1. You have been provided with the following information:

<table>
<thead>
<tr>
<th>Per Unit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$15</td>
</tr>
<tr>
<td>Less variable expenses</td>
<td>2</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>6</td>
</tr>
<tr>
<td>Less fixed expenses</td>
<td>12,000</td>
</tr>
<tr>
<td>Operating profit</td>
<td>$6,000</td>
</tr>
</tbody>
</table>

If sales decrease by 500 units, how much will fixed costs have to be reduced by to maintain the current operating profit of $6,000?

A. $9,000.
B. $7,500.
C. $6,000.
D. $3,000.
1. You have been provided with the following information:

<table>
<thead>
<tr>
<th></th>
<th>Per Unit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$15</td>
<td>$45,000</td>
</tr>
<tr>
<td>Less variable expenses</td>
<td>@2</td>
<td>27,000</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>@6</td>
<td>18,000</td>
</tr>
<tr>
<td>Less fixed expenses</td>
<td></td>
<td>12,000</td>
</tr>
<tr>
<td>Operating profit</td>
<td></td>
<td>$6,000</td>
</tr>
</tbody>
</table>

If sales decrease by 500 units, how much will fixed costs have to be reduced to maintain the current operating profit of $6,000?

A. $9,000.
B. $7,500.
C. $6,000.
D. $3,000.

$45,000/$15 = 3,000 units - 500 units = 2,500 units x ($15 - $9) = $15,000 - $12,000 = $3,000 new profit.

To maintain current profit level of $6,000 fixed costs will have to be reduced by $3,000.

AACSB: Analytic
AICPA FN: Decision Making
Blooms: Analyze
Difficulty: 3 Hard
Learning Objective: 03-01 Use cost-volume-profit (CVP) analysis to analyze decisions.
Topic Area: CVP Example
2. James Company has a margin of safety percentage of 20%. The break-even point is $200,000 and the variable costs are 45% of sales. Given this information, the operating profit is:

A. $27,500.
B. $18,000.
C. $22,500.
D. $22,000.

![Equation]

\[
\frac{(Actual - BE \text{ Sales})}{Actual \text{ Sales}} = 20\%
\]

\[
Actual \text{ Sales} \times \frac{Actual \text{ Sales} - 200,000}{Actual \text{ Sales}} = 20\% \times Actual \text{ Sales}
\]

\[
1.0 \frac{Actual \text{ Sales} - 200,000}{Actual \text{ Sales}} = 0.2 Actual \text{ Sales}
\]

\[
\frac{+200,000}{-0.2 Actual \text{ Sales}} = +200,000
\]

\[
Actual \text{ Sales} = \frac{200,000}{0.8}
\]

\[
Actual Sales = 250,000
\]

55 CM 110,000 137,500
45 VC 110,000 110,000
100 S 200,000 250,000

NI $ 27,500

BE
2. James Company has a margin of safety percentage of 20%. The break-even point is $200,000 and the variable costs are 45% of sales. Given this information, the operating profit is:

A. $27,500.
B. $18,000.
C. $22,500.
D. $22,000.

$200,000 + (1 - .20) = $250,000; ($250,000 - 200,000) × (1 - .45) = $27,500.

AACSB: Analytic
AICPA FN: Measurement
Blooms: Apply
Difficulty: 3 Hard
Learning Objective: 03-02 Understand the effect of cost structure on decisions.
Topic Area: Margin of Safety
3. JJ Motors Inc. employs 45 sales personnel to market its line of luxury automobiles. The average car sells for $23,000, and a 6 percent commission is paid to the salesperson. JJ Motors is considering a change to the commission arrangement where the company would pay each salesperson a salary of $2,000 per month plus a commission of 2 percent of the sales made by that salesperson. The amount of total monthly car sales at which JJ Motors would be indifferent as to which plan to select is:

A. $2,250,000.
B. $3,000,000.
C. $1,500,000.
D. $1,250,000.
E. $4,500,000.

\[ \frac{100}{6\%} = \frac{100}{94\%} \]

\[ \frac{S}{\text{New Structure}} \]

\[ \frac{\text{VC}}{\text{CM}} \]

\[ \frac{\text{FC} \left( \frac{2000 \times 45}{\text{sales persons}} \right)}{\text{NI}} \]

\[ \text{Indifference Point} = 0.065 \Rightarrow 0.02S + \left( \frac{2000 \times 45}{\text{sales persons}} \right) \]

\[ 0.04S = 90,000 \]

\[ S = \$2,250,000 \]
3. JJ Motors Inc. employs 45 sales personnel to market its line of luxury automobiles. The average car sells for $23,000, and a 6 percent commission is paid to the salesperson. JJ Motors is considering a change to the commission arrangement where the company would pay each salesperson a salary of $2,000 per month plus a commission of 2 percent of the sales made by that salesperson. The amount of total monthly car sales at which JJ Motors would be indifferent as to which plan to select is:

A. $2,250,000.
B. $3,000,000.
C. $1,500,000.
D. $1,250,000.
E. $4,500,000.

\[(2,000 \times 45) + (.02)(\text{total revenue}) = (.06)(\text{total revenue}); \quad 90,000 + .02TR = .06TR; \quad 90,000 = .04TR; \quad TR = 90,000/.04 = 2,250,000.\]

AACSB: Analytic
AICPA FN: Decision Making
Blooms: Analyze
Difficulty: 3 Hard
Learning Objective: 03-04 Incorporate taxes; multiple products; and alternative cost structures into the CVP analysis.
Topic Area: Alternative Cost Structures
E3-28 Basic Decision Analysis Using CVP

Balance, Inc., is considering the introduction of a new energy snack with the following price and cost characteristics:

<table>
<thead>
<tr>
<th></th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales price</td>
<td>1.00</td>
</tr>
<tr>
<td>Variable costs</td>
<td>0.20</td>
</tr>
<tr>
<td>Fixed costs</td>
<td>400,000</td>
</tr>
</tbody>
</table>

Assume that the company plans to sell 600,000 units per month. Consider requirements (b), (c), and (d) independently of each other.

**Required**

a. What will be the operating profit?

b. What is the impact on operating profit if the sales price decreases by 10 percent? Increases by 20 percent?

c. What is the impact on operating profit if variable costs per unit decrease by 10 percent? Increase by 20 percent?

d. Suppose that fixed costs for the year are 10 percent lower than projected, and variable costs per unit are 10 percent higher than projected. What impact will these cost changes have on operating profit for the year? Will profit go up? Down? By how much?

<table>
<thead>
<tr>
<th>Units</th>
<th>Original</th>
<th>(b1)</th>
<th>(b2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>600,000</td>
<td>1</td>
</tr>
<tr>
<td>Sales</td>
<td>$1.00</td>
<td>$600,000</td>
<td>$0.90</td>
</tr>
<tr>
<td>Var Costs</td>
<td>$0.20</td>
<td>$120,000</td>
<td>$0.20</td>
</tr>
<tr>
<td>CM</td>
<td>$0.80</td>
<td>$480,000</td>
<td>$0.70</td>
</tr>
<tr>
<td>Fixed Costs</td>
<td>$400,000</td>
<td>$400,000</td>
<td>$400,000</td>
</tr>
<tr>
<td>Op. Profit</td>
<td>$80,000</td>
<td>$20,000</td>
<td>$400,000</td>
</tr>
</tbody>
</table>

**Impact on Original Op. Profit**: decrease by $60,000 increase by $120,000

<table>
<thead>
<tr>
<th>Units</th>
<th>Original</th>
<th>(c1)</th>
<th>(c2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>600,000</td>
<td>1</td>
</tr>
<tr>
<td>Sales</td>
<td>$1.00</td>
<td>$600,000</td>
<td>$1.00</td>
</tr>
<tr>
<td>Var Costs</td>
<td>$0.20</td>
<td>$120,000</td>
<td>$0.18</td>
</tr>
<tr>
<td>CM</td>
<td>$0.80</td>
<td>$480,000</td>
<td>$0.82</td>
</tr>
<tr>
<td>Fixed Costs</td>
<td>$400,000</td>
<td>$400,000</td>
<td>$400,000</td>
</tr>
<tr>
<td>Op. Profit</td>
<td>$80,000</td>
<td>$92,000</td>
<td>$400,000</td>
</tr>
</tbody>
</table>

**Impact on Original Op. Profit**: increase by $12,000 decrease by $24,000

<table>
<thead>
<tr>
<th>Units</th>
<th>Original</th>
<th>(d)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>600,000</td>
</tr>
<tr>
<td>Sales</td>
<td>$1.00</td>
<td>$600,000</td>
</tr>
<tr>
<td>Var Costs</td>
<td>$0.20</td>
<td>$120,000</td>
</tr>
<tr>
<td>CM</td>
<td>$0.80</td>
<td>$480,000</td>
</tr>
<tr>
<td>Fixed Costs</td>
<td>$400,000</td>
<td>$400,000</td>
</tr>
<tr>
<td>Op. Profit</td>
<td>$80,000</td>
<td>$108,000</td>
</tr>
</tbody>
</table>

**Impact on Original Op. Profit**: increase by $28,000
E 3-28 (30 min.) Basic Decision Analysis Using CVP: Balance, Inc.

a. Profit = ($1.00 – $0.20) x 600,000 – $400,000
   = $80,000

b. 10% price decrease. Now P = $0.90
   Profit = ($0.90 – $0.20) x 600,000 – $400,000
   = $20,000 Profit decreases by $60,000

20% price increase. Now P = $1.20
   Profit = ($1.20 – $0.20) x 600,000 – $400,000
   = $200,000 Profit increases by $120,000

c. 10% variable cost decrease. Now V = $0.18
   Profit = ($1.00 – $0.18) x 600,000 – $400,000
   = $92,000 Profit increases by $12,000

20% variable cost increase. Now V = $0.24
   Profit = ($1.00 – $0.24) x 600,000 – $400,000
   = $56,000 Profit decreases by $24,000

d. Profit = ($1.00 – $0.22) x 600,000 – $360,000
   = $108,000 Profit increases by $28,000
E 3-30. Analysis of Cost Structure

The Dollar Store's cost structure is dominated by variable costs with a contribution margin ratio of .30 and fixed costs of $30,000. Every dollar of sales contributes 30 cents toward fixed costs and profit. The cost structure of a competitor, One-Mart, is dominated by fixed costs with a higher contribution margin ratio of .80 and fixed costs of $280,000. Every dollar of sales contributes 80 cents toward fixed costs and profit. Both companies have sales of $500,000 for the month.

**Required**

a. Compare the two companies' cost structures using the format shown in Exhibit 3.5 as follows:

<table>
<thead>
<tr>
<th></th>
<th>Lo-Lev Company (1,000,000 units)</th>
<th>Hi-Lev Company (1,000,000 units)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount</td>
<td>Percentage</td>
</tr>
<tr>
<td>Sales</td>
<td>$1,000,000</td>
<td>100</td>
</tr>
<tr>
<td>Variable costs</td>
<td>750,000</td>
<td>75</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$250,000</td>
<td>25</td>
</tr>
<tr>
<td>Fixed costs</td>
<td>50,000</td>
<td>5</td>
</tr>
<tr>
<td>Operating profit</td>
<td>$200,000</td>
<td>20</td>
</tr>
<tr>
<td>Break-even point</td>
<td>200,000 units</td>
<td></td>
</tr>
<tr>
<td>Contribution margin per unit</td>
<td>$0.25</td>
<td></td>
</tr>
</tbody>
</table>

b. Suppose that both companies experience a 15 percent increase in sales volume.

By how much would each company's profits increase?
### E 3-30 (30 min.) Analysis of Cost Structure: The Dollar Store vs. One-Mart.

#### a.

<table>
<thead>
<tr>
<th></th>
<th>Dollar Store</th>
<th>One-Mart</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount</td>
<td>Percentage</td>
</tr>
<tr>
<td>Sales</td>
<td>$500,000</td>
<td>100%</td>
</tr>
<tr>
<td>Variable cost</td>
<td>350,000</td>
<td>70%</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$150,000</td>
<td>30%</td>
</tr>
<tr>
<td>Fixed costs</td>
<td>$30,000</td>
<td>6%</td>
</tr>
<tr>
<td>Operating profit</td>
<td>$120,000</td>
<td>24%</td>
</tr>
</tbody>
</table>

#### b.

Dollar Store’s profits increase by $22,500 \(= .30 \times (500,000 \times .15)\) and One Mart’s profits increase by $60,000 \(= .80 \times (500,000 \times .15)\).
E 3-36. Multiproduct CVP Analysis

Rio Coffee Shoppe sells two coffee drinks, a regular coffee and a latte. The two drinks have the following prices and cost characteristics:

<table>
<thead>
<tr>
<th></th>
<th>Regular Coffee</th>
<th>Latte</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales price (per cup)</td>
<td>$1.50</td>
<td>$2.50</td>
</tr>
<tr>
<td>Variable costs (per cup)</td>
<td>0.70</td>
<td>1.30</td>
</tr>
</tbody>
</table>

The monthly fixed costs at Rio are $6,720. Based on experience, the manager at Rio knows that the store sells 60 percent regular coffee and 40 percent lattes.

**Required**

How many cups of regular coffee and lattes must Rio sell every month to break even?

\[
\text{Weighted Average} = \frac{0.48 \times 60\% + 0.48 \times 40\%}{1} = 0.96 \text{ cm per unit}
\]

\[
\text{BE Units} = \frac{\text{FC}}{\text{cm per unit}} = \frac{6,720}{0.96} = 7,000 \text{ cups}
\]

Reg Coffee \(\rightarrow\) \(7,000 \times 60\% = 4,200\) cups

Latte \(\rightarrow\) \(7,000 \times 40\% = 2,800\) cups
E 3-36 (20 min.) Multiproduct CVP Analysis: Rio Coffee Shoppe.
First, compute the weighted-average contribution margin per unit:
$0.96 = 60\% \times (1.50 - 0.70) + 40\% \times (2.50 - 1.30)
The total number of cups of regular coffee and lattes (X) to break even is:

\[
\text{Profit} = (P - V)X - F
\]
\[
$0 = 0.96 X - 6,720
\]
\[
X = 7,000 \text{ cups}
\]
\[
= 4,200 (= 60\% \times 7,000) \text{ cups of coffee and}
\]
\[
= 2,800 (= 40\% \times 7,000) \text{ lattes}
\]