CHAPTER 3

EXERCISE 3-25 (5 MINUTES)

Work-in-Process Inventory ....................................................... 5,480
Raw-Material Inventory ....................................................... 4,600
Wages Payable.................................................................  680
Manufacturing Overhead ................................................  200

Finished-Goods Inventory......................................................... 5,480
Work-in-Process Inventory ....................................................... 5,480

EXERCISE 3-27 (20 MINUTES)

1. Raw-material inventory, January 1 .......................................................... $134,000
Add: Raw-material purchases ........................................................... 191,000
Raw material available for use ......................................................... $325,000
Deduct: Raw-material inventory, January 31 .......................................... 124,000
Raw material used in January ........................................................... 201,000
Direct labor......................................................................................... 300,000
Total prime costs incurred in January .................................................. $501,000

2. Total prime cost incurred in January .................................................... $501,000
Applied manufacturing overhead (60% × $300,000) ............................... 180,000
Total manufacturing cost for January .................................................. $681,000

3. Total manufacturing cost for January .................................................. $681,000
Add: Work-in-process inventory, January 1 ........................................... 235,000
Subtotal.............................................................................................. $916,000
Deduct: Work-in-process inventory, January 31 ........................................ 251,000
Cost of goods manufactured............................................................... $665,000

4. Finished-goods inventory, January 1 ..................................................... $125,000
Add: Cost of goods manufactured ....................................................... 665,000
Cost of goods available for sale .......................................................... $790,000
Deduct: Finished-goods inventory, January 31 ........................................ 117,000
Cost of goods sold.............................................................................. $673,000

Since the company accumulates overapplied or underapplied overhead until the end of
the year, no adjustment is made to cost of goods sold until December 31.

5. Applied manufacturing overhead for January ..................................... $180,000
Actual manufacturing overhead incurred in January .............................. 175,000
Overapplied overhead as of January 31 ................................................ $  5,000
The balance in the Manufacturing Overhead account on January 31 is a $5,000 credit balance.

NOTE: Actual selling and administrative expense, although given in the exercise, is irrelevant to the solution.

EXERCISE 3-28 (15 MINUTES)
1. Applied manufacturing overhead = total manufacturing costs \times 30%
   = $2,500,000 \times 30%
   = $750,000

   Applied manufacturing overhead = direct-labor cost \times 80%

   Direct-labor cost = applied manufacturing overhead \div 80%
   = $750,000 \div .8
   = $937,500

2. Direct-material cost = total manufacturing cost
   \quad – \quad direct labor cost
   \quad – \quad applied manufacturing overhead
   = $2,500,000 – $937,500 – $750,000
   = $812,500

3. Let \(X\) denote work-in-process inventory on December 31.

   \[
   \begin{align*}
   \text{Total manufacturing cost} & + \quad \text{work-in-process inventory, Jan.1} & - \quad \text{work-in-process inventory, Dec. 31} & = \quad \text{cost of goods manufactured} \\
   $2,500,000 & + \quad .75X & - \quad X & = \quad $2,425,000 \\
   .25X & = \quad $2,500,000 – $2,425,000 \\
   X & = \quad $300,000
   \end{align*}
   \]

   Work-in-process inventory on December 31 amounted to $300,000.

EXERCISE 3-30 (30 MINUTES)
1. CRUNCHM CEREAL COMPANY
   SCHEDULE OF COST OF GOODS MANUFACTURED
   FOR THE YEAR ENDED DECEMBER 31, 20X1

   Direct material:
   Raw-material inventory, January 1................................. $ 30,000
   Add: Purchases of raw material ....................................... 278,000
   Raw material available for use........................................ $308,000
Deduct: Raw-material inventory, December 31.............. 33,000

Raw material used...................................................... $275,000
Direct labor ................................................................. 120,000
Manufacturing overhead
Total manufacturing costs ........................................ $647,000
Add: Work-in-process inventory, January 1 .................... 39,000
Subtotal ......................................................................... 686,000
Deduct: Work-in-process inventory, December 31 ............ 42,900
Cost of goods manufactured ....................................... $643,100

*Applied manufacturing overhead is $252,000 ($120,000 \times 210\%). Actual manufacturing overhead is also $252,000, so there is no overapplied or underapplied overhead.

2. Finished-goods inventory, January 1 ........................................ $ 42,000
Add: Cost of goods manufactured .................................. 643,100
Cost of goods available for sale ..................................... $685,100
Deduct: Finished-goods inventory, December 31 ............. 46,200
Cost of goods sold ....................................................... $638,900

EXERCISE 3-32 (20 MINUTES)
1. Raw material:

Beginning inventory .................................................. $ 71,000
Add: Purchases ........................................................... ?
Deduct: Raw material used .......................................... 326,000
Ending inventory ....................................................... $ 81,000

Therefore, purchases for the year were......................... $336,000

2. Direct labor:

Total manufacturing cost ........................................... $686,000
Deduct: Direct material .............................................. 326,000
Direct labor and manufacturing overhead ..................... $360,000

\[ \text{Direct labor} = \frac{360,000}{1.6} \]

Direct labor = $225,000
3. Cost of goods manufactured:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work in process, beginning inventory</td>
<td>$80,000</td>
</tr>
<tr>
<td>Add: Total manufacturing costs</td>
<td>686,000</td>
</tr>
<tr>
<td>Deduct: Cost of goods manufactured</td>
<td>?</td>
</tr>
<tr>
<td>Work in process, ending inventory</td>
<td>$30,000</td>
</tr>
</tbody>
</table>

Therefore, cost of goods manufactured was $736,000

4. Cost of goods sold:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finished goods, beginning inventory</td>
<td>$90,000</td>
</tr>
<tr>
<td>Add: Cost of goods manufactured</td>
<td>736,000</td>
</tr>
<tr>
<td>Cost of goods available for sale</td>
<td>$826,000</td>
</tr>
<tr>
<td>Deduct: Cost of goods sold</td>
<td>?</td>
</tr>
<tr>
<td>Finished goods, ending inventory</td>
<td>$110,000</td>
</tr>
</tbody>
</table>

Therefore, cost of goods sold was $716,000

EXERCISE 3-34 (15 MINUTES)

NOTE: Actual selling and administrative expense, although given in the exercise, is irrelevant to the solution.

1. Predetermined overhead rate = \[ \frac{997,500}{75,000 \text{ hours}} \] = $13.30 per hour

2. To compute actual manufacturing overhead:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depreciation</td>
<td>$231,000</td>
</tr>
<tr>
<td>Property taxes</td>
<td>21,000</td>
</tr>
<tr>
<td>Indirect labor</td>
<td>82,000</td>
</tr>
<tr>
<td>Supervisory salaries</td>
<td>200,000</td>
</tr>
<tr>
<td>Utilities</td>
<td>59,000</td>
</tr>
<tr>
<td>Insurance</td>
<td>30,000</td>
</tr>
<tr>
<td>Rental of space</td>
<td>300,000</td>
</tr>
</tbody>
</table>

Indirect material:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning inventory, January 1</td>
<td>$48,000</td>
</tr>
<tr>
<td>Add: Purchases</td>
<td>94,000</td>
</tr>
<tr>
<td>Indirect material available for use</td>
<td>$142,000</td>
</tr>
<tr>
<td>Deduct: Ending inventory, December 31</td>
<td>63,000</td>
</tr>
<tr>
<td>Indirect material used</td>
<td>79,000</td>
</tr>
</tbody>
</table>

Actual manufacturing overhead = $1,002,000
Overapplied overhead = actual manufacturing overhead – applied manufacturing overhead

= $1,002,000 – ($13.30 × 80,000*) = $62,000

*Actual direct-labor hours.

3. Manufacturing Overhead .......................................................... 62,000
   Cost of Goods Sold ............................................................... 62,000

EXERCISE 3-39 (15 MINUTES)
Work-in-Process Inventory: Tanning Department ......................... 6,000a
   Manufacturing Overhead ....................................................... 6,000
   a $6,000 = 100 sq. ft. per set × 20 sets × $3 per sq. ft.
Work-in-Process Inventory: Assembly Department ..................... 540b
   Manufacturing Overhead ....................................................... 540
   b $540 = 3 machine hours × 20 sets × $9 per machine hour.
Work-in-Process Inventory: Saddle Department ......................... 3,200c
   Manufacturing Overhead ....................................................... 3,200
   c $3,200 = 40 direct-labor hours × 20 sets × $4 per direct-labor hour.
1. Predetermined overhead rate = \( \frac{\text{budgeted manufacturing overhead}}{\text{budgeted direct-labor hours}} \)
   \[ = \frac{240,000}{(2,000)(10)} = 12 \text{ per hour} \]

2. Journal entries:

   (a) Raw-Material Inventory .................................................. 33,000
       Accounts Payable .................................................. 33,000

   (b) Work-in-Process Inventory .......................................... 460
       Raw-Material Inventory ........................................... 460

   (c) Manufacturing Overhead ........................................... 100
       Manufacturing-Supplies Inventory .................... 100

   (d) Manufacturing Overhead ........................................... 8,000
       Accumulated Depreciation: Building ................ 8,000

   (e) Manufacturing Overhead ........................................... 400
       Cash ................................................................. 400

   (f) Work-in-Process Inventory ........................................ 34,000
       Wages Payable .................................................. 34,000

   To record direct-labor cost \([(1,000 + 700) \times 20]\).

   Work-in-Process Inventory ........................................ 20,400
   Manufacturing Overhead ........................................... 20,400

   To apply manufacturing overhead to work in process \((20,400 = 1,700 \times 12 \text{ per hour})\).

   (g) Manufacturing Overhead ........................................... 910
       Property Taxes Payable ........................................ 910

   (h) Manufacturing Overhead ........................................... 2,500
       Wages Payable .................................................. 2,500

   (i) Finished-Goods Inventory ........................................ 14,400
       Work-in-Process Inventory ................................... 14,400
PROBLEM 3-43 (CONTINUED)

(j) Accounts Receivable .................................................... 13,500
    Sales Revenue ................................................... 13,500

Cost of Goods Sold .................................................... 10,800*
    Finished-Goods Inventory .................................. 10,800

* $10,800 = (9/12)($14,400)

PROBLEM 3-45 (35 MINUTES)

1. Predetermined overhead rate = budgeted overhead ÷ budgeted machine hours
   = $840,000 ÷ 16,000 = $52.50 per machine hour

2. (a) Work-in-Process Inventory ....................................... 80,000*
      Raw-Material Inventory ......................................... 80,000

    Work-in-Process Inventory ..................................... 130,800**
      Wages Payable .................................................. 130,800
      * $21,000 + $44,000 + $15,000 = $80,000
      ** $35,000 + $22,000 + $65,000 + $8,800 = $130,800

(b) Manufacturing Overhead ......................................... 238,500
    Accumulated Depreciation ....................................... 34,000
    Wages Payable .................................................. 60,000
    Manufacturing Supplies Inventory ................................ 5,000
    Miscellaneous Accounts ......................................... 139,500

(c) Work-in-Process Inventory ....................................... 231,000*
    Manufacturing Overhead ......................................... 231,000
    * (1,200 + 700 + 2,000 + 500) x $52.50 = $231,000

(d) Finished-Goods Inventory ........................................ 315,250*
    Work-in-Process Inventory ....................................... 315,250
    * Job 64: $84,000 + $21,000 + $35,000 + (1,200 x $52.50) = $203,000
    Job 65: $53,500 + $22,000 + (700 x $52.50) = $112,250
    $315,250 = $203,000 + $112,250

(e) Accounts Receivable ............................................... 146,950*
    Sales Revenue .................................................... 146,950

    * $112,250 + $34,700 = $146,950

Cost of Goods Sold ................................................... 112,250
    Finished-Goods Inventory .................................. 112,250

3. Job no. 66 and no. 67 are in production as of March 31:
    Job 66: $44,000 + $65,000 + (2,000 x $52.50) ............... $214,000
    Job 67: $15,000 + $8,800 + (500 x $52.50) ............... 50,050
    Total .............................................................. $264,050
PROBLEM 3-45 (CONTINUED)
4. Finished-goods inventory increased by $203,000 ($315,250 - $112,250).
5. The company’s actual overhead amounted to $238,500, whereas applied overhead totaled $231,000. Thus, overhead was underapplied by $7,500.

PROBLEM 3-48 (30 MINUTES)
NOTE: Actual selling and administrative expense, although given in the exercise, is irrelevant to the solution.
1. Machining Dept. overhead rate = budgeted overhead ÷ budgeted machine hours
   = $4,000,000 ÷ 400,000 = $10 per machine hour

   Assembly Dept. overhead rate = budgeted overhead ÷ budgeted direct-labor cost
   = $3,080,000 ÷ $5,600,000 = 55% of direct-labor cost

2. The ending work-in-process inventory is carried at a cost of $153,530, computed as follows:
   Machining Department:
   - Direct material.............................................. $24,500
   - Direct labor.................................................... 27,900
   - Manufacturing overhead (360 x $10)............. 3,600 $  56,000
   Assembly Department:
   - Direct material.............................................. $  6,700
   - Direct labor.................................................... 58,600
   - Manufacturing overhead ($58,600 x 55%)..... 32,230  97,530
   Total cost........................................................ $153,530

3. Actual overhead in the Machining Department amounted to $4,260,000, whereas applied overhead totaled $4,250,000 (425,000 hours x $10). Thus, overhead was underapplied by $10,000 during the year.
4. Actual overhead in the Assembly Department amounted to $3,050,000, whereas applied overhead totaled $3,179,000 ($5,780,000 x 55%). Thus, overhead was overapplied by $129,000.
5. The company’s manufacturing overhead was overapplied by $119,000 ($129,000 - $10,000). As a result, excessive overhead flowed from Work-in-Process Inventory, to Finished-Goods Inventory, to Cost of Goods Sold, meaning that the Cost of Goods Sold account must be decreased at year-end.
6. The Work-in-Process account is charged with applied overhead, or $7,429,000 ($4,250,000 + $3,179,000).
7. The firm’s selection of cost drivers (or application bases) seems appropriate. There should be a strong correlation between the cost driver and the amount of overhead incurred. In the Machining Department, much of the overhead is probably related to the operation of machines. Similarly, in the Assembly Department, a considerable
portion of the overhead incurred is related to manual assembly (i.e., labor) operations.

PROBLEM 3-53 (30 MINUTES)

1. Predetermined overhead rate = \( \frac{\text{budgeted manufacturing overhead}}{\text{budgeted machine hours}} \)

\[ = \frac{\$235,000}{47,000} = \$5 \text{ per machine hour} \]

2. Calculation of applied manufacturing overhead:

Applied manufacturing overhead = machine hrs. used \( \times \) predetermined overhead rate

\[ \$20,000 = 4,000 \text{ hrs. } \times \$5 \text{ per hr.} \]

3. Underapplied overhead = actual overhead \( - \) applied overhead

\[ \$6,000 = \$26,000 - \$20,000 \]

4. Cost of Goods Sold ........................................................... 6,000
Manufacturing Overhead ........................................ 6,000

5. (a) Calculation of proration amounts:

<table>
<thead>
<tr>
<th>Account</th>
<th>Explanation</th>
<th>Amount*</th>
<th>Percentage</th>
<th>Calculation of Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work in Process</td>
<td>Job P82 only</td>
<td>$2,500</td>
<td>12.5%</td>
<td>2,500 ( \div ) 20,000</td>
</tr>
<tr>
<td>Finished Goods</td>
<td>Job N08 only</td>
<td>12,500</td>
<td>62.5%</td>
<td>12,500 ( \div ) 20,000</td>
</tr>
<tr>
<td>Cost of Goods Sold</td>
<td>Job A79 only</td>
<td>5,000</td>
<td>25.0%</td>
<td>5,000 ( \div ) 20,000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$20,000</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

*Machine hours used on job \( \times \) predetermined overhead rate.

<table>
<thead>
<tr>
<th>Account</th>
<th>Underapplied Overhead</th>
<th>( \times )</th>
<th>Percentage</th>
<th>Amount Added to Account</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work in Process</td>
<td>$6,000</td>
<td>( \times )</td>
<td>12.5%</td>
<td>$750</td>
</tr>
<tr>
<td>Finished Goods</td>
<td>6,000</td>
<td>( \times )</td>
<td>62.5%</td>
<td>3,750</td>
</tr>
<tr>
<td>Cost of Goods Sold</td>
<td>6,000</td>
<td>( \times )</td>
<td>25.0%</td>
<td>1,500</td>
</tr>
</tbody>
</table>
(b) Journal entry:

<table>
<thead>
<tr>
<th>Account</th>
<th>Debit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work-in-Process Inventory</td>
<td>750</td>
</tr>
<tr>
<td>Finished-Goods Inventory</td>
<td>3,750</td>
</tr>
<tr>
<td>Cost of Goods Sold</td>
<td>1,500</td>
</tr>
<tr>
<td>Manufacturing Overhead</td>
<td>6,000</td>
</tr>
</tbody>
</table>

Total $6,000