Breakeven in Units

Oberon Company manufactures dorm-room-sized refrigerators. Fixed costs amount to $270,000 per year. Variable costs per refrigerator are $23, and the average price per refrigerator is $50.

Required:

1. How many refrigerators must Oberon Company sell to break even?
2. If Oberon Company sells 16,000 refrigerators in a year, what is the operating income?
3. If Oberon Company's variable costs decrease to $20 per refrigerator while the price and fixed costs remain unchanged, what is the new break-even point?

17–2

1. **Break-even in units = $270,000/($50 – $23) = 10,000 refrigerators**

2.

Sales ($50 × 16,000)	$800,000
Less: Variable costs ($23 × 16,000)	368,000
Contribution margin	$432,000
Less: Fixed costs	270,000
Operating income	$162,000

3. **New break-even in units = $270,000/($50 – $20)**
   = 9,000 refrigerators

Breakeven for a Service Firm

Tamara Ames owns and operates The Hassle-Free Hothouse (THH), which provides live plants and flower arrangements to professional offices. Tamara has fixed costs of $2,380 per month for office/greenhouse rent, advertising, and a delivery van. Variable costs for the plants, fertilizer, pots, and other supplies average $25 per job. THH charges $60 per month for the average job.

Required:

1. How many jobs must THH average each month to break even?
2. What is the operating income for THH in a month with 65 jobs? With 100 jobs?
3. Suppose that THH decides to increase the price to $75 per job. What is the new break-even point in number of jobs per month?

17–4

1. Break-even in units = $2,380/($60 – $25) = 68 jobs per month

2.

	65 Jobs	100 Jobs
Sales	$3,900	$6,000
Less: Variable cost	1,625	2,500
Contribution margin	$2,275	$3,500
Less: Fixed expenses	2,380	2,380
Operating income	$ (105)	$1,120

At 100 jobs, the profit is $1,120; at 65 jobs, the loss is $105.

3. Break-even in units = $2,380/($75 – $25) = 47.6 or 48 jobs per month

Breakeven in Sales Dollars, Margin of Safety

StarSports, Inc., represents professional athletes and movie and television stars. The agency had revenue of $10,780,000 last year, with total variable costs of $5,066,600 and fixed costs of $2,194,200.

Required:

1. What is the contribution margin ratio for StarSports based on last year's data? What is the break-even point in sales revenue?
2. What was the margin of safety for StarSports last year?
3. One of StarSports's agents proposed that the firm begin cultivating high school sports stars around the nation. This proposal is expected to increase revenue by $150,000 per year, with increased fixed costs of $140,000. Is this proposal a good idea? Explain.

Chapter 17 Solutions: 17-6

17–6

1. **Contribution margin ratio = 1 – ($5,066,600/$10,780,000) = 0.53**

   Break-even sales revenue = $2,194,200/0.53 = $4,140,000

2. **Margin of safety = Sales – Break-even sales**
   = $10,780,000 – $4,140,000 = $6,640,000

3. **Contribution margin from increased sales = ($150,000)(0.53) = $79,500**

   Cost of proposal = $140,000

   No, the proposal is not a good idea, the company's operating income will decrease by $60,500.

Contribution Margin, CVP, Net Income, Margin of Safety

Chromatics, Inc., produces novelty nail polishes. Each bottle sells for $3.60. Variable unit costs are as follows:

Acrylic base	$0.75
Pigments	0.38
Other ingredients	0.35
Bottle, packing material	1.15
Selling commission	0.25

Fixed overhead costs are $12,000 per year. Fixed selling and administrative costs are $6,720 per year. Chromatics sold 35,000 bottles last year.

Required:

1. What is the contribution margin per unit for a bottle of nail polish? What is the contribution margin ratio?
2. How many bottles must be sold to break even? What is the break-even sales revenue?
3. What was Chromatics' operating income last year?
4. What was the margin of safety?
5. Suppose that Chromatics raises the price to $4.00 per bottle, but anticipated sales will drop to 30,400 bottles. What will the new break-even point in units be? Should Chromatics raise the price? Explain.

17–11

1. **Contribution margin per unit = $3.60 – $2.88* = $0.72**

   ***Variable unit cost = $0.75 + $0.38 + $0.35 + $1.15 + $0.25**
   = $2.88

   Contribution margin ratio = $0.72/$3.60 = 0.20

2. **Break-even in units = ($12,000 + $6,720)/$0.72 = 26,000 bottles**

   Break-even in sales = 26,000 × $3.60 = $93,600
   or
   = ($12,000 + $6,720)/0.20 = $93,600

17–11 Concluded

3.	Sales ($3.60 × 35,000)	$126,000
	Variable costs ($2.88 × 35,000)	100,800
	Contribution margin	$ 25,200
	Fixed costs	18,720
	Operating income	$ 6,480

4. Margin of safety = $126,000 – $93,600 = $32,400
   or 35,000 – 26,000 = 9,000 units

5. Break-even in units = $18,720/($4.00 – $2.88)
   = 16,714.3, or 16,715 if rounded to whole units

   New operating income = $4(30,400) – $2.88(30,400) – $18,720
   = $121,600 – $87,552 – $18,720
   = $15,328

   Yes, operating income will increase by $8,848 ($15,328 – $6,480).

After-Tax Target Income, Profit Analysis

Siberian Ski Company recently expanded its manufacturing capacity, which will allow it to produce up to 15,000 pairs of cross-country skis of the mountaineering model or the touring model. The sales department assures management that it can sell between 9,000 and 13,000 pairs of either product this year. Because the models are very similar, Siberian Ski will produce only one of the two models.

The following information was compiled by the accounting department:

	Per-Unit (Pair) Data	
	Mountaineering	***Touring***
Selling price	$88.00	$80.00
Variable costs	52.80	52.80

Fixed costs will total $369,600 if the mountaineering model is produced but will be only $316,800 if the touring model is produced. Siberian Ski is subject to a 40 percent income tax rate.

Required:

1. If Siberian Ski Company desires an after-tax net income of $24,000, how many pairs of touring model skis will the company have to sell?
2. Suppose that Siberian Ski Company decided to produce only one model of skis. What is the total sales revenue at which Siberian Ski Company would make the same profit or loss regardless of the ski model it decided to produce?
3. If the sales department could guarantee the annual sale of 12,000 pairs of either model, which model would the company produce, and why? *(CMA adapted)*

7–14

1. Before-tax income = $24,000/(1 – 0.4)
   = $40,000

   Number of pairs of touring model skis to earn $24,000 after-tax income:

   = ($316,800 + $40,000)/($80.00 – $52.80)
   = 13,118 pairs

2. Let X = Number of pairs of mountaineering skis
   and Y = Number of pairs of touring skis

$$\$88X - \$52.80X - \$369,600 = \$80Y - \$52.80Y - \$316,800$$
$$\$88X - \$52.80X - \$52,800 = \$80Y - \$52.80Y$$
$$\$88X - \$52.80X - \$52,800 = \$80(88/80)X - \$52.80(88/80)X^*$$
$$\$5.28X = \$52,800$$
$$X = 10,000 \text{ pairs}$$

Revenue = $88 × 10,000 = $880,000

*If total revenue is the same, then 88X = 80Y, or Y = (88/80)X and (88/80)X can be substituted for Y.

7–14 Concluded

3. Siberian Ski Company would produce and sell 12,000 pairs of the mountaineering skis because they are more profitable.

	Mountaineering Model	Touring Model
Sales	$1,056,000	$960,000
Less: Variable expenses	633,600	633,600
Contribution margin	$ 422,400	$326,400
Less: Fixed expenses	369,600	316,800
Operating income	$ 52,800	$ 9,600

Breakeven in Units

Don Masters and two of his colleagues are considering opening a law office in a large metropolitan area that would make inexpensive legal services available to those who could not otherwise afford these services. The intent is to provide easy access for their clients by having the office open 360 days per year, 16 hours each day from 7:00 A.M. to 11:00 P.M. The office would be staffed by a lawyer, paralegal, legal secretary, and clerk-receptionist for each of the two 8-hour shifts.

In order to determine the feasibility of the project, Don hired a marketing consultant to assist with market projections. The results of this study show that if the firm spends $500,000 on advertising the first year, the number of new clients expected each day would have the following probability distribution.

Number of New Clients per Day	*Probability*
20	0.10
30	0.30
55	0.40
85	0.20

Don and his associates believe these numbers are reasonable and are prepared to spend the $500,000 on advertising. Other pertinent information about the operation of the office is as follows.

The only charge to each new client would be $30 for the initial consultation. All cases that warranted further legal work would be accepted on a contingency basis with the firm earning 30 percent of any favorable settlements or judgments. Don estimates that 20 percent of new client consultations will result in favorable settlements or judgments averaging $2,000 each. Repeat clients are not expected during the first year of operations.

The hourly wages of the staff are projected to be $25 for the lawyer, $20 for the paralegal, $15 for the legal secretary, and $10 for the clerk-receptionist. Fringe benefit expenses will be 40 percent of the wages paid. A total of 400 hours of overtime is expected for the year; this will be divided equally between the legal secretary and the clerk-receptionist positions. Overtime will be paid at one and one-half times the regular wage, and the fringe benefit expense will apply to the full wages.

Don has located 6,000 square feet of suitable office space, which rents for $28 per square foot annually. Associated expenses will be $22,000 for property insurance and $32,000 for utilities.

It will be necessary for the group to purchase malpractice insurance, which is expected to cost $180,000 annually.

The initial investment in office equipment will be $60,000; this equipment has an estimated useful life of four years.

The cost of office supplies has been estimated to be $4 per expected new client consultation.

Required:

1. Determine how many new clients must visit the law office being considered by Don Masters and his colleagues in order for the venture to break even during its first year of operations.
2. Using the information provided by the marketing consultant, determine if it is feasible for the law office to achieve break-even operations. *(CMA adapted)*

17–15

1. Break-even calculations for the first year of operations:

Fixed expenses:	
Advertising	**$ 500,000**
Rent (6,000 × $28)	**168,000**
Property insurance	**22,000**
Utilities	**32,000**
Malpractice insurance	**180,000**
Depreciation ($60,000/4)	**15,000**
Wages and fringe benefits:	
Regular wages[a]	**403,200**
Overtime wages[b]	**7,500**
Fringe benefits (@ 40%)	**164,280**
Total fixed expenses	**$1,491,980**

[a]($25 + $20 + $15 + $10)(16 hours)(360 days) = $403,200.

[b](200 × $15 × 1.5) + (200 × $10 × 1.5) = $7,500.

$$\begin{aligned}\text{Break-even point} &= \text{Revenue} - \text{Variable costs} - \text{Fixed costs}\\ &= \$30X + (\$2{,}000)(0.2X)(0.3) - \$4X - \$1{,}491{,}980\\ &= \$30X + \$120X - \$4X - \$1{,}491{,}980\\ 146X &= \$1{,}491{,}980\\ X &= 10{,}219.04 \text{ or } 10{,}220 \text{ clients}\end{aligned}$$

2. Based on the report of the marketing consultant, the expected number of new clients during the first year is 18,000. Therefore, it is feasible for the law office to break even during the first year of operations as the break-even point is 10,220 clients (as shown above).

Expected value = (20 × 0.1) + (30 × 0.3) + (55 × 0.4) + (85 × 0.2)
= 50 clients per day

Annual clients = 50 × 360 days
= 18,000 clients per year

Basic CVP Concepts

Devonly Company produces a variety of products. One division makes gas grills for outdoor cooking. The division's projected income statement for the coming year is as follows:

Sales (120,000 units)	$7,500,000
Less: Variable expenses	3,450,000
Contribution margin	$4,050,000
Less: Fixed expenses	3,375,000
Operating income	$ 675,000

Required:

1. Compute the contribution margin per unit, and calculate the break-even point in units. Repeat, using the contribution margin ratio.
2. The divisional manager has decided to increase the advertising budget by $100,000 and cut the average selling price to $58. These actions will increase sales revenues by $1 million. Will the division be made better off?
3. Suppose sales revenues exceed the estimated amount on the income statement by $540,000. Without preparing a new income statement, determine by how much profits are underestimated.
4. How many units must be sold to earn an after-tax profit of $1.254 million? Assume a tax rate of 34 percent.
5. Compute the margin of safety in dollars based on the given income statement.
6. Compute the operating leverage based on the given income statement. If sales revenues are 20 percent greater than expected, what is the percentage increase in profits?

Chapter 17 Solutions: 17-21

17–21

1. Unit contribution margin = $4,050,000/120,000 = $33.75
   Break-even point = $3,375,000/$33.75 = 100,000
   CM ratio = $4,050,000/$7,500,000 = 0.54
   Break-even point = $3,375,000/0.54 = $6,250,000

2.

Sales	$8,500,000
Variable expenses	4,213,450*
Contribution margin	$4,286,550
Fixed expenses	3,475,000
Operating income	$ 811,550

   *Unit variable cost = $3,450,000/120,000 = $28.75 Variable cost ratio = 28.75/58 = 0.4957. Thus, variable expenses = 0.4957 × $8,500,000 = $4,213,450.

   The company would gain $136,550 if the proposal is implemented.

3. $540,000 × 0.54 = $291,600

4. Operating income = $1,254,000/(1 – 0.34) = $1,900,000
   Units = ($3,375,000 + $1,900,000)/$33.75
   = 156,297 units

5. Margin of safety = $7,500,000 – $6,250,000 = $1,250,000

6. Operating leverage = $4,050,000/$675,000 = 6
   Profit increase = 20% × 6 = 120%

Corporate Profiles

Next Week - 10 minute MAX!

Major US Pharmaceutical Companies and Drug Stores

- Phizer
- Johnson & Johnson
- CVS
- Walgreen

Corporate Profiles

This Week – 10 minutes MAX

Major Multinational Electronics Companies From Around the World

- Apple (USA)
- Samsung (S. Korea)
- General Electric (USA)
- Siemens (Germany)