} = 0.4\ (CR)$$

$$Now\ BEP = \frac{TFC}{CR} = \frac{Rs.\ 3,000}{0.4} = Rs.\ 7,500$$

Hence it is clear from this calculations that at sales value of Rs. 7500 (BEP)
There is no profit and no loss.

A firm incurs fixed cost of Rs. 4000 and variable cost of Rs. 10000 and its total sales receipts are Rs.15000. determine Break even point

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First step is to calculate Contribution Ratio (CR)

$$CR = \frac{TR - TVC}{TR} = \frac{Rs.\ 15000 - Rs.\ 10000}{Rs.\ 15,000} = 0.33\ (CR)$$

$$Now\ BEP = \frac{TFC}{CR} = \frac{Rs.\ 4000}{0.33} = Rs.\ 12121$$

Hence it is clear from this calculations that at sales value of Rs. 12121 (BEP) There is no profit and no loss.

- M/s. Gayatri Engineering furnishes the following information.. On the basis of the information
- Annual Sales 20,000 units
- Selling Price Rs. 8.00
- VC (per Unit) Rs. 6.00
- TFC   Rs. 60,000

a) Find BEP in physical units and in terms of sales value in rupees.

b) Show the amount of Total Variable Cost at BEP

c) Profit made by the company at 20,000 units when the selling price is increased by 25%.

i) Physical Units:

$$TFC/CM = 60000/2 \ \text{=30000 Units}$$

ii) Sales Value: $CR = \dfrac{TR - TVC}{TR} = \dfrac{160000-120000}{160000} \quad \dfrac{40000}{160000} = 0.25$

$$\dfrac{TFC}{CR} \quad \dfrac{60000}{0.25} = \text{Rs. 240000}$$

2) Units at BEP is 30000, VC (per Unit) Rs. 6.00

    = 30000 X 6   = Rs. 180000 (Total Variable Cost at BEP)

3) When the selling price is increased by 25% (i.e.Rs.10(8+2)).

    Profit= TR-TC

    TR=200000(20000 X 10)   *TR = P X Q*

    TC= 180000 (60000 (TFC)+ 120000(TVC))   *TC = TFC+TVC*

    Profit = 200000 – 180000

        = 20000

Profit for new selling price (Rs.10) is Rs. 20000

SAMPLE PROBLEMS FOR CALCULATING BREAK EVEN POINT

ROBLEM 1

Premier Engineering Co. incurs a FC of Rs. 4000 and VC of Rs. 10000 and its total sales receipts

Are Rs.15000. Determining Break Even point

PROBLEM 2

ABC Enterprises with annual sales of small ball bearings 8000 units. It is selling at Rs. 9.50 per unit.

The TFC of the company is Rs. 18000 and VC per unit is Rs. 6.50. on the basis of above calculate:

a)   BEP in physical units and sales value in rupees.

b)   Show the amount of VC at BEP.

c)   Profit made by the company at 8000 units.

i) Physical Units:

TFC/CM=18000/3 =6000 Units

ii) Sales Value: CR $= \dfrac{TR - TVC}{TR}$ $= \dfrac{76000\text{-}52000}{76000}$ $\dfrac{24000}{760000}$ = 0.31

$\dfrac{TFC}{CR}$ $\dfrac{18000}{0.31}$ = Rs. 58064

2) Units at BEP is 6000, VC (per Unit) Rs. 6.5

= 6000 X 6.5   = Rs. 39000 (Total Variable Cost at BEP)

3)

Profit= TR-TC

TR=76000(8000 X 9.5)   TR = P X Q

TC= 700000 (18000 (TFC)+ 52000(TVC))   TC = TFC+TVC

Profit = 76000 – 70000

= 6000

Profit for new selling price (Rs.9.5) is Rs. 6000

SAMPLE PROBLEMS ON COST ANALYSIS

PROBLEM 1

Excel engineers have provided the following information:

Output (in units)	0	1	2	3	4	5	6	7	8
Total Cost (Rs.)	400	480	550	590	620	650	730	820	950

Calculate TVC, AFC, AVC, and MC

PROBLEM 2

XYZ Engineers provided the following information. Calculate TFC, TVC, AC and MC. Give a graphic illustration to explain the relationship between Output and TC.

Output (in units)	0	1	2	3	4	5	6
TC (Rs.)	150	200	240	270	260	400	510

PROBLEM 3

M/s. Instrumentation Engineers have provided the following cost data. Calculate TVC, AFC, AVC, AC and MC.

Output (in units)	0	1	2	3	4	5	6
TC (Rs.)	360	540	600	630	675	780	990

Solution for PROBLEM 1

Output	Total Cost	TFC	TVC	AFC	AVC	MC
0	400	400	0			
1	480	400	80	400.00	80	80
2	550	400	150	200.00	75	70
3	590	400	190	133.33	63.33	40
4	620	400	220	100.00	55	30
5	650	400	250	80.00	50	30
6	730	400	330	66.67	55	80
7	820	400	420	57.14	60	90
8	950	400	550	50.00	68.75	130

Solution for PROBLEM 2

Output	TC	FC	VC	AC	MC
0	150	150	0		
1	200	150	50	200	50
2	240	150	90	120	40
3	270	150	120	90	30
4	260	150	110	65	-10
5	400	150	250	80	140
6	510	150	360	85	110

Solution for PROBLEM 3

Output	TC	TFC	TVC	AFC	AVC	AC	MC
0	360	360	0				
1	540	360	180	360	180	540	180
2	600	360	240	180	120	300	60
3	630	360	270	120	90	210	30
4	675	360	315	90	78.75	168.75	45
5	780	360	420	72	84	156	105
6	990	360	630	60	105	165	210