Chapter 6

Variable Costing and Segment Reporting:   
Tools for Management

Solutions to Questions

**6-1** Absorption and variable costing differ in how they handle fixed manufacturing overhead. Under absorption costing, fixed manufacturing overhead is treated as a product cost and hence is an asset until products are sold. Under variable costing, fixed manufacturing overhead is treated as a period cost and is immediately expensed on the income statement.

**6-2** Selling and administrative expenses are treated as period costs under both variable costing and absorption costing.

**6-3** Under absorption costing, fixed manufacturing overhead costs are included in product costs, along with direct materials, direct labor, and variable manufacturing overhead. If some of the units are not sold by the end of the period, then they are carried into the next period as inventory. When the units are finally sold, the fixed manufacturing overhead cost that has been carried over with the units is included as part of that period’s cost of goods sold.

**6-4** Absorption costing advocates argue that absorption costing does a better job of matching costs with revenues than variable costing. They argue that all manufacturing costs must be assigned to products to properly match the costs of producing units of product with the revenues from the units when they are sold. They believe that no distinction should be made between variable and fixed manufacturing costs for the purposes of matching costs and revenues.

**6-5** Advocates of variable costing argue that fixed manufacturing costs are not really the cost of any particular unit of product. If a unit is made or not, the total fixed manufacturing costs will be exactly the same. Therefore, how can one say that these costs are part of the costs of the products? These costs are incurred to have the capacity to make products during a particular period and should be charged against that period as period costs according to the matching principle.

**6-6** If production and sales are equal, net operating income should be the same under absorption and variable costing. When production equals sales, inventories do not increase or decrease and therefore under absorption costing fixed manufacturing overhead cost cannot be deferred in inventory or released from inventory.

**6-7** If production exceeds sales, absorption costing will usually show higher net operating income than variable costing. When production exceeds sales, inventories increase and under absorption costing part of the fixed manufacturing overhead cost of the current period is deferred in inventory to the next period. In contrast, all of the fixed manufacturing overhead cost of the current period is immediately expensed under variable costing.

**6-8** If fixed manufacturing overhead cost is released from inventory, then inventory levels must have decreased and therefore production must have been less than sales.

**6-9** Under absorption costing net operating income can be increased by simply increasing the level of production without any increase in sales. If production exceeds sales, units of product are added to inventory. These units carry a portion of the current period’s fixed manufacturing overhead costs into the inventory account, reducing the current period’s reported expenses and causing net operating income to increase.

**6-10** Differences in reported net operating income between absorption and variable costing arise because of changing levels of inventory. In lean production, goods are produced strictly to customers’ orders. With production tied to sales, inventories are largely (or entirely) eliminated. If inventories are completely eliminated, they cannot change from one period to another and absorption costing and variable costing will report the same net operating income.

**6-11** A segment is any part or activity of an organization about which a manager seeks cost, revenue, or profit data. Examples of segments include departments, operations, sales territories, divisions, and product lines.

**6-12** Under the contribution approach, costs are assigned to a segment if and only if the costs are traceable to the segment (i.e., could be avoided if the segment were eliminated). Common costs are not allocated to segments under the contribution approach.

**6-13** A traceable cost of a segment is a cost that arises specifically because of the existence of that segment. If the segment were eliminated, the cost would disappear. A common cost, by contrast, is a cost that supports more than one segment, but is not traceable in whole or in part to any one of the segments. If the departments of a company are treated as segments, then examples of the traceable costs of a department would include the salary of the department’s supervisor, depreciation of machines used exclusively by the department, and the costs of supplies used by the department. Examples of common costs would include the salary of the general counsel of the entire company, the lease cost of the headquarters building, corporate image advertising, and periodic depreciation of machines shared by several departments.

**6-14** The contribution margin is the difference between sales revenue and variable expenses. The segment margin is the amount remaining after deducting traceable fixed expenses from the contribution margin. The contribution margin is useful as a planning tool for many decisions, particularly those in which fixed costs don’t change. The segment margin is useful in assessing the overall profitability of a segment.

**6-15** If common costs were allocated to segments, then the costs of segments would be overstated and their margins would be understated. As a consequence, some segments may appear to be unprofitable and managers may be tempted to eliminate them. If a segment were eliminated because of the existence of arbitrarily allocated common costs, the overall profit of the company would decline and the common cost that had been allocated to the segment would be reallocated to the remaining segments—making them appear less profitable.

**6-16** There are often limits to how far down an organization a cost can be traced. Therefore, costs that are traceable to a segment may become common as that segment is divided into smaller segment units. For example, the costs of national TV and print advertising might be traceable to a specific product line, but be a common cost of the geographic sales territories in which that product line is sold.

**6-17** No, a company should not allocate its common fixed expenses to business segments. These costs are not traceable to individual segments and will not be affected by segment-level decisions.

**The Foundational 15**

1. and 2.

The unit product costs under variable costing and absorption costing are computed as follows:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Variable Costing | Absorption Costing | |
| Direct materials | $24 | $24 |
| Direct labor | 14 | 14 |
| Variable manufacturing overhead | 2 | 2 |
| Fixed manufacturing overhead  ($800,000 ÷ 40,000 units) | — | 20 |
| Unit product cost | $40 | $60 |

3. and 4.

The total contribution margin and net operating income under variable costing are computed as follows:

|  |  |  |
| --- | --- | --- |
| Sales |  | $2,800,000 |
| Variable expenses: |  |  |
| Variable cost of goods sold |  |  |
| (35,000 units × $40 per unit) | $1,400,000 |  |
| Variable selling and administrative  (35,000 units × $4 per unit) | 140,000 | 1,540,000 |
| Contribution margin |  | 1,260,000 |
| Fixed expenses: |  |  |
| Fixed manufacturing overhead | 800,000 |  |
| Fixed selling and administrative | 496,000 | 1,296,000 |
| Net operating loss |  | $   (36,000) | |

**The Foundational 15** (continued)

5. and 6.

The total gross margin and net operating income under absorption costing are computed as follows:

|  |  |
| --- | --- |
| Sales (35,000 units × $80 per unit) | $2,800,000 |
| Cost of goods sold (35,000 units × $60 per unit) | 2,100,000 |
| Gross margin | 700,000 |
| Selling and administrative expenses  [(35,000 units × $4 per unit) + $496,000] | 636,000 |
| Net operating income | $    64,000 |

7. The difference between the absorption and variable costing net operating incomes is explained as follows:

Manufacturing overhead deferred in (released from) inventory = Fixed manufacturing overhead in ending inventory – Fixed manufacturing overhead in beginning inventory = ($20 per unit × 5,000 units) − $0   
= $100,000

|  |  |
| --- | --- |
| Variable costing net operating loss | $(36,000) |
| Add fixed manufacturing overhead cost deferred in inventory under absorption costing\* | 100,000 |
| Absorption costing net operating income | $ 64,000 |

8. The break-even point in units is computed as follows:

|  |  |
| --- | --- |
| Profit | = Unit CM × Q − Fixed expenses |
| $0 | = ($80 − $44) × Q − $1,296,000 |
| $0 | = ($36) × Q − $1,296,000 |
| $36Q | = $1,296,000 |
| Q | = $1,296,000 ÷ $36 |
| Q | = 36,000 units |

The break-even point is above the actual sales volume; however, in question 6, the absorption costing net operating income is $64,000. This counter-intuitive result emerges because $100,000 of fixed manufacturing overhead is deferred in inventory under absorption costing.

**The Foundational 15** (continued)

9. The breakeven point of 36,000 units would remain the same. This occurs because the contribution margin per unit is the same regardless of whether a unit is sold in the East or West region. The total fixed cost also remains unchanged so the break-even point stays at 36,000 units.

10. and 11.

The variable costing net operating income would be the same as the answer to question 4 as shown below:

|  |  |  |
| --- | --- | --- |
| Sales |  | $2,800,000 |
| Variable expenses: |  |  |
| Variable cost of goods sold |  |  |
| (35,000 units × $40 per unit) | $1,400,000 |  |
| Variable selling and administrative  (35,000 units × $4 per unit) | 140,000 | 1,540,000 |
| Contribution margin |  | 1,260,000 |
| Fixed expenses: |  |  |
| Fixed manufacturing overhead | 800,000 |  |
| Fixed selling and administrative | 496,000 | 1,296,000 |
| Net operating loss |  | $  (36,000) | |

When the number of units produced equals the number of units sold, absorption costing net operating income equals the variable costing net operating income. Therefore, the answer to question 11 is that the absorption costing net operating loss would be $36,000.

12. Absorption costing income will be lower than variable costing income. The variable costing income statement will only include the fixed manufacturing overhead costs incurred during the second year of operations, whereas the absorption costing cost of goods sold will include all of the fixed manufacturing overhead costs incurred during the second year of operations plus some of the fixed manufacturing overhead costs that were deferred in inventory at the end of the prior year.

**The Foundational 15** (continued)

13. The segment margins for the East and West regions are computed as follows:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | *Total*  *Company* | | | *East* | | *West* |
| Sales\* | | $2,800,000 | | | $2,000,000 | | | $800,000 |
| Variable expenses\*\* | | 1,540,000 | | | 1,100,000 | | | 440,000 |
| Contribution margin | | 1,260,000 | | | 900,000 | | | 360,000 |
| Traceable fixed expenses | | 400,000 | | | 150,000 | | | 250,000 |
| Region segment margin | | 860,000 | | | $ 750,000 | | | $110,000 |
| Common fixed expenses not traceable to regions ($800,000 + $96,000) | | 896,000 | | |  | | |  |
| Net operating loss | | | $ (36,000) | | |  | |  |
|  | | | | | |  | | |  |  |
| \*  \*\* | | East: 25,000 packs × $80 per pack = $2,000,000;  West: 10,000 packs × $80 per pack= $800,000.  East: 25,000 packs × $44 per pack = $1,100,000;  West: 10,000 packs × $44 per pack= $440,000. | | | | | | | | |

14. Diego has apparently determined that the total *gross margin* in the West region equals $200,000. As computed in requirement 1, the unit product cost under absorption costing is $60; therefore the gross margin per unit is $20 ($80 – $60). The West region’s total gross margin of $200,000 (10,000 units × $20 per unit) is less than its traceable fixed expenses of $250,000. This mode of analysis creates the illusion that the West region should be discontinued.

The correct way to answer this question is to focus on the information in the contribution format segmented income statements as follows:

|  |  |
| --- | --- |
| Forgone segment margin in the West region | $(110,000) |
| Additional contribution margin in East region\* | 45,000 |
| Decrease in profits if the West region is dropped | $  (65,000) |

\* $900,000 × 5% = $45,000.

**The Foundational 15** (continued)

15. The profit impact is computed as follows:

|  |  |
| --- | --- |
| Additional advertising | $(30,000) |
| Additional contribution margin in the West region\* | 72,000 |
| Increase in profits | $  42,000 |

\* $360,000 × 20% = $72,000.

**Exercise 6-1** (15 minutes)

1. Under absorption costing, all manufacturing costs (variable and fixed) are included in product costs.

|  |  |  |
| --- | --- | --- |
|  | Direct materials | $100 |
|  | Direct labor | 320 |
|  | Variable manufacturing overhead | 40 |
|  | Fixed manufacturing overhead ($60,000 ÷ 250 units) | 240 |
|  | Absorption costing unit product cost | $700 |

2. Under variable costing, only the variable manufacturing costs are included in product costs.

|  |  |  |
| --- | --- | --- |
|  | Direct materials | $100 |
|  | Direct labor | 320 |
|  | Variable manufacturing overhead | 40 |
|  | Variable costing unit product cost | $460 |

Note that selling and administrative expenses are not treated as product costs under either absorption or variable costing. These expenses are always treated as period costs and are charged against the current period’s revenue.

**Exercise 6-2** (20 minutes)

1. 25 units in ending inventory × $240 per unit fixed manufacturing overhead per unit = $6,000

2. The variable costing income statement appears below:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Sales |  | $191,250 |
|  | Variable expenses: |  |  |
|  | Variable cost of goods sold  (225 units sold × $460 per unit) | $103,500 |  |
|  | Variable selling and administrative expenses (225 units × $20 per unit) | 4,500 | 108,000 |
|  | Contribution margin |  | 83,250 |
|  | Fixed expenses: |  |  |
|  | Fixed manufacturing overhead | 60,000 |  |
|  | Fixed selling and administrative expenses | 20,000 | 80,000 |
|  | Net operating income |  | $   3,250 |

The difference in net operating income between variable and absorption costing can be explained by the deferral of fixed manufacturing overhead cost in inventory that has taken place under the absorption costing approach. Note from part (1) that $6,000 of fixed manufacturing overhead cost has been deferred in inventory to the next period. Thus, net operating income under the absorption costing approach is $6,000 higher than it is under variable costing.

**Exercise 6-3** (20 minutes)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. |  | *Year 1* | *Year 2* | *Year 3* |
|  | Beginning inventories | 200 | 170 | 180 |
|  | Ending inventories | 170 | 180 | 220 |
|  | Change in inventories | (30) | 10 | 40 |
|  |  |  |  |  |
|  | Fixed manufacturing overhead in beginning inventories (@$560 per unit) | $112,000 | $ 95,200 | $100,800 |
|  | Fixed manufacturing overhead in ending inventories (@$560 per unit) | 95,200 | 100,800 | 123,200 |
|  | Fixed manufacturing overhead deferred in (released from) inventories (@$560 per unit) | $ (16,800) | $  5,600 | $ 22,400 |
|  |  |  |  |  |
|  | Variable costing net operating income | $1,080,400 | $1,032,400 | $  996,400 |
|  | Add (deduct) fixed manufacturing overhead cost deferred in (released from) inventory under absorption costing | (16,800) | 5,600 | 22,400 |
|  | Absorption costing net operating income | $1,063,600 | $1,038,000 | $1,018,800 |

2. Because absorption costing net operating income was greater than variable costing net operating income in Year 4, inventories must have increased during the year and, hence, fixed manufacturing overhead was deferred in inventories. The amount of the deferral is the difference between the two net operating incomes, or $28,000 = $1,012,400 – $984,400.

**Exercise 6-4** (10 minutes)

|  |  |  |  |
| --- | --- | --- | --- |
|  | *Total*  *Company* | *Weedban* | *Greengrow* |
| Sales\* | $300,000 | $90,000 | $210,000 |
| Variable expenses\*\* | 183,000 | 36,000 | 147,000 |
| Contribution margin | 117,000 | 54,000 | 63,000 |
| Traceable fixed expenses | 66,000 | 45,000 | 21,000 |
| Product line segment margin | 51,000 | $ 9,000 | $ 42,000 |
| Common fixed expenses not traceable to products | 33,000 |  |  |
| Net operating income | $ 18,000 |  |  |

|  |  |
| --- | --- |
| \* | Weedban: 15,000 units × $6.00 per unit = $90,000. Greengrow: 28,000 units × $7.50 per unit = $210,000. |
| \*\* | Weedban: 15,000 units × $2.40 per unit = $36,000. Greengrow: 28,000 units × $5.25 per unit = $147,000. |

**Exercise 6-5** (10 minutes)

1. The companywide break-even point is computed as follows:

|  |  |  |
| --- | --- | --- |
| Dollar sales for company to break even | = | Traceable fixed expenses + Common fixed expenses  Overall CM ratio |
|  |  |  |
|  | = | $120,000 + $50,000  0.40 |
|  |  |  |
|  | = | $170,000  0.40 |
|  |  |  |
|  | = | $425,000 |

2. The break-even point for the North region is computed as follows:

|  |  |  |
| --- | --- | --- |
| Dollar sales for a segment to break even | = | Segment traceable fixed expenses  Segment CM ratio |
|  |  |  |
|  | = | $60,000  0.30 |
|  |  |  |
|  | = | $200,000 |

**Exercise 6-5** (continued)

3. The break-even point for the South region is computed as follows:

|  |  |  |
| --- | --- | --- |
| Dollar sales for a segment to break even | = | Segment traceable fixed expenses  Segment CM ratio |
|  |  |  |
|  | = | $60,000  0.60 |
|  |  |  |
|  | = | $100,000 |

**Exercise 6-6** (30 minutes)

1. a. The unit product cost under absorption costing would be:

|  |  |  |
| --- | --- | --- |
|  | Direct materials | $  6 |
|  | Direct labor | 9 |
|  | Variable manufacturing overhead | 3 |
|  | Total variable costs | 18 |
|  | Fixed manufacturing overhead ($300,000 ÷ 25,000 units) | 12 |
|  | Absorption costing unit product cost | $30 |

b. The absorption costing income statement:

|  |  |  |
| --- | --- | --- |
|  | Sales (20,000 units × $50 per unit) | $1,000,000 |
|  | Cost of goods sold (20,000 units × $30 per unit) | 600,000 |
|  | Gross margin | 400,000 |
|  | Selling and administrative expenses [(20,000 units × $4 per unit) + $190,000] | 270,000 |
|  | Net operating income | $  130,000 |

2. a. The unit product cost under variable costing would be:

|  |  |  |
| --- | --- | --- |
|  | Direct materials | $  6 |
|  | Direct labor | 9 |
|  | Variable manufacturing overhead | 3 |
|  | Variable costing unit product cost | $18 |

b. The variable costing income statement:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Sales (20,000 units × $50 per unit) |  | $1,000,000 |
|  | Variable expenses: |  |  |
|  | Variable cost of goods sold  (20,000 units × $18 per unit) | $360,000 |  |
|  | Variable selling expense  (20,000 units × $4 per unit) | 80,000 | 440,000 |
|  | Contribution margin |  | 560,000 |
|  | Fixed expenses: |  |  |
|  | Fixed manufacturing overhead | 300,000 |  |
|  | Fixed selling and administrative expense | 190,000 | 490,000 |
|  | Net operating income |  | $   70,000 |

**Exercise 6-7** (10 minutes)

The completed segmented income statement should appear as follows:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | |  | Divisions | | | | | | |
|  | Total Company | |  | North | |  | South | | | |
|  | Amount | % |  | Amount | % |  | | Amount | % | |
| Sales | $500,000 | 100.0 |  | $300,000 | 100.0 |  | | $200,000 | 100.0 | |
| Variable expenses | 270,000 | 54.0 |  | 150,000 | 50.0 |  | | 120,000 | 60.0 | |
| Contribution margin | 230,000 | 46.0 |  | 150,000 | 50.0 |  | | 80,000 | 40.0 | |
| Traceable fixed expenses | 130,000 | 26.0 |  | 80,000 | 26.7 |  | | 50,000 | 25.0 | |
| Territorial segment margin | 100,000 | 20.0 |  | $ 70,000 | 23.3 |  | | $30,000 | 15.0 | |
| Common fixed expenses | 90,000 | 18.0 |  |  |  |  |  | | |  |
| Net operating income | $ 10,000 | 2.0 |  |  |  |  |  | | |  |

**Exercise 6-8** (10 minutes)

Sales were above the company’s break-even sales and yet the company sustained a loss. The apparent contradiction is explained by the fact that the CVP analysis is based on variable costing, whereas the income reported to shareholders is prepared using absorption costing. Because sales were above the break-even point, the variable costing net operating income would have been positive. However, the absorption costing net operating income was negative. Ordinarily, this would only happen if inventories decreased and fixed manufacturing overhead deferred in inventories was released to the income statement on the absorption costing income statement. This added fixed manufacturing overhead cost resulted in a loss on an absorption costing basis even though the company operated at its break-even point on a variable costing basis.

**Exercise 6-9** (30 minutes)

1 a. Under variable costing, only the variable manufacturing costs are included in product costs.

|  |  |  |
| --- | --- | --- |
|  | *Year 1* | *Year 2* |
| Direct materials | $25 | $25 |
| Direct labor | 15 | 15 |
| Variable manufacturing overhead | 5 | 5 |
| Variable costing unit product cost | $45 | $45 |
|  |  |  |

Note that selling and administrative expenses are not treated as product costs; that is, they are not included in the costs that are inventoried. These expenses are always treated as period costs.

1 b.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Year 1 | | Year 2 | |
| Sales | $2,400,000 | | | $3,000,000 |
| Variable expenses: |  | | |  |
| Variable cost of goods sold @ $45 per unit | 1,800,000 | | | 2,250,000 |
| Variable selling and administrative @ $2 per unit | 80,000 | | | 100,000 |
| Total variable expenses | 1,880,000 | | | 2,350,000 |
| Contribution margin | 520,000 | | | 650,000 |
| Fixed expenses: |  | | |  |
| Fixed manufacturing overhead | 250,000 | | | 250,000 |
| Fixed selling and administrative | 80,000 | | | 80,000 |
| Total fixed expenses | 330,000 | | | 330,000 |
| Net operating income (loss) | $  190,000 | $   320,000 | | | |
|  |  |  | | | |

2 a. The unit product costs under absorption costing:

|  |  |  |  |
| --- | --- | --- | --- |
|  | *Year 1* | | *Year 2* |
| Direct materials | $25 | | $25.00 | |
| Direct labor | 15 | | 15.00 | |
| Variable manufacturing overhead | 5 | | 5.00 | |
| Fixed manufacturing overhead | \*5 | | \*\*6.25 | |
| Absorption costing unit product cost | $50 | | $51.25 | |
|  |  | |  |
| \* $250,000 ÷ 50,000 units = $5 per unit. | |  |  |  |
| \*\* $250,000 ÷ 40,000 units = $6.25 per unit. | | | |  |

**Exercise 6-9** (continued)

2 b. The absorption costing income statements appears below:

|  |  |  |
| --- | --- | --- |
|  | *Year 1* | *Year 2* |
| Sales | $2,400,000 | $3,000,000 | |
| Cost of goods sold | \*2,000,000 | \*\*2,550,000 | |
| Gross margin | 400,000 | 450,000 | |
| Selling and administrative expenses | 160,000 | 180,000 | |
| Net operating income | $  240,000 | $  270,000 | |
|  |  |  | |
| \* 40,000 units × $50 per unit = $2,000,000 | | | |
| \*\* (40,000 units × $51.25 per unit) + (10,000 units × $50 per unit) = $2,550,000 | | | |

3. The net operating incomes are reconciled as follows:

|  |  |  |
| --- | --- | --- |
|  | *Year 1* | *Year 2* |
| Units in beginning inventory | 0 | 10,000 |
| + Units produced | 50,000 | 40,000 |
| − Units sold | 40,000 | 50,000 |
| = Units in ending inventory | 10,000 | 0 |

|  |  |  |
| --- | --- | --- |
|  | *Year 1* | *Year 2* |
| Fixed manufacturing overhead in ending inventory (10,000 units × $5 per unit) | $50,000 | $         0 |
| − Fixed manufacturing overhead in beginning inventory (10,000 units × $5 per unit) |  | 50,000 |
| = Manufacturing overhead deferred in (released from) inventory | $50,000 | $(50,000) |

|  |  |  |
| --- | --- | --- |
|  | *Year 1* | *Year 2* |
| Variable costing net operating income | $190,000 | $320,000 |
| Add: Fixed manufacturing overhead cost deferred in inventory under absorption costing | 50,000 |  |
| Deduct: Fixed manufacturing overhead cost released from inventory under absorption costing |  | (50,000) |
| Absorption costing net operating income | $240,000 | $270,000 |

**Exercise 6-10** (20 minutes)

1. The companywide break-even point is computed as follows:

|  |  |  |
| --- | --- | --- |
| Dollar sales for company to break even | = | Traceable fixed expenses + Common fixed expenses  Overall CM ratio |
|  |  |  |
|  | = | $141,000 + $59,000  0.25 |
|  |  |  |
|  | = | $200,000  0.25 |
|  |  |  |
|  | = | $800,000 |

2. The break-even point for the East region is computed as follows:

|  |  |  |
| --- | --- | --- |
| Dollar sales for a segment to break even | = | Segment traceable fixed expenses  Segment CM ratio |
|  |  |  |
|  | = | $50,000  0.20 |
|  |  |  |
|  | = | $250,000 |

**Exercise 6-10** (continued)

3. The break-even point for the West region is computed as follows:

|  |  |  |
| --- | --- | --- |
| Dollar sales for a segment to break even | = | Segment traceable fixed expenses  Segment CM ratio |
|  |  |  |
|  | = | $91,000  0.35 |
|  |  |  |
|  | = | $260,000 |

4. The new segmented income statement is computed as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *Total*  *Company* | | *East* | *West* |
| Sales | $510,000 | $250,000 | | $260,000 |
| Variable expenses\* | 369,000 | 200,000 | | 169,000 |
| Contribution margin\*\* | 141,000 | 50,000 | | 91,000 |
| Traceable fixed expenses | 141,000 | 50,000 | | 91,000 |
| Product line segment margin | 0 | $      0 | | $      0 |
| Common fixed expenses not traceable to products | 59,000 |  | |  |
| Net operating loss | $(59,000) | |  |  |

|  |  |
| --- | --- |
| \* | East: $250,000 × 0.80 variable expense ratio = $200,000. West: $260,000 units × 0.65 variable expense ratio = $169,000. |
| \*\* | East: $250,000 × 0.20 CM ratio = $50,000. West: $260,000 units × 0.35 CM ratio = $91,000. |

5. No, a company should not allocate its common fixed expenses to business segments. These costs are not traceable to individual segments and will not be affected by segment-level decisions.

**Exercise 6-11** (20 minutes)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. |  | *Division* | | |
|  | *Total Company* | *East* | *Central* | *West* |
| Sales | $1,000,000 | $250,000 | $400,000 | $350,000 |
| Variable expenses | 390,000 | 130,000 | 120,000 | 140,000 |
| Contribution margin | 610,000 | 120,000 | 280,000 | 210,000 |
| Traceable fixed expenses | 535,000 | 160,000 | 200,000 | 175,000 |
| Divisional segment margin | 75,000 | $(40,000) | $ 80,000 | $ 35,000 |
| Common fixed expenses not traceable to divisions\* | 90,000 |  |  |  |
| Net operating loss | $ (15,000) |  |  |  |

\*$625,000 – $535,000 = $90,000.

|  |  |  |
| --- | --- | --- |
| 2. | Incremental sales ($350,000 × 20%) | $70,000 |
|  | Contribution margin ratio ($210,000 ÷ $350,000) | × 60% |
|  | Incremental contribution margin | $42,000 |
|  | Less incremental advertising expense | 15,000 |
|  | Incremental net operating income | $27,000 |

Yes, the advertising program should be initiated.

**Exercise 6-12** (20 minutes)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. | Sales (35,000 units × $25 per unit) |  |  | $875,000 |
|  | Variable expenses: |  |  |  |
|  | Variable cost of goods sold  (35,000 units × $12 per unit\*) | $420,000 |  |  |
|  | Variable selling and administrative expenses  (35,000 units × $2 per unit) | 70,000 |  | 490,000 |
|  | Contribution margin |  |  | 385,000 |
|  | Fixed expenses: |  |  |  |
|  | Fixed manufacturing overhead | 160,000 |  |  |
|  | Fixed selling and administrative expenses | 210,000 |  | 370,000 |
|  | Net operating income |  |  | $  15,000 |

|  |  |  |
| --- | --- | --- |
| \* | Direct materials | $ 5 |
|  | Direct labor | 6 |
|  | Variable manufacturing overhead | 1 |
|  | Total variable manufacturing cost | $12 |

2. The difference in net operating income can be explained by the $20,000 in fixed manufacturing overhead deferred in inventory under the absorption costing method:

Units in ending inventory = Units in beginning inventory + Units produced – Units sold = 0 units + 40,000 units – 35,000 units   
= 5,000 units

Manufacturing overhead deferred in (released from) inventory = Fixed manufacturing overhead in ending inventory – Fixed manufacturing overhead in beginning inventory = (5,000 units × $4 per unit) – $0   
= $20,000

|  |  |  |
| --- | --- | --- |
|  | Variable costing net operating income | $15,000 |
|  | Add fixed manufacturing overhead cost deferred in inventory under absorption costing | 20,000 |
|  | Absorption costing net operating income | $35,000 |

**Exercise 6-13** (20 minutes)

1. The company is using variable costing. The computations are:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Variable Costing | Absorption Costing |
|  | Direct materials | $  9 | $  9 |
|  | Direct labor | 10 | 10 |
|  | Variable manufacturing overhead | 5 | 5 |
|  | Fixed manufacturing overhead  ($150,000 ÷ 25,000 units) | — | 6 |
|  | Unit product cost | $24 | $30 |
|  | Total cost, 3,000 units | $72,000 | $90,000 |

2. a. No, $72,000 is not the correct figure to use because variable costing is not generally accepted for external reporting purposes or for tax purposes.

b. The Finished Goods inventory account should be stated at $90,000, which represents the absorption cost of the 3,000 unsold units. Thus, the account should be increased by $18,000 for external reporting purposes. This $18,000 consists of the amount of fixed manufacturing overhead cost that is allocated to the 3,000 unsold units under absorption costing (3,000 units × $6 per unit fixed manufacturing overhead cost = $18,000).

**Exercise 6-14** (30 minutes)

1. Under variable costing, only the variable manufacturing costs are included in product costs.

|  |  |  |
| --- | --- | --- |
|  | Direct materials | $ 50 |
|  | Direct labor | 80 |
|  | Variable manufacturing overhead | 20 |
|  | Variable costing unit product cost | $150 |

Note that selling and administrative expenses are not treated as product costs; that is, they are not included in the costs that are inventoried. These expenses are always treated as period costs.

2. The variable costing income statement appears below:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Sales |  | $3,990,000 |
|  | Variable expenses: |  |  |
|  | Variable cost of goods sold (19,000 units × $150 per unit) | $2,850,000 |  |
|  | Variable selling and administrative expenses (19,000 units × $10 per unit) | 190,000 | 3,040,000 |
|  | Contribution margin |  | 950,000 |
|  | Fixed expenses: |  |  |
|  | Fixed manufacturing overhead | 700,000 |  |
|  | Fixed selling and administrative expenses | 285,000 | 985,000 |
|  | Net operating loss |  | $  (35,000) |

3. The break-even point in units sold can be computed using the contribution margin per unit as follows:

|  |  |
| --- | --- |
| Selling price per unit | $210 |
| Variable cost per unit | 160 |
| Contribution margin per unit | $ 50 |



**Exercise 6-15** (20 minutes)

1. Under absorption costing, all manufacturing costs (variable and fixed) are included in product costs.

|  |  |  |
| --- | --- | --- |
|  | Direct materials | $ 50 |
|  | Direct labor | 80 |
|  | Variable manufacturing overhead | 20 |
|  | Fixed manufacturing overhead  ($700,000 ÷ 20,000 units) | 35 |
|  | Absorption costing unit product cost | $185 |

2. The absorption costing income statement appears below:

|  |  |  |
| --- | --- | --- |
|  | Sales (19,000 units × $210 per unit) | $3,990,000 |
|  | Cost of goods sold (19,000 units × $185 per unit) | 3,515,000 |
|  | Gross margin | 475,000 |
|  | Selling and administrative expenses  ($285,000 + 19,000 units × $10 per unit) | 475,000 |
|  | Net operating income | $       0 |

Note: The company has a zero net operating income even though its sales are below the break-even point computed in Exercise 6-14. This occurs because $35,000 of fixed manufacturing overhead has been deferred in inventory and does not appear on the income statement prepared using absorption costing.

**Exercise 6-16** (20 minutes)

1. The companywide break-even point is computed as follows:

|  |  |  |
| --- | --- | --- |
| Dollar sales for company to break even | = | Traceable fixed expenses + Common fixed expenses  Overall CM ratio |
|  |  |  |
|  | = | $126,000 + $63,000  0.50 |
|  |  |  |
|  | = | $189,000  0.50 |
|  |  |  |
|  | = | $378,000 |

The break-even point for the Chicago office is computed as follows:

|  |  |  |
| --- | --- | --- |
| Dollar sales for a segment to break even | = | Segment traceable fixed expenses  Segment CM ratio |
|  |  |  |
|  | = | $78,000  0.70 |
|  |  |  |
|  | = | $111,429 (rounded) |

**Exercise 6-16** (continued)

The break-even point for the Minneapolis office is computed as follows:

|  |  |  |
| --- | --- | --- |
| Dollar sales for a segment to break even | = | Segment traceable fixed expenses  Segment CM ratio |
|  |  |  |
|  | = | $48,000  0.40 |
|  |  |  |
|  | = | $120,000 |

The sum of the segment break-even points is less than the companywide break-even point because the companywide break-even point takes into account common fixed expenses that do not affect the segment break-even calculations.

2. $75,000 × 40% CM ratio = $30,000 increased contribution margin in Minneapolis. Because the fixed costs in the office and in the company as a whole will not change, the entire $30,000 would result in increased net operating income for the company.

It is not correct to multiply the $75,000 increase in sales by Minneapolis’ 24% segment margin ratio. This approach assumes that the segment’s traceable fixed expenses increase in proportion to sales, but if they did, they would not be fixed.

**Exercise 6-16** (continued)

3. a. The segmented income statement follows:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | |  | Segments | | | | |
|  | Total Company | |  | Chicago | |  | Minneapolis | |
|  | Amount | % |  | Amount | % |  | Amount | % |
| Sales | $500,000 | 100.0 |  | $200,000 | 100 |  | $300,000 | 100 |
| Variable expenses | 240,000 | 48.0 |  | 60,000 | 30 |  | 180,000 | 60 |
| Contribution margin | 260,000 | 52.0 |  | 140,000 | 70 |  | 120,000 | 40 |
| Traceable fixed expenses | 126,000 | 25.2 |  | 78,000 | 39 |  | 48,000 | 16 |
| Office segment margin | 134,000 | 26.8 |  | $ 62,000 | 31 |  | $ 72,000 | 24 |
| Common fixed expenses not traceable to segments | 63,000 | 12.6 |  |  |  |  |  |  |
| Net operating income | $ 71,000 | 14.2 |  |  |  |  |  |  |

b. The segment margin ratio rises and falls as sales rise and fall due to the presence of fixed costs. The fixed costs are spread over a larger base as sales increase.

In contrast to the segment ratio, the contribution margin ratio is stable so long as there is no change in either the variable expenses or the selling price per unit of service.

**Exercise 6-17** (15 minutes)

1. The company should focus its campaign on the Dental market. The computations are:

|  |  |  |
| --- | --- | --- |
|  | Medical | Dental |
| Increased sales | $40,000 | $35,000 |
| Market CM ratio | ×   36% | ×  48% |
| Incremental contribution margin | $14,400 | $16,800 |
| Less cost of the campaign | 5,000 | 5,000 |
| Increased segment margin and net operating income for the company as a whole | $ 9,400 | $11,800 |

2. The $48,000 in traceable fixed expenses in the previous exercise is now partly traceable and partly common. When we segment Minneapolis by market, only $33,000 remains a traceable fixed expense. This amount represents costs such as advertising and salaries of individuals that arise because of the existence of the Medical and Dental markets. The remaining $15,000 ($48,000 – $33,000) is a common cost when Minneapolis is segmented by market. This amount would include costs such as the salary of the manager of the Minneapolis office that could not be avoided by eliminating either of the two market segments.

**Problem 6-18** (45 minutes)

1. The break-even point in units sold can be computed using the contribution margin per unit as follows:

|  |  |
| --- | --- |
| Selling price per unit | $58 |
| Variable cost per unit | 38 |
| Contribution margin per unit | $20 |
|  |  |

Break-even unit sales = Fixed expenses ÷ Unit contribution margin

= $1,200,000 ÷ $20 per unit

= 60,000 units

2 a. Under variable costing, only the variable manufacturing costs are included in product costs.

|  |  |  |  |
| --- | --- | --- | --- |
|  | *Year 1* | *Year 2* | *Year 3* |
| Direct materials | $20 | $20 | $20 |
| Direct labor | 12 | 12 | 12 |
| Variable manufacturing overhead | 4 | 4 | 4 |
| Variable costing unit product cost | $36 | $36 | $36 |
|  |  |  |  |

Note that selling and administrative expenses are not treated as product costs; that is, they are not included in the costs that are inventoried. These expenses are always treated as period costs.

**Problem 6-18** (continued)

2 b. The variable costing income statements appear below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | | *Year 1* | *Year 2* | *Year 3* |
| Sales | $3,480,000 | | $2,900,000 | $3,770,000 |
| Variable expenses: |  | |  |  |
| Variable cost of goods sold @ $36 per unit | 2,160,000 | | 1,800,000 | 2,340,000 |
| Variable selling and administrative @ $2 per unit | 120,000 | | 100,000 | 130,000 |
| Total variable expenses | 2,280,000 | | 1,900,000 | 2,470,000 |
| Contribution margin | 1,200,000 | | 1,000,000 | 1,300,000 |
| Fixed expenses: |  | |  |  |
| Fixed manufacturing overhead | 960,000 | | 960,000 | 960,000 |
| Fixed selling and administrative | 240,000 | | 240,000 | 240,000 |
| Total fixed expenses | 1,200,000 | | 1,200,000 | 1,200,000 |
| Net operating income (loss) | $            0 | | $  (200,000) | $  100,000 |
|  |  | |  |  |

3 a. The unit product costs under absorption costing:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *Year 1* | | | *Year 2* | | *Year 3* | | |
| Direct materials | $20 | | | $20.00 | | $20 | | |
| Direct labor | 12 | | | 12.00 | | 12 | | |
| Variable manufacturing overhead | 4 | | | 4.00 | | 4 | | |
| Fixed manufacturing overhead | \*16 | | | \*\*12.80 | | \*\*\*24 | | |
| Absorption costing unit product cost | | $52 | | $48.80 | | $60 | | |
| \* $960,000 ÷ 60,000 units = $16 per unit. | | |  |  |  | | |
| \*\* $960,000 ÷ 75,000 units = $12.80 per unit.  \*\*\* $960,000 ÷ 40,000 units = $24 per unit. | | | | |  | |

**Problem 6-18** (continued)

3 b. The absorption costing income statements appears below:

|  |  |  |  |
| --- | --- | --- | --- |
|  | *Year 1* | *Year 2* | *Year 3* |
| Sales | $3,480,000 | $2,900,000 | $3,770,000 |
| Cost of goods sold | 3,120,000 | 2,440,000 | 3,620,000 |
| Gross margin | 360,000 | 460,000 | 150,000 |
| Selling and administrative expenses | 360,000 | 340,000 | 370,000 |
| Net operating income (loss) | $            0 | $  120,000 | $ (220,000) |
|  |  |  |  |

Cost of goods sold computations:

Year 1: 60,000 units × $52 per unit = $3,120,000

Year 2: 50,000 units × $48.80 per unit = $2,440,000

Year 3: (25,000 × $48.80 per unit) + (40,000 × $60 per unit) = $3,620,000

4.

|  |  |  |  |
| --- | --- | --- | --- |
|  | *Year 1* | *Year 2* | *Year 3* |
| Units sold | 60,000 | 50,000 | 65,000 |
| Break-even point in units | 60,000 | 60,000 | 60,000 |
| Units above (below) break-even point | 0 | (10,000) | 5,000 |
|  |  |  |  |
| Variable costing net operating income (loss) | $0 | $(200,000) | $ 100,000 |
| Absorption costing net operating income (loss) | $0 | $ 120,000 | $(220,000) |

The absorption costing net operating incomes in years 2 and 3 are counter-intuitive. In year 2, the number of units sold is below the break-even point; however, absorption costing reports a net operating income greater than zero. In year 3, the number of units sold is above the break-even point; however, absorption costing reports a net operating income less than zero.

**Problem 6-19** (30 minutes)

1. The unit product cost under variable costing is computed as follows:

|  |  |  |
| --- | --- | --- |
|  | Direct materials | $ 4 |
|  | Direct labor | 7 |
|  | Variable manufacturing overhead | 1 |
|  | Variable costing unit product cost | $12 |

With this figure, the variable costing income statements can be prepared:

|  |  |  |
| --- | --- | --- |
|  | Year 1 | Year 2 |
| Unit sales | 40,000 units | 50,000 units |
|  |  |  |
| Sales | $1,000,000 | $1,250,000 |
| Variable expenses: |  |  |
| Variable cost of goods sold  (@ $12 per unit) | 480,000 | 600,000 |
| Variable selling and administrative expenses (@ $2 per unit) | 80,000 | 100,000 |
| Total variable expenses | 560,000 | 700,000 |
| Contribution margin | 440,000 | 550,000 |
| Fixed expenses: |  |  |
| Fixed manufacturing overhead | 270,000 | 270,000 |
| Fixed selling and administrative expenses | 130,000 | 130,000 |
| Total fixed expenses | 400,000 | 400,000 |
| Net operating income | $    40,000 | $  150,000 |

**Problem 6-19** (continued)

2. The reconciliation of absorption and variable costing follows:

|  |  |  |
| --- | --- | --- |
|  | *Year 1* | *Year 2* |
| Units in beginning inventory | 0 | 5,000 |
| + Units produced | 45,000 | 45,000 |
| − Units sold | 40,000 | 50,000 |
| = Units in ending inventory | 5,000 | 0 |

|  |  |  |
| --- | --- | --- |
|  | *Year 1* | *Year 2* |
| Fixed manufacturing overhead in ending inventory (5,000 units × $6 per unit) | $30,000 | $         0 |
| − Fixed manufacturing overhead in beginning inventory (5,000 units × $6 per unit) |  | 30,000 |
| = Manufacturing overhead deferred in (released from) inventory | $30,000 | $(30,000) |

|  |  |  |
| --- | --- | --- |
|  | *Year 1* | *Year 2* |
| Variable costing net operating income (loss) | $40,000 | $150,000 |
| Add: Fixed manufacturing overhead cost deferred in inventory under absorption costing | 30,000 |  |
| Deduct: Fixed manufacturing overhead cost released from inventory under absorption costing |  | (30,000) |
| Absorption costing net operating income | $70,000 | $120,000 |

**Problem 6-20** (45 minutes)

1. a. The unit product cost under absorption costing is:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Direct materials | $20 |
|  |  | Direct labor | 8 |
|  |  | Variable manufacturing overhead | 2 |
|  |  | Fixed manufacturing overhead  ($100,000 ÷ 10,000 units) | 10 |
|  |  | Absorption costing unit product cost | $40 |

b. The absorption costing income statement is:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Sales (8,000 units × $75 per unit) | $600,000 |
|  |  | Cost of goods sold (8,000 units × $40 per unit) | 320,000 |
|  |  | Gross margin | 280,000 |
|  |  | Selling and administrative expenses [$200,000 + (8,000 units × $6 per unit)] | 248,000 |
|  |  | Net operating income | $ 32,000 |

2. a. The unit product cost under variable costing is:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Direct materials | $20 |
|  |  | Direct labor | 8 |
|  |  | Variable manufacturing overhead | 2 |
|  |  | Variable costing unit product cost | $30 |

b. The variable costing income statement is:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Sales (8,000 units × $75 per unit) |  | $600,000 |
|  |  | Variable expenses: |  |  |
|  |  | Variable cost of goods sold  (8,000 units × $30 per unit) | $240,000 |  |
|  |  | Variable selling expenses (8,000 units × $6 per unit) | 48,000 | 288,000 |
|  |  | Contribution margin |  | 312,000 |
|  |  | Fixed expenses: |  |  |
|  |  | Fixed manufacturing overhead | 100,000 |  |
|  |  | Fixed selling and administrative expenses | 200,000 | 300,000 |
|  |  | Net operating income |  | $ 12,000 |

**Problem 6-20** (continued)

3. The difference in the ending inventory relates to a difference in the handling of fixed manufacturing overhead costs. Under variable costing, these costs have been expensed in full as period costs. Under absorption costing, these costs have been added to units of product at the rate of $10 per unit ($100,000 ÷ 10,000 units produced = $10 per unit). Thus, under absorption costing a portion of the $100,000 fixed manufacturing overhead cost for the month has been added to the inventory account rather than expensed on the income statement:

|  |  |  |
| --- | --- | --- |
|  | Added to the ending inventory  (2,000 units × $10 per unit) | $ 20,000 |
|  | Expensed as part of cost of goods sold  (8,000 units × $10 per unit) | 80,000 |
|  | Total fixed manufacturing overhead cost for the month | $100,000 |

Because $20,000 of fixed manufacturing overhead cost has been deferred in inventory under absorption costing, the net operating income reported under that costing method is $20,000 higher than the net operating income under variable costing, as shown in parts (1) and (2) above.

**Problem 6-21** (30 minutes)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. |  |  | |  | Sales Territory | | | | |
|  |  | Total Company | |  | Northern | |  | Southern | |
|  |  | Amount | % |  | Amount | % |  | Amount | % |
|  | Sales | $750,000 | 100.0 |  | $300,000 | 100 |  | $450,000 | 100 |
|  | Variable expenses | 336,000 | 44.8 |  | 156,000 | 52 |  | 180,000 | 40 |
|  | Contribution margin | 414,000 | 55.2 |  | 144,000 | 48 |  | 270,000 | 60 |
|  | Traceable fixed expenses | 228,000 | 30.4 |  | 120,000 | 40 |  | 108,000 | 24 |
|  | Territorial segment margin | 186,000 | 24.8 |  | $ 24,000 | 8 |  | $162,000 | 36 |
|  | Common fixed expenses\* | 150,000 | 20.0 |  |  |  |  |  |  |
|  | Net operating income | $ 36,000 | 4.8 |  |  |  |  |  |  |
|  |  | |  |  |  |  |  |  |  |
|  | \*378,000 – $228,000 = $150,000 | |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | |  | |  | Product Line | | | | |
|  |  | Northern Territory | | |  | Paks | |  | Tibs | |
|  |  | Amount | | % |  | Amount | % |  | Amount | % |
|  | Sales | $300,000 | | 100.0 |  | $50,000 | 100 |  | $250,000 | 100 |
|  | Variable expenses | | 156,000 | 52.0 |  | 11,000 | 22 |  | 145,000 | 58 |
|  | Contribution margin | | 144,000 | 48.0 |  | 39,000 | 78 |  | 105,000 | 42 |
|  | Traceable fixed expenses | | 70,000 | 23.3 |  | 30,000 | 60 |  | 40,000 | 16 |
|  | Product line segment margin | | 74,000 | 24.7 |  | $ 9,000 | 18 |  | $ 65,000 | 26 |
|  | Common fixed expenses\* | | 50,000 | 16.7 |  |  |  |  |  |  |
|  | Sales territory segment margin | | $ 24,000 | 8.0 |  |  |  |  |  |  |
|  |  | | |  |  |  |  |  |  |  |
|  | \*$120,000 – $70,000 = $50,000 | | |  |  |  |  |  |  |  |

**Problem 6-21** (continued)

2. Two insights should be brought to the attention of management. First, compared to the Southern territory, the Northern territory has a low contribution margin ratio. Second, the Northern territory has high traceable fixed expenses. Overall, compared to the Southern territory, the Northern territory is very weak.

3. Again, two insights should be brought to the attention of management. First, the Northern territory has a poor sales mix. Note that the territory sells very little of the Paks product, which has a high contribution margin ratio. This poor sales mix accounts for the low overall contribution margin ratio in the Northern territory mentioned in part (2) above. Second, the traceable fixed expenses of the Paks product seem very high in relation to sales. These high fixed expenses may simply mean that the Paks product is highly leveraged; if so, then an increase in sales of this product line would greatly enhance profits in the Northern territory and in the company as a whole.

**Problem 6-22** (45 minutes)

|  |  |  |  |
| --- | --- | --- | --- |
| 1. | a. and b. | Absorption Costing | Variable Costing |
|  | Direct materials | $  7 | $  7 |
|  | Direct labor | 10 | 10 |
|  | Variable manufacturing overhead | 5 | 5 |
|  | Fixed manufacturing overhead  ($315,000 ÷ 17,500 units) | 18 | — |
|  | Unit product cost | $40 | $22 |

|  |  |  |  |
| --- | --- | --- | --- |
| 2. |  | July | August |
|  | Unit sales | 15,000 | 20,000 |
|  |  |  |  |
|  | Sales | $900,000 | $1,200,000 |
| Variable expenses: |  |  |
| Variable cost of goods sold @ $22 per unit | 330,000 | 440,000 |
| Variable selling and administrative expenses @ $3 per unit | 45,000 | 60,000 |
| Total variable expenses | 375,000 | 500,000 |
| Contribution margin | 525,000 | 700,000 |
| Fixed expenses: |  |  |
| Fixed manufacturing overhead | 315,000 | 315,000 |
| Fixed selling and administrative expenses | 245,000 | 245,000 |
| Total fixed expenses | 560,000 | 560,000 |
| Net operating income (loss) | $ (35,000) | $ 140,000 |

|  |  |  |  |
| --- | --- | --- | --- |
| 3. |  | July | August |
|  | Units in beginning inventory | 0 | 2,500 |
|  | + Units produced | 17,500 | 17,500 |
|  | − Units sold | 15,000 | 20,000 |
|  | = Units in ending inventory | 2,500 | 0 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | Fixed manufacturing overhead in ending inventory (2,500 units × $18 per unit) | $45,000 | $        0 |
|  | − Fixed manufacturing overhead in beginning inventory (2,500 units × $18 per unit) | 0 | 45,000 |
|  | = Manufacturing overhead deferred in (released from) inventory | $45,000 | $(45,000) |

**Problem 6-22** (continued)

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | July | August |
|  | Variable costing net operating income (loss) | $ (35,000) | $ 140,000 |
|  | Add fixed manufacturing overhead cost deferred in inventory under absorption costing | 45,000 |  |
|  | Deduct fixed manufacturing overhead cost released from inventory under absorption costing |  | (45,000) |
|  | Absorption costing net operating income | $  10,000 | $  95,000 |

4. As shown in the reconciliation in part (3) above, $45,000 of fixed manufacturing overhead cost was deferred in inventory under absorption costing at the end of July because $18 of fixed manufacturing overhead cost “attached” to each of the 2,500 unsold units that went into inventory at the end of that month. This $45,000 was part of the $560,000 total fixed cost that has to be covered each month in order for the company to break even. Because the $45,000 was added to the inventory account, and thus did not appear on the income statement for July as an expense, the company was able to report a small profit for the month even though it sold less than the break-even volume of sales. In short, only $515,000 of fixed cost ($560,000 – $45,000) was expensed for July, rather than the full $560,000 as presented in the break-even analysis. As stated in the text, this is a major problem with the use of absorption costing internally for management purposes. The method does not harmonize well with the principles of cost-volume-profit analysis, and can result in data that are unclear or confusing.

**Problem 6-23** (60 minutes)

1. a. Absorption costing unit product cost is:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Direct materials | $ 3.50 |
|  |  | Direct labor | 12.00 |
|  |  | Variable manufacturing overhead | 1.00 |
|  |  | Fixed manufacturing overhead  ($300,000 ÷ 30,000 units) | 10.00 |
|  |  | Absorption costing unit product cost | $26.50 |

b. The absorption costing income statement is:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Sales (28,000 units) | $1,120,000 |
|  |  | Cost of goods sold (28,000 units × $26.50 per unit) | 742,000 |
|  |  | Gross margin | 378,000 |
|  |  | Selling and administrative expenses  ($200,000 + 28,000 units × $6.00 per unit) | 368,000 |
|  |  | Net operating income | $    10,000 |

c. The reconciliation is as follows:

Units in ending inventory = Units in beginning inventory + Units produced – Units sold = 0 units +30,000 units – 28,000 units   
= 2,000 units

Manufacturing overhead deferred in (released from) inventory = Fixed manufacturing overhead in ending inventory – Fixed manufacturing overhead in beginning inventory = (2,000 units × $10 per unit) – $0  
= $20,000

|  |  |  |
| --- | --- | --- |
|  | Variable costing net loss | $(10,000) |
|  | Add fixed manufacturing overhead cost deferred in inventory under absorption costing | 20,000 |
|  | Absorption costing net operating income | $ 10,000 |

**Problem 6-23** (continued)

2. Under absorption costing, the company did earn a profit for the quarter. However, before the question can really be answered, one must first define what is meant by a “profit.” The central issue here relates to *timing* of release of fixed manufacturing overhead costs to expense. Advocates of variable costing argue that all such costs should be expensed immediately, and that no profit is earned unless the revenues of a period are sufficient to cover the fixed manufacturing overhead costs in full. From this point of view, no profit was earned during the quarter because the fixed costs were not fully covered.

Advocates of absorption costing would argue, however, that fixed manufacturing overhead costs attach to units of product as they are produced, and that such costs do not become an expense until the units are sold. Therefore, if the selling price of a unit is greater than the unit product cost (including a proportionate amount of fixed manufacturing overhead), then a profit is earned even if some units produced are unsold and carry some fixed manufacturing overhead with them to the following period. A difficulty with this argument is that “profits” will vary under absorption costing depending on how many units are added to or taken out of inventory. That is, profits will depend not only on sales, but on what happens to inventories. In particular, profits can be consciously manipulated by increasing or decreasing a company’s inventories.

3. a. The variable costing income statement is:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Sales (32,000 units × $40 per unit) |  | $1,280,000 |
|  |  | Variable expenses: |  |  |
|  |  | Variable cost of goods sold  (32,000 units × $16.50 per unit) | $528,000 |  |
|  |  | Variable selling and administrative expenses (32,000 units × $6 per unit) | 192,000 | 720,000 |
|  |  | Contribution margin |  | 560,000 |
|  |  | Fixed expenses: |  |  |
|  |  | Fixed manufacturing overhead | 300,000 |  |
|  |  | Fixed selling and administrative expense | 200,000 | 500,000 |
|  |  | Net operating income |  | $   60,000 |

**Problem 6-23** (continued)

b. The absorption costing income statement would be constructed as follows:

The absorption costing unit product cost will remain at $26.50, the same as in part (1).

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Sales (32,000 units × $40 per unit) | $1,280,000 |
|  |  | Cost of goods sold (32,000 units × $26.50 per unit) | 848,000 |
|  |  | Gross margin | 432,000 |
|  |  | Selling and administrative expenses  ($200,000 + 32,000 units × $6.00 per unit) | 392,000 |
|  |  | Net operating income | $    40,000 |

c. The reconciliation of variable costing and absorption costing income is:

Units in ending inventory = Units in beginning inventory + Units produced – Units sold = 2,000 units +30,000 units – 32,000 units   
= 0 units

Manufacturing overhead deferred in (released from) inventory = Fixed manufacturing overhead in ending inventory – Fixed manufacturing overhead in beginning inventory = (0 units × $10 per unit) – (2,000 units × $10 per unit) = -$20,000

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Variable costing net operating income | $ 60,000 |
|  |  | Deduct fixed manufacturing overhead cost released from inventory under absorption costing | (20,000) |
|  |  | Absorption costing net operating income | $ 40,000 |

**Problem 6-24** (45 minutes)

1. The intern’s decision to use the absorption format for her segmented income statements is a bad idea because it does not focus on cost behavior. To make decisions and perform break-even analysis, the contribution format is superior to the absorption format because it separates costs into variable cost and fixed cost categories.

2. To answer this question, students must understand that cost of goods sold for a merchandiser is a variable cost. Thus, all of the company’s fixed costs plus its sales commissions are reported as part of selling and administrative expenses. The amount of common fixed expenses allocated to each segment is computed as follows:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | *Total* | | *Commercial* | *Residential* |
| Total selling and administrative  expense (a) | | $240,000 | $104,000 | $136,000 | |
| Traceable fixed expenses | | 93,000 | 55,000 | 38,000 | |
| Sales commissions  (10% of sales) | | 75,000 | 25,000 | 50,000 | |
| Selling and administrative expenses accounted for (b) | | 168,000 | 80,000 | 88,000 | |
| Common fixed expenses (a) – (b) | | $  72,000 | $  24,000 | $48,000 |

The amount of common fixed expenses allocated to Residential ($48,000) is twice as much as the amount of common fixed expenses allocated to Commercial ($24,000). Because the Residential sales ($500,000) are twice as much as the Commercial sales ($250,000), it appears that the common fixed expenses were allocated to segments based on sales dollars.

Allocating common fixed expenses is a bad idea because these costs are not traceable to segments and they are not affected by segment-level decisions.

**Problem 6-24** (continued)

3. The contribution format segmented income statements would appear as follows:

|  |  |  |  |
| --- | --- | --- | --- |
|  | *Total*  *Company* | *Commercial* | *Residential* |
| Sales | $750,000 | $250,000 | $500,000 |
| Variable expenses: |  |  |  |
| Cost of goods sold | 500,000 | 140,000 | 360,000 |
| Sales commissions (10%) | 75,000 | 25,000 | 50,000 |
| Total variable expenses | 575,000 | 165,000 | 410,000 |
| Contribution margin | 175,000 | 85,000 | 90,000 |
| Traceable fixed expenses | 93,000 | 55,000 | 38,000 |
| Segment margin | 82,000 | $  30,000 | $  52,000 |
| Common fixed expenses | 72,000 |  |  |
| Net operating income | $  10,000 |  |  |

**Problem 6-24** (continued)

4. The companywide break-even point is computed as follows:

|  |  |  |
| --- | --- | --- |
| Dollar sales for company to break even | = | Traceable fixed expenses + Common fixed expenses  Overall CM ratio |
|  |  |  |
|  | = | $93,000 + $72,000  0.233 (rounded) |
|  |  |  |
|  | = | $165,000  0.233 |
|  |  |  |
|  | = | $707,244 (rounded) |

5. The break-even point for the Commercial Division is computed as follows:

|  |  |  |
| --- | --- | --- |
| Dollar sales for a segment to break even | = | Segment traceable fixed expenses  Segment CM ratio |
|  |  |  |
|  | = | $55,000  0.34 |
|  |  |  |
|  | = | $161,765 (rounded) |

**Problem 6-24** (continued)

The break-even point for the Residential Division is computed as follows:

|  |  |  |
| --- | --- | --- |
| Dollar sales for a segment to break even | = | Segment traceable fixed expenses  Segment CM ratio |
|  |  |  |
|  | = | $38,000  0.18 |
|  |  |  |
|  | = | $211,111 (rounded) |

6. The new break-even point for the Commercial Division is computed as follows:

|  |  |  |
| --- | --- | --- |
| Dollar sales for a segment to break even | = | Segment traceable fixed expenses  Segment CM ratio |
|  |  |  |
|  | = | $70,000  0.39 |
|  |  |  |
|  | = | $179,487 (rounded) |

The new break-even point for the Residential Division is computed as follows:

|  |  |  |
| --- | --- | --- |
| Dollar sales for a segment to break even | = | Segment traceable fixed expenses  Segment CM ratio |
|  |  |  |
|  | = | $68,000  0.23 |
|  |  |  |
|  | = | $295,652 (rounded) |

**Problem 6-25** (75 minutes)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. |  | Year 1 | Year 2 | Year 3 |
|  | Unit sales | 50,000 | 40,000 | 50,000 |
|  |  |  |  |  |
|  | Sales | $800,000 | $ 640,000 | $800,000 |
|  | Variable expenses: |  |  |  |
|  | Variable cost of goods sold  @ $2 per unit | 100,000 | 80,000 | 100,000 |
|  | Variable selling and administrative expenses  @ $1 per unit | 50,000 | 40,000 | 50,000 |
|  | Total variable expenses | 150,000 | 120,000 | 150,000 |
|  | Contribution margin | 650,000 | 520,000 | 650,000 |
|  | Fixed expenses: |  |  |  |
|  | Fixed manufacturing overhead | 480,000 | 480,000 | 480,000 |
|  | Fixed selling and administrative expenses | 140,000 | 140,000 | 140,000 |
|  | Total fixed expenses | 620,000 | 620,000 | 620,000 |
|  | Net operating income (loss) | $  30,000 | $(100,000) | $  30,000 |

**Problem 6-25** (continued)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2. | a. |  | Year 1 | Year 2 | Year 3 |
|  |  | Variable manufacturing cost | $ 2.00 | $ 2.00 | $ 2.00 |
|  |  | Fixed manufacturing cost: |  |  |  |
|  |  | $480,000 ÷ 50,000 units | 9.60 |  |  |
|  |  | $480,000 ÷ 60,000 units |  | 8.00 |  |
|  |  | $480,000 ÷ 40,000 units |  |  | 12.00 |
|  |  | Absorption costing unit product cost | $11.60 | $10.00 | $14.00 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | b. | Units in beginning inventory | 0 | 0 | 20,000 |
|  |  | + Units produced | 50,000 | 60,000 | 40,000 |
|  |  | − Units sold | 50,000 | 40,000 | 50,000 |
|  |  | = Units in ending inventory | 0 | 20,000 | 10,000 |
|  |  |  |  |  |  |
|  |  | Fixed manufacturing overhead in ending inventory | $       0 | $160,000 | $120,000 |
|  |  | − Fixed manufacturing overhead in beginning inventory | 0 | 0 | 160,000 |
|  |  | = Manufacturing overhead deferred in (released from) inventory | $       0 | $160,000 | $(40,000) |
|  |  |  |  |  |  |
|  |  | Variable costing net operating income (loss) | $30,000 | $(100,000) | $ 30,000 |
|  |  | Add fixed manufacturing overhead deferred in inventory |  | 160,000 |  |
|  |  | Deduct fixed manufacturing overhead cost released from inventory |  |  | (40,000) |
|  |  | Absorption costing net operating income (loss) | $30,000 | $  60,000 | $(10,000) |

3. Production went up sharply in Year 2, thereby reducing the unit product cost, as shown in (2a) above. This reduction in cost per unit, combined with the large amount of fixed manufacturing overhead deferred in inventory for the year, more than offset the loss of revenue. The net result is that the company’s net operating income increased.

4. The fixed manufacturing overhead deferred in inventory from Year 2 was charged against Year 3 operations. This added charge against Year 3 operations was offset somewhat by the fact that part of Year 3’s fixed

**Problem 6-25** (continued)

manufacturing overhead costs were deferred in inventory to future years. Overall, the added costs charged against Year 3 were greater than the costs deferred to future years, so the company reported less income for the year even though the same number of units was sold as in Year 1.

5. a. With lean production, production would have been tied to sales in each year so that little or no inventory of finished goods would have been built up in either Year 2 or Year 3.

b. If lean production had been in use, the net operating income under absorption costing would have been the same as under variable costing in all three years. With production tied to sales, there would have been no ending inventory, and therefore there would have been no fixed manufacturing overhead costs deferred in inventory to other years. If the predetermined overhead rate is based on 50,000 units in each year, the income statements under absorption costing would have appeared as follows:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Year 1 |  | Year 2 |  | Year 3 |
|  | Unit sales | 50,000 |  | 40,000 |  | 50,000 |
|  |  |  |  |  |  |  |
|  | Sales | $ 800,000 |  | $ 640,000 |  | $ 800,000 |
|  | Cost of goods sold: |  |  |  |  |  |
|  | Cost of goods manufactured @ $11.60 per unit | 580,000 |  | 464,000 | \* | 580,000 |
|  | Add underapplied overhead |  |  | 96,000 | \*\* |  |
|  | Cost of goods sold | 580,000 |  | 560,000 |  | 580,000 |
|  | Gross margin | 220,000 |  | 80,000 |  | 220,000 |
|  | Selling and administrative expenses | 190,000 |  | 180,000 |  | 190,000 |
|  | Net operating income (loss) | $  30,000 |  | $(100,000) |  | $  30,000 |

\* 40,000 units × $11.60 per unit = $464,000.

\*\* 10,000 units *not* produced × $9.60 per unit fixed manufacturing overhead cost per unit = $96,000 fixed manufacturing overhead cost not applied to products.

**Problem 6-26** (60 minutes)

1. The disadvantages or weaknesses of the company’s version of a segmented income statement are as follows:

a. The company should include a column showing the combined results of the three regions taken together.

b. The regional expenses should be segregated into variable and fixed categories to permit the computation of both a contribution margin and a regional segment margin.

c. The corporate expenses are probably common to the regions and should not be arbitrarily allocated.

2. Corporate advertising expenses have been allocated on the basis of sales dollars; the general administrative expenses have been allocated evenly among the three regions. Such allocations can be misleading to management because they seem to imply that these expenses are caused by the segments to which they have been allocated. The segment margin—which only includes costs that are actually caused by the segments—should be used to measure the performance of a segment. The “net operating income” or “net loss” after allocating common expenses should *not* be used to judge the performance of a segment.

**Problem 6-26** (continued)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3. |  | Total Company | |  | West | |  | Central | |  | East | |
|  | Sales | $2,000,000 | 100.0 |  | $450,000 | 100 |  | $800,000 | 100 |  | $750,000 | 100 |
|  | Variable expenses: |  |  |  |  |  |  |  |  |  |  |  |
|  | Cost of goods sold | 819,400 | 41.0 |  | 162,900 | 36 |  | 280,000 | 35 |  | 376,500 | 50 |
|  | Shipping expense | 77,600 | 3.9 |  | 17,100 | 4 |  | 32,000 | 4 |  | 28,500 | 4 |
|  | Total variable expenses | 897,000 | 44.9 |  | 180,000 | 40 |  | 312,000 | 39 |  | 405,000 | 54 |
|  | Contribution margin | 1,103,000 | 55.1 |  | 270,000 | 60 |  | 488,000 | 61 |  | 345,000 | 46 |
|  | Traceable fixed expenses: |  |  |  |  |  |  |  |  |  |  |  |
|  | Salaries | 313,000 | 15.6 |  | 90,000 | 20 |  | 88,000 | 11 |  | 135,000 | 18 |
|  | Utilities | 40,500 | 2.0 |  | 13,500 | 3 |  | 12,000 | 2 |  | 15,000 | 2 |
|  | Advertising | 518,000 | 25.9 |  | 108,000 | 24 |  | 200,000 | 25 |  | 210,000 | 28 |
|  | Depreciation | 85,000 | 4.3 |  | 27,000 | 6 |  | 28,000 | 4 |  | 30,000 | 4 |
|  | Total traceable fixed expenses | 956,500 | 47.8 |  | 238,500 | 53 |  | 328,000 | 42 |  | 390,000 | 52 |
|  | Regional segment margin | 146,500 | 7.3 |  | $ 31,500 | 7 |  | $160,000 | 19 |  | $ (45,000) | (6) |
|  | Common fixed expenses: |  |  |  |  |  |  |  |  |  |  |  |
|  | Advertising (general) | 80,000 | 4.0 |  |  |  |  |  |  |  |  |  |
|  | General administration | 150,000 | 7.5 |  |  |  |  |  |  |  |  |  |
|  | Total common fixed expense | 230,000 | 11.5 |  |  |  |  |  |  |  |  |  |
|  | Net operating loss | $  (83,500) | ( 4.2) |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

Note: Percentage figures may not total due to rounding.

**Problem 6-26** (continued)

4. The following points should be brought to the attention of management:

a. Sales in the West are much lower than in the other two regions. This is not due to lack of salespeople—salaries in the West are about the same as in the Central Region, which has the highest sales of the three regions.

b. The West is spending about half as much for advertising as the Central Region. Perhaps this is the reason for the West’s lower sales.

c. The East apparently is selling a large amount of low-margin items. Note that it has a contribution margin ratio of only 46%, compared to 60% or more for the other two regions.

d. The East appears to be overstaffed. Its salaries are about 50% greater than in either of the other two regions.

e. The East is not covering its own traceable costs. Attention should be given to improving the sales mix and reducing expenses in this region.

f. Apparently, the salespeople in all three regions are on a salary basis. Perhaps a change to a commission basis would encourage the sales staff to be more aggressive and improve sales throughout the company.

**Problem 6-27** (30 minutes)

1. Because of soft demand for the Brazilian Division’s product, the inventory should be drawn down to the minimum level of 50 units. Drawing inventory down to the minimum level would require production as follows during the last quarter:

|  |  |
| --- | --- |
| Desired inventory, December 31 | 50 units |
| Expected sales, last quarter | 600 units |
| Total needs | 650 units |
| Less inventory, September 30 | 400 units |
| Required production | 250 units |

This plan would save inventory carrying costs such as storage (rent, insurance), interest, and obsolescence.

The number of units scheduled for production will not affect the reported net operating income or loss for the year if variable costing is in use. All fixed manufacturing overhead cost will be treated as an expense of the period regardless of the number of units produced. Thus, no fixed manufacturing overhead cost would be shifted between periods through the inventory account and income would be a function of the number of units sold, rather than a function of the number of units produced.

2. To maximize the Brazilian Division’s operating income, Mr. Cavalas could produce as many units as storage facilities will allow. By building inventory to the maximum level, Mr. Cavalas would be able to defer a portion of the year’s fixed manufacturing overhead costs to future years through the inventory account, rather than having all of these costs appear as charges on the current year’s income statement. Building inventory to the maximum level of 1,000 units would require production as follows during the last quarter:

|  |  |
| --- | --- |
| Desired inventory, December 31 | 1,000 units |
| Expected sales, last quarter | 600 units |
| Total needs | 1,600 units |
| Less inventory, September 30 | 400 units |
| Required production | 1,200 units |

**Problem 6-27** (continued)

Thus, by producing enough units to build inventory to the maximum level that storage facilities would allow, Mr. Cavalas could relieve the current year of fixed manufacturing overhead cost and thereby maximize the current year’s operating income.

3. By setting a production schedule that will maximize his division’s net operating income—and maximize his own bonus—Mr. Cavalas would be acting against the best interests of the company as a whole. The extra units aren’t needed and would be expensive to carry in inventory. Moreover, there is no indication that demand would be any better next year than it has been in the current year, so the company may be required to carry the extra units in inventory a long time before they are ultimately sold.

The company’s bonus plan undoubtedly is intended to increase the company’s profits by increasing sales and controlling expenses. If Mr. Cavalas sets a production schedule as shown in part (2) above, he would obtain his bonus as a result of *producing* rather than as a result of selling. Moreover, he would obtain it by creating *greater* expenses—rather than fewer expenses—for the company as a whole.

In sum, producing as much as possible so as to maximize the division’s net operating income and the manager’s bonus would be unethical because it subverts the goals of the overall organization.

**Problem 6-28** (45 minutes)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1. | Total Company | Cook-book | | Travel Guide | Handy Speller |
| Sales | $300,000 | | $90,000 | $150,000 | $60,000 |
| Variable expenses: |  | |  |  |  |
| Printing cost | 102,000 | | 27,000 | 63,000 | 12,000 |
| Sales commissions | 30,000 | | 9,000 | 15,000 | 6,000 |
| Total variable expenses | 132,000 | | 36,000 | 78,000 | 18,000 |
| Contribution margin | 168,000 | | 54,000 | 72,000 | 42,000 |
| Traceable fixed expenses: |  | |  |  |  |
| Advertising | 36,000 | | 13,500 | 19,500 | 3,000 |
| Salaries | 33,000 | | 18,000 | 9,000 | 6,000 |
| Equipment depreciation\* | 9,000 | | 2,700 | 4,500 | 1,800 |
| Warehouse rent\*\* | 12,000 | | 1,800 | 6,000 | 4,200 |
| Total traceable fixed expenses | 90,000 | | 36,000 | 39,000 | 15,000 |
| Product line segment margin | 78,000 | | $18,000 | $ 33,000 | $27,000 |
| Common fixed expenses: |  | |  |  |  |
| General sales | 18,000 | |  |  |  |
| General administration | 42,000 | |  |  |  |
| Depreciation—office facilities | 3,000 | |  |  |  |
| Total common fixed expenses | 63,000 | |  |  |  |
| Net operating income | $ 15,000 | |  |  |  |

|  |  |
| --- | --- |
| \* | $9,000 × 30%, 50%, and 20%, respectively. |
| \*\* | $48,000 square feet × $3 per square foot = $144,000; $144,000 ÷ 12 months = $12,000 per month. $12,000 ÷ 48,000 square feet = $0.25 per square foot per month.  $0.25 per square foot × 7,200 square feet = $1,800; $0.25 per square foot × 24,000 square feet = $6,000; and $0.25 per square foot × 16,800 square feet = $4,200. |

**Problem 6-28** (continued)

2. a. No, the cookbook line should not be eliminated. The cookbook is covering all of its own costs and is generating an $18,000 segment margin toward covering the company’s common costs and toward profits. (Note: Problems relating to the elimination of a product line are covered in more depth in the next chapter.)

b.

|  |  |  |  |
| --- | --- | --- | --- |
|  | *Cook-book* | *Travel Guide* | *Handy Speller* |
| Contribution margin (a) | $54,000 | $72,000 | $42,000 |
| Sales (b) | $90,000 | $150,000 | $60,000 |
| Contribution margin ratio (a) ÷ (b) | 60% | 48% | 70% |

It is probably unwise to focus all available resources on promoting the travel guide. The company is already spending more on the promotion of this product than on the other two products combined. Furthermore, the travel guide has the lowest contribution margin ratio of the three products. Therefore, a dollar of sales of the travel guide generates less profit than a dollar of sales of either of the two other products. Nevertheless, we cannot say for sure which product should be emphasized in this situation without more information. The problem states that there is ample demand for all three products, which suggests that there is no idle capacity. If the equipment is being fully utilized, increasing the production of any one product would require cutting back production of the other products. In the next chapter we will discuss how to choose the most profitable product when a production constraint forces such a trade-off among products.

**Case 6-29** (45 minutes)

1 a. Under variable costing, only the variable manufacturing costs are included in product costs.

|  |  |  |  |
| --- | --- | --- | --- |
|  | *Year 1* | *Year 2* | *Year 3* |
| Direct materials | $32 | $32 | $32 |
| Direct labor | 20 | 20 | 20 |
| Variable manufacturing overhead | 4 | 4 | 4 |
| Variable costing unit product cost | $56 | $56 | $56 |
|  |  |  |  |

1 b. The variable costing income statements appear below:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Year 1 | Year 2 | Year 3 |
| Sales | $6,000,000 | $6,750,000 | $5,625,000 |
| Variable expenses: |  |  |  |
| Variable cost of goods sold @ $56 per unit | 4,480,000 | 5,040,000 | 4,200,000 |
| Variable selling and administrative @ $3 per unit | 240,000 | 270,000 | 225,000 |
| Total variable expenses | 4,720,000 | 5,310,000 | 4,425,000 |
| Contribution margin | 1,280,000 | 1,440,000 | 1,200,000 |
| Fixed expenses: |  |  |  |
| Fixed manufacturing overhead | 660,000 | 660,000 | 660,000 |
| Fixed selling and administrative | 120,000 | 120,000 | 120,000 |
| Total fixed expenses | 780,000 | 780,000 | 780,000 |
| Net operating income | $  500,000 | $   660,000 | $  420,000 |
|  |  |  |  |

2a. and 2b.

The answers to 2a and 2b are the same as 1a and 1b because the unit product costs are the same for all three years. The inventory flow assumption is irrelevant when the unit product cost stays constant.

**Case 6-29** (continued)

3 a. The unit product costs under absorption costing:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Year 1* | | *Year 2* | | *Year 3* | |
| Direct materials | $32.00 | | $32.00 | | $32.00 | |
| Direct labor | 20.00 | | 20.00 | | 20.00 | |
| Variable manufacturing overhead | 4.00 | | 4.00 | | 4.00 | |
| Fixed manufacturing overhead | \*6.60 | | \*\*8.80 | | \*\*\*8.25 | |
| Absorption costing unit product cost | $62.60 | | $64.80 | | $64.25 | |
|  | |  |  |  | |
| \* $660,000 ÷ 100,000 units = $6.60 per unit.  \*\* $660,000 ÷ 75,000 units = $8.80 per unit.  \*\*\* $660,000 ÷ 80,000 units = $8.25 per unit. | | | |

3 b. The absorption costing income statements appear below (FIFO):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *Year 1* | *Year 2* | *Year 3* | |
| Sales | $6,000,000 | $6,750,000 | $5,625,000 |
| Cost of goods sold | 5,008,000 | 5,788,000 | 4,821,500 |
| Gross margin | 992,000 | 962,000 | 803,500 |
| Selling and administrative expenses | 360,000 | 390,000 | 345,000 |
| Net operating income | $  632,000 | $  572,000 | $  458,500 |
|  |  |  |  |

Cost of goods sold computations:

Year 1: 80,000 units × $62.60 per unit = $5,008,000

Year 2: (20,000 units × $62.60 per unit) + (70,000 units × $64.80 per unit) = $5,788,000

Year 3: (5,000 × $64.80 per unit) + (70,000 × $64.25 per unit) = $4,821,500

**Case 6-29** (continued)

4 a. The unit product costs under absorption costing:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Year 1* | | *Year 2* | | *Year 3* | |
| Direct materials | $32.00 | | $32.00 | | $32.00 | |
| Direct labor | 20.00 | | 20.00 | | 20.00 | |
| Variable manufacturing overhead | 4.00 | | 4.00 | | 4.00 | |
| Fixed manufacturing overhead | \*6.60 | | \*\*8.80 | | \*\*\*8.25 | |
| Absorption costing unit product cost | $62.60 | | $64.80 | | $64.25 | |
|  | |  |  |  | |
| \* $660,000 ÷ 100,000 units = $6.60 per unit.  \*\* $660,000 ÷ 75,000 units = $8.80 per unit.  \*\*\* $660,000 ÷ 80,000 units = $8.25 per unit. | | | |

4 b. The absorption costing income statements appears below (LIFO):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *Year 1* | *Year 2* | *Year 3* | |
| Sales | $6,000,000 | $6,750,000 | $5,625,000 |
| Cost of goods sold | 5,008,000 | 5,799,000 | 4,818,750 |
| Gross margin | 992,000 | 951,000 | 806,250 |
| Selling and administrative expenses | 360,000 | 390,000 | 345,000 |
| Net operating income | $  632,000 | $  561,000 | $  461,250 |
|  |  |  |  |

Cost of goods sold computations:

Year 1: 80,000 units × $62.60 per unit = $5,008,000

Year 2: (75,000 units × $64.80 per unit) + (15,000 units × $62.60 per unit) = $5,799,000

Year 3: 75,000 × $64.25 per unit = $4,818,750

**Case 6-30** (75 minutes)

1. See the segmented statement on the second following page. Supporting computations for the statement are given below:

|  |  |
| --- | --- |
| Sales: |  |
| Membership dues (20,000 × $100) | $2,000,000 |
| Assigned to Magazine Subscriptions Division  (20,000 × $20) | 400,000 |
| Assigned to Membership Division | $1,600,000 |
| Non-member magazine subscriptions (2,500 × $30) | $   75,000 |
|  |  |
| Reports and texts (28,000 × $25) | $  700,000 |
| Continuing education courses: |  |
| One-day (2,400 × $75) | $  180,000 |
| Two-day (1,760 × $125) | 220,000 |
| Total revenue | $  400,000 |

Salary and personnel costs:

|  |  |  |
| --- | --- | --- |
|  | Salaries | Personnel Costs (25% of Salaries) |
| Membership Division | $210,000 | $  52,500 |
| Magazine Subscriptions Division | 150,000 | 37,500 |
| Books and Reports Division | 300,000 | 75,000 |
| Continuing Education Division | 180,000 | 45,000 |
| Total assigned to divisions | 840,000 | 210,000 |
| Corporate staff | 80,000 | 20,000 |
| Total | $920,000 | $230,000 |

**Case 6-30** (continued)

Some may argue that, except for the $50,000 in rental cost directly attributed to the Books and Reports Division, occupancy costs are common costs that should not be allocated. The correct treatment of the occupancy costs depends on whether they could be avoided in part by eliminating a division. In the solution below, we have assumed they could be avoided.

Occupancy costs ($230,000 allocated + $50,000 direct to the Books and

Reports Division = $280,000):

|  |  |  |
| --- | --- | --- |
| Allocated to: |  |  |
| Membership Division  ($230,000 × 0.2) |  | $  46,000 |
| Magazine Subscriptions Division  ($230,000 × 0.2) |  | 46,000 |
| Books and Reports Division  ($230,000 × 0.3 + $50,000) |  | 119,000 |
| Continuing Education Division  ($230,000 × 0.2) |  | 46,000 |
| Corporate staff  ($230,000 × 0.1) |  | 23,000 |
| Total occupancy costs |  | $280,000 |
|  |  |  |
| Printing and paper costs |  | $320,000 |
| Assigned to: |  |  |
| Magazine Subscriptions Division  (22,500 × $7) | $157,500 |  |
| Books and Reports Division  (28,000 × $4) | 112,000 | 269,500 |
| Remainder—Continuing Education Division |  | $  50,500 |
|  |  |  |
| Postage and shipping costs |  | $176,000 |
| Assigned to: |  |  |
| Magazine Subscriptions Division  (22,500 × $4) | $ 90,000 |  |
| Books and Reports Division  (28,000 × $2) | 56,000 | 146,000 |
| Remainder—corporate staff |  | $  30,000 |

**Case 6-30** (continued)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | Division | | | |
|  | Association Total | Membership | Magazine Subscriptions | Books & Reports | Continuing Education |
| Sales: |  |  |  |  |  |
| Membership dues | $2,000,000 | $1,600,000 | $400,000 |  |  |
| Non-member magazine subscriptions | 75,000 |  | 75,000 |  |  |
| Advertising | 100,000 |  | 100,000 |  |  |
| Reports and texts | 700,000 |  |  | $700,000 |  |
| Continuing education courses | 400,000 |  |  |  | $400,000 |
| Total revenues | 3,275,000 | 1,600,000 | 575,000 | 700,000 | 400,000 |
| Expenses traceable to segments: |  |  |  |  |  |
| Salaries | 840,000 | 210,000 | 150,000 | 300,000 | 180,000 |
| Personnel costs | 210,000 | 52,500 | 37,500 | 75,000 | 45,000 |
| Occupancy costs | 257,000 | 46,000 | 46,000 | 119,000 | 46,000 |
| Reimbursement of member costs to local chapters | 600,000 | 600,000 |  |  |  |
| Other membership services | 500,000 | 500,000 |  |  |  |
| Printing and paper | 320,000 |  | 157,500 | 112,000 | 50,500 |
| Postage and shipping | 146,000 |  | 90,000 | 56,000 |  |
| Instructors’ fees | 80,000 |  |  |  | 80,000 |
| Total traceable expenses | 2,953,000 | 1,408,500 | 481,000 | 662,000 | 401,500 |
| Division segment margin | 322,000 | $  191,500 | $ 94,000 | $ 38,000 | $ (1,500) |

[The statement is continued on the next page.]

**Case 6-30** (continued)

[Continuation of the segmented income statement.]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | Division | | | |
|  | Association Total | Membership | Magazine Subscriptions | Books & Reports | Continuing Education |
| Division segment margin | 322,000 | $  191,500 | $ 94,000 | $ 38,000 | $ (1,500) |
| Common expenses not traceable to divisions: | |  |  |  |  |
| Salaries—corporate staff | 80,000 |  |  |  |  |
| Personnel costs | 20,000 |  |  |  |  |
| Occupancy costs | 23,000 |  |  |  |  |
| Postage and shipping | 30,000 |  |  |  |  |
| General and administrative | 38,000 |  |  |  |  |
| Total common expenses | 191,000 |  |  |  |  |
| Excess of revenues over expenses | $  131,000 |  |  |  |  |

**Case 6-30** (continued)

2. While we do not favor the allocation of common costs to segments, the most common reason given for this practice is that segment managers need to be aware of the fact that common costs do exist and that they must be covered.

Arguments against allocation of all costs:

• Allocation bases will need to be chosen arbitrarily because no cause-and-effect relationship exists between common costs and the segments to which they are allocated.

• Management may be misled into eliminating a profitable segment that appears to be unprofitable because of allocated common costs.

• Segment managers usually have little control over common costs. They should not be held accountable for costs over which they have no control.

• Allocations of common costs undermine the credibility of performance reports. Segment managers may resent such allocations and ignore the entire performance report as arbitrary and unfair.

Appendix 6A

Super-Variable Costing

**Exercise 6A-1** (10 minutes)

1. a. The unit product cost under super-variable costing would include direct materials of $18.

b. The super-variable costing income statement would be:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Sales (20,000 units × $50 per unit) |  | $1,000,000 |
|  | Variable cost of goods sold  (20,000 units × $18 per unit) |  | 360,000 |
|  | Contribution margin |  | 640,000 |
|  | Fixed expenses: |  |  |
|  | Direct labor | $200,000 |  |
|  | Fixed manufacturing overhead | 250,000 |  |
|  | Fixed selling and administrative expense | 80,000 | 530,000 |
|  | Net operating income |  | $  110,000 |

**Exercise 6A-2** (20 minutes)

1. a. The unit product cost under super-variable costing would include direct materials of $13.

b. The super-variable costing income statement would be:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Sales (52,000 units × $40 per unit) |  | $2,080,000 |
|  | Variable cost of goods sold  (52,000 units × $13 per unit) |  | 676,000 |
|  | Contribution margin |  | 1,404,000 |
|  | Fixed expenses: |  |  |
|  | Direct labor | $750,000 |  |
|  | Fixed manufacturing overhead | 420,000 |  |
|  | Fixed selling and administrative expense | 110,000 | 1,280,000 |
|  | Net operating income |  | $  124,000 |

2. a. The unit product cost under variable costing would be:

|  |  |  |
| --- | --- | --- |
|  | Direct materials | $13.00 |
|  | Direct labor ($750,000 ÷ 60,000 units) | 12.50 |
|  | Variable costing unit product cost | $25.50 |

b. The variable costing income statement would be:

|  |  |  |
| --- | --- | --- |
| Sales (52,000 units × $40 per unit) |  | $2,080,000 |
| Variable cost of goods sold  (52,000 units × $25.50 per unit) |  | 1,326,000 |
| Contribution margin |  | 754,000 |
| Fixed expenses: |  |  |
| Fixed manufacturing overhead | 420,000 |  |
| Fixed selling and administrative expense | 110,000 | 530,000 |
| Net operating income |  | $  224,000 |

**Exercise 6A-2** (continued)

3. The difference between the super-variable costing and variable costing net operating incomes is explained as follows:

Units in ending inventory = Units in beginning inventory + Units produced – Units sold = 0 units + 60,000 units – 52,000 units  
= 8,000 units

Direct labor cost deferred in (released from) inventory = Direct labor cost ending inventory – Direct labor cost in beginning inventory   
= (8,000 units × $12.50 per unit) − $0  
= $100,000

|  |  |  |
| --- | --- | --- |
|  | Super-variable costing net operating income | $124,000 |
|  | Add direct labor cost deferred in inventory under variable costing | 100,000 |
|  | Variable costing net operating income | $224,000 |

**Exercise 6A-3** (20 minutes)

1 a. Under super-variable costing, the unit product cost for both years includes direct materials of $12.

1 b.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Year 1 | | Year 2 | | |
| Sales | $2,000,000 | | | $3,000,000 |
| Variable cost of goods sold (@ $12 per unit) | 480,000 | | | 720,000 |
| Contribution margin | 1,520,000 | | | 2,280,000 |
| Fixed expenses: |  | | |  |
| Direct labor | 500,000 | | | 500,000 |
| Fixed manufacturing overhead | 450,000 | | | 450,000 |
| Fixed selling and administrative | 180,000 | | | 180,000 |
| Total fixed expenses | 1,130,000 | | | 1,130,000 |
| Net operating income | $   390,000 | $1,150,000 | | |
|  |  |  | | | | |

2 a. The unit product costs under variable costing:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | *Year 1* | | *Year 2* | | | | |
| Direct materials | $12 | | $12 | | | | | |
| Direct labor | \*10 | | \*10 | | | | | |
| Variable costing unit product cost | $22 | | $22 | | | | | |
|  |  | |  | |
| \* $500,000 ÷ 50,000 units = $10 per unit. | |  | |  | |  |

**Exercise 6A-3** (continued)

2 b. The variable costing income statements would be:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Year 1 | | Year 2 | | |
| Sales | $2,000,000 | | | $3,000,000 |
| Variable cost of goods sold (@ $22 per unit) | 880,000 | | | 1,320,000 |
| Contribution margin | 1,120,000 | | | 1,680,000 |
| Fixed expenses: |  | | |  |
| Fixed manufacturing overhead | 450,000 | | | 450,000 |
| Fixed selling and administrative | 180,000 | | | 180,000 |
| Total fixed expenses | 630,000 | | | 630,000 |
| Net operating income | $  490,000 | $1,050,000 | | |

3. The net operating incomes are reconciled as follows:

|  |  |  |
| --- | --- | --- |
|  | *Year 1* | *Year 2* |
| Units in beginning inventory | 0 | 10,000 |
| + Units produced | 50,000 | 50,000 |
| − Units sold | 40,000 | 60,000 |
| = Units in ending inventory | 10,000 | 0 |

|  |  |  |
| --- | --- | --- |
|  | *Year 1* | *Year 2* |
| Direct labor cost in ending inventory (10,000 units × $10 per unit) | $100,000 | $         0 |
| − Direct labor cost in beginning inventory (10,000 units × $10 per unit) |  | 100,000 |
| = Direct labor cost deferred in (released from) inventory | $100,000 | $(100,000) |

|  |  |  |  |
| --- | --- | --- | --- |
|  | *Year 1* | *Year 2* | |
| Super-variable costing net operating income | $390,000 | $1,150,000 | |
| Add: Direct labor deferred in inventory under variable costing | 100,000 | |  |
| Deduct: Direct labor released from inventory under variable costing |  | | (100,000) |
| Variable costing net operating income | $490,000 | | $1,050,000 |

**Problem 6A-4** (30 minutes)

1 a. and b. The unit product cost for all three years under super-variable costing would include direct materials of $16 per unit. The super-variable costing income statements appear below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | *Year 1* | | *Year 2* | *Year 3* |
| Sales | $2,700,000 | | $2,475,000 | | $2,925,000 |
| Variable cost of goods sold (@ $16 per unit) | 960,000 | | 880,000 | | 1,040,000 |
| Contribution margin | 1,740,000 | | 1,595,000 | | 1,885,000 |
| Fixed expenses: |  | |  | |  |
| Direct labor | 540,000 | | 540,000 | | 540,000 |
| Fixed manufacturing overhead | 822,000 | | 822,000 | | 822,000 |
| Fixed selling and administrative | 370,000 | | 370,000 | | 370,000 |
| Total fixed expenses | 1,732,000 | | 1,732,000 | | 1,732,000 |
| Net operating income (loss) | $      8,000 | | $  (137,000) | | $  153,000 |

**Problem 6A-4** (continued)

2 a. The unit product costs under variable costing:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *Year 1* | | *Year 2* | *Year 3* |
| Direct materials | | $16 | $16 | $16 |
| Direct labor\* | | 9 | 9 | 9 |
| Variable costing unit product cost | | $25 | $25 | $25 |

\*Direct labor cost per unit for each year: $540,000 ÷ 60,000 units = $9.

2 b. The variable costing income statements appears below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | *Year 1* | | *Year 2* | *Year 3* |
| Sales | $2,700,000 | | $2,475,000 | | $2,925,000 |
| Variable cost of goods sold (@ $25 per unit) | 1,500,000 | | 1,375,000 | | 1,625,000 |
| Contribution margin | 1,200,000 | | 1,100,000 | | 1,300,000 |
| Fixed expenses: |  | |  | |  |
| Fixed manufacturing overhead | 822,000 | | 822,000 | | 822,000 |
| Fixed selling and administrative | 370,000 | | 370,000 | | 370,000 |
| Total fixed expenses | 1,192,000 | | 1,192,000 | | 1,192,000 |
| Net operating income (loss) | $      8,000 | | $   (92,000) | | $  108,000 |

**Problem 6A-4** (continued)

3. The net operating incomes are reconciled as follows:

|  |  |  |  |
| --- | --- | --- | --- |
|  | *Year 1* | *Year 2* | *Year 3* |
| Units in beginning inventory | 0 | 0 | 5,000 |
| + Units produced | 60,000 | 60,000 | 60,000 |
| − Units sold | 60,000 | 55,000 | 65,000 |
| = Units in ending inventory | 0 | 5,000 | 0 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | *Year 1* | *Year 2* | *Year 3* |
| Direct labor cost in ending inventory (5,000 units × $9 per unit) | $         0 | $45,000 | $         0 |
| − Direct labor cost in beginning inventory (5,000 units × $9 per unit) |  | 0 | 45,000 |
| = Direct labor cost deferred in (released from) inventory | $         0 | $45,000 | $(45,000) |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | | *Year 1* | *Year 2* | | | *Year 3* | |
| Super-variable costing net operating income (loss) | | $8,000 | $(137,000) | | | $153,000 |
| Add: Direct labor deferred in inventory under variable costing |  | | 45,000 | |  | |
| Deduct: Direct labor released from inventory under variable costing | |  |  | | (45,000) | |
| Variable costing net operating income (loss) | | $8,000 | | $ (92,000) | $108,000 | | |

**Problem 6A-5** (45 minutes)

1. a. The unit product cost under super-variable costing would include direct materials of $19.

b. The super-variable costing income statement would be:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Sales (18,000 units × $55 per unit) |  | $990,000 |
|  | Variable cost of goods sold  (18,000 units × $19 per unit) |  | 342,000 |
|  | Contribution margin |  | 648,000 |
|  | Fixed expenses: |  |  |
|  | Direct labor | $250,000 |  |
|  | Fixed manufacturing overhead | 300,000 |  |
|  | Fixed selling and administrative expense | 90,000 | 640,000 |
|  | Net operating income |  | $   8,000 |

2. a. The unit product cost under variable costing would be:

|  |  |  |
| --- | --- | --- |
|  | Direct materials | $19.00 |
|  | Direct labor ($250,000 ÷ 20,000 units) | 12.50 |
|  | Variable costing unit product cost | $31.50 |

b. The variable costing income statement would be:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Sales (18,000 units × $55 per unit) |  | $990,000 |
|  | Variable cost of goods sold  (18,000 units × $31.50 per unit) |  | 567,000 |
|  | Contribution margin |  | 423,000 |
|  | Fixed expenses: |  |  |
|  | Fixed manufacturing overhead | $300,000 |  |
|  | Fixed selling and administrative expense | 90,000 | 390,000 |
|  | Net operating income |  | $  33,000 |

**Problem 6A-5** (continued)

3. a. The unit product cost under absorption costing would be:

|  |  |  |
| --- | --- | --- |
|  | Direct materials | $19.00 |
|  | Direct labor ($250,000 ÷ 20,000 units) | 12.50 |
|  | Fixed manufacturing overhead ($300,000 ÷ 20,000 units) | 15.00 |
|  | Absorption costing unit product cost | $46.50 |

b. The absorption costing income statement would be:

|  |  |  |
| --- | --- | --- |
|  | Sales (18,000 units × $55 per unit) | $990,000 |
|  | Cost of goods sold (18,000 units × $46.50 per unit) | 837,000 |
|  | Gross margin | 153,000 |
|  | Selling and administrative expenses | 90,000 |
|  | Net operating income | $  63,000 |

4. The difference between the super-variable costing and variable costing net operating incomes is the direct labor deferred in (or released from) inventory during the period, which is determined as follows:

Units in ending inventory = Units in beginning inventory + Units produced – Units sold = 0 units + 20,000 units – 18,000 units   
= 2,000 units

Direct labor cost deferred in (released from) inventory = Direct labor cost in ending inventory – Direct labor cost in beginning inventory  
= (2,000 units × $12.50 per unit) – $0 = $25,000

|  |  |
| --- | --- |
| Super-variable costing net operating income | $ 8,000 |
| Add direct labor cost deferred in inventory under variable costing | 25,000 |
| Variable costing net operating income | $33,000 |

The difference between the super-variable costing and absorption costing net operating incomes is explained as follows:

Direct labor and fixed manufacturing overhead cost deferred in (released from) inventory = Direct labor and fixed manufacturing overhead cost in ending inventory – Direct labor and fixed manufacturing overhead cost in beginning inventory  
= (2,000 units × $27.50 per unit) – $0 = $55,000

**Problem 6A-5** (continued)

|  |  |
| --- | --- |
| Super-variable costing net operating income | $8,000 |
| Add direct labor and fixed manufacturing overhead cost deferred in inventory under absorption costing | 55,000 |
| Absorption costing net operating income | $63,000 | |