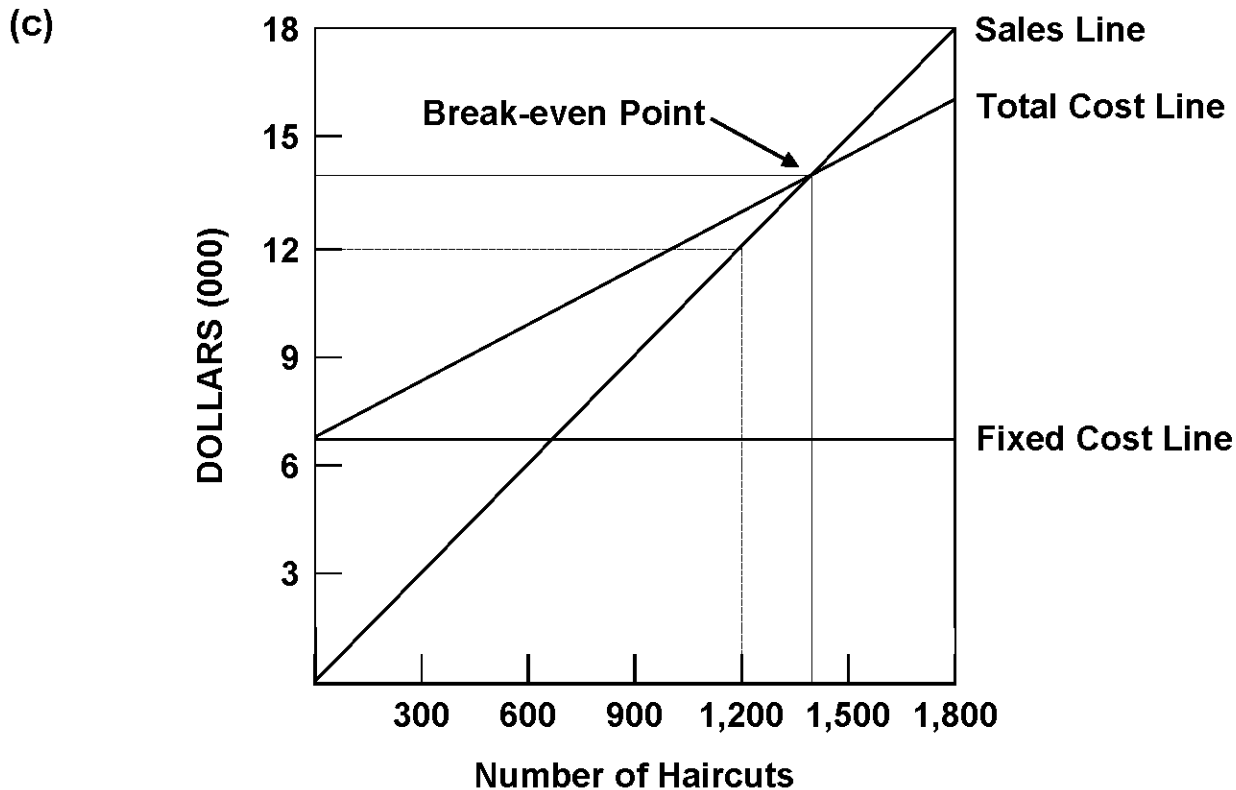


SOLUTIONS TO PROBLEMS

PROBLEM 5-1A

Variable costs (per haircut)		Fixed costs (per month)	
Barbers' commission	\$4.50	Barbers' salaries	\$5,000
Barber supplies	.30	Manager's extra salary	500
Utilities	.20	Advertising	200
Total variable cost per haircut	<u>\$5.00</u>	Rent	1,100
		Utilities	175
		Magazines	25
		Total fixed	<u>\$7,000</u>

(b) $\$10.00X = \$5.00X + \$7,000$ $1,400 \text{ haircuts} \times \$10 = \$14,000$
 $\$ 5.00X = \$7,000$
 $X = 1,400 \text{ haircuts}$



(d) Net income = $\$16,000 - [(\$5.00 \times 1,600) + \$7,000]$
 $= \$1,000$

PROBLEM 5-2A

(a) **JORGE COMPANY**
CVP Income Statement (Estimated)
For the Year Ending December 31, 2017

Sales		\$1,800,000
Variable expenses		
Cost of goods sold.....	\$1,170,000*	
Selling expenses	70,000	
Administrative expenses	<u>20,000</u>	
Total variable expenses		<u>1,260,000</u>
Contribution margin		540,000
Fixed expenses		
Cost of goods sold.....	280,000	
Selling expenses	65,000	
Administrative expenses	<u>60,000</u>	
Total fixed expenses		<u>405,000</u>
Net income		<u>\$ 135,000</u>

*Direct materials \$430,000 + direct labor \$360,000 + variable manufacturing overhead \$380,000.

(b) Variable costs = 70% of sales (\$1,260,000 ÷ \$1,800,000) or \$.35 per bottle (\$.50 X 70%). Total fixed costs = \$405,000.

$$\begin{aligned}
 1. \quad & \$.50X = \$.35X + \$405,000 \\
 & \$.15X = \$405,000 \\
 & X = 2,700,000 \text{ units}
 \end{aligned}$$

$$2. \quad 2,700,000 \times \$.50 = \$1,350,000$$

(c) Contribution margin ratio = $(\$.50 - \$.35) \div \$.50$
= 30% (or 1 - .70)

Margin of safety ratio = $(\$1,800,000 - \$1,350,000) \div \$1,800,000$
= 25%

(d) Required sales

$$X = \frac{\$405,000 + \$180,000}{.30} = \$1,950,000$$

PROBLEM 5-3A

- (a) Sales were \$2,500,000, variable expenses were \$1,750,000 (70% of sales), and fixed expenses were \$850,000. Therefore, the break-even point in dollars is:

$$\frac{\$850,000}{.30} = \$2,833,333 \text{ (rounded)}$$

- (b) 1. The effect of this alternative is to increase the selling price per unit to \$6 (\$5 X 120%). Total sales become \$3,000,000 (500,000 X \$6). Thus, the contribution margin ratio changes to 42% [(\$3,000,000 – \$1,750,000) ÷ \$3,000,000]. The new break-even point is:

$$\frac{\$850,000}{.42} = \$2,023,810 \text{ (rounded)}$$

2. The effects of this alternative are to change total fixed costs to \$760,000 (\$850,000 – \$90,000) and to change the contribution margin to 25% [(\$2,500,000 – \$1,750,000 – \$125,000) ÷ \$2,500,000]. The new break-even point is:

$$\frac{\$760,000}{.25} = \$3,040,000$$

Alternative 1 is the recommended course of action because it has a lower break-even point.

PROBLEM 5-4A

- (a) Current break-even point: $\$40X = \$24X + \$270,000$
(where X = pairs of shoes)

$$\begin{aligned} \$16X &= \$270,000 \\ X &= 16,875 \text{ pairs of shoes} \end{aligned}$$

New break-even point: $\$38X = \$24X + (\$270,000 + \$24,000)$
 $\$14X = \$294,000$
 $X = 21,000$ pairs of shoes

(b) Current margin of safety ratio = $\frac{(20,000 \times \$40) - (16,875 \times \$40)}{(20,000 \times \$40)}$
 = 16% (rounded)

New margin of safety ratio = $\frac{(24,000 \times \$38) - (21,000 \times \$38)}{(24,000 \times \$38)}$
 = 13% (rounded)

(c) **BARGAIN SHOE STORE**
CVP Income Statement

	Current	New	
Sales (20,000 X \$40)	\$800,000	\$912,000	(24,000 X \$38)
Variable expenses (20,000 X \$24)	480,000	576,000	(24,000 X \$24)
Contribution margin	320,000	336,000	
Fixed expenses	270,000	294,000	
Net income	\$ 50,000	\$ 42,000	

The proposed changes will raise the break-even point 4,125 units. This is a significant increase. Margin of safety is 3% lower and net income is \$8,000 lower. The recommendation is to not accept the proposed changes.

PROBLEM 5-5A

(a) (1)

	<u>Current Year</u>
Sales	<u>\$1,600,000</u>
Variable costs	
Direct materials	490,000
Direct labor	290,000
Manufacturing overhead (\$380,000 X .70)	266,000
Selling expenses (\$250,000 X .40)	100,000
Administrative expenses (\$270,000 X .20)	<u>54,000</u>
Total variable costs	<u>1,200,000</u>
Contribution margin	<u>\$ 400,000</u>

	<u>Current Year</u>		<u>Projected Year</u>
Sales	<u>\$1,600,000</u>	X 1.1	<u>\$1,760,000</u>
Variable costs			
Direct materials	490,000	X 1.1	539,000
Direct labor	290,000	X 1.1	319,000
Manufacturing overhead	266,000	X 1.1	292,600
Selling expenses	100,000	X 1.1	110,000
Administrative expenses	<u>54,000</u>	X 1.1	<u>59,400</u>
Total variable costs	<u>1,200,000</u>	X 1.1	<u>1,320,000</u>
Contribution margin	<u>\$ 400,000</u>	X 1.1	<u>\$ 440,000</u>

(2)

	<u>Current Year</u>	<u>Projected year</u>
Fixed Costs		
Manufacturing overhead (\$380,000 X .30)	\$114,000	\$114,000
Selling expenses (\$250,000 X .60)	150,000	150,000
Administrative expenses (\$270,000 X .80)	<u>216,000</u>	<u>216,000</u>
Total fixed costs	<u>\$480,000</u>	<u>\$480,000</u>

PROBLEM 5-5A (Continued)

(b) Unit selling price = $\$1,600,000 \div 100,000 = \16
Unit variable cost = $\$1,200,000 \div 100,000 = \12
Unit contribution margin = $\$16 - \$12 = \$4$
Contribution margin ratio = $\$4 \div \$16 = .25$

Break-even point in units = Fixed costs \div Unit contribution margin
120,000 units = $\$480,000 \div \4

Break-even point in dollars = Fixed costs \div Contribution margin ratio
 $\$1,920,000 = \$480,000 \div .25$

(c) Sales dollars
required for target net income = (Fixed costs + Target net income) \div Contribution margin ratio
 $\$2,720,000 = (\$480,000 + \$200,000) \div .25$

(d) Margin of safety ratio = (Expected sales - Break-even sales) \div Expected sales
29.4% = $(\$2,720,000 - \$1,920,000) \div \$2,720,000$

PROBLEM 5-6A

(a) 1. Let variable selling and administrative expenses = VSA
Sales – Variable cost of goods sold – VSA = Contribution Margin
 $\$1,200,000 - (\$400,000 + \$500,000 + \$50,000 + \text{VSA}) = \$180,000$
VSA = \$70,000

2. Let fixed manufacturing overhead = FMO
Sales – Variable cost of goods sold – FMO = Gross profit
 $\$1,200,000 - (\$400,000 + \$500,000 + \$50,000 + \text{FMO}) = \$180,000$
FMO = \$70,000

3. Let fixed selling and administrative expenses = FSA

Contribution margin ratio = $\$180,000 \div \$1,200,000 = 15\%$
Contribution margin at break-even = $\$1,300,000 \times 15\% = \$195,000$

At break-even, Contribution margin = Fixed costs (FSA + FMO)
 $\$195,000 = \text{FSA} + \$70,000$
FSA = \$125,000

(b) Incremental sales = $\$1,200,000 \times 25\% = \$300,000$
Incremental contribution margin = $\$300,000 \times 15\% = \$45,000$

The maximum increased advertising expenditure would be equal to the incremental contribution margin earned on the increased sales, which is \$45,000. The other fixed costs are irrelevant to this decision, because they would be incurred whether or not the advertising expenditure is increased.