

4. Briefly explain the difference between a fixed cost and a step-fixed cost.
5. Assume that a company has a step-fixed cost. Generally speaking, where on a step should the firm attempt to operate if it desires to achieve a maximum return on its investment?

\* Antioch Extraction, which mines ore in Montana, uses a calendar year for both financial-reporting and tax purposes. The following selected costs were incurred in December, the low point of activity, when 1,500 tons of ore were extracted:

Straight-line depreciation .....	\$ 25,000	Royalties .....	\$135,000
Charitable contributions* .....	11,000	Trucking and hauling .....	275,000
Mining labor/fringe benefits .....	345,000		

\*Incurred only in December.

Peak activity of 2,600 tons occurred in June, resulting in mining labor/fringe benefit costs of \$598,000, royalties of \$201,000, and trucking and hauling outlays of \$325,000. The trucking and hauling outlays exhibit the following behavior:

Less than 1,500 tons .....	\$250,000
From 1,500–1,899 tons .....	275,000
From 1,900–2,299 tons .....	300,000
From 2,300–2,699 tons .....	325,000

Antioch uses the high-low method to analyze costs.

**Required:**

1. Classify the five costs listed in terms of their behavior: variable, step-variable, committed fixed, discretionary fixed, step-fixed, or semivariable. Show calculations to support your answers for mining labor/fringe benefits and royalties.
2. Calculate the total cost for next February when 1,650 tons are expected to be extracted.
3. Comment on the cost-effectiveness of hauling 1,500 tons with respect to Antioch's trucking/hauling cost behavior. Can the company's effectiveness be improved? How?
4. Distinguish between committed and discretionary fixed costs. If Antioch were to experience severe economic difficulties, which of the two types of fixed costs should management try to cut? Why?
5. Speculate as to why the company's charitable contribution cost arises only in December.

Nation's Capital Fitness, Inc. operates a chain of fitness centers in the Washington, D.C., area. The firm's controller is accumulating data to be used in preparing its annual profit plan for the coming year. The cost behavior pattern of the firm's equipment maintenance costs must be determined. The accounting staff has suggested the use of an equation, in the form of  $Y = a + bX$ , for maintenance costs. Data regarding the maintenance hours and costs for last year are as follows:

Month	Hours of Maintenance Service	Maintenance Costs
January .....	520 .....	\$ 4,470
February .....	490 .....	4,260
March .....	300 .....	2,820
April .....	500 .....	4,350
May .....	310 .....	2,960
June .....	480 .....	4,200
July .....	320 .....	3,000
August .....	400 .....	3,600
September .....	470 .....	4,050
October .....	350 .....	3,300
November .....	340 .....	3,160
December .....	320 .....	3,030
Total .....	4,800 .....	\$43,200
Average .....	400 .....	\$ 3,600

**Problem 6-37**  
Cost Behavior and Analysis; High-Low Method  
(LO 6-2, 6-4, 6-5)

2. Total cost for 1,650 tons: \$823,500

**Problem 6-38**  
High-Low Method; Fitness Centers  
(LO 6-1, 6-2, 6-5)

3. Cost prediction at 590 hours of activity, maintenance cost: \$4,995



Houston-based Advanced Electronics manufactures audio speakers for desktop computers. The following data relate to the period just ended when the company produced and sold 42,000 speaker sets:

Sales .....	\$3,360,000
Variable costs .....	840,000
Fixed costs .....	2,280,000

Management is considering relocating its manufacturing facilities to northern Mexico to reduce costs. Variable costs are expected to average \$18 per set; annual fixed costs are anticipated to be \$1,984,000. (In the following requirements, ignore income taxes.)

**Required:**

- Calculate the company's current income and determine the level of dollar sales needed to double that figure, assuming that manufacturing operations remain in the United States.
- Determine the break-even point in speaker sets if operations are shifted to Mexico.
- Assume that management desires to achieve the Mexican break-even point; however, operations will remain in the United States.
  - If variable costs remain constant, what must management do to fixed costs? By how much must fixed costs change?
  - If fixed costs remain constant, what must management do to the variable cost per unit? By how much must unit variable cost change?
- Determine the impact (increase, decrease, or no effect) of the following operating changes.
  - Effect of an increase in direct material costs on the break-even point.
  - Effect of an increase in fixed administrative costs on the unit contribution margin.
  - Effect of an increase in the unit contribution margin on net income.
  - Effect of a decrease in the number of units sold on the break-even point.

**Problem 7-37**  
CVP Analysis; Impact of Operating Changes  
(LO 7-1, 7-4)

2. Break-even point: 32,000 units



Lawrence Corporation sells two ceiling fans, Deluxe and Basic. Current sales total 60,000 units, consisting of 39,000 Deluxe units and 21,000 Basic units. Selling price and variable cost information follow.

	Deluxe	Basic
Selling price .....	\$86	\$74
Variable cost .....	65	41

**Problem 7-38**  
Sales Mix and Employee Compensation; Operating Changes  
(LO 7-4, 7-5)

2(c). Commissions, total: \$535,600

Salespeople currently receive flat salaries that total \$400,000. Management is contemplating a change to a compensation plan that is based on commissions in an effort to boost the company's presence in the marketplace. Two plans are under consideration:

- Plan A: 10% commission computed on gross dollar sales. Deluxe sales are expected to total 45,500 units; Basic sales are anticipated to be 19,500 units.
- Plan B: 30% commission computed on the basis of production contribution margins. Deluxe sales are anticipated to be 26,000 units; Basic sales are expected to total 39,000 units.

**Required:**

- Define the term *sales mix*.
- Comparing Plan A to the current compensation arrangement:
  - Will Plan A achieve management's objective of an increased presence in the marketplace? Briefly explain.
  - From a sales-mix perspective, will the salespeople be promoting the product that one would logically expect? Briefly discuss.
  - Will the sales force likely be satisfied with the results of Plan A? Why?
  - Will Lawrence likely be satisfied with the resulting impact of Plan A on company profitability? Why?



### ■ Problem 7-39

Leverage; Analysis of Operating Change

(LO 7-1, 7-4, 7-8)

1. Plan B break-even point:  
2,200 units
3. Operating leverage factor,  
plan A: 1.2

3. Assume that Plan B is under consideration.
  - a. Compare Plan A and Plan B with respect to total units sold and the sales mix. Comment on the results.
  - b. In comparison with flat salaries, is Plan B more attractive to the sales force? To the company? Show calculations to support your answers.

Consolidated Industries is studying the addition of a new valve to its product line. The valve would be used by manufacturers of irrigation equipment. The company anticipates starting with a relatively low sales volume and then boosting demand over the next several years. A new salesperson must be hired because Consolidated's current sales force is working at capacity. Two compensation plans are under consideration:

- Plan A: An annual salary of \$22,000 plus a 10% commission based on gross dollar sales.  
 Plan B: An annual salary of \$66,000 and no commission.

Consolidated Industries will purchase the valve for \$50 and sell it for \$80. Anticipated demand during the first year is 6,000 units. (In the following requirements, ignore income taxes.)

**Required:**

1. Compute the break-even point in units for Plan A and Plan B.
2. What is meant by the term *operating leverage*?
3. Analyze the cost structures of both plans at the anticipated demand of 6,000 units. Which of the two plans has a higher operating leverage factor?
4. Assume that a general economic downturn occurred during year 2, with product demand falling from 6,000 to 5,000 units. Determine the percentage decrease in company net income if Consolidated had adopted Plan A.
5. Repeat requirement (4) for Plan B. Compare Plan A and Plan B, and explain a major factor that underlies any resulting differences.
6. Briefly discuss the likely profitability impact of an economic recession for highly automated manufacturers. What can you say about the risk associated with these firms?

### ■ Problem 7-40

Basic CVP Relationships

(LO 7-1, 7-2, 7-4)

3. Sales units required for target net profit: 140,000 units
6. Old contribution-margin ratio: .208

Serendipity Sound, Inc. manufactures and sells compact discs. Price and cost data are as follows:

Selling price per unit (package of two CDs) .....	\$ 25.00
Variable costs per unit:	
Direct material .....	\$ 10.50
Direct labor .....	5.00
Manufacturing overhead .....	3.00
Selling expenses .....	1.30
Total variable costs per unit .....	<u>\$ 19.80</u>
Annual fixed costs:	
Manufacturing overhead .....	\$ 192,000
Selling and administrative .....	276,000
Total fixed costs .....	<u>\$ 468,000</u>
Forecasted annual sales volume (120,000 units) .....	<u>\$3,000,000</u>

In the following requirements, ignore income taxes.

**Required:**

1. What is Serendipity Sound's break-even point in units?
2. What is the company's break-even point in sales dollars?
3. How many units would Serendipity Sound have to sell in order to earn \$260,000?
4. What is the firm's margin of safety?