Brief Exercise 8-2 (30 minutes)

1. Number of helmets ............................................. 35,000
   Standard kilograms of plastic per helmet ............. × 0.6
   Total standard kilograms allowed ..................... 21,000
   Standard cost per kilogram ................................ × RM 8
   Total standard cost ........................................... RM 168,000
   Actual cost incurred (given) ................................ RM 171,000
   Total standard cost (above) ................................ RM 168,000
   Total material variance—unfavorable ................. RM 3,000

2. Actual Quantity of Input, at Actual Price (AQ × AP)   Actual Quantity of Input, at Standard Price (AQ × SP)   Standard Quantity Allowed for Actual Output, at Standard Price (SQ × SP)
   22,500 kilograms × RM 8 per kilogram               = RM 180,000                                    = RM 168,000
   RM 171,000 = RM 180,000                            

   Price Variance, RM 9,000 F                        
   Quantity Variance, RM 12,000 U                    
   Total Variance, RM 3,000 U

*35,000 helmets × 0.6 kilograms per helmet = 21,000 kilograms

Alternatively:

Materials price variance = AQ (AP - SP)
22,500 kilograms (RM 7.60 per kilogram* - RM 8.00 per kilogram)  
= RM 9,000 F

* RM 171,000 ÷ 22,500 kilograms = RM 7.60 per kilogram

Materials quantity variance = SP (AQ - SQ)
RM 8 per kilogram (22,500 kilograms - 21,000 kilograms)  
= RM 12,000 U
### Brief Exercise 8-3 (30 minutes)

1. Number of meals prepared ..................... 4,000
   
   Standard direct labor-hours per meal....... $ \times 0.25$
   
   Total direct labor-hours allowed .............. 1,000
   
   Standard direct labor cost per hour ........ $ \times 9.75$
   
   Total standard direct labor cost............... $9,750$
   
   Actual cost incurred ............................... $9,600$
   
   Total standard direct labor cost (above)... 9,750
   
   Total direct labor variance ...................... $ 150$
   
   Favorable

### 2.

<table>
<thead>
<tr>
<th>Actual Hours of Input, at the Actual Rate (AH × AR)</th>
<th>Actual Hours of Input, at the Standard Rate (AH × SR)</th>
<th>Standard Hours Allowed for Actual Output, at the Standard Rate (SH × SR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>960 hours × $10.00 per hour = $9,600</td>
<td>960 hours × $9.75 per hour = $9,360</td>
<td>1,000 hours × $9.75 per hour = $9,750</td>
</tr>
</tbody>
</table>

Rate Variance, $\uparrow$ $240\text{ U}$

Efficiency Variance, $\uparrow$ $390\text{ F}$

Total Variance, $\uparrow$ $150\text{ F}$

Alternatively, the variances can be computed using the formulas:

**Labor rate variance** = AH(AR – SR)

= 960 hours ($10.00 per hour – $9.75 per hour)

= $240\text{ U}$

**Labor efficiency variance** = SR(AH – SH)

= $9.75 per hour (960 hours – 1,000 hours)

= $390\text{ F}$
**Brief Exercise 8-4** (30 minutes)

1. Number of items shipped.......................... 120,000
   Standard direct labor-hours per item .............. × 0.02
   Total direct labor-hours allowed.................. 2,400
   Standard variable overhead cost per hour .......... × $3.25
   Total standard variable overhead cost ............ $ 7,800
   Actual variable overhead cost incurred............. $7,360
   Total standard variable overhead cost (above) ... 7,800
   Total variable overhead variance.................... $ 440 Favorable

2. 

<table>
<thead>
<tr>
<th>Actual Hours of Input, at the Actual Rate (AH × AR)</th>
<th>Actual Hours of Input, at the Standard Rate (AH × SR)</th>
<th>Standard Hours Allowed for Actual Output, at the Standard Rate (SH × SR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,300 hours × $3.20 per hour*</td>
<td>2,300 hours × $3.25 per hour</td>
<td>2,400 hours × $3.25 per hour</td>
</tr>
<tr>
<td>= $7,360</td>
<td>= $7,475</td>
<td>= $7,800</td>
</tr>
</tbody>
</table>

   Variable Overhead Spending Variance, $115 F
   Variable Overhead Efficiency Variance, $325 F
   Total Variance, $440 F

   *$7,360 ÷ 2,300 hours = $3.20 per hour

Alternatively, the variances can be computed using the formulas:

   Variable overhead spending variance:
   \[ AH(AR - SR) = 2,300 \text{ hours} \times ($3.20 \text{ per hour} - $3.25 \text{ per hour}) \]
   \[ = $115 \text{ F} \]

   Variable overhead efficiency variance:
   \[ SR(AH - SH) = $3.25 \text{ per hour} \times (2,300 \text{ hours} - 2,400 \text{ hours}) \]
   \[ = $325 \text{ F} \]
Problem 8-12A (90 minutes)

1. a.

<table>
<thead>
<tr>
<th>Actual Quantity of Input, at Actual Price</th>
<th>Actual Quantity of Input, at Standard Price</th>
<th>Standard Quantity Allowed for Actual Output, at Standard Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>60,000 pounds × $1.95 per pound</td>
<td>60,000 pounds × $2.00 per pound</td>
<td>45,000 pounds* × $2.00 per pound</td>
</tr>
<tr>
<td>= $117,000</td>
<td>= $120,000</td>
<td>= $90,000</td>
</tr>
</tbody>
</table>

↑

Price Variance, $3,000 F

↑

49,200 pounds × $2.00 per pound = $98,400

↑

Quantity Variance, $8,400 U

*15,000 pools × 3.0 pounds per pool = 45,000 pounds

Alternative Solution:

Materials price variance = AQ (AP - SP)
60,000 pounds ($1.95 per pound - $2.00 per pound) = $3,000 F

Materials quantity variance = SP (AQ - SQ)
$2.00 per pound (49,200 pounds - 45,000 pounds) = $8,400 U
**Problem 8-12A (continued)**

b. Actual Hours of Input, at the Actual Rate (AH × AR) | Actual Hours of Input, at the Standard Rate (AH × SR) | Standard Hours Allowed for Actual Output, at the Standard Rate (SH × SR) |
---|---|---|
11,800 hours × $7.00 per hour = $82,600 | 11,800 hours × $6.00 per hour = $70,800 | 12,000 hours* × $6.00 per hour = $72,000 |
↓ Rate Variance, $11,800 U ↓ Efficiency Variance, $1,200 F ↓ Total Variance, $10,600 U |

*15,000 pools × 0.8 hours per pool = 12,000 hours

Alternative Solution:

Labor rate variance = AH (AR – SR)
11,800 hours ($7.00 per hour – $6.00 per hour) = $11,800 U

Labor efficiency variance = SR (AH – SH)
$6.00 per hour (11,800 hours – 12,000 hours) = $1,200 F
### Problem 8-12A (continued)

**c.**

<table>
<thead>
<tr>
<th>Actual Hours of Input, at the Actual Rate (AH × AR)</th>
<th>Actual Hours of Input, at the Standard Rate (AH × SR)</th>
<th>Standard Hours Allowed for Actual Output, at the Standard Rate (SH × SR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,900 hours × $3.00 per hour</td>
<td>6,000 hours* × $3.00 per hour</td>
<td></td>
</tr>
<tr>
<td>$18,290</td>
<td>= $17,700</td>
<td>= $18,000</td>
</tr>
</tbody>
</table>

↑  Spending Variance, $590 U

↑  Efficiency Variance, $300 F

↑  Total Variance, $290 U

*15,000 pools × 0.4 hours per pool = 6,000 hours

**Alternative Solution:**

Variable overhead spending variance = AH (AR – SR)

5,900 hours ($3.10 per hour* – $3.00 per hour) = $590 U

*$18,290 ÷ 5,900 hours = $3.10 per hour

Variable overhead efficiency variance = SR (AH – SH)

$3.00 per hour (5,900 hours – 6,000 hours) = $300 F
Problem 8-12A (continued)

2. Summary of variances:

Material price variance........................... $  3,000 F
Material quantity variance ...................... 8,400 U
Labor rate variance ............................... 11,800 U
Labor efficiency variance ..................... 1,200 F
Variable overhead spending variance ...... 590 U
Variable overhead efficiency variance ...... 300 F
Net variance ......................................... $16,290 U

The net unfavorable variance of $16,290 for the month caused the plant’s variable cost of goods sold to increase from the budgeted level of $180,000 to $196,290:

Budgeted cost of goods sold at $12 per pool .......... $180,000
Add the net unfavorable variance, as above ........... $16,290
Actual cost of goods sold ...................................... $196,290

This $16,290 net unfavorable variance also accounts for the difference between the budgeted net operating income and the actual net operating income for the month.

Budgeted net operating income.............................. $36,000
Deduct the net unfavorable variance added to cost of goods sold for the month ......................... $16,290
Net operating income ............................................ $19,710

3. The two most significant variances are the materials quantity variance and the labor rate variance. Possible causes of the variances include:

Materials quantity variance: Outdated standards, unskilled workers, poorly adjusted machines, carelessness, poorly trained workers, inferior quality materials.

Labor rate variance: Outdated standards, change in pay scale, overtime pay.
Problem 8-13A (75 minutes)

1. a. In the solution below, the materials price variance is computed on the entire amount of materials purchased whereas the materials quantity variance is computed only on the amount of materials used in production:

<table>
<thead>
<tr>
<th>Actual Quantity of Input, at Actual Price (AQ × AP)</th>
<th>Actual Quantity of Input, at Standard Price (AQ × SP)</th>
<th>Standard Quantity Allowed for Actual Output, at Standard Price (SQ × SP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$225,000</td>
<td>$240,000</td>
<td>$187,500</td>
</tr>
</tbody>
</table>

**Price Variance,** $15,000 F

9,500 ounces × $20.00 per ounce = $190,000

**Quantity Variance,** $2,500 U

*3,750 units × 2.5 ounces per unit = 9,375 ounces

Alternatively:

Materials price variance = AQ (AP – SP)
12,000 ounces ($18.75 per ounce* – $20.00 per ounce) = $15,000 F

*$225,000 ÷ 12,000 ounces = $18.75 per ounce

Materials quantity variance = SP (AQ – SQ)
$20.00 per ounce (9,500 ounces – 9,375 ounces) = $2,500 U

b. Yes, the contract probably should be signed. The new price of $18.75 per ounce is substantially lower than the old price of $20.00 per ounce, resulting in a favorable price variance of $15,000 for the month. Moreover, the material from the new supplier appears to cause little or no problem in production as shown by the small materials quantity variance for the month.
### Problem 8-13A (continued)

2. a.

<table>
<thead>
<tr>
<th>Actual Hours of Input, at the Actual Rate (AH × AR)</th>
<th>Actual Hours of Input, at the Standard Rate (AH × SR)</th>
<th>Standard Hours Allowed for Actual Output, at the Standard Rate (SH × SR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,600 hours* × $12.00 per hour = $67,200</td>
<td>5,600 hours × $12.50 per hour = $70,000</td>
<td>5,250 hours** × $12.50 per hour = $65,625</td>
</tr>
</tbody>
</table>

| Rate Variance, $2,800 F                           | Efficiency Variance, $4,375 U                         | Total Variance, $1,575 U                                           |

* 35 technicians × 160 hours per technician = 5,600 hours

** 3,750 units × 1.4 hours per technician = 5,250 hrs

Alternatively:

<table>
<thead>
<tr>
<th>Labor rate variance = AH (AR - SR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,600 hours ($12.00 per hour - $12.50 per hour) = $2,800 F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Labor efficiency variance = SR (AH - SH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$12.50 per hour (5,600 hours - 5,250 hours) = $4,375 U</td>
</tr>
</tbody>
</table>

b. No, the new labor mix probably should not be continued. Although it decreases the average hourly labor cost from $12.50 to $12.00, thereby causing a $2,800 favorable labor rate variance, this savings is more than offset by a large unfavorable labor efficiency variance for the month. Thus, the new labor mix increases overall labor costs.
**Problem 8-13A (continued)**

3.  

<table>
<thead>
<tr>
<th>Actual Hours of Input, at the Actual Rate (AH × AR)</th>
<th>Actual Hours of Input, at the Standard Rate (AH × SR)</th>
<th>Standard Hours Allowed for Actual Output, at the Standard Rate (SH × SR)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5,600 hours* × $3.50 per hour</td>
<td>5,250 hours** × $3.50 per hour</td>
</tr>
<tr>
<td></td>
<td>= $19,600</td>
<td>= $18,375</td>
</tr>
</tbody>
</table>

$18,200

\[\text{Spending Variance, }$1,400 \text{ F}\]

\[\text{Efficiency Variance, }$1,225 \text{ U}\]

\[\text{Total Variance, }$175 \text{ F}\]

* Based on direct labor hours:
  35 technicians × 160 hours per technician = 5,600 hours

** 3,750 units × 1.4 hours per unit = 5,250 hours

Alternatively:

Variable overhead spending variance = AH (AR - SR)  
5,600 hours ($3.25 per hour* - $3.50 per hour) = $1,400 F

* $18,200 ÷ 5,600 hours = $3.25 per hour

Variable overhead efficiency variance = SR (AH - SH)  
$3.50 per hour (5,600 hours - 5,250 hours) = $1,225 U

Both the labor efficiency variance and the variable overhead efficiency variance are computed by comparing actual labor-hours to standard labor-hours. Thus, if the labor efficiency variance is unfavorable, then the variable overhead efficiency variance will be unfavorable as well.