EXERCISES

Ex. 22–1 (FIN MAN); Ex. 7–1 (MAN)

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
<th>×</th>
<th>Price</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cocoa</td>
<td>510 lbs.</td>
<td>×</td>
<td>$0.70 per lb.</td>
<td>$357.00</td>
</tr>
<tr>
<td>Sugar</td>
<td>150 lbs.</td>
<td>×</td>
<td>$1.18 per lb.</td>
<td>177.00</td>
</tr>
<tr>
<td>Milk</td>
<td>120 gal.</td>
<td>×</td>
<td>$1.80 per gal.</td>
<td>216.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$750.00</strong></td>
</tr>
</tbody>
</table>

Standard direct materials cost per bar of chocolate:

\[
\frac{\$750.00 \text{ per batch}}{5,000 \text{ bars}} = \$0.15 \text{ per bar}
\]

Ex. 22–2 (FIN MAN); Ex. 7–2 (MAN)

a. Direct labor ...............................................  $16.00 × 1.8 hrs. $ 28.80
   Direct materials ........................................  $12.50 × 17 bd. ft. 212.50
   Variable factory overhead ........................  $2.40 × 1.8 hrs.  4.32
   Fixed factory overhead ............................  $1.10 × 1.8 hrs. 1.98
   **Total cost per unit** ...............................     $247.60

b. A standard cost system provides Cumberland management a cost control tool using the principle of management by exception. Using this principle, costs that deviate significantly from standards can be investigated and corrected. The standard cost system can also be used to motivate employees to work efficiently with their time, use of materials, and other factory overhead resources.
Ex. 22–3 (FIN MAN); Ex. 7–3 (MAN)

a. 

<table>
<thead>
<tr>
<th>PET BOTTLE COMPANY</th>
<th>Manufacturing Cost Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For the Month Ended March 31, 2012</td>
</tr>
<tr>
<td>Manufacturing costs:</td>
<td>Standard Cost at Planned Volume (450,000 Bottles)</td>
</tr>
<tr>
<td>Direct labor</td>
<td>$  5,940</td>
</tr>
<tr>
<td>Direct materials</td>
<td>24,030</td>
</tr>
<tr>
<td>Factory overhead</td>
<td>1,530</td>
</tr>
<tr>
<td>Total</td>
<td>$31,500</td>
</tr>
</tbody>
</table>

$1.32 \times (450,000/100) = $5,940 \\
$5.34 \times (450,000/100) = $24,030 \\
$0.34 \times (450,000/100) = $1,530 \\

Note: The cost standards are expressed as “per 100 bottles.”

b. 

<table>
<thead>
<tr>
<th>PET BOTTLE COMPANY</th>
<th>Manufacturing Costs—Budget Performance Report</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For the Month Ended March 31, 2012</td>
</tr>
<tr>
<td>Manufacturing costs:</td>
<td>Actual Costs</td>
</tr>
<tr>
<td>Direct labor</td>
<td>$  5,900</td>
</tr>
<tr>
<td>Direct materials</td>
<td>25,300</td>
</tr>
<tr>
<td>Factory overhead</td>
<td>1,900</td>
</tr>
<tr>
<td>Total manufacturing cost</td>
<td>$33,100</td>
</tr>
</tbody>
</table>

$1.32 \times (500,000/100) = $6,600 \\
$5.34 \times (500,000/100) = $26,700 \\
$0.34 \times (500,000/100) = $1,700

c. Pet Bottle Company’s actual costs were $1,900 less than budgeted. Favorable direct labor and direct material cost variances more than offset a small unfavorable factory overhead cost variance.

Note to Instructors: The budget prepared in part (a) at the beginning of the month should not be used in the budget performance report because actual volumes were greater than planned (500,000 vs. 450,000).
Ex. 22–4 (FIN MAN); Ex. 7–4 (MAN)

a. **Price variance:**

Direct Materials Price Variance = (Actual Price – Standard Price) \times Actual Quantity

Direct Materials Price Variance = ($2.05 per lb. – $2.00 per lb.) \times 43,100 lbs.

Direct Materials Price Variance = $2,155 Unfavorable Variance

**Quantity variance:**

Direct Materials Quantity Variance = (Actual Quantity – Standard Quantity) \times Standard Price

Direct Materials Quantity Variance = (43,100 lbs. – 44,100 lbs.) \times $2.00 per lb.

Direct Materials Quantity Variance = – $2,000 Favorable Variance

**Total direct materials cost variance:**

Direct Materials Cost Variance = Direct Materials Price Variance + Direct Materials Quantity Variance

Direct Materials Cost Variance = $2,155 – $2,000

Direct Materials Cost Variance = $155 Unfavorable Variance

b. The direct materials price variance should normally be reported to the Purchasing Department, which may or may not be able to control this variance. If materials of the same quality were purchased from another supplier at a price higher than the standard price, the variance was controllable. However, if the variance resulted from a market-wide price increase, the variance was not subject to control.

The direct materials quantity variance should be reported to the proper level of operating management. For example, if lower amounts of direct materials had been used because of production efficiencies, the variance would be reported to the production supervisor. However, if the favorable use of raw materials had been caused by the purchase of higher-quality raw materials, the variance should be reported to the Purchasing Department.

The total materials cost variance should be reported to senior plant management, such as the plant manager or materials manager.
Ex. 22–5 (FIN MAN); Ex. 7–5 (MAN)

Price variance:
Direct Materials Price Variance = (Actual Price – Standard Price) × Actual Quantity
Direct Materials Price Variance = ($8.00 per unit – $8.60 per unit) × 570
Direct Materials Price Variance = – $342 Favorable Variance
* $4,560/570 units = $8 per unit

Quantity variance:
Direct Materials Quantity Variance = (Actual Quantity – Standard Quantity) × Standard Price
Direct Materials Quantity Variance = (570 units – 540 units) × $8.60 per unit
Direct Materials Quantity Variance = $258 Unfavorable Variance

Total direct materials cost variance:
Direct Materials Cost Variance = Direct Materials Price Variance + Direct Materials Quantity Variance
Direct Materials Cost Variance = – $342 + $258
Direct Materials Cost Variance = – $84 Favorable Variance

Ex. 22–6 (FIN MAN); Ex. 7–6 (MAN)

Product finished ................................................................... 460 units
Standard finished product for direct materials used
(2,000 lbs./4 lbs.) .................................................................. 500
Deficiency of finished product for materials used ...... (40 units)

Standard cost for direct materials:
Quantity variance divided by deficiency of product for materials used ($500/40 units) ....................... $12.50

Alternate solution:
Materials used ..................................................................... 2,000 lbs.
Price variance, favorable .................................................. $1,450
Price variance per lb. ($1,450/2,000 lbs.), favorable .... $0.725
Unit price of direct materials ............................................... $2.400
Plus price variance (favorable) per lb. ......................... $0.725
Standard price per lb. ...................................................... $3.125
Pounds per unit of product ............................................. × 4
Standard direct materials cost per unit of product..... $12.50
Ex. 22–7 (FIN MAN); Ex. 7–7 (MAN)

a. 

<table>
<thead>
<tr>
<th>Standard</th>
<th>Standard</th>
<th>Standard Cost per Batch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity</td>
<td>Price</td>
<td>=</td>
</tr>
<tr>
<td>Whole tomatoes</td>
<td>2,400</td>
<td>$ 0.45</td>
</tr>
<tr>
<td>Vinegar</td>
<td>160</td>
<td>2.75</td>
</tr>
<tr>
<td>Corn syrup</td>
<td>14</td>
<td>10.00</td>
</tr>
<tr>
<td>Salt</td>
<td>62</td>
<td>2.50</td>
</tr>
</tbody>
</table>

$ 1,815

Pounds per batch

\(\frac{1,500}{\text{lbs.}}\)

$ 1.21 per lb.

b. 

<table>
<thead>
<tr>
<th>Actual Quantity for Batch K-54</th>
<th>Standard Quantity per Batch</th>
<th>Quantity Difference</th>
<th>Standard Price</th>
<th>Materials Quantity Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,540</td>
<td>2,400</td>
<td>140</td>
<td>$ 0.45</td>
<td>$ 63 U</td>
</tr>
<tr>
<td>164</td>
<td>160</td>
<td>4</td>
<td>2.75</td>
<td>11 U</td>
</tr>
<tr>
<td>13</td>
<td>14</td>
<td>–1</td>
<td>10.00</td>
<td>– 10 F</td>
</tr>
<tr>
<td>60</td>
<td>62</td>
<td>–2</td>
<td>2.50</td>
<td>– 5 F</td>
</tr>
</tbody>
</table>

$ 59 U
Ex. 22–8 (FIN MAN); Ex. 7–8 (MAN)

a. **Rate variance:**

   Direct Labor Rate Variance = (Actual Rate per Hour – Standard Rate per Hour) × Actual Hours

   Direct Labor Rate Variance = ($16.40 – $16.70) × 3,450 hrs.
   Direct Labor Rate Variance = – $1,035 Favorable Variance

**Time variance:**

   Direct Labor Time Variance = (Actual Direct Labor Hours – Standard Direct Labor Hours) × Standard Rate per Hour

   Direct Labor Time Variance = (3,450 hrs. – 3,390 hrs.) × $16.70 per hour
   Direct Labor Time Variance = $1,002 Unfavorable Variance

**Total direct labor cost variance:**

   Direct Labor Cost Variance = Direct Labor Rate Variance + Direct Labor Time Variance

   Direct Labor Cost Variance = – $1,035 + $1,002
   Direct Labor Cost Variance = – $33 Favorable Variance

b. The employees may have been less experienced or poorly trained, thereby resulting in a lower labor rate than planned. The lower level of experience or training may have resulted in less efficient performance. Thus, the actual time required was more than standard. Fortunately, the lost efficiency is offset by the lower labor rate.
Ex. 22–9 (FIN MAN); Ex. 7–9 (MAN)

a. Rate variance:

Direct Labor Rate Variance = (Actual Rate per Hour – Standard Rate per Hour) × Actual Hours

Direct Labor Rate Variance = ($14.00 – $14.20) × 650 hrs.

Direct Labor Rate Variance = – $130 Favorable Variance

Time variance:

Direct Labor Time Variance = (Actual Direct Labor Hours – Standard Direct Labor Hours) × Standard Rate per Hour

Direct Labor Time Variance = (650 hrs. – 630 hrs. *) × $14.20 per hour

Direct Labor Time Variance = $284 Unfavorable Variance

*2.25 hrs. × 280 units

Total direct labor cost variance:

Direct Labor Cost Variance = Direct Labor Rate Variance + Direct Labor Time Variance

Direct Labor Cost Variance = – $130 + $284

Direct Labor Cost Variance = $154 Unfavorable Variance

b. Debit to Work in Process: $8,946

<table>
<thead>
<tr>
<th>Standard hours at actual production</th>
<th>630</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard rate</td>
<td>×$14.20</td>
</tr>
<tr>
<td>Standard direct labor cost</td>
<td>$ 8,946</td>
</tr>
</tbody>
</table>
a.
(1) Cutting Department

Rate variance:

Direct Labor Rate Variance = (Actual Rate per Hour – Standard Rate per Hour) × Actual Hours

Direct Labor Rate Variance = ($11.80 – $12.00) × 3,500 hrs.
Direct Labor Rate Variance = – $700 Favorable Variance

Time variance:

Direct Labor Time Variance = (Actual Direct Labor Hours – Standard Direct Labor Hours) × Standard Rate per Hour

Direct Labor Time Variance = (3,500 hrs. – 3,420 hrs.*) × $12.00 per hour
Direct Labor Time Variance = $960 Unfavorable Variance

*0.19 hr. × 18,000 units

Total direct labor cost variance:

Direct Labor Cost Variance = Direct Labor Rate Variance + Direct Labor Time Variance

Direct Labor Cost Variance = – $700 + $960
Direct Labor Cost Variance = $260 Unfavorable Variance
(2) Sewing Department

Rate variance:
Direct Labor Rate Variance = (Actual Rate per Hour – Standard Rate per Hour) × Actual Hours
Direct Labor Rate Variance = ($12.15 – $12.00) × 5,800 hrs.
Direct Labor Rate Variance = $870 Unfavorable Variance

Time variance:
Direct Labor Time Variance = (Actual Direct Labor Hours – Standard Direct Labor Hours) × Standard Rate per Hour
Direct Labor Time Variance = (5,800 hrs. – 5,940 hrs.*) × $12.00 per hour
Direct Labor Time Variance = – $1,680 Favorable Variance
*0.33 hr. × 18,000 units

Total direct labor cost variance:
Direct Labor Cost Variance = Direct Labor Rate Variance + Direct Labor Time Variance
Direct Labor Cost Variance = $870 – $1,680
Direct Labor Cost Variance = – $810 Favorable Variance

b. The two departments have opposite results. The Cutting Department has a favorable rate and an unfavorable time variance, resulting in a total unfavorable cost variance of $260. In contrast, the Sewing Department has an unfavorable rate variance, but has a very favorable time variance, resulting in a total favorable cost variance of $810. The causes of this disparity are worthy of investigation. There are many possible causes including tight or loose standards, inferior or superior operating methods, and inappropriate or appropriate use of overtime. Combining both departments, the overall operation shows a favorable cost variance of – $550 ($260 – $810), as a result of the strong performance in the Sewing Department.
Ex. 22–11 (FIN MAN); Ex. 7–11 (MAN)

a. Actual weekly expenditure: 2 people $12.00 per hr. $12.00 per hr. 40 hrs. per week = $960

b. Standard time used for the volume of admissions:

<table>
<thead>
<tr>
<th></th>
<th>Unscheduled</th>
<th>Scheduled</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of admissions</td>
<td>60</td>
<td>210</td>
<td></td>
</tr>
<tr>
<td>Standard time ........</td>
<td>× 40 min.</td>
<td>× 10 min.</td>
<td></td>
</tr>
<tr>
<td>Total ..................</td>
<td>2,400 min.</td>
<td>2,100 min.</td>
<td>4,500 min.</td>
</tr>
</tbody>
</table>

75 hrs. (+ 60 min.)

c. Actual productive minutes available

(2 employees × 40 hrs. × 60 min.) 4,800
Less standard minutes used at actual volume 4,500
Time difference from standard 300
Standard rate per minute × $0.20
Direct labor time variance—unfavorable $ 60

or

[(2 × 40 hours) – 75 hours] × $12 per hour = $60
or
$960 [from (a)] – $900 = $60

1Standard direct labor rate:
$12/60 min. = $0.20 per min.

2Standard labor cost at actual volume:
Productive time (4,500/60) × $12 = $900

The Admissions Department was less efficient than standard by 300 minutes, or five hours. This is equal to $60 at the standard rate of $12 per hour.
Ex. 22–12 (FIN MAN); Ex. 7–12 (MAN)

a. Standard Sorts per Minute × Standard Minutes per Hour = Standard Sorts per Hour (per employee)
   60 sorts per min. × 60 min. per hr. = 3,600 standard sorts per hr.

Pieces of Mail ÷ Standard Sorts per Hour = Number of Hours Planned
35,100,000 letters ÷ 3,600 sorts per hr. = 9,750 hrs. planned

Number of Hours Planned ÷ Hours per Temporary Employee per Month = Number of Hires
9,750 hrs. ÷ 150 hrs. = 65 temporary hires for December

b. Actual pieces sorted = 34,020,000

Actual Pieces of Mail Sorted ÷ Standard Sorts per Hour = Standard Number of Hours for Actual Production
34,020,000 ÷ 3,600 standard sorts per hr. = 9,450 standard hrs. for actual production

<table>
<thead>
<tr>
<th>Actual hours staffed</th>
<th>9,750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard hours for actual production</td>
<td>9,450</td>
</tr>
<tr>
<td>Excess of actual over standard hours</td>
<td>300</td>
</tr>
<tr>
<td>Standard hourly rate</td>
<td>$16</td>
</tr>
<tr>
<td>Direct labor time variance—unfavorable</td>
<td>$4,800</td>
</tr>
</tbody>
</table>
Ex. 22–13 (FIN MAN); Ex. 7–13 (MAN)

Step 1: Determine the standard direct materials and direct labor per unit.

Standard direct materials quantity per unit:

\[
\text{Direct materials lbs. budgeted for June:} \quad \frac{\$24,000}{\$0.75 \text{ per lb.}} = 32,000 \text{ lbs.}
\]

Standard pounds per unit:

\[
\frac{32,000 \text{ lbs.}}{16,000 \text{ units}} = 2.0 \text{ standard lbs. per unit}
\]

Standard direct labor time per unit:

\[
\text{Direct labor hrs. budgeted for June:} \quad \frac{\$8,000}{\$12.50 \text{ per hr.}} = 640 \text{ direct labor hrs.}
\]

Standard direct labor hrs. per unit:

\[
\frac{640 \text{ hrs.}}{16,000 \text{ units}} = 0.04 \text{ standard direct labor hr. per unit}
\]

Step 2: Using the standard quantity and time rates in step 1, determine the standard costs for the actual June production.

\[
\text{Standard direct materials at actual volume:} \quad 14,000 \text{ units} \times 2.0 \text{ lbs. per unit} \times \$0.75 = \$21,000
\]

\[
\text{Standard direct labor at actual volume:} \quad 14,000 \text{ units} \times 0.04 \text{ direct labor hr. per unit} \times \$12.50 = \$7,000
\]

Total

\[
\$28,000
\]

Step 3: Determine the direct materials quantity and direct labor time variances, assuming no direct materials price or direct labor rate variances.

\[
\text{Actual direct materials used in production} \quad \$21,300
\]

\[
\text{Standard direct materials (step 2)} \quad \$21,000
\]

\[
\text{Direct materials quantity variance—unfavorable} \quad \$300^*
\]

\[
*(28,400 \text{ lbs.} - 28,000 \text{ lbs.}) \times \$0.75 = \$300 \text{ U}
\]

\[
\text{Actual direct labor} \quad \$6,800
\]

\[
\text{Standard direct labor (step 2)} \quad \$7,000
\]

\[
\text{Direct labor time variance—favorable} \quad \$-200^{**}
\]

\[
**14,000 \text{ units} \times 0.04 \text{ hr.} = 560 \text{ standard hrs.}
\]

\[
\text{Actual} \quad \$6,800/\$12.50 = 544 \text{ actual hrs.}
\]

\[
(544 \text{ hrs.} - 560 \text{ hrs.}) \times \$12.50 = -\$200 \text{ F}
\]
Ex. 22–14 (FIN MAN); Ex. 7–14 (MAN)

### CARSON WOOD PRODUCTS COMPANY

### Factory Overhead Cost Budget—Press Department

For the Month Ended May 31, 2012

<table>
<thead>
<tr>
<th>Direct labor hours</th>
<th>8,000</th>
<th>10,000</th>
<th>12,000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable overhead cost:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect factory labor</td>
<td>$ 66,400 $</td>
<td>$ 83,000</td>
<td>$ 99,600</td>
</tr>
<tr>
<td>Power and light</td>
<td>3,040 $</td>
<td>3,800 $</td>
<td>4,560 $</td>
</tr>
<tr>
<td>Indirect materials</td>
<td>22,400 $</td>
<td>28,000 $</td>
<td>33,600 $</td>
</tr>
<tr>
<td><strong>Total variable factory overhead</strong></td>
<td>$ 91,840</td>
<td>$ 114,800</td>
<td>$ 137,760</td>
</tr>
<tr>
<td><strong>Fixed factory overhead cost:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supervisory salaries</td>
<td>$ 40,000</td>
<td>$ 40,000</td>
<td>$ 40,000</td>
</tr>
<tr>
<td>Depreciation of plant and equipment</td>
<td>25,000</td>
<td>25,000</td>
<td>25,000</td>
</tr>
<tr>
<td>Insurance and property taxes</td>
<td>16,000</td>
<td>16,000</td>
<td>16,000</td>
</tr>
<tr>
<td><strong>Total fixed factory overhead</strong></td>
<td>$ 81,000</td>
<td>$ 81,000</td>
<td>$ 81,000</td>
</tr>
<tr>
<td><strong>Total factory overhead</strong></td>
<td>$172,840</td>
<td>$195,800</td>
<td>$218,760</td>
</tr>
</tbody>
</table>

1. $8,000 × ($83,000/10,000)
2. $8,000 × ($3,800/10,000)
3. $8,000 × ($28,000/10,000)
Ex. 22–15 (FIN MAN); Ex. 7–15 (MAN)

a.  

<table>
<thead>
<tr>
<th>Direct labor hours</th>
<th>13,000</th>
<th>14,000</th>
<th>15,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable factory overhead cost</td>
<td>$50,700</td>
<td>$54,600</td>
<td>$58,500</td>
</tr>
<tr>
<td>Fixed factory overhead cost</td>
<td>$72,800</td>
<td>$72,800</td>
<td>$72,800</td>
</tr>
<tr>
<td>Total factory overhead</td>
<td>$123,500</td>
<td>$127,400</td>
<td>$131,300</td>
</tr>
</tbody>
</table>

b. Overhead applied at actual production:

Actual hours ................................................................. 15,000
× Overhead application rate ................................................... × $9.10*
Factory overhead applied ...................................................... $136,500

*Total factory overhead rate to be applied to production:

Variable factory overhead ............................................. $3.90
Fixed factory overhead ................................................... 5.20**
Total .............................................................................. $9.10

**Fixed factory overhead rate: \( \frac{72,800}{14,000} = 5.20 \) per hr.

Note: The fixed factory overhead rate is determined at normal production.
Variable factory overhead controllable variance:

Actual variable factory overhead cost incurred...... $130,000  
Budgeted variable factory overhead for 5,000 hrs. 
\[5,000 \times ($32.00 – $4.75)\] ...................................... 136,250  
Variance—favorable............................................. $ – 6,250

Fixed factory overhead volume variance:

Productive capacity at 100%................................. 6,500 hrs.  
Standard for amount produced ............................... 5,000 hrs.  
Productive capacity not used ............................... 1,500 hrs.  
Standard fixed factory overhead rate....................... \(\times $4.75\)  
Variance—unfavorable........................................... 7,125

Total factory overhead cost variance—unfavorable .... $ 875*

*Actual Overhead – Applied Overhead = Total Overhead Variance:  
($130,000 + $30,875) – $160,000 = $875

Alternative Computation of Overhead Variances

<table>
<thead>
<tr>
<th>Actual costs</th>
<th>160,875</th>
<th>Applied costs</th>
<th>160,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance</td>
<td>875</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Actual Factory Overhead

Budgeted Factory Overhead for Amount Produced

Variable cost \[5,000 \times ($32.00 – $4.75)\] $136,250

Fixed cost $30,875

Total $167,125

– $6,250 F Controllable Variance

$7,125 U Volume Variance

$875 U Total Factory Overhead Cost Variance
Ex. 22–17 (FIN MAN); Ex. 7–17 (MAN)

a. Controllable variance:

Actual variable factory overhead
($178,900 – $62,000) ......................... $116,900

Standard variable factory overhead at
actual production:
Standard hours at actual production ...... 31,000
Variable factory overhead rate \(^1\) .......... × $4.15
Standard variable factory overhead .... 128,650
Controllable variance—favorable .......... $ –11,750

b. Volume variance:

Volume at 100% of normal capacity .......... 40,000
Less standard hours .......................... 31,000
Idle capacity ........................................ 9,000
Fixed overhead rate \(^2\) ....................... × $1.55
Volume variance—unfavorable ............... 13,950
Total factory overhead cost
variance—unfavorable ......................... $ 2,200 \(^3\)

\(^1\) Variable factory overhead rate: \(
\frac{\$124,500}{30,000\text{ hrs.}}\) = $4.15 per hr.

\(^2\) Fixed factory overhead rate: \(
\frac{\$62,000}{40,000\text{ hrs.}}\) = $1.55 per hr.

\(^3\) Actual Overhead – Applied Overhead = Total Overhead Variance:
$178,900 – [($4.15 + $1.55) × 31,000 hrs.] = $2,200
Ex. 22–17 (FIN MAN); Ex. 7–17 (MAN)  (Concluded)

Alternative Computation of Overhead Variances

Factory Overhead

Actual costs 178,900  Applied costs 176,700*

Balance (underapplied) 2,200

Actual Factory Overhead

Budgeted Factory Overhead for Amount Produced

Variable cost (31,000 × $4.15) 128,650

Fixed cost 62,000

Total 190,650

$190,650

– $11,750 F. Controllable Variance

Volume Variance $13,950 U

Total Factory Overhead Cost Variance $2,200 U

*$[(4.15 + 1.55) × 31,000]
In determining the volume variance, the productive capacity overemployed (1,000 hours) should be multiplied by the standard fixed factory overhead rate of $2.10 ($5.00 − $2.90) to yield a favorable variance of $2,100. The variance analysis provided by the chief cost accountant incorrectly multiplied the 1,000 hours by the total factory overhead rate of $5.00 per hour and reported it as unfavorable.

A correct determination of the factory overhead cost variances is as follows:

Variable factory overhead controllable variance:
- Actual variable factory overhead cost incurred...... $218,900
- Budgeted variable factory overhead for 76,000 hours (76,000 × $2.90) ........................................... 220,400
- Variance—favorable .............................................. $ – 1,500

Fixed factory overhead volume variance:
- Productive capacity at 100%........................................ 75,000 hrs.
- Standard for amount produced ................................. 76,000 hrs.
- Productive capacity overemployed .......................... (1,000) hrs.
- Standard fixed factory overhead rate ....................... × $2.10
- Variance—favorable .............................................. $ – 2,100

Total factory overhead cost variance—favorable........ $ – 3,600

**Alternative Computation of Overhead Variances**

<table>
<thead>
<tr>
<th>Factory Overhead</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual costs 376,400</td>
</tr>
<tr>
<td>($218,900 + $157,500)</td>
</tr>
<tr>
<td>Balance (overapplied) 3,600</td>
</tr>
</tbody>
</table>

Actual Factory Overhead:
- $376,400
  - Variable cost (76,000 × $2.90)
  - Fixed cost
  - Total
  - $1,500 F

Budgeted Factory Overhead for Amount Produced:
- $220,400
- $157,500
- $377,900

Applied Factory Overhead:
- $380,000
- $157,500
- $380,000
- $2,100 F

Total Factory Overhead Cost Variance:
- $3,600 F
Ex. 22–19 (FIN MAN); Ex. 7–19 (MAN)

<table>
<thead>
<tr>
<th>MEDICAL MOLDED PRODUCTS INC.</th>
<th>Factory Overhead Cost Variance Report—Trim Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>For the Month Ended March 31, 2012</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Productive capacity for the month</th>
<th>15,000 hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual productive capacity used for the month</td>
<td>11,000 hrs.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable factory overhead costs:(^1)</th>
<th>Budget</th>
<th>Actual</th>
<th>Favorable</th>
<th>Unfavorable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect factory labor</td>
<td>$ 31,900</td>
<td>$ 31,100</td>
<td>$800</td>
<td></td>
</tr>
<tr>
<td>Power and light</td>
<td>8,250</td>
<td>8,100</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Indirect materials</td>
<td>14,300</td>
<td>15,000</td>
<td>$ 700</td>
<td></td>
</tr>
<tr>
<td>Total variable factory overhead cost</td>
<td>$ 54,450</td>
<td>$ 54,200</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fixed factory overhead costs:</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisory salaries</td>
<td>$ 34,100</td>
<td>$ 34,100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation of plant and equipment</td>
<td>24,800</td>
<td>24,800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance and property taxes</td>
<td>22,100</td>
<td>22,100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total fixed factory overhead cost</td>
<td>$ 81,000</td>
<td>$ 81,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Total factory overhead cost           | $135,450 | $135,200 |          |
| Total controllable variances          | $950     | $ 700    |
| Net controllable variance—favorable   | $(250)   |
| Volume variance—unfavorable:          |          |
| Idle hours at the standard rate for fixed factory overhead— | 21,600 |
| (15,000 hrs. – 11,000 hrs.) × $5.40\(^2\) |          |
| Total factory overhead cost variance—unfavorable | $21,350 |

\(^1\)The budgeted variable factory overhead costs are determined by multiplying 11,000 hours by the variable factory overhead cost rate for each variable cost category. These rates are determined by dividing each budgeted amount (estimated at the beginning of the month) by the planned (budgeted) volume of 10,000 hours. Thus, for example:

$\frac{31,900}{10,000} = $29.90 per hr.

\(^2\)Fixed factory overhead rate: \(\frac{81,000}{15,000\text{ hrs.}} = 5.40\text{ per hr.}\)
Ex. 22–19 (FIN MAN); Ex. 7–19 (MAN)  (Concluded)

Alternative Computation of Overhead Variances

<table>
<thead>
<tr>
<th>Factory Overhead</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Actual costs</strong></td>
</tr>
<tr>
<td><strong>Balance</strong></td>
</tr>
<tr>
<td><strong>(underapplied)</strong></td>
</tr>
<tr>
<td><strong>Applied costs</strong></td>
</tr>
<tr>
<td><strong>135,200</strong></td>
</tr>
<tr>
<td><strong>113,850</strong></td>
</tr>
<tr>
<td><strong>21,350</strong></td>
</tr>
<tr>
<td><strong>[11,000 × ($4.95 + $5.40)]</strong></td>
</tr>
</tbody>
</table>

Actual Factory Overhead

Budgeted Factory Overhead for Amount Produced

Applied Factory Overhead

-$250 F  
Controllable Variance

$21,350 U  
Total Factory Overhead Cost Variance

*$49,500/10,000 hours budgeted at the beginning of the month
Ex. 22–20 (FIN MAN); Ex. 7–20 (MAN)

a. Materials ............................................................................... 110,500
   Direct Materials Price Variance .......................................... 6,630
   Accounts Payable ...................................................................... 117,130
   $1,700 × $65.00
   $1,700 × $3.90
   $1,700 × $68.90

b. Work in Process .................................................................. 72,800
   Direct Materials Quantity Variance ............................... 7,800
   Materials ......................................................................... 65,000
   $140 × 8 units × $65.00
   (1,120 units – 1,000 units) × $65.00
   $1,000 × $65.00

Ex. 22–21 (FIN MAN); Ex. 7–21 (MAN)

June 30 Work in Process ................................................... 52,500
   Direct Labor Time Variance .............................................. 4,500
   Direct Labor Rate Variance .............................................. 1,520
   Wages Payable ........................................................... 55,480

*2,000 × 1.75 hrs. × $15.00
Direct labor time variance: (3,800 – 3,500) × $15.00 = $4,500 U
Direct labor rate variance: ($14.60 – $15.00) × 3,800 = $1,520 F
**3,800 hours × $14.60 per hour
Ex. 22–22 (FIN MAN); Ex. 7–22 (MAN)

GENTRY COMPANY
Income Statement
For the Month Ended December 31, 2012

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
<th>Favorable</th>
<th>Unfavorable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$620,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of goods sold—at standard</td>
<td>$390,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross profit—at standard</td>
<td>$230,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less variances from standard cost:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct materials price</td>
<td>$1,200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct materials quantity</td>
<td>400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct labor rate</td>
<td>800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct labor time</td>
<td>350</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factory overhead controllable</td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factory overhead volume</td>
<td>2,200</td>
<td>2,000</td>
<td>2,400</td>
</tr>
<tr>
<td>Gross profit</td>
<td>$227,600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating expenses:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selling expenses</td>
<td>$92,300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative expenses</td>
<td>72,000</td>
<td>164,300</td>
<td></td>
</tr>
<tr>
<td>Income from operations</td>
<td>$63,300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other expense:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest expense</td>
<td>2,100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income before income tax</td>
<td>$61,200</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Ex. 22–23 (FIN MAN); Ex. 7–23 (MAN)

#### a. and b.

<table>
<thead>
<tr>
<th>Input Measure</th>
<th>Output Measure</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average computer response time to customer “clicks”</td>
<td>X</td>
<td>A measure of the speed of the ordering process. If the speed is too slow, we may lose customers.</td>
</tr>
<tr>
<td>Dollar amount of returned goods</td>
<td>X</td>
<td>An important measure of customer satisfaction with the final product that was ordered.</td>
</tr>
<tr>
<td>Elapsed time between customer order and product delivery</td>
<td>X</td>
<td>An important overall measure of process responsiveness. If the company is too slow in providing product, we may lose customers.</td>
</tr>
<tr>
<td>Maintenance dollars divided by hardware investment</td>
<td>X</td>
<td>A driver of the ordering system’s reliability and downtime. The maintenance dollars should be divided by the amount of hardware in order to facilitate comparison across time.</td>
</tr>
<tr>
<td>Number of customer complaints divided by the number of orders</td>
<td>X</td>
<td>An extreme measure of customer dissatisfaction with the ordering process.</td>
</tr>
<tr>
<td>Number of misfilled orders divided by the number of orders</td>
<td>X</td>
<td>Incorrectly filled orders reduce the customer’s satisfaction with the order process. A measure of output quality of the process.</td>
</tr>
<tr>
<td>Number of orders per warehouse employee</td>
<td>X</td>
<td>This measure is related to the capacity of the warehouse relative to the demands placed upon it. This relationship will impact the delivery cycle time.</td>
</tr>
<tr>
<td>Number of page faults or errors due to software programming errors</td>
<td>X</td>
<td>The page errors will negatively impact the customer’s ordering experience. It’s a measure of process output quality.</td>
</tr>
<tr>
<td>Number of software fixes per week</td>
<td>X</td>
<td>Software bugs reduce the effectiveness of the order fulfillment system; thus, fixes are an input that will improve the performance of the order fulfillment system.</td>
</tr>
<tr>
<td>Server (computer) downtime</td>
<td>X</td>
<td>A measure of computer system reliability.</td>
</tr>
<tr>
<td>Training dollars per programmer</td>
<td>X</td>
<td>Trained programmers should enhance the software’s responsiveness and reliability.</td>
</tr>
</tbody>
</table>
a. **Possible Input Measures**
   - Registration staffing per student
   - Technology investment per period for registration process
   - Training hours per registration personnel
   - Amount of faculty staffing
   - Amount of technology capacity (size of computer, number of input lines) for registration process
   - Maintenance dollars spent on the registration system
   - Employee satisfaction score
   - Number of hours per day registration is available

**Possible Output Measures**
- Cycle time for a student to register for classes
- Number of times a course is unavailable
- Number of separate registration events or steps (log-ons or line waits) per student
- Number of times a replacement course was used by a student
- Number of registration errors
- Student satisfaction score with the registration process
- Number of student complaints about registration process
- Number of registration rework steps per student
- Cost of registration per student
- Number of personnel overtime hours during registration
- Labor time variance for registration process (standard hours less actual hours at standard labor rate)
- Number of computer registration failures

b. **Lake Area College is interested in not only the efficiency of the process but also the quality of the process. This means that the process must meet multiple objectives. The college wants this process to meet the needs of students, which means it should not pose a burden to students. Students should be able to register for classes quickly, get the courses they want, and avoid registration errors, hassles, and problems. Thus, the nonfinancial measures are used to balance the need for a cost-efficient process with one that will meet the needs of the student.**