

# Chapter Three: Breakeven Point

## Q12-4

### Case 1:

**فكرة السؤال :** لحساب نقطة التعادل نحتاج عائد المساهمة للوحدة contribution Margin (CM) per unit وحساب CM per unit يتطلب معرفة سعر البيع sales price والكلفة المتغيرة للوحدة variable cost per unit . السؤال لم يعطي variable cost per unit وأعطى variable cost ratio . لحساب CM per unit هناك طريقتين:

#### First Method

**Variable cost per unit = sales price x variable cost ratio**

$$= \$40 \times \%65$$

$$= \$26 \text{ per unit}$$

**Contribution Margin (CM) per unit = sales price – variable cost per unit**

$$= \$40 - \$26$$

$$= \$14 \text{ per unit}$$

#### Second Method

الطريقة الثانية هي استخراج CM per unit بطريقة مباشرة من خلال الاستنتاج التالي

## Chapter Three: Breakeven Point

$$\begin{aligned} \text{Variable cost ratio} + \text{CM ratio} &= \%100 \\ \%65 + \text{CM ratio} &= \%100 \\ \text{CM ratio} &= \%35 \end{aligned}$$

$$\begin{aligned} \text{CM per unit} &= \text{sales price} \times \text{CM ratio} \\ &= \$40 \times \%35 \\ &= \$14 \text{ per unit} \end{aligned}$$

$$\begin{aligned} \text{Breakeven point (BEP)} &= \frac{\text{F. Cost}}{\text{CM per unit}} \\ &= \frac{182000 \$}{14 \$} \\ &= 13000 \text{ units} \end{aligned}$$

## Chapter Three: Breakeven Point

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Case 2:

**فكرة السؤال :** لحساب نقطة التعادل نحتاج عائد المساهمة للوحدة Contribution Margin (CM) per unit وحساب CM per unit يتطلب معرفة سعر البيع sales price. السؤال لم يعطي سعر البيع لكن أعطى cost variable per unit و variable cost ratio من خلال هاتين المعلومتين يمكن استخراج sales price ومن ثم CM per unit ومن ثم Breakeven point

**Variable cost per unit = Sales price x Variable Cost ratio**

$$\text{\$14} = \text{Sales price} \times \%70$$

$$\text{Sales price} = \frac{14 \$}{\%70}$$

Sales price = \$ 20 per unit

**Contribution Margin (CM) per unit = Sales price – variable cost per unit**

$$\begin{aligned} &= \$20 - \$14 \\ &= \$6 \text{ per unit} \end{aligned}$$

## Chapter Three: Breakeven Point

$$\begin{aligned}\text{Breakeven point (BEP)} &= \frac{\text{F. Cost}}{\text{CM per unit}} \\ &= \frac{141000 \$}{6 \$} \\ &= 23500 \text{ units}\end{aligned}$$

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Case 3:

$$\begin{aligned}\text{CM per unit} &= \text{Sales price} \times \text{CM ratio} \\ &= \$ 50 \quad \times \quad \% 24 \\ &= \$ 12\end{aligned}$$

$$\text{Breakeven point} = \frac{432000 \$}{12 \$}$$

$$\text{Breakeven point} = 36000 \text{ units}$$

## Chapter Three: Breakeven Point

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Case 4:

$$\begin{aligned} \text{Breakeven point (BEP)} &= \frac{\text{F. Cost}}{\text{CM per unit}} \\ &= \frac{270000 \$}{4 \$} \\ &= 67500 \text{ units} \end{aligned}$$

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Case 5:

**فكرة السؤال :** لحساب نقطة التعادل نحتاج عائد المساهمة للوحدة Contribution Margin (CM) per unit وحساب CM per unit يتطلب معرفة سعر البيع sales price. السؤال لم يعطي سعر البيع لكن أعطى cost variable per unit و CM ratio ومن خلال هاتين المعلومتين نستطيع حساب سعر البيع ثم عائد المساهمة وأخيرا نقطة التعادل وبالتالي:  
اولا: معرفة variable cost ratio وهي متمم نسبة CM ratio

$$\text{CM ratio} + \text{Variable Cost ratio} = \%100$$

$$\%25 + \text{Variable Cost ratio} = \%100$$

$$\text{Variable cost ratio} = \%75$$

## Chapter Three: Breakeven Point

ثانياً: بدلالة variable cost ratio و variable cost per unit نستطيع حساب سعر البيع

**Variable cost per unit = sales price x variable cost ratio**

$$\text{\$12} = \text{sales price} \times \%75$$

$$\text{Sales price} = \frac{\text{12 \$}}{\%75}$$

$$\text{Sales price} = \text{\$ 16}$$

**CM per unit = sales price – variable cost per unit**

$$\text{CM per unit} = \text{\$16} - \text{\$12} = \text{\$ 4 per unit}$$

$$\text{BEP} = \frac{\text{38000 \$}}{\text{4 \$}}$$

$$\text{BEP} = \text{9500 units}$$

## Chapter Three: Breakeven Point

**Q12-4**

**Required 1**

$$\begin{aligned} \text{CM per unit} &= \text{Sales price} - \text{Variable cost per unit} \\ &= \$ 50 - \$ 35 = \$15 \text{ per unit} \end{aligned}$$

$$\begin{aligned} \text{CM ratio} &= \frac{\text{CM per unit}}{\text{Sales price}} \\ &= \frac{15 \$}{50 \$} = \%30 \end{aligned}$$

$$\begin{aligned} \text{Dollar Sales to attain target profit} &= \frac{\text{F. Cost} + \text{Target profit before tax}}{\text{CM ratio}} \\ &= \frac{525000 + 450000 \$}{\%30} \\ &= \$ 3250000 \end{aligned}$$

## Chapter Three: Breakeven Point

### Required 2

$$\text{Target Profit before tax} = \frac{\text{Target profit After tax}}{\text{tax rate} - 1}$$
$$= \frac{600000}{\%20 - 1} = \$750000 =$$

$$\text{Units Sales to attain target profit} = \frac{\text{F. Cost} + \text{Target profit before tax}}{\text{CM per unit}}$$
$$= \frac{750000 + \$450000}{\$15} = \text{units } 80000 =$$

$$\text{Dollar Sales to attain target profit} = \frac{\text{F. Cost} + \text{Target profit before tax}}{\text{CM per ratio}}$$
$$= \frac{750000 + \$450000}{\%30} = \$4000000 =$$

## Chapter Three: Breakeven point

CM per unit = Sales Price – Variable Cost per units

$$\$25 = \$35 - \$60$$

= CM ratio

CM per unit

Sales price

25 \$

60 \$

%41.667 =

= Units Sales to attain target profit

F. Cost + Target profit before tax

CM per unit

340000 + \$428000

\$25

units 30720 =

= Dollar Sales to attain target profit

F. Cost + Target profit before tax

CM ratio

340000 + \$428000

%41.667

\$1843200 =

## Chapter Three: Breakeven Point

### Q15-4

**Variable cost ratio + CM ratio = %100**

$$\%80 + \text{CM ratio} = \%100$$

**CM ratio = %20**

**CM per unit = sales price x CM ratio**

$$= \$30 \times \%20 = \$6 \text{ per unit}$$

**OR**

**Variable cost per unit = Sales price x variable cost ratio**

$$= \$30 \times \%80 = \$24 \text{ per unit}$$

**CM per unit = sales price - variable cost per unit**

$$= \$30 - \$24 = \$6 \text{ per units}$$

**Target profit before tax =  $\frac{\text{Target profit After tax}}{\text{tax rate} - 1}$**

$$\frac{\$216000}{\%40 - 1} = \$360000$$

## Chapter Three: Breakeven Point

$$\text{Units sales to attain target profit} = \frac{\text{F. Cost} + \text{Target profit before tax}}{\text{CM per unit}}$$

$$\frac{360000 + \$420000}{\$6} = \text{units } 13000 =$$

Q16-4

Last Year  
F.Cost \$336000  
V.Cost per unit \$18

Next Year  
F.Cost \$408000  
(\$72000 + \$336000)  
V.Cost per unit \$15

## Chapter Three: Breakeven Point

$$\text{Breakeven point} = \frac{\text{F. Cost}}{\text{CM per unit}}$$

### Required 1

$$\begin{aligned} \text{Breakeven point for last year} &= \frac{336000 \$}{\$18 - \$30} \\ &= 28000 \text{ units} \end{aligned}$$

### Required 2

$$\begin{aligned} \text{Breakeven point for next year} &= \frac{408000 \$}{\$15 - \$30} \\ &= 27200 \text{ units} \end{aligned}$$

## Chapter Three: Breakeven Point

### Required 3

#### Symmetry point means

$$\begin{aligned}
 \text{Cost of first option} &= \text{Cost of second option} \\
 \text{Fixed cost} + \text{Variable Cost} &= \text{Fixed Cost} + \text{Variable Cost} \\
 \$336000 + (18 \times Z) &= \$408000 + (15 \times Z) \\
 3Z &= \$72000
 \end{aligned}$$

$$Z = \frac{\$72000}{\$3} \quad \text{units symmetry point } 24000 =$$

OR

$$\begin{aligned}
 \text{Symmetry point} &= \frac{\text{Fixed Cost } \blacktriangle}{\text{Variable cost per unit } \blacktriangle} \\
 &= \frac{336000 - \$408000}{15 - \$18} \\
 &= \frac{\$72000}{\$3} \quad \text{units } 24000 =
 \end{aligned}$$

## Chapter Three: Breakeven Point

What does point of symmetry mean?

**نقطة التماثل** تعني عند حجم إنتاج 24000 وحدة تكاليف البديل الأول (السنة الماضية) تتساوى مع تكاليف البديل الثاني المقترح للسنة القادمة. بمعنى آخر اختيار أي البديلين سوف يحقق نفس التكاليف. لكن اقل من 24000 وحدة سيكون البديل الأول أفضل لأنه كثيف العمل وأكثر من 24000 سيكون البديل الثاني هو الأفضل لأنه كثيف رأس المال. الجدول التالي يوضح ما ذكر اعلاه.

Best option	Cost of second option	Cost of first option	Units
First option	Total cost = F.Cost + V. cost =\$408000 + (\$15 x 23000) <b>=\$ 753000</b>	Total cost = F.Cost + V. cost =\$336000 + (\$18 x 23000) <b>= \$750000</b>	23000
same	=\$408000 + (\$15 x 24000) <b>= \$ 768000</b>	=\$336000 + (\$18 x 24000) <b>= \$ 768000</b>	24000
Second option	=\$408000 + (\$15 x 25000) <b>= \$ 783000</b>	=\$336000 + (\$18 x 25000) <b>= \$ 786000</b>	25000

## Chapter Three: Breakeven Point

### Q 17-4 Required 1

**Last Year**  
F.Cost \$7000000  
V.Cost per unit \$200

**Next Year**  
F.Cost \$5800000  
V.Cost per unit \$240

<b>Income Statement for the last year</b>	
45000000	Sales Revenue (150000 units x \$300)
30000000	- Variable Cost ( 150000 units x \$ 200)
15000000	= Contribution Margin (CM)
7000000	- Fixed Cost
8000000	= Net Profit before tax
3200000	- Tax (%40)
4800000	= Net profit after tax

## Chapter Three: Breakeven Point

### Required 2

BEP for last year =

$$= \frac{\text{F. Cost}}{\text{CM per unit}}$$

$$= \frac{\$7000000}{200 - \$300} = \text{units } 70000 =$$

### Required 3

Units sales to attain target profit =

F. Cost + Target profit before tax

CM per unit

8000000 + \$5800000

units 13000 =

240 - \$300

### Note:

1. Fixed cost for next year is \$5800000
2. Variable cost for next year = \$200 + (200 x %20) = \$240

## Chapter Three: Breakeven Point

### Required 4

Units sales to attain target profit =

F. Cost + Target profit before tax

CM per unit

8000000 + \$7000000

240 - \$300

units 25000 =

### Required 5

1- The fixed cost can be reduced

BEP =

\$5800000

240 - \$300

units 96667 =

2- The fixed cost can not be reduced

BEP =

\$7000000

240 - \$300

units 116667 =

## Chapter Three: Breakeven Point

### Required 6

#### Symmetry point means

$$\begin{aligned}
 \text{Cost of first option} &= \text{Cost of second option} \\
 \text{Fixed cost + Variable Cost} &= \text{Fixed Cost + Variable Cost} \\
 \$7000000 + (\$200 \times Z) &= \$5800000 + (240 \times Z) \\
 \$1200000 &= \$40
 \end{aligned}$$

$$Z = \frac{\$1200000}{\$40} = \text{units symmetry point } 30000 =$$

OR

$$\begin{aligned}
 \text{Symmetry Point} &= \frac{\text{Fixed Cost } \blacktriangle}{\text{Variable cost per unit } \blacktriangle} \\
 &= \frac{5800000 - \$7000000}{200 - \$240} \\
 &= \frac{\$1200000}{\$40} = \text{units } 30000 =
 \end{aligned}$$

## Chapter Three: Breakeven Point

Q10-4

### Required 1

$$\begin{aligned}\text{Contribution Margin (CM) per unit} &= \text{Sales price} - \text{Variable cost per unit} \\ &= \$20 - \$15 \\ &= \$5 \text{ per unit}\end{aligned}$$

### Required 2

$$\begin{aligned}\text{Total Contribution Margin (CM)} &= \text{Sales units} \times \text{CM per unit} \\ &= 12000 \times \$5 \\ &= \$60000\end{aligned}$$

### Required 3

$$\begin{aligned}\text{Contribution Margin (CM) ratio} &= \frac{\text{CM per unit}}{\text{Sales price}} \\ &= \frac{\$5}{\$20} \\ &= \%25\end{aligned}$$

## Chapter Three: Breakeven Point

### Required 4

Breakeven point (in units) =

F. Cost

CM per unit

\$40000

units 8000 =

\$5

Breakeven point (in Dollar) =

F. Cost

CM ratio

\$40000

\$160000 =

%25

OR

Breakeven point (in Dollar) = Breakeven point in units x sales price

= 8000 units x \$20

= \$ 160000

## Chapter Three: Breakeven Point

### Required 5

$$\begin{aligned}\text{Margin of Safety in units} &= \text{Sales units} - \text{Breakeven Point in units} \\ &= 12000 - 80000 \\ &= 4000 \text{ units}\end{aligned}$$

$$\begin{aligned}\text{Margin of Safety in dollar} &= \text{Sales revenues} - \text{breakeven point in dollar} \\ &= \$240000 - \$160000 \\ &= \$80000\end{aligned}$$

OR

$$\begin{aligned}\text{Margin of Safety in dollar} &= \text{Margin of Safety in units} \times \text{sales price} \\ &= 4000 \text{ units} \times \$20 \\ &= \$80000\end{aligned}$$

### Required 6

$$\text{Safety Margin ratio} = \frac{\text{Units of Safety Margin}}{\text{Sales Units}} = \frac{4000}{12000} = \%33 =$$

## Chapter Three: Breakeven Point

### Required 7

**Net Profit = Units of Safety margin x CM per unit**

$$= 4000 \text{ units} \times \$5$$

$$= \$20000$$

**OR**

**Net Profit = Sales revenues - Fixed Cost - Variable Cost**

$$= \$240000 - 40000 - 180000$$

$$= \$20000$$

### Required 8

$$\text{Cash Breakeven point in units} = \frac{\text{F. Cost - Depreciation}}{\text{CM per unit}}$$
$$= \frac{10000 - \$40000}{\$5}$$

units 6000 =

## Chapter Three: Breakeven Point

$$\text{Cash Breakeven point in dollar} = \frac{\text{F. Cost} - \text{Depreciation}}{\text{CM per ratio}}$$
$$\frac{10000 - \$40000}{\%25} = \$120000 =$$

## Chapter Three: Breakeven Point

Q17-4

### Last Year

F. cost= \$1600000 + \$ 400000  
rent= \$2000000  
V.Cost per unit \$4

### First option for next year

F. cost= \$1600000  
V.Cost per unit \$4 + \$3 rent

### Second option for next year

F. cost= \$1600000 + \$ 150000  
rent= \$1750000  
V.Cost per unit \$4 + \$ 1 rent

## Chapter Three: Breakeven Point

### Required 1

BEP for the last year =

$$\frac{\text{F. Cost}}{\text{CM per unit}} = \frac{\$2000000}{4 - \$12} = \text{units } 250000$$

### Required 2

If the company accepts the first option

$$\text{BEP for next year} = \frac{\$1600000}{7 - \$12} = \text{units } 320000$$

### Required 2

If the company accepts the first option

$$\text{BEP for next year} = \frac{\$1750000}{5 - \$12} = \text{units } 250000$$

## Chapter Three: Breakeven Point

### Required 4

Second option	First option	Last Year	Details
3600000	3600000	3600000	Sales Revenue
1500000	2100000	1200000	- Variable Cost
2100000	1500000	2400000	= CM
1750000	1600000	2000000	- Fixed Cost
350000	(100000)	400000	= Net Profit

**The second option is better**

## Chapter Three: Breakeven Point

Total	Z	Y	X	Details
3600000	2025000	1350000	225000	Sales Revenue
2700000	1462500	1080000	157500	- Variable Cost
900000	562500	270000	67500	= CM
450000				- Fixed Cost
450000				= Net Profit

Weighted average for CM per unit =

$$\frac{\text{Total CM}}{\text{Total Sales units}} = \text{per unit } \$60$$

$\frac{\$900000}{15000} = \text{per unit } \$60$

# Chapter Three: Breakeven Point

$$\text{BEP in units} = \frac{\text{F. Cost}}{\text{Weighted average for CM per unit}}$$

$$\frac{\$450000}{\$60} = \text{units } 7500$$

$$\text{BEP in units for product (X)} = 7500 \times \frac{1500}{15000} = \text{units } 750 =$$

$$\text{BEP in units for product (Y)} = 7500 \times \frac{6000}{15000} = \text{units } 3000 =$$

$$\text{BEP in units for product (Z)} = 7500 \times \frac{7500}{15000} = \text{units } 3750 =$$

# Chapter Three: Breakeven Point

Weighted average for CM ratio = 
$$\frac{\text{Total CM}}{\text{Total Sales Revenue}}$$
$$\frac{\$900000}{3600000} = \%25$$

BEP in dollar = 
$$\frac{\text{F. Cost}}{\text{Weighted average for CM ratio}}$$
$$\frac{\$450000}{\%25} = \$1800000$$

## Chapter Three: Breakeven Point

$$\text{BEP in dollar for product (X)} = 1800000 \times \frac{225000}{360000} = \$112500=$$

$$\text{BEP in dollar for product (Y)} = 1800000 \times \frac{1350000}{3600000} = \$675000=$$

$$\text{BEP in dollar for product (Z)} = 1800000 \times \frac{2025000}{3600000} = \$1012500=$$

# End Chapter Three