

**DIRECT COSTING AND COST-VOLUME-PROFIT ANALYSIS**

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**MULTIPLE CHOICE**

Question Nos. 7-10, 11-13, 27, 28, 32, and 33 are AICPA adapted.

Question Nos. 14-16, 25, 26, 29, 30, 31, and 34-35 are CIA adapted.

- C 1. The costing procedure that treats fixed manufacturing costs as period costs is:
- A. full costing
  - B. absorption costing
  - C. direct costing
  - D. conventional costing
  - E. none of the above
- C 2. The following must be known about a production process in order to institute a direct costing system:
- A. the contribution margin and break-even point for all goods in production
  - B. the gross profit and margin of safety for all goods in production
  - C. the variable and fixed components of all costs related to production
  - D. the controllable and noncontrollable components of all costs related to production
  - E. standard production rates and times for all elements of production
- E 3. A cost that is included as part of product costs under both absorption costing and direct costing is:
- A. managerial staff costs
  - B. insurance
  - C. variable marketing expenses
  - D. taxes on factory building
  - E. variable materials handling labor
- B 4. When inventories increase from one period to the next and all other factors remain constant, income under direct costing:
- A. will be irrelevant for decision making
  - B. will be smaller than under absorption costing
  - C. cannot be accurately computed
  - D. leads to smaller federal income tax payments
  - E. will be greater than under absorption costing
- C 5. Of the following, the organization most likely to support direct costing is the:
- A. American Institute of Certified Public Accountants
  - B. Securities and Exchange Commission
  - C. Institute of Management Accountants
  - D. Internal Revenue Service
  - E. Financial Accounting Standards Board

- E 6. The following unit costs for the production of laser guns were based on expected capacity in the coming period:
- |  |     |
|--|-----|
| Direct materials .....                               | \$4 |
| Direct labor .....                                   | 7   |
| Variable overhead .....                              | 2   |
| Fixed overhead.....                                  | 5   |
| Variable marketing and administrative expenses ..... | 6   |
| Fixed marketing and administrative expenses .....    | 4   |

Under the direct costing method, these units are recorded in inventory at a cost of:

- A. \$11
- B. \$16
- C. \$18
- D. \$19
- E. none of the above

**SUPPORTING CALCULATION:**

$$\$4 + \$7 + \$2 = \$13$$

- B 7. A basic tenet of direct costing is that period costs should be currently expensed. The rationale behind this procedure is that:
- A. allocation of period costs is arbitrary at best and could lead to erroneous decisions by management
  - B. since period costs will occur whether or not production occurs, it is improper to allocate these costs to production and defer a current cost of doing business
  - C. period costs are uncontrollable and should not be charged to a specific product
  - D. period costs are generally immaterial in amount and the cost of assigning the amounts to specific products would outweigh the benefits
  - E. all of the above
- C 8. A term more descriptive of the type of cost accounting often called direct costing is:
- A. relevant costing
  - B. prime costing
  - C. variable costing
  - D. out-of-pocket costing
  - E. full costing
- A 9. Costs that are treated as product costs under variable (direct) costing are:
- A. only variable production costs
  - B. all variable costs
  - C. all variable and fixed manufacturing costs
  - D. variable manufacturing costs and fixed general and administrative costs
  - E. only direct costs

- A 10. Direct costing is not in accordance with generally accepted accounting principles because:
- A. fixed manufacturing costs are assumed to be period costs
  - B. direct costing includes variable administrative costs in inventory
  - C. direct costing procedures are not well known in industry
  - D. net earnings are always overstated when using direct costing procedures
  - E. direct costing ignores the concept of lower of cost or market when valuing inventory
- D 11. In an income statement prepared as an internal report using the direct costing method, fixed selling and administrative expenses would:
- A. be used in the computation of the contribution margin
  - B. be inventoried
  - C. appear in the same section as variable selling and administrative expenses
  - D. be used in the computation of operating income but not in the computation of the contribution margin
  - E. not be used
- D 12. A company had income of \$50,000 using direct costing for a given period. Beginning and ending inventories for that period were 13,000 units and 18,000 units, respectively. Ignoring income taxes, if the fixed overhead application rate were \$2.00 per unit, what would the income have been using absorption costing?
- A. \$86,000
  - B. \$40,000
  - C. \$50,000
  - D. \$60,000
  - E. cannot be determined from the information given

**SUPPORTING CALCULATION:**

$$\$50,000 + \$2 (18,000 - 13,000) = \$60,000$$

- D 13. In an income statement prepared as an internal report using the direct costing method, which of the following terms should appear?

	<b>Gross Profit</b>		<b>Operating Income (Loss)</b>
	<b><u>(Margin)</u></b>		
A.	Yes		Yes
B.	Yes		No
C.	No		No
D.	No		Yes
E.	No		Sometimes

- D 14. Using absorption costing, which of the following columns includes only product costs?**

.....	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
Direct labor .....	X		X	X
Direct materials .....	X	X		X
Sales materials .....		X		
Advertising costs.....			X	
Indirect factory materials.....	X	X		X
Indirect labor .....		X	X	X
Sales commissions.....	X			
Factory utilities .....	X		X	X
Administrative supplies expense .....		X		
Administrative labor .....			X	
Depreciation on administration building .....	X			
Cost of research on customer demographics .....			X	

- A. A  
 B. B  
 C. C  
 D. D  
 E. none of the above

- B 15. A company manufactures 50,000 units of a product and sells 40,000 units. Total manufacturing cost per unit is \$50 (variable manufacturing cost, \$10; fixed manufacturing cost, \$40). Assuming no beginning inventory, the effect on net income if absorption costing is used instead of variable costing is that:**
- A. net income is \$400,000 lower  
 B. net income is \$400,000 higher  
 C. net income is the same  
 D. net income is \$200,000 higher  
 E. none of the above

**SUPPORTING CALCULATION:**

$$\$40 (50,000 - 40,000) = \$400,000$$

- B 16. A company has the following cost data:**

Fixed manufacturing costs .....	\$2,000
Fixed selling, general, and administrative costs .....	1,000
Variable selling costs per unit sold.....	1
Variable manufacturing costs per unit.....	2

Beginning inventory .....	0 units
Production .....	100 units
Sales .....	90 units at \$40 per unit

Variable and absorption-cost net incomes are:

- A. \$320 variable, \$520 absorption
- B. \$330 variable, \$530 absorption
- C. \$520 variable, \$320 absorption
- D. \$530 variable, \$330 absorption
- E. none of the above

**SUPPORTING CALCULATION:**

Variable:  $\$3,600 - \$180 - \$90 - \$2,000 - \$1,000 = \$330$

Absorption:  $\$3,600 - \$180 - [(90 \div 100) \times \$2,000] - \$90 - \$1,000 = \$530$

- C 17. All of the following statements related to the use of break-even analysis are true *except*:**
- A. a change in fixed costs changes the break-even point but not the contribution margin figure
  - B. a combined change in fixed and variable costs in the same direction causes a sharp change in the break-even point
  - C. a change in fixed costs changes the contribution margin figure but not the break-even point
  - D. a change in per-unit variable costs changes the contribution margin ratio
  - E. a change in sales price changes the break-even point
- E 18. The costing method that lends itself most readily to the preparation of break-even analysis is:**
- A. weighted average costing
  - B. absorption costing
  - C. first-in, first-out costing
  - D. semivariable costing
  - E. direct costing
- E 19. The break-even volume in units is found by dividing fixed expenses by the:**
- A. unit gross profit
  - B. total variable expenses
  - C. unit net profit
  - D. contribution margin ratio
  - E. unit contribution margin

- C 20. A major assumption concerning cost and revenue behavior that is important to the development of break-even charts is that:
- A. all costs are variable
  - B. total costs are quadratic
  - C. costs and revenues are linear
  - D. the relevant range is greater than sales volume
  - E. costs will not exceed revenues
- B 21. If the fixed cost attendant to a product increases while the variable cost and sales price remain constant, the contribution margin and break-even point will:
- |    | <u>Contribution Margin</u> | <u>Break-Even Point</u> |
|----|----------------------------|-------------------------|
| A. | increase                   | increase                |
| B. | not change                 | increase                |
| C. | not change                 | not change              |
| D. | increase                   | decrease                |
| E. | decrease                   | increase                |
- E 22. If current sales are \$1,000,000 and break-even sales are \$600,000, the margin of safety ratio is:
- A. 6%
  - B. 60%
  - C. 167%
  - D. 100%
  - E. 40%

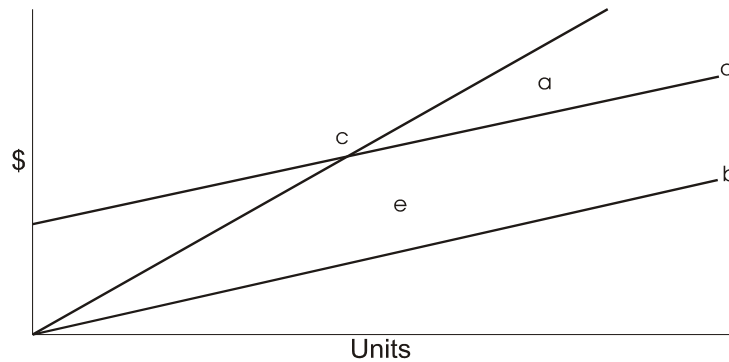
**SUPPORTING CALCULATION:**

$$\frac{\$1,000,000 - \$600,000}{\$1,000,000} = 40\%$$

- A 23. Assuming that there is no effect on other products that are manufactured, a company should discontinue a product line for economic reasons when the:
- A. contribution margin from the product line is negative
  - B. sales of the product are less than the break-even point
  - C. profit from the product line is less than that for the other products
  - D. profit from the product line is negative
  - E. contribution margin from the product line is less than that for other products
- E 24. When referring to the "margin of safety," an accountant would be thinking of:
- A. the excess of sales revenue over variable costs
  - B. the excess of budgeted or actual sales over the contribution margin
  - C. the excess of budgeted or actual sales revenue over fixed costs
  - D. the excess of actual sales over budgeted sales
  - E. none of the above

- C 25. Based on the cost-volume-profit chart in Figure 20-1 for a manufacturing company, the correct statement is:

A. line b graphs total fixed costs  
 B. point c represents the point at which the marginal contribution per unit increases  
 C. line d graphs total costs  
 D. area e (between lines b and d) represents the contribution margin  
 E. area a represents the area of net loss



- B 26. A valid assumption for cost-volume-profit analysis is:
- A. an increase in fixed costs will cause the break-even point to rise  
 B. demand is constant regardless of price  
 C. a decrease in variable cost per unit will lower the break-even point  
 D. variable costs per unit are assumed to remain constant within the range of activity analyzed  
 E. all of the above are invalid assumptions

- D 27. The following information pertains to Izzy Co.:

Sales (50,000 units).....	\$1,000,000
Direct materials and direct labor .....	300,000
Factory overhead:	
Variable.....	40,000
Fixed .....	70,000
Selling and general expenses:	
Variable.....	10,000
Fixed .....	60,000

How much was Izzy's break-even point in number of units?

A. 18,571  
 B. 26,000  
 C. 9,848  
 D. 10,000  
 E. none of the above

**SUPPORTING CALCULATION:**

$$\frac{\$70,000 + \$60,000}{(\$1,000,000 \div 50,000) - (\$350,000 \div 50,000)} = 10,000$$

- A 28. The following information pertains to Izzy Co.:**

Sales (50,000 units).....	\$1,000,000
Direct materials and direct labor .....	300,000
Factory overhead:	
Variable.....	40,000
Fixed .....	70,000
Selling and general expenses:	
Variable.....	10,000
Fixed .....	60,000

What was Izzy's contribution margin ratio?

- A. 65%
- B. 59%
- C. 35%
- D. 66%
- E. none of the above

**SUPPORTING CALCULATION:**

$$1 \bullet \frac{\$300,000 + \$40,000 + \$10,000}{\$1,000,000} = .65$$

- A 29. A result from lowering the break-even point is:**
- A. an increase in the sales price per unit
  - B. an increase in the semivariable cost per unit
  - C. an increase in the variable cost per unit
  - D. a decrease in the contribution margin per unit
  - E. an increase in income tax rates
- C 30. A company manufactures a single product that sells for \$30. If the company has fixed costs of \$150,000 and a contribution margin of 40%, the break-even point in sales dollars is:**
- A. \$250,000
  - B. \$275,000
  - C. \$375,000
  - D. \$525,000
  - E. none of the above

**SUPPORTING CALCULATION:**

$$\$150,000 \div .40 = \$375,000$$



- C 31. A company producing widgets expects to incur fixed costs during the next year of \$3 million. It also expects to incur handling costs of \$1 per widget, labor costs of \$3 per widget, and materials costs of \$2 per widget. The company produces widgets only when ordered and, therefore, does not incur any carrying costs. It sells widgets for \$10 each. The number of widgets that must be sold next year in order to break even is:
- A. 500,000 units
  - B. 600,000 units
  - C. 750,000 units
  - D. 1,000,000 units
  - E. none of the above

**SUPPORTING CALCULATION:**

$$\$3,000,000 \div (\$10 - \$6) = 750,000$$

- E 32. Clark Co.'s operating percentages were as follows:

Sales.....		100%
Cost of sales:		
Variable.....	50%	
Fixed .....	<u>10</u>	<u>60</u>
Gross profit .....		40%
Other operating expenses:		
Variable.....	20%	
Fixed .....	<u>15</u>	<u>35</u>
Operating income .....		<u><u>5%</u></u>

Clark's sales totaled \$2,000,000. At what sales level would Clark break even?

- A. \$1,900,000
- B. \$666,667
- C. \$1,250,000
- D. \$833,333
- E. \$1,666,667

**SUPPORTING CALCULATION:**

$$[\$2,000,000 \times 25\%] \div [1 - (70\% \div 100\%)] = \$1,666,667$$

- C 33. The following information pertains to Neon Co.'s cost-volume-profit relationships:

Break-even point in units sold .....	1,000
Variable costs per unit.....	\$500
Total fixed costs .....	\$ 150,000

How much will be contributed to profit when unit 1,001 is sold?

- A. \$650
- B. \$500
- C. \$150
- D. 0
- E. none of the above

**SUPPORTING CALCULATION:**

Break-even point =  $(1,000 \times \$500) + \$150,000 = \$650,000$

$\therefore$  Selling price =  $\$650,000 \div 1,000 = \$650$

Contribution margin =  $\$650 - \$500 = \$150$

- C 34. During June, a company expects sales revenue from its only product to be \$300,000, fixed costs to be \$90,000, and variable costs to be \$120,000. If the company's actual sales revenue during June is \$350,000, its profit would be:
- A. \$90,000
  - B. \$105,000
  - C. \$120,000
  - D. \$140,000
  - E. none of the above

**SUPPORTING CALCULATION:**

Sales .....	\$350,000
Variable costs.....	<u>140,000</u>
Contribution margin.....	\$210,000
Fixed costs .....	<u>90,000</u>
Profit .....	<u>\$120,000</u>

- C 35. A company has just completed the final development of its only product, general recombinant bacteria, that kills most insects before dying. The product has taken three years and \$6,000,000 to develop. The following costs are expected to be incurred on a monthly basis for the production of 1,000,000 pounds of the new product:

	<u>1,000,000 Pounds</u>
Direct materials .....	\$ 300,000
Direct labor .....	1,250,000
Variable overhead .....	450,000
Fixed overhead.....	2,000,000
Variable selling, general, and administrative expenses.....	900,000
Fixed selling, general, and administrative expenses .....	<u>1,500,000</u>
Total.....	<u>\$ 6,400,000</u>

At a sale price of \$5.90 per pound, the sales in pounds necessary to ensure a \$3,000,000 profit the first year would be (to the nearest thousand pounds):

- A. 13,017,000 pounds
- B. 14,000,000 pounds
- C. 15,000,000 pounds
- D. 25,600,000 pounds
- E. none of the above

**SUPPORTING CALCULATION:**

$$\frac{[12(\$2,000,000 + \$1,500,000)] + \$3,000,000}{\$5.90 - \$0.30 - \$1.25 - \$0.45 - \$0.90} = 15,000,000 \text{ pounds}$$

- C 36.** A specialized version of direct costing for short-run optimization is :
- A.** learning theory
  - B.** absorption costing
  - C.** the theory of constraints
  - D.** variable costing
  - E.** none of the above
- D 37.** The theory of constraints uses which of the following basic measures :
- A.** throughput
  - B.** operating expense
  - C.** assets
  - D.** all of the above
  - E.** none of the above
- B 38.** The practice of improving a reported volume or idle capacity variance by producing more than is currently needed is viewed by the theory of constraints as :
- A.** a benefit with no cost increase
  - B.** a cost increase with no benefit
  - C.** both a cost increase and a benefit
  - D.** worthwhile from a cost/benefit perspective
  - E.** none of the above
- E 39.** The theory of constraints is a short-run optimization technique that views which of the following as relatively constant :
- A.** resources
  - B.** technology
  - C.** product lines
  - D.** demand
  - E.** all of the above
- A 40.** The theory of constraints is primarily useful for :
- A.** short-run decisions
  - B.** medium range decisions
  - C.** long-run decisions
  - D.** both short-run and long-run decisions
  - E.** medium range to long-run decisions

## PROBLEMS

### PROBLEM

1.

**Income Statement Using Absorption Costing and Direct Costing.** Clouseau Corp. developed the following standard unit costs:

Materials.....	\$ 6.00
Labor.....	4.25
Variable overhead .....	4.80
Fixed overhead.....	1.55
Variable marketing expenses.....	1.50
Fixed administrative expenses .....	4.50
Total .....	<u>\$ 22.60</u>

The selling price is estimated at \$30, and standard production is 9,000 units. Last year, production amounted to 9,000 units, of which 1,500 units were in inventory at the end of the year. This year, production amounted to 7,700 units; 7,000 units were sold at standard price. There are no work in process or materials inventories.

*Required:*

- (1) Prepare an income statement for the current year, using (a) absorption costing and (b) direct costing. (Round all computations to the nearest whole dollar and round \$.50 up. Any over- or underapplied factory overhead should be closed to Cost of Goods Sold.)
- (2) Compute and reconcile the difference in operating income under the two methods.

### SOLUTION

(1)(a)

#### Absorption Costing

Sales (7,000 units @ \$30).....	\$ 210,000
Cost of goods sold:	
Beginning inventory (1,500 units x \$16.60 <sup>1</sup> ) .....	\$ 24,900
Production costs:	
Materials (7,700 units @ \$6) .....	\$46,200
Direct labor (7,700 units @ \$4.25) .....	32,725
Variable overhead (7,700 units @ \$4.80).....	36,960
Fixed overhead (7,700 units @ \$1.55) .....	<u>11,935</u>
Cost of goods available for sale .....	\$ 127,820
Ending inventory (2,200 units x \$16.60) .....	<u>36,520</u>
Cost of goods sold (7,000 units x \$16.60).....	\$ 116,200
Volume variance (9,000 - 7,700 x \$1.55) .....	<u>2,015</u>
Cost of goods sold at actual.....	<u>118,215</u>
Gross profit .....	\$ 91,785
Variable marketing expenses (7,000 units @ \$1.50).....	\$ 10,500
Fixed administrative expenses (9,000 units @ \$4.50) .....	<u>40,500</u>
Total marketing and administrative expenses .....	<u>51,000</u>
Operating income for the current year .....	<u>\$ 40,785</u>

<sup>1</sup>Beginning inventory:

Materials .....	\$ 6.00
Labor .....	4.25
Variable overhead .....	4.80
Fixed overhead .....	<u>1.55</u>
Total .....	<u>\$ 16.60</u>

## (b) Direct Costing

Sales (7,000 units @ \$30) .....		\$ 210,000
Variable cost of goods sold:		
Beginning inventory (1,500 units @ \$15.05 <sup>1</sup> ) .....	\$ 22,575	
Variable production cost (7,700 units @ \$15.05) .....	<u>115,885</u>	
Variable cost of goods available for sale .....		\$ 138,460
Ending inventory (2,200 units @ \$15.05) .....		<u>33,110</u>
Variable cost of goods sold (7,000 units x \$15.05) .....		<u>105,350</u>
Gross contribution margin .....		\$ 104,650
Variable marketing expenses (7,000 units @ \$1.50) .....		<u>10,500</u>
Contribution margin .....		\$ 94,150
Less fixed expenses:		
Overhead (9,000 units x \$1.55) .....	\$ 13,950	
Administrative (9,000 units x \$4.50) .....	<u>40,500</u>	<u>54,450</u>
Operating income for the current year .....		<u>\$ 39,700</u>

<sup>1</sup>Beginning inventory:

Materials .....	\$ 6.00
Labor .....	4.25
Variable overhead .....	<u>4.80</u>
Total .....	<u>\$ 15.05</u>

## (2)

Operating income under absorption costing .....	\$ 40,785
Operating income under direct costing .....	<u>39,700</u>
Difference .....	<u>\$ 1,085</u>
Units produced during year .....	7,700
Units sold during year .....	<u>7,000</u>
Increase in finished goods .....	700
Fixed factory overhead per unit .....	x <u>\$1.55</u>
Difference .....	<u>\$ 1,085</u>

**PROBLEM**

2.

**Distinguishing Between Costing Methods.** The president of Symbiotic Systems Inc. asks the controller to prepare a cost analysis, using both direct costing and absorption costing, as well as an assessment of the impact of allocating a \$25,000 unfavorable labor efficiency variance among inventories. The following income statements were prepared:

	<u>D</u>	<u>C</u>	<u>B</u>	<u>A</u>
Sales .....	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000
Cost of goods sold:				
Current cost .....	\$ 480,000	\$ 455,000	\$ 305,000	\$ 330,000
Beginning work in process .....	39,000	39,000	23,750	23,750
Ending work in process .....	(40,000)	(56,667)	(41,667)	(25,000)
Beginning finished goods.....	16,000	16,000	10,000	10,000
Ending finished goods.....	(20,000)	(28,333)	(20,833)	(12,500)
Cost of goods sold .....	\$ 475,000	\$ 425,000	\$ 276,250	\$ 326,250
Gross profit .....	\$ 525,000	\$ 575,000	\$ 723,750	\$ 673,750
Other costs (not included above) .....	240,000	240,000	390,000	390,000
Net income .....	\$ 285,000	\$ 335,000	\$ 333,750	\$ 283,750

A few days later, the controller was arrested for embezzlement. The president now asks the assistant controller to: (1) identify the method that was used to prepare each income statement, (2) compute the total current production cost at standard under each costing method, and (3) compute the fixed production cost.

**Required:** Prepare the answers requested by the president.

**SOLUTION**

*Note to instructor: This problem may be made more difficult by eliminating income statement B.*

(1)

<u>Income Statement</u>	<u>Costing Method Used</u>
D.....	Absorption (no allocation)
C.....	Absorption (with allocation)
B.....	Direct (with allocation)
A.....	Direct (no allocation)

(2)

The total current production cost at standard would equal the current cost (no allocation) less the unfavorable variance.

Absorption costing .....	\$ 480,000	Current cost in D
	- 25,000	
	<u>\$ 455,000</u>	
Direct costing .....	\$ 330,000	Current cost in A
	- 25,000	
	<u>\$ 305,000</u>	

(3)

The fixed production cost would be equal to the difference between the current cost under absorption costing and the current cost under direct costing when both methods use the same allocation method.

$$\$480,000 - \$330,000 = \$150,000 \text{ or}$$

$$\$455,000 - \$305,000 = \$150,000 \text{ or}$$

Use the difference in below-the-line costs:

$$\$390,000 - \$240,000 = \$150,000$$

### PROBLEM

3.

**Direct Costing Income Statements.** Pro-Am Products presents the following data from absorption costing income statements for the last two years:

	<u>19A</u>	<u>19B</u>
Sales.....	\$2,000,000	\$2,500,000
Cost of goods sold (at standard).....	800,000	950,000
Over- or underapplied overhead.....	25,000	(25,000)
Marketing and general expense .....	500,000	550,000
Operating income .....	675,000	1,050,000

**Required:** Prepare the direct costing income statements for each year, assuming that there were no changes in capacity between years and that the unit variable costs are constant. (*Hint:* Use the high- and low-points method to determine the fixed and variable portions of each cost element.)

### SOLUTION

	<u>19A</u>	<u>19B</u>
Sales .....	\$ 2,000,000	\$ 2,500,000
Variable cost of goods sold .....	\$ 400,000	\$ 500,000
Variable marketing and general expenses .....	<u>200,000</u>	<u>250,000</u>
Gross contribution margin.....	\$ 1,400,000	\$ 1,750,000
Fixed expenses:		
Manufacturing expenses .....	\$ 425,000	\$ 425,000
Marketing and general expenses.....	<u>300,000</u>	<u>300,000</u>
Total fixed expenses .....	<u>\$ 725,000</u>	<u>\$</u>
<u>725,000</u>		
Operating income .....	<u>\$ 675,000</u>	<u>\$ 1,025,000</u>

**Additional computations:**

Actual overhead:

19A (\$800,000 + \$25,000).....	\$ 825,000
19B (\$950,000 - \$25,000) .....	<u>925,000</u>
Difference .....	<u>\$ 100,000</u>

$$\text{Variable production cost} : \frac{\$925,000 - \$825,000}{\$2,500,000 - \$2,000,000} = 20\% \text{ of sales}$$

$$\begin{aligned} \text{Fixed production cost} &= \text{Total cost} - \text{Variable cost} \\ &= \$825,000 - (\$2,000,000 \times 20\%) \\ &= \$425,000 \end{aligned}$$

or

$$\$925,000 - (\$2,500,000 \times 20\%) = \$425,000$$

$$\text{Variable marketing and general expenses} : \frac{\$550,000 - \$500,000}{\$2,500,000 - \$2,000,000} = 10\% \text{ of sales}$$

$$\text{Fixed marketing and general expenses} : \$500,000 - (\$2,000,000 \times 10\%) = \$300,000$$

### PROBLEM

4.

**Absorption Costing Income Statement.** Fong Products Co. manufactures restaurant equipment. The direct costing income statement for last year is given below:

Sales.....	\$ 370,000
Less:	
Variable manufacturing cost.....	98,000
Variable marketing and general expenses .....	<u>64,000</u>
Contribution margin.....	\$ 208,000
Less:	
Fixed manufacturing cost .....	50,000
Fixed marketing and general expenses .....	<u>70,000</u>
Operating income .....	<u>\$ 88,000</u>

The variable and fixed costs in inventories for last year were:

	<u>Beginning Inventory</u>	<u>Ending Inventory</u>
<b>Work in process:</b>		
Variable cost.....	\$ 6,000	\$ 9,000
Fixed cost .....	<u>8,000</u>	<u>10,000</u>
Total.....	<u>\$ 14,000</u>	<u>\$ 19,000</u>
<b>Finished goods:</b>		
Variable cost.....	\$ 26,000	\$ 20,000
Fixed cost .....	<u>16,000</u>	<u>8,000</u>
Total.....	<u>\$ 42,000</u>	<u>\$ 28,000</u>

There were no cost variances.

**Required:** Prepare an absorption costing income statement for last year, including inventory details.



**SOLUTION**

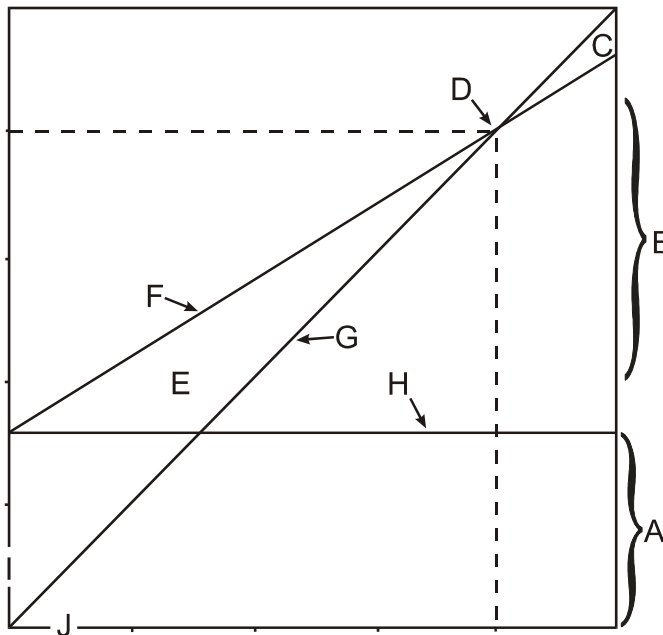
Sales.....		\$ 370,000
Cost of goods sold:		
Current manufacturing cost .....	\$ 148,000	
Add work in process—beginning inventory.....	<u>14,000</u>	
	\$ 162,000	
Less work in process—ending inventory .....	<u>19,000</u>	
Cost of goods manufactured .....	\$ 143,000	
Add finished goods—beginning inventory.....	<u>42,000</u>	
	\$ 185,000	
Less finished goods—ending inventory .....	<u>28,000</u>	
Cost of goods sold .....		<u>157,000</u>
Gross profit .....		\$ 213,000
Marketing and general expenses.....		<u>134,000</u>
Operating income .....		<u>\$ 79,000</u>

**PROBLEM**

5.

**Terminology on Break-Even Chart.** A traditional break-even chart is illustrated in Figure 20-2.

**Required:** Identify each letter on the chart, using the proper terminology.



**SOLUTION**

<u>Lettered Item in Break-Even Chart</u>	<u>Terminology</u>
A	Fixed cost area
B	Variable cost area
C	Profit area
D	Break-even point
E	Loss area
F	Total cost line
G	Sales line
H	Fixed cost line
I	y-axis
J	x-axis

**PROBLEM**

6.

**Contribution Margin; Break-Even Sales in Dollars.** The management of Ivory Coast Products Co. is presented with the following data:

Sales.....		\$ 500,000
Direct materials .....	\$ 60,000	
Direct labor .....	90,000	
Factory overhead.....	<u>100,000</u>	<u>250,000</u>
Gross profit .....		\$ 250,000
Marketing expenses .....	\$ 70,000	
General expenses .....	<u>100,000</u>	<u>170,000</u>
Net income .....		<u>\$ 80,000</u>

Fifty percent of factory overhead is fixed, while 40% of marketing expenses and all general expenses are fixed.

*Required:*

- (1) Compute the contribution margin ratio.
- (2) Compute the break-even point in sales dollars.
- (3) New factory equipment may be purchased that will not affect total costs at this sales level but will increase fixed factory overhead costs to 75% of factory overhead. Assuming that this purchase is made, show its effect by recomputing the answer to (1).
- (4) Assuming that the new factory equipment is purchased, show its effect by recomputing the answer to (2).

(Round all percentages to the nearest tenth of a percent and all dollar amounts to the nearest whole dollar.)

**SOLUTION**

(1)

$$\frac{\text{Sales} \quad \text{Variable costs}}{\text{Sales}} = \frac{\$500,000 \quad \$60,000 \quad \$90,000 \quad \$50,000 \quad \$42,000}{\$500,000}$$

$$= \frac{\$258,000}{\$500,000} = \underline{\underline{51.6\%}}$$

(2)

$$\frac{\text{Fixed costs}}{\text{C/M ratio}} = \frac{\$50,000 + \$28,000 + \$100,000}{.516} = \frac{\$178,000}{.516} = \underline{\underline{\$344,961}}$$

(3)

$$\frac{\text{Sales} \quad \text{Variable costs}}{\text{Sales}} = \frac{\$500,000 \quad \$60,000 \quad \$90,000 \quad \$25,000 \quad \$42,000}{\$500,000}$$

$$= \frac{\$283,000}{\$500,000} = \underline{\underline{56.6\%}}$$

(4)

$$\frac{\text{Fixed costs}}{\text{C/M ratio}} = \frac{\$75,000 + \$28,000 + \$100,000}{.566} = \frac{\$203,000}{.566} = \underline{\underline{\$358,657}}$$

**PROBLEM**

7.

**Expected Profits; Break-Even Point in Units; Margin of Safety; Effect of an Increase in Sales.** Panko's Pickles Inc. estimates sales of 500,000 units at \$5 per unit. Variable costs generally equal \$1 per unit. Fixed expenses for this planned sales level would equal \$2 per unit.

**Required:** Compute the following (round all answers to the nearest whole number):

- (1) Estimated profit for the planned level of sales
- (2) Break-even point in units and dollars
- (3) Margin of safety ratio (M/S)
- (4) Increase in profit that would result from a 10% increase in sales
- (5) Profit as a percentage of the planned level of sales

**SOLUTION**

(1)

**500,000 units x Unit profit = 500,000 x (\$5 - \$2 - \$1) = \$1,000,000 Estimated profit**

$$\frac{\text{Total fixed expenses}}{\text{Contribution margin per unit}} = \frac{500,000 \text{ units} \times \$2}{\$5 - \$1} = \frac{\$1,000,000}{\$4}$$

$$= 250,000 \text{ Breakeven point in units}$$

$$250,000 \times \$5 = \$1,250,000 \text{ Break-even point in dollars}$$

(2)

$$\frac{\text{Planned sales} - \text{Breakeven sales}}{\text{Planned sales}} = \frac{\$2,500,000 - \$1,250,000}{\$2,500,000}$$

$$= 50\% \text{ Margin of safety (M/S) ratio}$$

(3)

(4)

**Contribution margin per unit x Unit increase = \$4 x (500,000 x 10%) = \$200,000**

(5)

**Profit = C/M ratio x M/S ratio = 80% x 50% = 40%**

**PROBLEM**

8.

**Break-Even Point in Dollars; Direct Costing Statement; Net Income as a Percentage of Last Year's Net Income.**  
**Mordeci Manufacturing Co. shows the following comparative income statement data for the last two years:**

	<u>19A</u>	<u>19B</u>
Sales (in units).....	15,000	20,000
Sales.....	\$ 300,000	\$ 400,000
Cost of goods sold:		
Materials.....	\$ 150,000	\$ 200,000
Labor.....	75,000	100,000
Overhead.....	30,000	35,000
Total.....	\$ 255,000	\$ 335,000
Gross profit .....	\$ 45,000	\$ 65,000
Other expenses.....	30,000	40,000
Net income .....	\$ 15,000	\$ 25,000

**Required:**

- (1) Compute the 19B net income as a percentage of 19A net income.
  - (2) Prepare a direct costing income statement for 19A and 19B. (*Hint:* Use the high- and low-points method to determine the fixed and variable portions of each cost element.)
  - (3) Compute the break-even point in dollars as determined from the above data.
- (Round all answers to the nearest whole number.)

**SOLUTION**

$$\frac{\$25,000}{\$15,000} = 167\%$$

(1)

(2)

	<u>19A</u>	<u>19B</u>
Sales.....	\$ 300,000	\$ 400,000
Less variable expenses:		
Materials .....	\$ 150,000	\$ 200,000
Labor .....	75,000	100,000
Overhead (5% of sales) <sup>1</sup> .....	15,000	20,000
Other variable (10% of sales) <sup>2</sup> .....	30,000	40,000
Total .....	<u>\$ 270,000</u>	<u>\$ 360,000</u>
Contribution margin .....	\$ 30,000	\$ 40,000
Less fixed expenses:		
Overhead <sup>3</sup> .....	15,000	15,000
Net income .....	<u>\$ 15,000</u>	<u>\$ 25,000</u>

Additional computations:

$$^1 \text{Variable overhead} = \frac{\text{Change in overhead}}{\text{Change in sales}}$$

$$= \frac{\$35,000 - \$30,000}{\$400,000 - \$300,000} = \frac{\$5,000}{\$100,000} = 5\%$$

$$^2 \text{Other variable expenses} = \frac{\text{Change in other expenses}}{\text{Change in sales}}$$

$$= \frac{\$40,000 - \$30,000}{\$400,000 - \$300,000} = \frac{\$10,000}{\$100,000} = 10\%$$

<sup>3</sup>\$30,000 - \$15,000 or \$35,000 - \$20,000

(3)

$$\frac{\text{Fixed expenses}}{\text{Contribution margin (C/M) ratio}} = \frac{\$15,000}{\$40,000 \div \$400,000}$$

or

$$\frac{\$15,000}{\$30,000 \div \$300,000}$$

$$= \frac{\$15,000}{.10} = \$150,000 \text{ Breakeven point}$$



**PROBLEM**

9.

**Break-Even Point in Units and Dollars.** Professional Products Inc. manufactures two products—Type A and Type B. Relevant budgeted sales and cost data for the coming year are:

<u>Product</u>	<u>Unit Sales</u>	<u>Unit Price</u>	<u>Variable Expenses per Unit</u>
Type A.....	100,000	\$15	\$6
Type B.....	150,000	10	7

The fixed costs for the company amounted to \$1,000,000.

*Required:* Compute the break-even point in units and in dollars for Type A and Type B.

**SOLUTION**

$$\frac{\text{Type B } 150,000}{\text{Type A } 100,000} = 1.5 \text{ or } 3:2$$

$$\begin{aligned} \text{Contribution margin per hypothetical package} &= [2 \times (\$15 - \$6)] + [3 \times (\$10 - \$7)] \\ &= \$18 + \$9 \\ &= \$27 \end{aligned}$$

$$\frac{\text{Total fixed costs}}{\text{Contribution margin per hypothetical package}} = \frac{\$1,000,000}{\$27}$$

$$= 37,037 \text{ breakeven point in } \\ \text{hypothetical package}$$

<u>Product</u>		<u>Break-Even Point</u>
Type A.....	37,037 x 2 = 74,074 units;	74,074 @ \$15 = \$1,111,110
Type B.....	37,037 x 3 = 111,111 units;	111,111 @ \$10 = \$1,111,110