

Cost-Volume-Profit Relationships

Exercises & Solutions

Fill in the missing amounts in each of the four case situations below. Each case is independent of the others. (*Hint: One way to find the missing amounts would be to prepare a contribution format income statement for each case, enter the known data, and then compute the missing items.*)

Case	Units Sold	Sales	Variable Expenses	Contribution Margin per Unit	Fixed Expenses	Net Operating Income
A	20,000	\$300,000	\$220,000	?	\$45,000	?
B	12,000	?	\$120,000	\$15	?	\$18,000

Case	Sales	Variable Expenses	Average Contribution Margin Ratio	Fixed Expenses	Net Operating Income
C	\$900,000	?	40%	?	\$125,000
D	?	?	45%	\$120,000	\$37,500

Required:

1. Cases A and B assume that only one product is being sold.
2. Cases C and D assume that more than one product is being sold.

[Ex.04]

Requirement 1: Cases A and B assume that only one product is being sold.

Case A		
Number of units sold	<u>20,000</u>	
Sales	\$ 300,000	\$ 15
Variable expenses	<u>220,000</u>	<u>11</u>
Contribution margin	80,000	<u>\$ 4</u>
Fixed expenses	<u>45,000</u>	
Net operating income	<u>\$ 35,000</u>	

Case B		
Number of units sold	<u>12,000</u>	
Sales	\$ 300,000	\$ 25
Variable expenses	<u>120,000</u>	<u>10</u>
Contribution margin	180,000	<u>\$ 15</u>
Fixed expenses	<u>162,000</u>	
Net operating income	<u>\$ 18,000</u>	

Requirement 2: Cases C and D assume that more than one product is being sold.

	Case C	
Sales	\$ 900,000	100%
Variable expenses	<u>540,000</u>	<u>60%</u>
Contribution margin	360,000	<u>40%</u>
Fixed expenses	<u>235,000</u>	
Net operating income	\$ <u>125,000</u>	

	Case D	
Sales	\$ 350,000	100%
Variable expenses	<u>192,500</u>	<u>55%</u>
Contribution margin	157,500	<u>45%</u>
Fixed expenses	<u>120,000</u>	
Net operating income	\$ <u>37,500</u>	

Tralynna Products distributes two premium kid chairs—Hayden Recliner and Hadley Rocking. Monthly sales and the contribution margin ratios for the two products follow:

	Hayden Recliner	Hadley Rocking	Total
Sales	\$600,000	\$300,000	\$900,000
CM ratio	75%	45%	?

Fixed expenses total \$360,750 per month.

Required:

1. Prepare a contribution format income statement for the company as a whole. Carry computations to one decimal place.
2. What is the company's break-even point in dollar sales based on the current sales mix?
3. If sales increased by \$120,000 a month, by how much would you expect the monthly net operating income to increase?

[Ex. 05]

Requirement 1: Prepare a contribution format income statement for the company as a whole. Carry computations to one decimal place.

	Hayden	Hadley Rocking	Total
Sales	\$600,000	\$300,000	\$900,000
Variable expenses	<u>150,000</u>	<u>165,000</u>	<u>315,000</u>
Contribution margin	<u>\$450,000</u>	<u>\$135,000</u>	585,000
Fixed expenses			<u>360,750</u>
Net operating income			<u>\$224,250</u>

Requirement 2: What is the company's break-even in dollar sales based on the current sales mix?

$$\begin{aligned} \text{Overall CM ratio} &= \frac{\text{Total contribution margin}}{\text{Total sales}} \\ &= \frac{\$585,000}{\$900,000} \\ &= 65.0\% \end{aligned}$$

$$\begin{aligned} \text{Overall break - even} &= \frac{\text{Total fixed expenses}}{\text{Overall CM ratio}} \\ &= \frac{\$360,750}{65\%} \\ &= \$555,000 \end{aligned}$$

Requirement 3: If sales increased by \$120,000 a month, by how much would you expect the monthly net operating income to increase?

$$\begin{aligned} \text{Increase to operating income} &= \$120,000 \times 65.0\% = \$78,000 \\ &= \end{aligned}$$

Miller Company's contribution format income statement for the most recent month is shown below:

	Total	Per Unit
Sales (25,000 units)	\$450,000	\$18.00
Variable expenses	250,000	10.00
Contribution margin	\$200,000	\$ 8.00
Fixed expenses	85,000	
Net operating income	\$115,000	

Required: (Consider each case independently):

1. What is the revised net operating income if unit sales increase by 20%?
2. What is the revised net operating income if the selling price decreases by \$2.00 per unit and the number of units sold increases by 15%?
3. What is the revised net operating income if the selling price increases by \$2.00 per unit, fixed expenses increase by \$15,000, and the number of units sold decreases by 4%?
4. What is the revised net operating income if the selling price per unit increases by 10%, variable expenses increase by 80 cents per unit, and the number of units sold decreases by 8%?

[Ex. 06]

Requirement 1: What is the revised net operating income if unit sales increase by 20%?

	Total	Per Unit
Sales (25,000 units \times 1.2 = 30,000 units)	\$540,000	\$18.00
Variable expenses	<u>300,000</u>	<u>10.00</u>
Contribution margin	240,000	<u>\$ 8.00</u>
Fixed expenses	<u>85,000</u>	
Net operating income	<u>\$155,000</u>	

Requirement 2: What is the revised net operating income if the selling price decreases by \$2.00 per unit and the number of units sold increases by 15%?

	Total	Per Unit
Sales (25,000 units \times 1.15 = 28,750 units)	\$460,000	\$16.00
Variable expenses	<u>287,500</u>	<u>10.00</u>
Contribution margin	172,500	<u>\$ 6.00</u>
Fixed expenses	<u>85,000</u>	
Net operating income	<u>\$ 87,500</u>	

Requirement 3: What is the revised net operating income if the selling price increases by \$2.00 per unit, fixed expenses increase by \$15,000, and the number of units sold decreases by 4%?

	Total	Per Unit
Sales (25,000 units \times 0.96 = 24,000 units)	\$480,000	\$20.00
Variable expenses	<u>240,000</u>	<u>10.00</u>
Contribution margin	240,000	<u>\$10.00</u>
Fixed expenses	<u>100,000</u>	
Net operating income	<u>\$140,000</u>	

Requirement 4: What is the revised net operating income if the selling price per unit increases by 10%, variable expenses increase by 80 cents per unit, and the number of units sold decreases by 8%?

	Total	Per Unit
Sales (25,000 units \times 0.92 = 23,000 units)	\$455,400	\$19.80
Variable expenses	<u>248,400</u>	<u>10.80</u>
Contribution margin	207,000	<u>\$ 9.00</u>
Fixed expenses	<u>85,000</u>	
Net operating income	<u>\$122,000</u>	