SOLUTIONS TO EXERCISES

EXERCISE 11-22 (20 MINUTES)

1. Variable-overhead spending variance = actual variable overhead – \((AH \times SVR)\)
   = $320,000 – (50,000 \times $6.00)
   = $20,000 U

2. Variable-overhead efficiency variance = \(SVR(AH – SH)\)
   = $6.00(50,000 – 40,000*)
   = $60,000 U

\(^\ast SH = 40,000 \text{ hrs.} = 20,000 \text{ units} \times 2 \text{ hrs. per unit}\)

3. Fixed-overhead budget variance = actual fixed overhead – budgeted fixed overhead
   = $97,000 – $100,000
   = $3,000 F

4. Fixed-overhead volume variance = budgeted fixed overhead – applied fixed overhead
   = $100,000 – $80,000†
   = $20,000 (positive sign**)

\(†\text{Applied fixed overhead} = \left(\frac{\text{predetermined fixed overhead rate}}{\text{standard allowed hours}}\right) \times 225,000\)
   = \(\frac{\$100,000}{25,000 \times 2}\) \times (20,000 \times 2)
   = $80,000

**Consistent with the discussion in the text, we choose not to interpret the volume variance as either favorable or unfavorable. Some accountants would designate a positive volume variance as "unfavorable" and a negative volume variance as "favorable."
1. Variable overhead variances:

<table>
<thead>
<tr>
<th>ACTUAL VARIABLE OVERHEAD</th>
<th>FLEXIBLE BUDGET: VARIABLE OVERHEAD</th>
<th>VARIABLE OVERHEAD APPLIED TO WORK-IN-PROCESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Hours (AH) x Actual Rate (AVR)</td>
<td>Actual Hours (AH) x Standard Rate (SVR)</td>
<td>Standard Allowed Hours (SH) x Standard Rate (SVR)</td>
</tr>
<tr>
<td>50,000 hours x $6.40 per hour†</td>
<td>50,000 hours x $6.00 per hour</td>
<td>40,000 hours x $6.00 per hour</td>
</tr>
<tr>
<td>$320,000</td>
<td>$300,000</td>
<td>$240,000</td>
</tr>
</tbody>
</table>

- Variable-overhead spending variance: $320,000 - $300,000 = $20,000 Unfavorable
- Variable-overhead efficiency variance: $240,000 - $240,000 = $60,000 Unfavorable
- No difference

*Actual variable-overhead rate (AVR) = \(\frac{\text{actual variable overhead cost}}{\text{actual hours}}\) = \(\frac{320,000}{50,000}\) = $6.40 per hour

†Column (4) is not used to compute the variances. It is included to point out that the flexible-budget amount for variable overhead, $240,000, is the amount that will be applied to Work-in-Process Inventory for product costing purposes.
EXERCISE 11-23 (CONTINUED)

2. Fixed-overhead variances:

**FIXED-OVERHEAD BUDGET AND VOLUME VARIANCES**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ACTUAL</td>
<td>BUDGETED</td>
<td>FIXED OVERHEAD APPLIED TO WORK IN PROCESS</td>
</tr>
<tr>
<td></td>
<td>FIXED OVERHEAD</td>
<td>FIXED OVERHEAD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Standard Allowed Hours ( \times ) Standard Fixed-Overhead Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40,000 hours ( \times ) $2.00 per hour*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[
\begin{align*}
\text{Standard Allowed Hours} & = 40,000 \\
\text{Standard Fixed-Overhead Rate} & = \$2.00 \text{ per hour}^* \\
\text{Standard Allowed Hours} \times \text{Standard Fixed-Overhead Rate} & = \$100,000 \\
\text{Fixed-overhead budget variance} & = \$97,000 \\
\text{Fixed-overhead volume variance} & = \$80,000
\end{align*}
\]

\[
\begin{align*}
\text{Fixed-overhead budget variance} & = \$97,000 - \$100,000 = \$3,000 \text{ Favorable} \\
\text{Fixed-overhead volume variance} & = \$100,000 - \$80,000 = \$20,000 \text{ (Positive)}^t
\end{align*}
\]

*Fixed overhead rate = $2.00 per hour = \( \frac{\$100,000}{(25,000) \times (2 \text{ hrs per unit})} \)

^Consistent with the discussion in the text, we choose not to interpret the volume variance as either favorable or unfavorable. Some accountants would designate a positive volume variance as “unfavorable” and a negative volume variance as “favorable.”

EXERCISE 11-27 (10 MINUTES)

1. | Product  | Standard Hours per Unit | Number of Units | Total Standard Hours |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Field</td>
<td>3</td>
<td>200</td>
<td>600</td>
</tr>
<tr>
<td>Professional</td>
<td>5</td>
<td>300</td>
<td>1,500</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>2,100</td>
</tr>
</tbody>
</table>

The total standard allowed direct-labor hours in May is 2,100 hours.
2. Basing the flexible budget on the number of binoculars produced would not be meaningful. Production of 500 binoculars could mean 100 field models and 400 professional models, or 200 field models and 300 professional models, and so forth. Depending on the composition of the 500 units, in terms of production type, different amounts of direct labor would be expected. More to the point, different amounts of variable-overhead costs would be expected.

EXERCISE 11-28 (15 MINUTES)

1. Formula flexible budget:

   Total budgeted monthly electricity cost = (3 \text{ euros} \times \text{ number of patient days}) + 1,000 \text{ euros}

   *3 \text{ euros} per patient day = 30 \text{ kwh per patient day} \times .10 \text{ euro per kwh}

2. Columnar flexible budget:

<table>
<thead>
<tr>
<th>Patient Days</th>
<th>30,000</th>
<th>40,000</th>
<th>50,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable electricity cost</td>
<td>90,000 \text{ euros}</td>
<td>120,000 \text{ euros}</td>
<td>150,000 \text{ euros}</td>
</tr>
<tr>
<td>Fixed electricity cost</td>
<td>1,000 \text{ euros}</td>
<td>1,000 \text{ euros}</td>
<td>1,000 \text{ euros}</td>
</tr>
<tr>
<td>Total electricity cost</td>
<td>91,000 \text{ euros}</td>
<td>121,000 \text{ euros}</td>
<td>151,000 \text{ euros}</td>
</tr>
</tbody>
</table>
EXERCISE 11-30 (45 MINUTES)

Standard machine hours per unit of output ................................................. 4 hours
Standard variable-overhead rate per machine hour ..................................... $8.00
Actual variable-overhead rate per machine hour ....................................... $9.00$ b
Actual machine hours per unit of output .................................................. $3^d$
Budgeted fixed overhead ................................................................. $50,000$
Actual fixed overhead ............................................................... $65,000^a$
Budgeted production in units ......................................................... 25,000
Actual production in units ......................................................... 24,000$ c$
Variable-overhead spending variance ........................................... $72,000 U$
Variable-overhead efficiency variance ........................................... $192,000 F$
Fixed-overhead budget variance ................................................... $15,000 U$
Fixed-overhead volume variance .................................................. $2,000^g$ (positive)
Total actual overhead ............................................................... $713,000$
Total budgeted overhead (flexible budget) ........................................ $818,000^e$
Total budgeted overhead (static budget) ........................................ $850,000^f$
Total applied overhead ............................................................... $816,000$

Explanatory Notes:

a. Fixed-overhead budget variance = actual fixed overhead – budgeted fixed overhead
   
   $15,000 U = X - $50,000
   
   $X = $65,000 = actual fixed overhead

b. Total actual overhead = actual variable overhead + actual fixed overhead

   $713,000 = X + $65,000
   
   $X = $648,000 = actual variable overhead
   
   Variable-overhead spending variance = actual variable overhead – ($AH \times SR$)
   
   $72,000 U = $648,000 – ($AH \times $8)$
   
   $8AH = $576,000
   
   $AH = 72,000$
   
   Actual variable-overhead rate per machine hour = \frac{actual variable overhead}{actual hours}
   
   = \frac{$648,000}{72,000} = $9 per hour
EXERCISE 11-30 (CONTINUED)

c. Fixed-overhead rate = \frac{\text{budgeted fixed overhead}}{\text{budgeted machine hours}}

= \frac{\$50,000}{(25,000 \text{ units})(4 \text{ hrs. per unit})}

= \$0.50 \text{ per hr.}

Total standard overhead rate = \text{standard variable overhead rate} + \text{fixed-overhead rate}

$8.50 = \$8.00 + \$0.50$

Total applied overhead = total standard hours \times total standard overhead rate

$816,000 = X \times \$8.50$

$X = 96,000 = \text{total standard hrs.}$

Actual production = \frac{\text{total standard hrs.}}{\text{standard hrs. per unit}}

= \frac{96,000}{4} = 24,000 \text{ units}$

d. Actual machine hrs. per unit of output = \frac{\text{total actual machine hrs.}}{\text{actual production}}

= \frac{72,000 \text{ hrs.}}{24,000 \text{ units}} = 3 \text{ hrs. per unit}$

e. Total budgeted overhead (flexible budget)

= \text{budgeted fixed overhead} + (\text{SVR} \times \text{SH})

= \$50,000 + (\$8.00 \times 24,000 \text{ units} \times 4 \text{ hrs. per unit})

= \$818,000
EXERCISE 11-30 (CONTINUED)

f. Total budgeted overhead (static budget)
   \[
   = \left( \frac{\text{total standard}}{\text{budgeted overhead rate}} \right) \left( \frac{\text{standard hrs.}}{\text{production per unit}} \right)
   \]
   \[
   = (8.50)(25,000)(4)
   \]
   \[
   = 850,000
   \]

g. Fixed overhead volume variance
   \[
   = \text{budgeted fixed overhead} - \text{applied fixed overhead}
   \]
   \[
   = 50,000 - (0.50)(24,000 \times 4)
   \]
   \[
   = 2,000 \text{ (positive)*}
   \]

*Consistent with the discussion in the text, we choose not to interpret the volume variance as either favorable or unfavorable. Some accountants would designate a positive volume variance as "unfavorable" and a negative volume variance as "favorable."
1. Policy Type | Standard Hours per Application | Actual Activity | Standard Hours Allowed
--- | --- | --- | ---
Automobile | 1 | 250 | 250
Renter's | 1 | 200 | 200
Homeowner's | 2 | 100 | 200
Health | 2 | 400 | 800
Life | 5 | 200 | 1,000
Total | | | 2,450

2. The different types of applications require different amounts of clerical time, and variable overhead cost is related to the use of clerical time. Therefore, basing the flexible budget on the number of applications would give a misleading estimate of overhead costs. For example, processing 100 life insurance applications will entail much more overhead cost than processing 100 automobile insurance applications.

3. Formula flexible budget:

\[
\text{Total budgeted monthly overhead cost} = \left( \text{budgeted variable overhead cost per hour} \times \frac{\text{total clerical hours}}{\text{total clerical time in hours}} \right) + \text{budgeted fixed-overhead cost per month}
\]

Total budgeted monthly overhead cost = \((4 \times X) + 2,000\)

where \(X\) denotes total clerical time in hours.

4. Budgeted overhead cost for July \(= (4 \times 2,450) + 2,000\) \(= 11,800\)
11-38 (40 MINUTES)

1. a. Units produced during May .........................................................  66,000
   Overhead application rate per unit
   (budgeted overhead per unit at expected level of output)..... 
   Applied overhead costs ...............................................................  $396,000

b. Variable-overhead spending variance ........................................  $     150  U*

c. Fixed-overhead budget variance .................................................  6,000  U

d. Variable-overhead efficiency variance .......................................  8,850  F

e. Fixed-overhead volume variance ................................................  18,300†

*U denotes unfavorable; F denotes favorable.
†Negative sign. Consistent with the discussion in the chapter, we choose not to
designate the volume variance as favorable or unfavorable. Some accountants would
designate a negative volume variance as "favorable."

Supporting calculations are presented in the following schedule:

<table>
<thead>
<tr>
<th>Variable Overhead</th>
<th>Actual Overhead</th>
<th>Spending Variance</th>
<th>Budgeted Overhead at Actual Hours</th>
<th>Efficiency Variance</th>
<th>Flexible Budget (Applied Overhead)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect material</td>
<td>$111,000</td>
<td>$.34</td>
<td>$186,000</td>
<td>$150     U</td>
<td>$194,700</td>
</tr>
<tr>
<td>Indirect labor</td>
<td>75,000</td>
<td>.25</td>
<td>$185,850</td>
<td>$8,850    F</td>
<td>$201,700</td>
</tr>
<tr>
<td>Machine hours*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Calculation of machine hours in the flexible budget column:
3,600,000 machine hrs / 72,000 units = 5 hrs per unit; 5 x 66,000 units = 330,000 hrs

<table>
<thead>
<tr>
<th>Fixed Overhead</th>
<th>Actual Overhead</th>
<th>Budget Variance</th>
<th>Flexible Budget</th>
<th>Volume Variance</th>
<th>Applied Overhead</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervision</td>
<td>$51,000</td>
<td></td>
<td>$54,000</td>
<td></td>
<td>$.18</td>
</tr>
<tr>
<td>Utilities</td>
<td>54,000</td>
<td></td>
<td>45,000</td>
<td></td>
<td>.15</td>
</tr>
<tr>
<td>Depreciation</td>
<td>84,000</td>
<td></td>
<td>84,000</td>
<td></td>
<td>.28</td>
</tr>
<tr>
<td>Machine hours*</td>
<td></td>
<td></td>
<td>$183,000</td>
<td>$18,300**</td>
<td>$201,300</td>
</tr>
</tbody>
</table>

**Negative sign. Some accountants would designate this volume variance as “favorable.”
PROBLEM 11-39 (30 MINUTES)

1. A static budget is based on a single expected activity level. In contrast, a flexible budget reflects data for several activity levels.

2. Given the focus on a range of activity, a flexible budget would be more useful because it incorporates several different activity levels.

3. Static budget vs. actual experience:

<table>
<thead>
<tr>
<th></th>
<th>Static Budget:</th>
<th>Actual:</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24,000 Units</td>
<td>20,000 Units</td>
<td></td>
</tr>
<tr>
<td>Direct material used ($20.00)</td>
<td>$480,000</td>
<td>$432,500</td>
<td>$47,500 F</td>
</tr>
<tr>
<td>Direct labor ($5.00)</td>
<td>$120,000</td>
<td>$110,600</td>
<td>9,400 F</td>
</tr>
<tr>
<td>Variable manufacturing overhead ($6.25)</td>
<td>$150,000</td>
<td>$152,000</td>
<td>2,000 U</td>
</tr>
<tr>
<td>Depreciation</td>
<td>$24,000</td>
<td>$24,000</td>
<td>----</td>
</tr>
<tr>
<td>Supervisory salaries</td>
<td>$36,000</td>
<td>$37,800</td>
<td>1,800 U</td>
</tr>
<tr>
<td>Other fixed manufacturing overhead</td>
<td>$240,000</td>
<td>$239,000</td>
<td>1,000 F</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1,050,000</strong></td>
<td><strong>$995,900</strong></td>
<td><strong>$54,100 F</strong></td>
</tr>
</tbody>
</table>

Calculations:

Direct material used: $1,440,000 ÷ 72,000 units = $20.00 per unit
Direct labor: $360,000 ÷ 72,000 units = $5.00 per unit
Variable manufacturing overhead: $450,000 ÷ 72,000 units = $6.25 per unit
Depreciation: $72,000 ÷ 3 months = $24,000 per month
Supervisory salaries: $108,000 ÷ 3 months = $36,000 per month
Other fixed manufacturing overhead: $(900,000 - $72,000 - $108,000) ÷ 3 months = $240,000 per month
PROBLEM 11-39 (CONTINUED)

4. Flexible budget vs. actual experience:

<table>
<thead>
<tr>
<th></th>
<th>Flexible Budget</th>
<th>Actual:</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20,000</td>
<td>20,000</td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct material used ($20.00)</td>
<td>$400,000</td>
<td>$432,500</td>
<td>$32,500 U</td>
</tr>
<tr>
<td>Direct labor ($5.00)</td>
<td>100,000</td>
<td>110,600</td>
<td>10,600 U</td>
</tr>
<tr>
<td>Variable manufacturing overhead ($6.25)</td>
<td>125,000</td>
<td>152,000</td>
<td>27,000 U</td>
</tr>
<tr>
<td>Depreciation</td>
<td>24,000</td>
<td>24,000</td>
<td>---</td>
</tr>
<tr>
<td>Supervisory salaries</td>
<td>36,000</td>
<td>37,800</td>
<td>1,800 U</td>
</tr>
<tr>
<td>Other fixed manufacturing overhead</td>
<td>240,000</td>
<td>239,000</td>
<td>1,000 F</td>
</tr>
<tr>
<td>Total</td>
<td>$925,000</td>
<td>$995,900</td>
<td>$70,900 U</td>
</tr>
</tbody>
</table>

5. A performance report based on flexible budgeting is preferred. The report compares budgeted and actual performance at the same volume level, eliminating any variations in activity. In essence, everything is placed on a “level playing field.”

The general manager’s warning is appropriate because of the sizable variances that have arisen. With the static budget, performance appears favorable, especially with respect to variable costs. Bear in mind, though, that volume was below the original monthly expectation of 24,000 units, presumably because of the plant closure. A reduced volume will likely lead to lower variable costs than anticipated (and resulting favorable variances).

When the volume differential is removed, variable cost variances total $70,100 U ($32,500 U + $10,600 U + $27,000 U), or 11.2% of budgeted variable costs ($400,000 + $100,000 + $125,000). Variable cost incurrence appears excessive with respect to all components of the total: direct material, direct labor, and variable manufacturing overhead.
PROBLEM 11-41 (25 MINUTES)

1. Let $X = \text{budgeted fixed overhead}$
   
   \[ X = \frac{20,000 \text{ machine hours}}{20,000} \times \$4.00 \text{ per hour} \]
   
   \[ X = \$80,000 \]

2. Variable-overhead spending variance:
   
   Actual hours x actual rate
   
   \[ 23,100 \text{ hours} \times \$2.40 = \$55,440 \]
   
   Actual hours x standard rate
   
   \[ 23,100 \text{ hours} \times \$2.50 = \$57,750 \]
   
   Variable-overhead spending variance
   
   \[ \$2,310 \text{ Favorable} \]

   \[ \star \frac{$55,440}{23,100 \text{ hours}} \]

3. Fixed-overhead volume variance:
   
   Budgeted fixed overhead
   
   \[ \$80,000 \]
   
   Standard hours allowed x standard rate
   
   \[ 5,350 \text{ hours} \times \$4.00 = 21,400 \]
   
   Fixed-overhead volume variance
   
   \[ \$58,600 \]

   \[ \star 10,700 \text{ units} \times 0.5 \text{ hours per unit} \]

   The fixed-overhead volume variance is positive; some managerial accountants would interpret it as an unfavorable variance.

4. Maxwell spent more than anticipated. Actual fixed overhead amounted to $100,460 ($155,900 - $55,440) when the budget was set at $80,000. The fixed-overhead budget variance is $20,460 unfavorable ($100,460 - $80,000).

5. Variable overhead is underapplied by $42,065:
   
   Actual overhead: Actual hours x actual rate
   
   \[ 23,100 \text{ hours} \times \$2.40 = \$55,440 \]
   
   Applied overhead: Standard hours allowed x standard rate
   
   \[ 5,350 \text{ hours} \times \$2.50 = 13,375 \]
   
   Underapplied variable overhead
   
   \[ \$42,065 \]

6. Without having complete information, it is difficult to be 100% certain. However, by an analysis of data related to the volume variance, a lengthy strike appears to be a strong possibility. Maxwell had planned to work 20,000 machine hours during the period, giving the company the capability of producing 40,000 finished units (20,000
hours x 2 units per hour). Actual production amounted to only 10,700 units, leaving the firm far shy of its manufacturing goal. A strike is a plausible explanation.

PROBLEM 11-43 (40 MINUTES)

1. The flexible budget for LawnMate Company for the month of May, based on 4,800 units, showing separate variable cost budgets is as follows:

LAWNMATE COMPANY
FLEXIBLE BUDGET
FOR THE MONTH OF MAY

Revenue \[4,800 \times \left(\frac{1,200,000}{5,000}\right)\] .................................. $ 1,152,000

Deduct: Variable costs:

- Direct material \(4,800 \times 60\) ........................................... $ 288,000
- Direct labor \(4,800 \times 44\) ................................................ 211,200
- Variable overhead \(4,800 \times 36\) .................................... 172,800
- Variable selling \(4,800 \times 12\) ......................................... 57,600

Total variable costs ................................................... 729,600

Contribution margin ............................................................. $ 422,400

Deduct: Fixed costs:

- Fixed overhead ................................................................. $ 180,000
- Fixed general and administrative .................................. 120,000 300,000

Operating income ................................................................. $ 122,400
2. For the month of May, the company’s flexible-budget variances are as follows:

**LawnMate Company**  
**Flexible-Budget Variances**  
**For the Month of May**

<table>
<thead>
<tr>
<th></th>
<th>Actual</th>
<th>Flexible Budget</th>
<th>Flexible-Budget Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>4,800</td>
<td>4,800</td>
<td>0</td>
</tr>
<tr>
<td>Revenue</td>
<td>$1,152,000</td>
<td>$1,152,000</td>
<td>$0</td>
</tr>
<tr>
<td>Variable costs:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct material</td>
<td>$320,000</td>
<td>$288,000</td>
<td>$32,000 U</td>
</tr>
<tr>
<td>Direct labor</td>
<td>192,000</td>
<td>211,200</td>
<td>19,200 F</td>
</tr>
<tr>
<td>Variable overhead</td>
<td>176,000</td>
<td>172,800</td>
<td>3,200 U</td>
</tr>
<tr>
<td>Variable selling</td>
<td>92,000</td>
<td>57,600</td>
<td>34,400 U</td>
</tr>
<tr>
<td>Deduct: Total variable costs</td>
<td>$780,000</td>
<td>$729,600</td>
<td>$50,400 U</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$372,000</td>
<td>$422,400</td>
<td>$50,400 U</td>
</tr>
<tr>
<td>Fixed costs:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed overhead</td>
<td>$180,000</td>
<td>$180,000</td>
<td>$0</td>
</tr>
<tr>
<td>Fixed general and administrative</td>
<td>115,000</td>
<td>120,000</td>
<td>5,000 F</td>
</tr>
<tr>
<td>Deduct: Total fixed costs</td>
<td>$295,000</td>
<td>$300,000</td>
<td>$5,000 F</td>
</tr>
<tr>
<td>Operating income</td>
<td>$77,000</td>
<td>$122,400</td>
<td>$45,400 U</td>
</tr>
</tbody>
</table>

3. The revised budget and variance data are likely to have the following impact:

- Richmond is likely to be encouraged by the revised data, since the major portion of the variable-cost variance (direct material and variable selling expense) is the responsibility of others.

- The detailed report of variable costs shows that the direct-labor variance is favorable. Richmond should be motivated by this report because it indicates that the cost-cutting measures that he implemented have been effective.

- The report shows unfavorable variances for direct material and variable selling expense. Richmond may be encouraged to work with those responsible for these areas to control costs.

4. In the electronic version of the solutions manual, press the CTRL key and click on the following link: [Build a Spreadsheet 11-43.xls](#)
PROBLEM 11-48 (60 MINUTES)

1. Standard machine hours per unit = \( \frac{\text{budgeted machine hours}}{\text{budgeted production}} = \frac{30,000}{6,000} = 5 \) hours per unit

2. Actual cost of direct material per unit = \( \frac{\$270,000 + \$83,000}{6,200 \text{ units}} = $56.94 \) per unit (rounded)

3. Standard direct-material cost per machine hour = \( \frac{\$252,000 + \$78,000}{30,000} = $11 \) per machine hour

4. Standard direct-labor cost per unit = \( \frac{\$273,000 + \$234,000}{6,000 \text{ units}} = $84.50 \) per unit

5. Standard variable-overhead rate per machine hour = \( \frac{\$647,200 - \$627,000}{32,000 - 30,000} = \frac{\$20,200}{2,000 \text{ hours}} = $10.10 \) per machine hour

6. First, continue using the high-low method to determine total budgeted fixed overhead as follows:

   Total budgeted overhead at 30,000 hours................................................. $627,000
   Total budgeted variable overhead at 30,000 hours (30,000 \times $10.10)...... 303,000
   Total budgeted fixed overhead................................................................. $324,000

   The key here is to realize that fixed overhead includes not only insurance and depreciation but also the fixed component of the semivariable-overhead costs i.e., supervision, and inspection. (Note that maintenance and supplies are variable costs.)

   Now, we can compute the standard fixed-overhead rate per machine hour, as follows:

   Standard fixed-overhead rate per machine hour = \( \frac{\$324,000}{30,000 \text{ hours}} = $10.80 \) per hour
PROBLEM 11-48 (CONTINUED)

7. First, compute actual variable overhead as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total actual overhead</td>
<td>$633,000</td>
</tr>
<tr>
<td>Total fixed overhead (given)</td>
<td>$324,000</td>
</tr>
<tr>
<td>Total variable overhead</td>
<td>$309,000</td>
</tr>
</tbody>
</table>

Variable-overhead spending variance = Actual variable overhead – \((AH \times SVR)\)

\[
= $309,000 – (32,000 \times $10.10) = $14,200 \text{ Favorable}
\]

8. Variable-overhead efficiency variance

\[
= (AH \times SVR) – (SH \times SVR) \\
= (32,000 \times $10.10) – (31,000* \times $10.10) = $10,100 \text{ Unfavorable}
\]

*Standard allowed machine hours = 6,200 units \times 5 hours per unit

9. Fixed-overhead budget variance

\[
= \text{actual fixed overhead – budgeted fixed overhead} \\
= $324,000 – $324,000 = 0
\]

10. Fixed-overhead volume variance

\[
= \text{budgeted fixed overhead – applied fixed overhead} \\
= $324,000 – (31,000 \times $10.80) = $10,800 \text{ (negative sign)*}
\]

*Consistent with the discussion in the text, we choose not to interpret the volume variance as either favorable or unfavorable. Some accountants would designate a positive volume variance as "unfavorable" and a negative volume variance as "favorable."
11. Flexible budget formula, using the high-low method of cost estimation:

Variable cost per machine hour = \( \frac{\$1,540,000 - \$1,464,000}{32,000 - 30,000} = \$38 \) per hour

Total budgeted cost at 30,000 hours ........................................................... $1,464,000
Total variable cost at 30,000 hours (30,000 \( \times \$38 \)) ..................$1,140,000
Fixed overhead cost ......................................................................................$324,000

Thus, the flexible budget formula is as follows:

Total production cost = $38X + $324,000

where \( X \) = number of machine hours allowed.

Therefore, the total budgeted production cost for 6,050 units is:

\((38 \times 30,250) + 324,000 = 1,473,500\)

*Standard allowed machine hours = 6,050 units \( \times \) 5 hours per unit