

# CHAPTER 25

## Standard Costs and Balanced Scorecard

### ASSIGNMENT CLASSIFICATION TABLE

<u>Study Objectives</u>	<u>Questions</u>	<u>Brief Exercises</u>	<u>Exercises</u>	<u>A Problems</u>	<u>B Problems</u>
1. Distinguish between a standard and a budget.	1, 2	1	1		
2. Identify the advantages of standard costs.	3		1		
3. Describe how companies set standards.	4, 5, 6, 7, 8, 9	2, 3	1, 2, 3, 4, 18		
4. State the formulas for determining direct materials and direct labor variances.	10, 11, 19	4, 5	4, 5, 6, 7, 8, 9, 11, 15, 20	1A, 2A, 3A, 4A, 5A, 6A	1B, 2B, 3B, 4B, 5B, 6B
5. State the formulas for determining manufacturing overhead variances.	12, 13, 14, 15, 16, 17	6, 7, 8	10, 12, 13, 14, 20	1A, 2A, 3A, 4A, 5A, 6A	1B, 2B, 3B, 4B, 5B, 6B
6. Discuss the reporting of variances.	18, 19		9, 15, 16	3A	3B
7. Prepare an income statement for management under a standard costing system.	23		17	2A, 5A, 6A	2B, 5B, 6B
8. Describe the balanced scorecard approach to performance evaluation.	20, 21, 22	9	18		
*9. Identify the features of a standard cost accounting system.	24	10, 11	19, 20, 21, 22	6A	6B

## ASSIGNMENT CHARACTERISTICS TABLE

<b>Problem Number</b>	<b>Description</b>	<b>Difficulty Level</b>	<b>Time Allotted (min.)</b>
1A	Compute variances.	Simple	20–30
2A	Compute variances, and prepare income statement.	Simple	30–40
3A	Compute and identify significant variances.	Moderate	20–30
4A	Answer questions about variances.	Complex	30–40
5A	Compute variances, prepare an income statement, and explain unfavorable variances.	Moderate	30–40
*6A	Journalize and post standard cost entries, and prepare income statement.	Moderate	40–50
1B	Compute variances.	Simple	20–30
2B	Compute variances, and prepare income statement.	Simple	30–40
3B	Compute and identify significant variances.	Moderate	30–40
4B	Answer questions about variances.	Complex	30–40
5B	Compute variances, prepare an income statement, and explain unfavorable variances.	Moderate	30–40
*6B	Journalize and post standard cost entries, and prepare income statement.	Moderate	40–50

# BLOOM'S TAXONOMY TABLE

Correlation Chart between Bloom's Taxonomy, Study Objectives and End-of-Chapter Exercises and Problems

Study Objective	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
1. Distinguish between a standard and a budget.		Q25-1 Q25-2	BE25-1 E25-1			
2. Identify the advantages of standard costs.	Q25-3		E25-1			
3. Describe how companies set standards.	Q25-8	Q25-4 Q25-5 Q25-6	BE25-2 BE25-3 E25-1	E25-2 E25-3 E25-4		
4. State the formulas for determining direct materials and direct labor variances.	Q25-10 Q25-11	Q25-19	BE25-4 BE25-5 E25-4 E25-5 E25-6 E25-7	E25-9 E25-11 E25-15 P25-1A P25-5B P25-6B P25-5A	E25-8 E25-20 P25-3A P25-4A P25-3B P25-4B	
5. State the formulas for determining manufacturing overhead variances.		Q25-15 Q25-16 Q25-17	Q25-12 Q25-13 Q25-14 Q25-16 BE25-7 BE25-8	E25-14 E25-20 P25-1A P25-6B P25-5A P25-6A	E25-10 P25-4B E25-12 E25-13 P25-3A P25-4A P25-3B	
6. Discuss the reporting of variances.		Q25-18 Q25-19	E25-9 E25-15	E25-16		
7. Prepare an income statement for management under a standard costing system.		Q25-23	E25-17 P25-2A P25-5A	P25-6B P25-2B P25-5B		
8. Describe the balanced scorecard approach to performance evaluation.		Q25-20 Q25-21 Q25-22	BE25-9			
*9. Identify the features of a standard cost accounting system.		Q25-24	BE25-10 BE25-11 E25-19	E25-21 P25-6B P25-6A	E25-20	
Broadening Your Perspective		Communication Exploring the Web	Managerial Analysis			Decision Making Across the Organization Ethics Case Real-World Focus All About You

# ANSWERS TO QUESTIONS

1. (a) This is incorrect. Standard costs are predetermined unit costs.  
(b) Agree. Examples of governmental regulations that establish standards for a business are the Fair Labor Standards Act, the Equal Employment Opportunity Act, and a multitude of environmental laws.
2. (a) Standards and budgets are similar in that both are predetermined costs and both contribute significantly to management planning and control. The two terms differ in that a standard is a unit amount and a budget is a total amount.  
(b) There are important accounting differences between budgets and standards. Except in the application of manufacturing overhead to jobs and processes, budget data are not journalized in cost accounting systems. In contrast, standard costs may be incorporated into cost accounting systems. It is possible for a company to report inventories at standard costs in its financial statements, but it is not possible to report inventories at budgeted costs.
3. In addition to facilitating management planning, standard costs offer the following advantages to an organization:
  - (1) They promote greater economy by making employees more “cost-conscious.”
  - (2) They may be useful in setting selling prices.
  - (3) They contribute to management control by providing a basis for evaluating cost control.
  - (4) They are useful in highlighting variances in “management by exception.”
  - (5) They simplify the costing of inventories and reduce clerical costs.
4. The management accountant provides input to the setting of standards through the accumulation of historical cost data and knowledge of the behavior of costs in response to changes in activity levels. Management has the responsibility for setting the standards.
5. Ideal standards represent the optimum level of performance under perfect operating conditions. Normal standards represent an efficient level of performance that is attainable under expected operating conditions.
6. (a) The direct materials price standard should be based on the purchasing department’s best estimate of the cost of raw materials and an amount for related costs such as receiving, storing, and handling.  
(b) The direct materials quantity standard should be based on both quality and quantity requirements plus allowances for unavoidable waste and normal spoilage.
7. Agree. The direct labor quantity standard should include allowances for rest periods, cleanup, machine setup, and machine downtime.
8. With standard costs, the predetermined overhead rate is determined by dividing budgeted overhead costs by an expected standard activity index.
9. A favorable cost variance has a positive connotation. It suggests efficiencies in incurring manufacturing costs and in using direct materials, direct labor, and manufacturing overhead. An unfavorable cost variance has a negative connotation. It suggests that too much was paid for one or more of the manufacturing cost elements or that the elements were used inefficiently.

## Questions Chapter 25 (Continued)

10. (a) (1) actual price. (2) standard price.  
(b) (3) actual quantity. (4) standard price.  
(c) (5) standard price. (6) standard quantity.
11.  $(1) - (3) = \text{total labor variance}$ ;  $(1) - (2) = \text{labor price variance}$ ; and  $(2) - (3) = \text{labor quantity variance}$ .
12. Overhead applied =  $\$8 \times 27,000 = \$216,000$ .
13. Overhead controllable variance = actual overhead costs (\$218,000) – overhead budgeted. Overhead budgeted is based on standard hours allowed as follows: variable costs ( $27,000 \times \$5 = \$135,000$ ) + fixed costs ( $28,000 \times \$3 = \$84,000$ ) = total budgeted (\$219,000). Thus, the controllable variance is \$1,000 favorable.
14. The overhead volume variance is the fixed overhead rate (\$3)  $\times$  [normal capacity hours – standard hours allowed ( $28,000 - 27,000$ )] = \$3,000 unfavorable.
15. The purpose of computing the overhead volume variance is to determine whether plant facilities were efficiently used during the period. The basic formula is fixed overhead rate  $\times$  (normal capacity – standard hours allowed).
16. Fixed costs remain the same at every level of activity within the relevant range. Since the predetermined overhead rate is based on normal capacity, it follows that if standard hours allowed are less than standard hours at normal capacity, fixed overhead costs will be underapplied. The reverse is true when production exceeds normal capacity.
17. Nick should include the following points about overhead variances:  
(1) Standard hours allowed are used in each of the variances.  
(2) Budgeted costs for the controllable variance are derived from the flexible budget.  
(3) The controllable variance generally pertains to variable costs.  
(4) The volume variance pertains solely to fixed costs.
18. Variances should be reported to appropriate levels of management as soon as possible. The principle of “management by exception” may be used with variance reports.
19. The purchasing department would be responsible for an unfavorable materials price variance when it paid more than the standard price for the materials. The purchasing department would also be responsible for an unfavorable materials quantity variance if it purchased materials of inferior quality which caused an excess use of materials.
20. The four perspectives of the balanced scorecard are: financial, customer, internal process, and learning and growth. The financial perspective employs financial measures of performance used by most firms. The customer perspective evaluates how well the company is performing from the viewpoint of those people who buy and use its product in terms of price, quality, product innovation, customer service, and other dimensions. The internal process perspective evaluates the value chain—product development, production, delivery and after-sale service—to ensure that the company is operating effectively and efficiently. The learning and growth perspective evaluates how well the company develops and retains its employees. The four perspectives are linked in that the results in one perspective influence the results in the next.

## Questions Chapter 25 (Continued)

- 21.** Tom Jones is not correct. The balanced scorecard does not replace financial measures, it instead integrates both financial and nonfinancial measures. In fact, financial measures are very critical to the balanced scorecard, since they represent the final “destination” of all the company’s efforts.
- 22.** The possibilities for nonfinancial measures are limitless. Some that were mentioned in the chapter were: capacity utilization of plants, average age of key assets, impact of strikes, brand-loyalty statistics, market profile of customer-end products, number of new products, employee stock ownership percentages, number of scientists and technicians used in R&D, customer satisfaction data, factors affecting customer product selection, number of patents and trademarks held, customer brand awareness, number of ATMs by state, number of products used by average customer, percentage of customer service calls handled by interactive voice response units, personnel cost per employee, credit card retention rates.
- 23.** (a) Variances are reported in income statements for management below gross profit which is reported at standard costs. Each variance is identified and the total variance is shown.  
(b) Standard costs may be used in costing inventories when there is no significant difference between actual costs and standard costs. When there are significant differences, actual costs must be reported.
- \*24.** (a) A standard cost accounting system is a double-entry system of accounting in which standard costs are used in making entries and standard cost variances are formally recognized in the accounts.  
(b) The variance account will have: (1) a debit balance when the materials price variance is unfavorable and (2) a credit balance when the labor quantity variance is favorable.

## SOLUTIONS TO BRIEF EXERCISES

### BRIEF EXERCISE 25-1

- (a) Standards are stated as a per unit amount. Thus, the standards are materials \$2.40 ( $\$1,200,000 \div 500,000$ ) and labor \$3.20 ( $\$1,600,000 \div 500,000$ ).
- (b) Budgets are stated as a total amount. Thus, the budgeted costs for the year are materials \$1,200,000 and labor \$1,600,000.

### BRIEF EXERCISE 25-2

- (a) Standard materials price per gallon = \$2.50 ( $\$2.20 + \$.20 + \$.10$ ).
- (b) Standard materials quantity per gallon = 3 pounds ( $2.6 + .4$ ).
- (c) Standard materials cost per gallon = \$7.50 ( $\$2.50 \times 3$ ).

### BRIEF EXERCISE 25-3

- (a) Standard direct labor rate per hour = \$14.00 ( $\$12.00 + \$.80 + \$1.20$ ).
- (b) Standard direct labor hours per gallon = 1.6 hours ( $1.2 + .25 + .15$ ).
- (c) Standard labor cost per gallon = \$22.40 ( $\$14.00 \times 1.6$ ).

### BRIEF EXERCISE 25-4

Total materials variance = \$1,160 U ( $3,200 \times \$5.05^*$ ) – ( $3,000^{**} \times \$5.00$ ).  
Materials price variance = \$160 U ( $3,200 \times \$5.05$ ) – ( $3,200 \times \$5.00$ ).  
Materials quantity variance = \$1,000 U ( $3,200 \times \$5.00$ ) – ( $3,000 \times \$5.00$ ).

\* $\$16,160 \div 3,200$

\*\* $1,500 \times 2$

### BRIEF EXERCISE 25-5

Total labor variance = \$2,050 U ( $2,100 \times \$10.50$ ) – ( $2,000 \times \$10.00$ ).  
Labor price variance = \$1,050 U ( $2,100 \times \$10.50$ ) – ( $2,100 \times \$10.00$ ).  
Labor quantity variance = \$1,000 U ( $2,100 \times \$10.00$ ) – ( $2,000 \times \$10.00$ ).

**BRIEF EXERCISE 25-6**

The formula is:

<b>Actual</b>	<b>Overhead</b>	
<b>Overhead</b>	<b>– Applied</b>	<b>= Total Overhead Variance</b>
<b>\$115,000</b>	<b>– \$120,000*</b>	<b>\$5,000 F</b>

**\*20,000 X \$6 = \$120,000**

**BRIEF EXERCISE 25-7**

The formula is:

	<b>Overhead</b>	<b>Overhead</b>
<b>Actual Overhead</b>	<b>– Budgeted</b>	<b>= Controllable Variance</b>
<b>\$115,000</b>	<b>– \$130,000*</b>	<b>\$15,000 F</b>

**\*(20,000 X \$4) + \$50,000 = \$130,000**

**BRIEF EXERCISE 25-8**

The formula is:

<b>Fixed</b>		<b>Overhead</b>
<b>Overhead X (Normal Capacity Hours – Standard Hours Allowed)</b>	<b>=</b>	<b>Volume</b>
<b>Rate</b>		<b>Variance</b>
<b>\$2.00*/hr. X</b>	<b>(25,000 – 20,000)</b>	<b>= \$10,000 U</b>

**\*( \$50,000 ÷ 25,000 hrs.)**

**BRIEF EXERCISE 25-9**

- |                                     |  |
|-------------------------------------|--|
| <b>(1) financial.....</b>           | <b>(c) return on assets</b>                        |
| <b>(2) customer.....</b>            | <b>(d) brand recognition</b>                       |
| <b>(3) internal process.....</b>    | <b>(a) plant capacity utilization</b>              |
| <b>(4) learning and growth.....</b> | <b>(b) employee work days missed due to injury</b> |



**\*BRIEF EXERCISE 25-10**

(a)	Raw Materials Inventory .....	12,000	
	Materials Price Variance .....		900
	Accounts Payable .....		11,100
(b)	Work in Process Inventory (5,800 X \$2*) .....	11,600	
	Materials Quantity Variance .....		600
	Raw Materials Inventory (5,500 X \$2) .....		11,000
	*\$12,000 ÷ 6,000		

**\*BRIEF EXERCISE 25-11**

(a)	Factory Labor .....	25,200	
	Labor Price Variance .....		1,200
	Wages Payable .....		24,000
(b)	Work in Process Inventory (3,100 X \$8.40*) .....	26,040	
	Labor Quantity Variance .....		840
	Factory Labor .....		25,200
	*\$25,200 ÷ 3,000		

# SOLUTIONS TO EXERCISES

## EXERCISE 25-1

- (a) Direct materials:  $(2,000 \times 3) \times \$6 = \underline{\$36,000}$   
 Direct labor:  $(2,000 \times 1/2) \times \$14 = \underline{\$14,000}$   
 Overhead:  $\$14,000 \times 70\% = \underline{\$9,800}$
- (b) Direct materials:  $3 \times \$6 = \$18.00$   
 Direct labor:  $1/2 \times \$14 = 7.00$   
 Overhead:  $\$7 \times 70\% = \underline{4.90}$   
 Standard cost: **\$29.90**
- (c) The advantages of standard costs which are carefully established and prudently used are:
1. Management planning is facilitated.
  2. Greater economy is promoted by making employees more cost-conscious.
  3. Setting prices is facilitated.
  4. Management control is enhanced by having a basis for evaluation of cost control.
  5. Variances are highlighted in management by exception.
  6. Costing of inventories is simplified and clerical cost are reduced.

## EXERCISE 25-2

Ingredient	Amount Per Gallon	Standard Waste	Standard Usage	Standard Price	Standard Cost Per Gallon
Grape concentrate	60* oz.	4%	(a) 62.5 oz.	\$.04	\$2.50
Sugar ( $54 \div 50$ )	1.08 lb.	10%	(b) 1.2 lb.	.35	.42
Lemons ( $60 \div 50$ )	1.2	20%	(c) 1.5	.60	.90
Yeast	1 tablet	0%	1 tablet	.25	.25
Nutrient	1 tablet	0%	1 tablet	.20	.20
Water ( $2,500 \div 50$ )	50 oz.	0%	50 oz.	.004	.20
					<u><b>\$4.47</b></u>

\* $3,000 \div 50$

- (a)  $.96X = 60$  ounces; or  $X = (60 \text{ ounces})/.96$ .  
 (b)  $.90X = 1.08$  pounds; or  $X = (1.08 \text{ pounds})/.90$ .  
 (c)  $.80X = 1.2$  lemons; or  $X = (1.2 \text{ lemons})/.80$ .

### EXERCISE 25-3

#### Direct materials

Cost per pound [ $\$4 - (2\% \times \$4) + \$0.25$ ]	\$4.17	
Pounds per unit ( $4.5 + 0.5$ )	<u>X 5</u>	\$20.85

#### Direct labor

Cost per hour ( $\$12 + \$3$ )	\$ 15	
Hours per unit ( $2 + .2$ )	<u>X 2.2</u>	33.00

#### Manufacturing overhead

2.2 hours X \$6		<u>13.20</u>
Total standard cost per unit		<u>\$67.05</u>

### EXERCISE 25-4

(a) Actual service time	1.0 hours
Setup and downtime	0.1 hours
Cleanup and rest periods	<u>0.3 hours</u>
Standard direct labor hours per oil change	<u>1.4 hours</u>

(b) Hourly wage rate	\$10.00
Payroll taxes ( $\$10 \times 10\%$ )	1.00
Fringe benefits ( $\$10 \times 25\%$ )	<u>2.50</u>
Standard direct labor hourly rate	<u>\$13.50</u>

(c) Standard direct labor cost per oil change = 1.40 hours X \$13.50 per hour  
= \$18.90

(d) Direct labor quantity variance =  $(1.50 \text{ hours} \times \$13.50) - (1.40 \text{ hours} \times \$13.50)$   
=  $\$20.25 - \$18.90$   
= \$1.35 U

## EXERCISE 25-5

(a) Total materials variance:

$$\begin{array}{rcl} (AQ \times AP) - (SQ \times SP) & & \\ (28,000 \times \$4.70) - (27,000^* \times \$5.00) & & \\ \$131,600 - \$135,000 & = & \$3,400 \text{ F} \end{array}$$

$$*9,000 \times 3$$

Materials price variance:

$$\begin{array}{rcl} (AQ \times AP) - (AQ \times SP) & & \\ (28,000 \times \$4.70) - (28,000 \times \$5.00) & & \\ \$131,600 - \$140,000 & = & \$8,400 \text{ F} \end{array}$$

Materials quantity variance:

$$\begin{array}{rcl} (AQ \times SP) - (SQ \times SP) & & \\ (28,000 \times \$5.00) - (27,000 \times \$5.00) & & \\ \$140,000 - \$135,000 & = & \$5,000 \text{ U} \end{array}$$

(b) Total materials variance:

$$\begin{array}{rcl} (AQ \times AP) - (SQ \times SP) & & \\ (26,200 \times \$5.20) - (27,000 \times \$5.00) & & \\ \$136,240 - \$135,000 & = & \$1,240 \text{ U} \end{array}$$

Materials price variance:

$$\begin{array}{rcl} (AQ \times AP) - (AQ \times SP) & & \\ (26,200 \times \$5.20) - (26,200 \times \$5.00) & & \\ \$136,240 - \$131,000 & = & \$5,240 \text{ U} \end{array}$$

Materials quantity variance:

$$\begin{array}{rcl} (AQ \times SP) - (SQ \times SP) & & \\ (26,200 \times \$5.00) - (27,000 \times \$5.00) & & \\ \$131,000 - \$135,000 & = & \$4,000 \text{ F} \end{array}$$

## EXERCISE 25-6

(a) Total labor variance:

$$\begin{array}{rcl} (AH \times AR) - (SH \times SR) & & \\ (40,800 \times \$12.10) - (40,000^* \times \$12.00) & & \\ \$493,680 - \$480,000 & = & \$13,680 \text{ U} \end{array}$$

$$^*10,000 \times 4$$

(b) Labor price variance:

$$\begin{array}{rcl} (AH \times AR) - (AH \times SR) & & \\ (40,800 \times \$12.10) - (40,800 \times \$12.00) & & \\ \$493,680 - \$489,600 & = & \$4,080 \text{ U} \end{array}$$

Labor quantity variance:

$$\begin{array}{rcl} (AH \times SR) - (SH \times SR) & & \\ (40,800 \times \$12.00) - (40,000 \times \$12.00) & & \\ \$489,600 - \$480,000 & = & \$9,600 \text{ U} \end{array}$$

(c) Labor price variance:

$$\begin{array}{rcl} (AH \times AR) - (AH \times SR) & & \\ (40,800 \times \$12.10) - (40,800 \times \$12.25) & & \\ \$493,680 - \$499,800 & = & \$6,120 \text{ F} \end{array}$$

Labor quantity variance:

$$\begin{array}{rcl} (AH \times SR) - (SH \times SR) & & \\ (40,800 \times \$12.25) - (42,000 \times \$12.25) & & \\ \$499,800 - \$514,500 & = & \$14,700 \text{ F} \end{array}$$

## EXERCISE 25-7

Total materials variance:

$$\begin{array}{rcl} (AQ \times AP) - (SQ \times SP) & & \\ (1,900 \times \$2.60^*) - (1,840^{**} \times \$2.50) & & \\ \$4,940 - \$4,600 & = & \$340 \text{ U} \end{array}$$

Materials price variance:

$$\begin{array}{rcl} (AQ \times AP) - (AQ \times SP) & & \\ (1,900 \times \$2.60) - (1,900 \times \$2.50) & & \\ \$4,940 - \$4,750 & = & \$190 \text{ U} \end{array}$$

$$^*\$4,940 \div 1,900$$

$$^{**}230 \times 8$$

## EXERCISE 25-7 (Continued)

Materials quantity variance:

$$\begin{array}{rclcl} (AQ \times SP) & - & (SQ \times SP) & & \\ (1,900 \times \$2.50) & - & (1,840 \times \$2.50) & & \\ \$4,750 & - & \$4,600 & = & \$150 \text{ U} \end{array}$$

Total labor variance:

$$\begin{array}{rclcl} (AH \times AR) & - & (SH \times SR) & & \\ (700 \times \$11.60^*) & - & (690^{**} \times \$12.00) & & \\ \$8,120 & - & \$8,280 & = & \$160 \text{ F} \end{array}$$

$$*\$8,120 \div 700$$

$$**230 \times 3$$

Labor price variance:

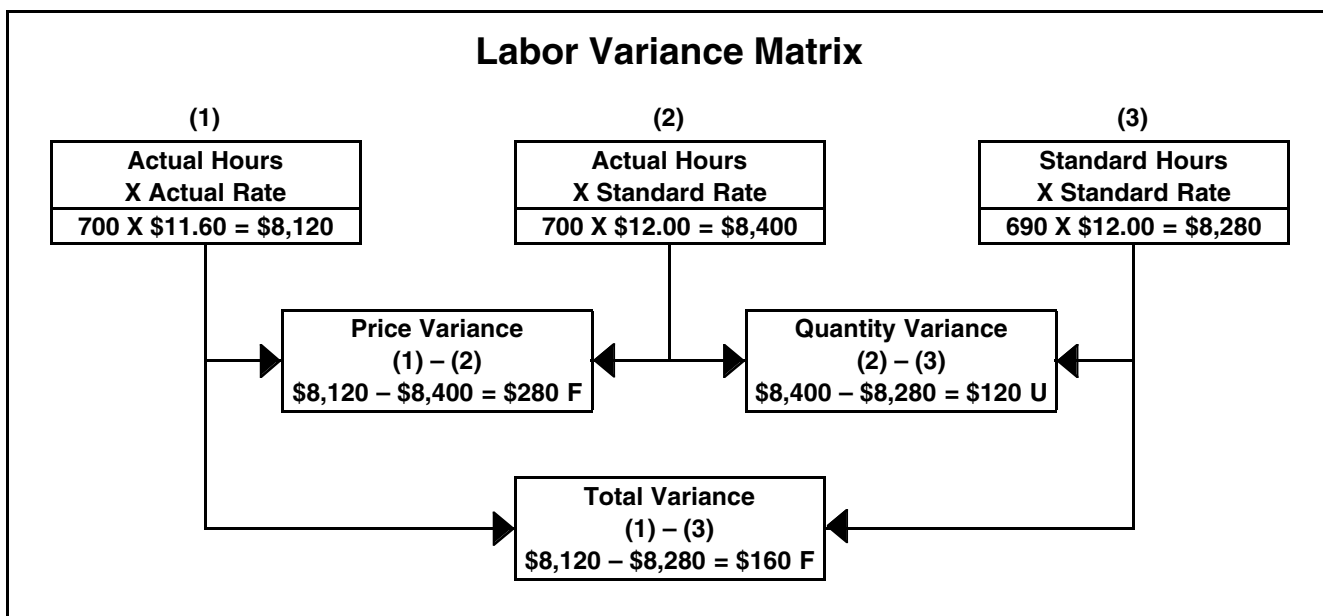
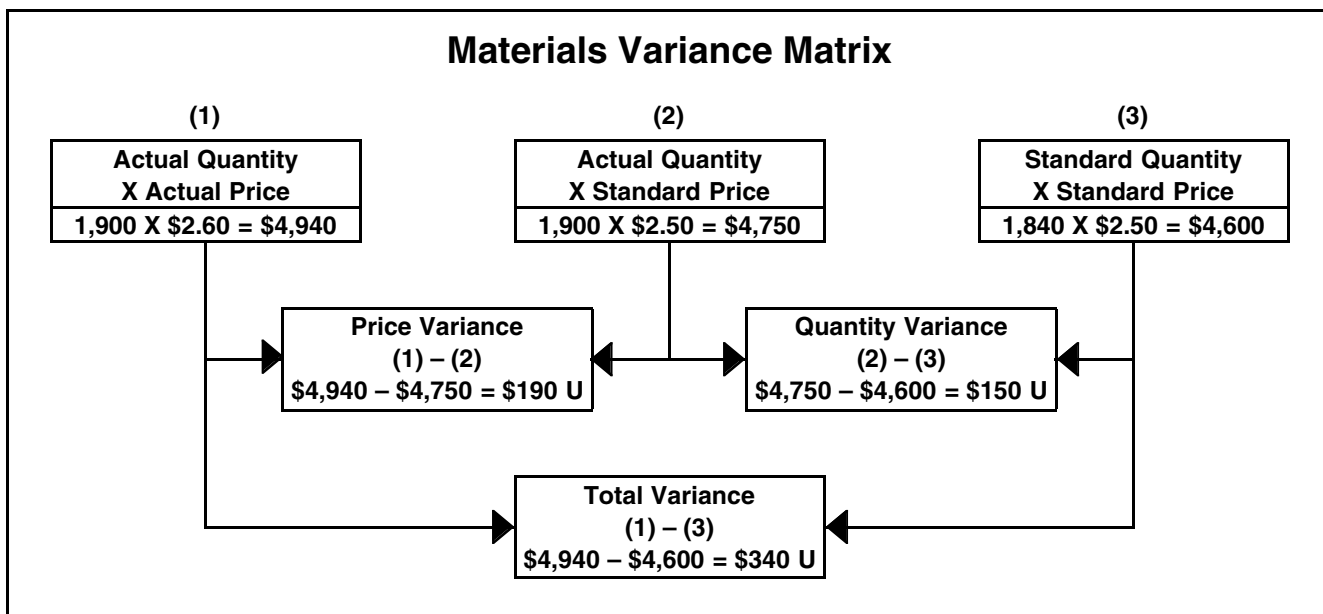
$$\begin{array}{rclcl} (AH \times AR) & - & (AH \times SR) & & \\ (700 \times \$11.60) & - & (700 \times \$12.00) & & \\ \$8,120 & - & \$8,400 & = & \$280 \text{ F} \end{array}$$

Labor quantity variance:

$$\begin{array}{rclcl} (AH \times SR) & - & (SH \times SR) & & \\ (700 \times \$12.00) & - & (690 \times \$12.00) & & \\ \$8,400 & - & \$8,280 & = & \$120 \text{ U} \end{array}$$

## EXERCISE 25-7 (Continued)

(Not Required)



## EXERCISE 25-8

(a) Total materials variance:

$$\begin{array}{rcl} (\text{AQ} \times \text{AP}) - (\text{SQ} \times \text{SP}) & & \\ (1,225 \times \$128) - (1,200 \times \$130) & & \\ \$156,800 - \$156,000 & = & \$800 \text{ U} \end{array}$$

Materials price variance:

$$\begin{array}{rcl} (\text{AQ} \times \text{AP}) - (\text{AQ} \times \text{SP}) & & \\ (1,225 \times \$128) - (1,225 \times \$130) & & \\ \$156,800 - \$159,250 & = & \$2,450 \text{ F} \end{array}$$

Materials quantity variance:

$$\begin{array}{rcl} (\text{AQ} \times \text{SP}) - (\text{SQ} \times \text{SP}) & & \\ (1,225 \times \$130) - (1,200 \times \$130) & & \\ \$159,250 - \$156,000 & = & \$3,250 \text{ U} \end{array}$$

Total labor variance:

$$\begin{array}{rcl} (\text{AH} \times \text{AR}) - (\text{SH} \times \text{SR}) & & \\ (4,200 \times \$13) - (4,300 \times \$12) & & \\ \$54,600 - \$51,600 & = & \$3,000 \text{ U} \end{array}$$

Labor price variance:

$$\begin{array}{rcl} (\text{AH} \times \text{AR}) - (\text{AH} \times \text{SR}) & & \\ (4,200 \times \$13) - (4,200 \times \$12) & & \\ \$54,600 - \$50,400 & = & \$4,200 \text{ U} \end{array}$$

Labor quantity variance:

$$\begin{array}{rcl} (\text{AH} \times \text{SR}) - (\text{SH} \times \text{SR}) & & \\ (4,200 \times \$12) - (4,300 \times \$12) & & \\ \$50,400 - \$51,600 & = & \$1,200 \text{ F} \end{array}$$

- (b) The unfavorable materials quantity variance may be caused by the carelessness or inefficiency of production workers. Alternatively, the excess quantities may be caused by inferior quality materials acquired by the purchasing department.

The unfavorable labor price variance may be caused by misallocation of the work force by the production department. In this case, more experienced workers may have been assigned to tasks normally done by inexperienced workers. An unfavorable labor variance may also occur when workers are paid higher wages than expected. The manager who authorized the wage increase is responsible for this variance.



**EXERCISE 25-9**

**HINTON TOOL & DIE COMPANY**  
**Direct Labor Variance Report**  
**For the Month Ended March 31, 2008**

<u>Job No.</u>	<u>Actual Hours</u>	<u>Standard Hours</u>	<u>Quantity Variance</u> <sup>(a)</sup>	<u>Actual Rate</u> <sup>(1)</sup>	<u>Standard Rate</u> <sup>(2)</sup>	<u>Price Variance</u> <sup>(b)</sup>	<u>Explanation</u>
A257	220	225	\$100.00 F	\$20.00	\$20.00	\$ 0	Repeat job
A258	450	430	400.00 U	\$22.00	\$20.00	900.00 U	Rush job
A259	300	300	0	\$20.50	\$20.00	150.00 U	Replacement worker
A260	115	110	100.00 U	\$18.00	\$20.00	230.00 F	New trainee
<b>Totals</b>			<u>\$ 400.00 U</u>			<u>\$820.00 U</u>	

<sup>(a)</sup> LQV = SR X (AH – SH)

<sup>(1)</sup> Actual costs ÷ actual hours

<sup>(b)</sup> LPV = AH X (AR – SR)

<sup>(2)</sup> Standard costs ÷ standard costs

**EXERCISE 25-10**

**Total overhead variance:**

<b>Actual Overhead</b>	–	<b>Overhead Applied</b>	
\$213,000	–	\$204,000	= \$9,000 U
		(51,000 X \$4)	

**Overhead controllable variance:**

<b>Actual Overhead</b>	–	<b>Overhead Budgeted</b>	
\$213,000	–	\$207,000	= \$6,000 U
		[(51,000 X \$3) + \$54,000]	

**Overhead volume variance:**

<b>Fixed Overhead Rate</b>	X	<b>Normal Capacity Hours</b>	–	<b>Standard Hours Allowed</b>	
\$1.00	X	(54,000	–	51,000)	= \$3,000 U

## EXERCISE 25-11

(a)  $(AQ \times AP) - (SQ \times SP) = \text{Total Materials Variance}$   
 $(\$10,900) - (2,140 \times \$5) = \$200 \text{ U}$

$(AQ \times AP) - (AQ \times SP) = \text{Materials Price Variance}$   
 $(\$10,900) - (2,300 \times \$5) = \$600 \text{ F}$

$(AQ \times SP) - (SQ \times SP) = \text{Materials Quantity Variance}$   
 $(2,300 \times \$5) - (2,140 \times \$5) = \$800 \text{ U}$

- (b) One possible cause of an unfavorable materials quantity variance is the purchase of substandard materials. Such materials would normally be purchased at a lower price than normal, which means there would also be favorable materials price variance. Substandard materials could also cause work slowdowns and delays, causing an unfavorable labor quantity variance. Therefore, the purchase of substandard materials could cause all three variances mentioned.

## EXERCISE 25-12

(a) Item	Amount	Hours	Rate
Variable overhead .....	\$33,000	16,500	\$2.00
Fixed overhead .....	19,800	16,500	1.20
Total overhead .....	<u>\$52,800</u>	16,500	<u>\$3.20</u>

(b) Total overhead variance:  
Actual Overhead – Overhead Applied  
\$54,000 – \$51,200 = \$2,800 U  
(16,000\* X \$3.20)

\*4,000 X 4 hrs. = 16,000 hrs.

Overhead controllable variance:  
Actual Overhead – Overhead Budgeted  
\$54,000 – \$51,800 = \$2,200 U  
[(16,000 X \$2) + \$19,800]

Overhead volume variance:  
Fixed Overhead Rate X  $\left( \begin{array}{l} \text{Normal Capacity} \\ \text{Hours} \end{array} - \begin{array}{l} \text{Standard Hours} \\ \text{Allowed} \end{array} \right)$   
\$1.20 X  $\left( \begin{array}{l} [(16,500 \\ - (4,000 \times 4)] \end{array} \right) = \$600 \text{ U}$

## EXERCISE 25-12 (Continued)

- (c) The overhead controllable variance is generally associated with variable overhead costs. Thus, this variance indicates the production manager's inefficiency in controlling variable overhead costs.  
The overhead volume variance relates to fixed overhead costs. This variance indicates whether plant facilities were efficiently used. In this case 500 (16,500 – 16,000) hours of plant capacity were not utilized.

## EXERCISE 25-13

- (a) (1)
- |                            |   |                       |   |                                      |
|----------------------------|---|-----------------------|---|--------------------------------------|
| Total actual overhead cost | = | Overhead<br>Budgeted  | + | Overhead<br>Controllable<br>Variance |
|                            | = | (\$18,000 + \$13,200) | + | \$1,500                              |
|                            | = | \$32,700              |   |                                      |
- (2) Actual variable overhead cost = Actual Overhead – Fixed Overhead
- |  |   |          |   |          |
|--|---|----------|---|----------|
|  | = | \$32,700 | – | \$13,200 |
|  | = | \$19,500 |   |          |
- (3) Variable overhead cost applied = 2,000 hours X \$9 = \$18,000
- (4) Fixed overhead cost applied = 2,000 hours X \$6 = \$12,000
- (5) Overhead volume variance
- |  |   |                           |   |   |
|--|---|---------------------------|---|---|
|  | = | Fixed<br>Overhead<br>Rate | X | $\left( \begin{array}{cc} \text{Normal} & \text{Standard} \\ \text{Capacity} & \text{Hours} \\ \text{Hours} & \text{Allowed} \end{array} \right)$ |
|  | = | \$6                       | X | (2,200* – 2,000)  |
|  | = | \$1,200 U                 |   |   |
- \*\$13,200 ÷ \$6 per hour = 2,200 hours
- (b) Number of loans processed = Standard hours allowed ÷ Standard hours per application
- |  |   |                       |
|--|---|-----------------------|
|  | = | 2,000 ÷ 2             |
|  | = | 1,000 loans processed |

## EXERCISE 25-14

$$(a) \text{ (Actual) } - \text{ (Applied) } = \text{Total Overhead Variance}$$

$$(\$18,800) - (1,800 \times \$10) = \$800 \text{ U}$$

$$\text{(Actual)} - \text{(Budgeted)} = \text{Overhead Controllable Variance}$$

$$(\$18,800) - (17,600) = \$1,200 \text{ U}$$

$$\begin{array}{rclclcl} \text{Fixed OH} & & \left( \begin{array}{c} \text{Normal} \\ \text{Capacity} \end{array} \right. & & \text{Standard Hours} & & \text{Overhead Volume} \\ \text{Rate} & \times & & - & \text{Allowed} & & \text{Variance} \\ \$3^* & & (1,667^{**}) & - & 1,800 & & = \$400 \text{ F} \end{array}$$

$$*(\$5,000 \times 12)/20,000$$

$$^{**}20,000/12$$

- (b) The cause of an unfavorable controllable variance could be higher than expected use of indirect materials, indirect labor, and factory supplies, or increases in indirect manufacturing costs, such as fuel and maintenance costs. A favorable volume variance would be caused by production of more units than what is considered normal capacity.

## EXERCISE 25-15

(a)

### IMPERIAL LANDSCAPING Variance Report – Purchasing Department For the Current Month

Project	Actual Pounds Purchased	(1) Actual Price	(2) Standard Price	Price Variance <sup>(a)</sup>	Explanation
Ames	500	\$2.35	\$2.50	\$75 F	Purchased poor quality seeds
Korman	400	2.40	2.50	40 F	Seeds on sale
Stilles	500	2.60	2.50	50 U	Price increased
Total price variance				<u>\$65</u> F	

<sup>(a)</sup>MPV = AQ X (AP – SP) <sup>(1)</sup>Actual costs ÷ actual quantity <sup>(2)</sup>Standard costs ÷ standard quantity.

## EXERCISE 25-15 (Continued)

(b)

### IMPERIAL LANDSCAPING Variance Report – Production Department For the Current Month

Project	Actual Pounds	Standard Pounds	Standard Price	Quantity Variance <sup>(b)</sup>	Explanation
Ames	500	460	\$2.50	\$100 U	Purchased poor quality seeds
Korman	400	410	2.50	25 F	Purchased higher quality seeds
Stilles	500	480	2.50	50 U	New employee
Total quantity variance				<u>\$125 U</u>	

(b)  $MQV = SP \times (AQ - SQ)$

## EXERCISE 25-16

### ARCHANGEL CORPORATION Variance Report – Purchasing Department For Week Ended January 9, 2009

Type of Materials	Quantity Purchased	Actual Price	Standard Price	Price Variance	Explanation
Rogue 11	26,000 lbs.	\$5.20	\$5.00	\$5,200 U	Price increase
Storm 17	7,000 oz.	\$3.40	\$3.25	\$1,050 U	Rush order
Beast 27	22,000 units.	\$0.45	\$0.43	\$ 440 F	Bought larger quantity

$26,000 = \$5,200 / (\$5.20 - \$5.00)$ .

\$5,200 U because the actual price (\$5.20) exceeds the standard price (\$5.00).

$\$1,050 / 7,000 = \$0.15$ ;  $\$3.25 + \$0.15 = \$3.40$

$\$440 / 22,000 = \$0.02$ ;  $\$0.45 - \$0.02 = \$0.43$

**EXERCISE 25-17**

**CEPEDA COMPANY**  
**Income Statement**  
**For the Month Ended January 31, 2008**

Sales (8,000 X \$8) .....		\$64,000
Cost of goods sold (8,000 X \$6) .....		<u>48,000</u>
Gross profit (at standard) .....		16,000
Variances		
Materials price .....	\$1,250	
Materials quantity .....	(700)	
Labor price .....	525	
Labor quantity .....	725	
Overhead controllable .....	(200)	
Overhead volume .....	<u>1,000</u>	
Total variance—unfavorable .....		<u>2,600</u>
Gross profit (actual) .....		13,400
Selling and administrative expenses .....		<u>6,000</u>
Net income .....		<u>\$ 7,400</u>

**EXERCISE 25-18**

- (1) **Balanced scorecard—(c)** An approach that incorporates financial and nonfinancial measures in an integrated system that links performance measurement and a company's strategic goals.
- (2) **Variance—(a)** The difference between total actual costs and total standard costs.
- (3) **Learning and growth perspective—(d)** A viewpoint employed in the balanced scorecard to evaluate how well a company develops and retains its employees.
- (4) **Nonfinancial measures —(e)** An evaluation tool that is not based on dollars.
- (5) **Customer perspective—(f)** A viewpoint employed in the balanced scorecard to evaluate the company from the perspective of those people who buy and use its products or services.

## EXERCISE 25-18 (Continued)

- (6) Internal process perspective—(h) A viewpoint employed in the balanced scorecard to evaluate the efficiency and effectiveness of the company's value chain.
- (7) Ideal standards—(g) An optimum level of performance under perfect operating conditions.
- (8) Normal standards—(b) An efficient level of performance that is attainable under expected operating conditions.

## \*EXERCISE 25-19

1.	Raw Materials Inventory (18,000 X \$4.30) .....	77,400	
	Materials Price Variance (18,000 X \$.20) .....	3,600	
	Accounts Payable (18,000 X \$4.50) .....		81,000
2.	Work in Process Inventory (17,600 X \$4.30) .....	75,680	
	Materials Quantity Variance (400 X \$4.30) .....	1,720	
	Raw Materials Inventory (18,000 X \$4.30) .....		77,400
3.	Factory Labor (15,200 X \$5.50) .....	83,600	
	Labor Price Variance (15,200 X \$.70) .....		10,640
	Wages Payable (15,200 X \$4.80) .....		72,960
4.	Work in Process Inventory (15,400 X \$5.50) .....	84,700	
	Labor Quantity Variance (200 X \$5.50) .....		1,100
	Factory Labor (15,200 X \$5.50) .....		83,600
5.	Work in Process Inventory (84,700 X 100%) .....	84,700	
	Manufacturing Overhead .....		84,700

## \*EXERCISE 25-20

- (a) \$130,000 (\$128,000 + \$2,000).
- (b) \$127,000 (\$130,000 – \$3,000).
- (c) \$141,500 (\$140,000 + \$1,500).
- (d) \$139,100 (\$140,000 – \$900).
- (e) \$166,200 (\$165,000 + \$1,200).
- (f) \$300 credit balance (\$1,500 – \$1,200).

**\*EXERCISE 25-21**

Raw Materials Inventory (1,900 X \$2.50).....	4,750	
Materials Price Variance (1,900 X \$0.10) .....	190	
Accounts Payable (1,900 X \$2.60) .....		4,940

Work in Process Inventory (1,840* X \$2.50) .....	4,600	
Materials Quantity Variance (60 X \$2.50).....	150	
Raw Materials Inventory (1,900 X \$2.50).....		4,750

**\*230 X 8**

Factory Labor (700 X \$12) .....	8,400	
Labor Price Variance (700 X \$0.40) .....		280
Wages Payable (700 X \$11.60) .....		8,120

Work in Process Inventory (690* X \$12) .....	8,280	
Labor Quantity Variance (10 X \$12) .....	120	
Factory Labor (700 X \$12) .....		8,400

**\*230 X 3**

**\*EXERCISE 25-22**

(a) Manufacturing Overhead .....	213,000	
Cash, Accounts Payable, etc. ....		213,000

Work in Process Inventory (51,000 X \$4) .....	204,000	
Manufacturing Overhead .....		204,000

(b) Overhead Controllable Variance .....	6,000*	
Overhead Volume Variance .....	3,000**	
Manufacturing Overhead .....		9,000

\*\$213,000 – [(51,000 X \$3) + \$54,000]

\*\*\$1 X (54,000 – 51,000)



# SOLUTIONS TO PROBLEMS

## PROBLEM 25-1A

**Total materials variance:**

$$\begin{array}{rcl} (AQ \times AP) & - & (SQ \times SP) \\ (5,100 \times \$7.30) & & (4,900 \times \$7.00) \\ \$37,230 & - & \$34,300 \\ & & = \$2,930 \text{ U} \end{array}$$

**Materials price variance:**

$$\begin{array}{rcl} (AQ \times AP) & - & (AQ \times SP) \\ (5,100 \times \$7.30) & & (5,100 \times \$7.00) \\ \$37,230 & - & \$35,700 \\ & & = \$1,530 \text{ U} \end{array}$$

**Materials quantity variance:**

$$\begin{array}{rcl} (AQ \times SP) & - & (SQ \times SP) \\ (5,100 \times \$7.00) & & (4,900 \times \$7.00) \\ \$35,700 & - & \$34,300 \\ & & = \$1,400 \text{ U} \end{array}$$

**Total labor variance:**

$$\begin{array}{rcl} (AH \times AR) & - & (SH \times SR) \\ (7,000 \times \$12.50) & & (7,350^* \times \$12.00) \\ \$87,500 & - & \$88,200 \\ & & = \$700 \text{ F} \end{array}$$

\*4,900 X 1.5

**Labor price variance:**

$$\begin{array}{rcl} (AH \times AR) & - & (AH \times SR) \\ (7,000 \times \$12.50) & & (7,000 \times \$12.00) \\ \$87,500 & - & \$84,000 \\ & & = \$3,500 \text{ U} \end{array}$$

**Labor quantity variance:**

$$\begin{array}{rcl} (AH \times SR) & - & (SH \times SR) \\ (7,000 \times \$12.00) & & (7,350 \times \$12.00) \\ \$84,000 & - & \$88,200 \\ & & = \$4,200 \text{ F} \end{array}$$

**Total overhead variance:**

$$\begin{array}{rcl} \text{Actual} & & \text{Overhead} \\ \text{Overhead} & - & \text{Applied} \\ (\$56,170 + \$19,680) & - & (7,350 \times \$10.00) \\ \$75,850 & & \$73,500 \\ & & = \$2,350 \text{ U} \end{array}$$

## PROBLEM 25-1A (Continued)

**Overhead controllable variance:**

<b>Actual</b>		<b>Overhead</b>		
<b>Overhead</b>	–	<b>Budgeted</b>		
\$75,850	–	\$73,875		= \$1,975 U
		[(7,350 X \$7.50) + \$18,750]		

**Overhead volume variance:**

<b>Fixed</b>		<b>Normal</b>	<b>Standard</b>	
<b>Overhead</b>	X	<b>Capacity</b>	<b>Hours</b>	
<b>Rate</b>		<b>Hours</b>	<b>Allowed</b>	
\$2.50/hr.	X	(7,500	– 7,350)	= \$375 U

<b>PROBLEM 25-2A</b>
----------------------

(a) (1)

**Total materials variance:**

$$\begin{array}{rcl}
 (AQ \times AP) - (SQ \times SP) & & \\
 (10,600 \times \$2.25) - (10,000 \times \$2.00) & & \\
 \$23,850 - \$20,000 & = & \$3,850 \text{ U}
 \end{array}$$

**Materials price variance:**

$$\begin{array}{rcl}
 (AQ \times AP) - (AQ \times SP) & & \\
 (10,600 \times \$2.25) - (10,600 \times \$2.00) & & \\
 \$23,850 - \$21,200 & = & \$2,650 \text{ U}
 \end{array}$$

**Materials quantity variance:**

$$\begin{array}{rcl}
 (AQ \times SP) - (SQ \times SP) & & \\
 (10,600 \times \$2.00) - (10,000 \times \$2.00) & & \\
 \$21,200 - \$20,000 & = & \$1,200 \text{ U}
 \end{array}$$

(2)

**Total labor variance:**

$$\begin{array}{rcl}
 (AH \times AR) - (SH \times SR) & & \\
 (14,400 \times \$8.50^*) - (15,000 \times \$8.00^{**}) & & \\
 \$122,400 - \$120,000 & = & \$2,400 \text{ U}
 \end{array}$$

$$\begin{array}{ll}
 *\$122,400 \div 14,400 & **\$120,000 \div 15,000
 \end{array}$$

**Labor price variance:**

$$\begin{array}{rcl}
 (AH \times AR) - (AH \times SR) & & \\
 (14,400 \times \$8.50) - (14,400 \times \$8.00) & & \\
 \$122,400 - \$115,200 & = & \$7,200 \text{ U}
 \end{array}$$

**Labor quantity variance:**

$$\begin{array}{rcl}
 (AH \times SR) - (SH \times SR) & & \\
 (14,400 \times \$8.00) - (15,000 \times \$8.00) & & \\
 \$115,200 - \$120,000 & = & \$4,800 \text{ F}
 \end{array}$$

(3)

**Total overhead variance:**

$$\begin{array}{rcl}
 \text{Actual Overhead} - \text{Overhead Applied} & & \\
 \$184,500 - \$189,000 & = & \$4,500 \text{ F} \\
 & & (45,000 \times \$4.20)
 \end{array}$$

## PROBLEM 25-2A (Continued)

### Overhead controllable variance:

Actual		Overhead	
Overhead	–	Budgeted	
\$184,500	–	\$186,000	= \$1,500 F
		[(45,000 X \$3.00) + (42,500 X \$1.20)]	

### Overhead volume variance:

Fixed		Normal		Standard	
Overhead	X	Capacity	–	Hours	
Rate		Hours		Allowed	
\$1.20/hr.	X	(42,500	–	45,000)	= \$3,000 F

(b) **DINKEL MANUFACTURING CORPORATION**  
**Income Statement**  
**For the Month Ended June 30, 2008**

Sales .....	\$400,000
Cost of goods sold (at standard) .....	<u>329,000*</u>
Gross profit (at standard) .....	71,000
<b>Variances</b>	
Materials price .....	\$ 2,650
Materials quantity .....	1,200
Labor price .....	7,200
Labor quantity .....	(4,800)
Overhead controllable .....	(1,500)
Overhead volume .....	<u>(3,000)</u>
Total variance—unfavorable .....	<u>1,750</u>
Gross profit (actual) .....	69,250
Selling and administrative expenses .....	<u>40,000</u>
Net income .....	<u>\$ 29,250</u>

\*Materials \$20,000 + labor \$120,000 + overhead applied \$189,000.

<b>PROBLEM 25-3A</b>
----------------------

(a) (1) Total materials variance:

$$\begin{array}{rcl}
 (\text{AQ} \times \text{AP}) - (\text{SQ} \times \text{SP}) & & \\
 (90,500 \times \$4.10) - (89,600^* \times \$4.30) & & \\
 \$371,050 - \$385,280 & = & \$14,230 \text{ F} \\
 *11,200 \times 8 & & 
 \end{array}$$

Materials price variance:

$$\begin{array}{rcl}
 (\text{AQ} \times \text{AP}) - (\text{AQ} \times \text{SP}) & & \\
 (90,500 \times \$4.10) - (90,500 \times \$4.30) & & \\
 \$371,050 - \$389,150 & = & \$18,100 \text{ F}
 \end{array}$$

Materials quantity variance:

$$\begin{array}{rcl}
 (\text{AQ} \times \text{SP}) - (\text{SQ} \times \text{SP}) & & \\
 (90,500 \times \$4.30) - (89,600 \times \$4.30) & & \\
 \$389,150 - \$385,280 & = & \$3,870 \text{ U}
 \end{array}$$

(2) Total labor variance:

$$\begin{array}{rcl}
 (\text{AH} \times \text{AR}) - (\text{SH} \times \text{SR}) & & \\
 (14,300 \times \$14.10) - (13,440^* \times \$13.50) & & \\
 \$201,630 - \$181,440 & = & \$20,190 \text{ U} \\
 *11,200 \times 1.2 & & 
 \end{array}$$

Labor price variance:

$$\begin{array}{rcl}
 (\text{AH} \times \text{AR}) - (\text{AH} \times \text{SR}) & & \\
 (14,300 \times \$14.10) - (14,300 \times \$13.50) & & \\
 \$201,630 - \$193,050 & = & \$8,580 \text{ U}
 \end{array}$$

Labor quantity variance:

$$\begin{array}{rcl}
 (\text{AH} \times \text{SR}) - (\text{SH} \times \text{SR}) & & \\
 (14,300 \times \$13.50) - (13,440 \times \$13.50) & & \\
 \$193,050 - \$181,440 & = & \$11,610 \text{ U}
 \end{array}$$

(3) Total overhead variance:

Actual		Overhead	
Overhead	–	Applied	
\$86,000	–	\$80,640	
(\$49,000 + \$37,000)		(13,440 X \$6)	= \$5,360 U

## PROBLEM 25-3A (Continued)

### Overhead controllable variance:

Actual		Overhead		
Overhead	–	Budgeted		
\$86,000	–	\$82,600		= \$3,400 U
(\$49,000 + \$37,000)		[(13,440 X \$2.50) + \$49,000]		

### Overhead volume variance:

Fixed		(	Normal		Standard	
Overhead	X		Capacity	–	Hours	
Rate			Hours		Allowed	)
\$3.50/hr.	X		(14,000	–	13,440)	= \$1,960 U

- (b) The materials price variance is more than 4% from standard. The actual price for materials of \$4.10 is \$.20 below the standard price of \$4.30 or 4.7% (\$.20 ÷ \$4.30). The same result can be obtained by dividing the total price variance by the total standard price for the quantities purchased (\$18,100 ÷ \$389,150).

The labor price variance is 4.4% from standard (\$.60 ÷ \$13.50). The same result can be obtained by dividing the total price variance by the total standard price for the direct labor hours used (\$8,530 ÷ \$193,050).

The labor quantity variance is 6.4% from standard. The same result can be obtained by dividing the total quantity variance by the total standard price for the standard hours allowed (\$11,610 ÷ \$181,440).

<b>PROBLEM 25-4A</b>
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- (a)  $\$2,620 \div 131,000 = \$0.02$ ;  $\$.92 + \$0.02 = \$.94$  standard materials price per pound. OR  
 $131,000 \times \$.92 = \$120,520$ ;  $\$120,520 + \$2,620 = \$123,140$ ;  $\$123,140 \div 131,000 = \$.94$  per pound.
- (b)  $\$4,700 \div \$.94 = 5,000$  pounds;  $131,000 - 5,000 = 126,000$  standard quantity for 28,000 units or 4.5 pounds ( $126,000 \div 28,000$ ) per unit. OR  
 $\$123,140 - \$4,700 = \$118,440$ ;  $\$118,440 \div \$.94 = 126,000$ ;  $126,000 \div 28,000 = 4.5$  pounds per unit.
- (c) Standard hours allowed are 42,000 ( $28,000 \times 1\frac{1}{2}$ ).
- (d)  $\$7,200 \div \$12.00 = 600$  hours over standard; 42,000 standard hours + 600 hours = 42,600 actual hours worked. OR  
 $42,000 \times \$12 = \$504,000$ ;  $\$504,000 + \$7,200 = \$511,200$ ;  $\$511,200 \div \$12 = 42,600$  actual hours worked
- (e)  $\$10,650 \div 42,600 = \$.25$ ;  $\$12.00 - \$.25 = \$11.75$  actual rate per hour. OR  
 $\$511,200 - \$10,650 = \$500,550$ ;  $\$500,550 \div 42,600 = \$11.75$  actual rate per hour
- (f)  $\$350,000 \div 50,000 = \$7.00$  predetermined overhead rate per direct labor hour.
- (g) Direct materials 4.5 pounds  $\times$   $\$.94 = \$4.23$ ; direct labor  $1\frac{1}{2} \times \$12.00 = \$18.00$ ; manufacturing overhead  $1\frac{1}{2} \times \$7.00 = \$10.50$ .  $\$4.23 + \$18.00 + \$10.50 = \$32.73$  standard cost per unit.
- (h)  $42,000 \times \$7.00 = \$294,000$  overhead applied.
- (i) Standard hours allowed (42,000) – normal capacity hours (50,000) = 8,000 hours;  $8,000 \times \$2.00 = \$16,000$  U overhead volume variance.

## **PROBLEM 25-4A (Continued)**

- (j) Total overhead rate \$7.00 less fixed overhead rate \$2.00 = \$5.00 variable overhead rate;  $\$5.00 \times 42,000$  standard hours allowed = \$210,000 budgeted variable overhead costs;  $\$210,000 + \$3,000 = \$213,000$  variable overhead costs incurred.
- (k)  $\$32.73$  [see (g) above]  $\times 28,000 = \$916,440$  or direct materials \$118,440 + direct labor \$504,000 + overhead applied \$294,000 = \$916,440.



<b>PROBLEM 25-5A</b>
----------------------

(a) **Materials price variance:**

$$\begin{array}{rclcl}
 (\text{AQ} \times \text{AP}) & - & (\text{AQ} \times \text{SP}) & & \\
 (3,050 \times \$1.40^*) & & (3,050 \times \$1.50) & & \\
 \$4,270 & - & \$4,575 & & = \$305 \text{ F}
 \end{array}$$

$$*\$4,270 \div 3,050$$

**Materials quantity variance:**

$$\begin{array}{rclcl}
 (\text{AQ} \times \text{SP}) & - & (\text{SQ} \times \text{SP}) & & \\
 (3,050 \times \$1.50) & & (3,000^* \times \$1.50) & & \\
 \$4,575 & - & \$4,500 & & = \$75 \text{ U}
 \end{array}$$

$$*1,500 \times 2$$

**Labor price variance:**

$$\begin{array}{rclcl}
 (\text{AH} \times \text{AR}) & - & (\text{AH} \times \text{SR}) & & \\
 (1,600 \times \$23^*) & & (1,600 \times \$25) & & \\
 \$36,800 & - & \$40,000 & & = \$3,200 \text{ F}
 \end{array}$$

$$*\$36,800 \div 1,600$$

**Labor quantity variance:**

$$\begin{array}{rclcl}
 (\text{AH} \times \text{SR}) & - & (\text{SH} \times \text{SR}) & & \\
 (1,600 \times \$25) & & (1,500^* \times \$25) & & \\
 \$40,000 & - & \$37,500 & & = \$2,500 \text{ U}
 \end{array}$$

$$*1,500 \times 1 \text{ hr.}$$

**Overhead controllable variance:**

$$\begin{array}{rclcl}
 \text{Actual} & & \text{Overhead} & & \\
 \text{Overhead} & - & \text{Budgeted} & & \\
 \$21,400 & - & \$21,500 & & = \$100 \text{ F} \\
 (\$7,400 + \$14,000) & & [(1,500 \times \$5) + \$14,000] & & 
 \end{array}$$

**Overhead volume variance:**

$$\begin{array}{rclcl}
 \text{Fixed} & & \text{Normal} & \text{Standard} & \\
 \text{Overhead} & \times & \text{Capacity} & - & \text{Hours} \\
 \text{Rate} & & \text{Hours} & & \text{Allowed} \\
 \$10 & \times & (1,400^* & - & 1,500) & = \$1,000 \text{ F}
 \end{array}$$

$$*\$14,000 \div \$10$$

**PROBLEM 25-5A (Continued)**

**(b)**

**FARM LABS, INC.**  
**Income Statement**  
**For the Month Ended November 30, 2008**

<b>Service revenue .....</b>		<b>\$75,000</b>
<b>Cost of service provided (at standard)</b>		
<b>(1,500 X \$43) .....</b>		<b><u>64,500</u></b>
<b>Gross profit (at standard) .....</b>		<b>10,500</b>
<b>Variances</b>		
<b>Materials price .....</b>	<b>\$ (305)</b>	
<b>Materials quantity .....</b>	<b>75</b>	
<b>Labor price .....</b>	<b>(3,200)</b>	
<b>Labor quantity .....</b>	<b>2,500</b>	
<b>Overhead controllable .....</b>	<b>(100)</b>	
<b>Overhead volume .....</b>	<b><u>(1,000)</u></b>	
<b>Total variance—favorable .....</b>		<b><u>(2,030)</u></b>
<b>Gross profit (at standard) .....</b>		<b>12,530</b>
<b>Selling and administrative expenses .....</b>		<b><u>4,000</u></b>
<b>Net income .....</b>		<b><u>\$ 8,530</u></b>

**(c) The unfavorable materials quantity variance could be caused by poor quality materials or inexperienced workers or faulty test procedures.**

**The unfavorable labor quantity variance could be caused by inexperienced workers, poor quality materials, or faulty test procedures.**

<b>*PROBLEM 25-6A</b>
-----------------------

(a) 1.	Raw Materials Inventory (6,250 X \$1.00) .....	6,250	
	Materials Price Variance.....	375	
	[6,250 X (\$1.06 – \$1.00)]		
	Accounts Payable (6,250 X \$1.06) .....		6,625
2.	Work in Process Inventory (5,700* X \$1).....	5,700	
	Materials Quantity Variance .....	550	
	[(6,250 – 5,700) X \$1.00]		
	Raw Materials Inventory .....		6,250
	*1,900 X 3		
3.	Factory Labor (2,100 X \$8).....	16,800	
	Labor Price Variance .....		525
	[2,100 X (\$8.00 – \$7.75)]		
	Wages Payable (2,100 X \$7.75).....		16,275
4.	Work in Process Inventory .....	15,200	
	(1,900 X \$8.00)		
	Labor Quantity Variance .....	1,600	
	[(2,100 – 1,900) X \$8.00]		
	Factory Labor.....		16,800
5.	Manufacturing Overhead.....	25,800	
	Accounts Payable.....		25,800
6.	Work in Process Inventory .....	23,750	
	(3,800* X \$6.25)		
	Manufacturing Overhead.....		23,750
	*1,900 X 2		
7.	Finished Goods Inventory .....	44,650	
	(1,900 X \$23.50)		
	Work in Process Inventory .....		44,650
8.	Accounts Receivable.....	70,000	
	Sales.....		70,000
	Cost of Goods Sold.....	44,650	
	Finished Goods Inventory .....		44,650

**\*PROBLEM 25-6A (Continued)**

<b>9. Selling and Administrative Expenses .....</b>	<b>2,000</b>	
<b>    Accounts Payable .....</b>		<b>2,000</b>

(b)	<u>Raw Materials Inventory</u>		<u>Materials Price Variance</u>		<u>Work in Process Inventory</u>	
	(1)	6,250	(2)	6,250	(1)	375
					(2)	5,700
					(4)	15,200
					(6)	23,750
	<u>Factory Labor</u>		<u>Materials Quantity Variance</u>		<u>Finished Goods Inventory</u>	
	(3)	16,800	(4)	16,800	(2)	550
					(7)	44,650
					(8)	44,650
	<u>Manufacturing Overhead</u>		<u>Labor Price Variance</u>		<u>Cost of Goods Sold</u>	
	(5)	25,800	(6)	23,750		
					(3)	525
					(8)	44,650
			<u>Labor Quantity Variance</u>			
			(4)	1,600		

<b>(c) Overhead Volume Variance (1).....</b>	<b>900</b>	
<b>Overhead Controllable Variance (2).....</b>	<b>1,150</b>	
<b>    Manufacturing Overhead .....</b>		<b>2,050</b>

(1)  $\$2.25 \times [4,200 \text{ (normal capacity)} - 3,800 \text{ (standard machine hours allowed)}]$ .

(2)  $\$25,800 - \$24,650$  [Variable  $\$15,200$  ( $\$4$  per hour  $\times$  3,800 standard machine hours allowed for the 1,900 units) + Fixed  $\$9,450$  ( $\$2.25 \times$  normal capacity of 4,200 hours)].

**\*PROBLEM 25-6A (Continued)**

**(d)**

**ADCOCK CORPORATION**  
**Income Statement**  
**For the Month Ended January 31, 2008**

<b>Sales.....</b>		<b>\$70,000</b>
<b>Cost of goods sold (at standard).....</b>		<b><u>44,650</u></b>
<b>(1,900 X \$23.50)</b>		
<b>Gross profit (at standard) .....</b>		<b>25,350</b>
<b>Variances</b>		
<b>Materials price .....</b>	<b>\$ 375</b>	
<b>Materials quantity .....</b>	<b>550</b>	
<b>Labor price .....</b>	<b>(525)</b>	
<b>Labor quantity .....</b>	<b>1,600</b>	
<b>Overhead controllable .....</b>	<b>1,150</b>	
<b>Overhead volume .....</b>	<b><u>900</u></b>	
<b>Total variance—unfavorable .....</b>		<b><u>4,050</u></b>
<b>Gross profit (actual) .....</b>		<b>21,300</b>
<b>Selling and administrative expenses .....</b>		<b><u>2,000</u></b>
<b>Net income .....</b>		<b><u><u>\$19,300</u></u></b>

<b>PROBLEM 25-1B</b>
----------------------

**Total materials variance:**

$$\begin{array}{rcl}
 (\text{AQ} \times \text{AP}) - (\text{SQ} \times \text{SP}) & & \\
 (15,000 \times \$4.90) - (14,800^* \times \$5.00) & & \\
 \$73,500 - \$74,000 & = & \$500 \text{ F}
 \end{array}$$

**\*7,400 X 2**

**Materials price variance:**

$$\begin{array}{rcl}
 (\text{AQ} \times \text{AP}) - (\text{AQ} \times \text{SP}) & & \\
 (15,000 \times \$4.90) - (15,000 \times \$5.00) & & \\
 \$73,500 - \$75,000 & = & \$1,500 \text{ F}
 \end{array}$$

**Materials quantity variance:**

$$\begin{array}{rcl}
 (\text{AQ} \times \text{SP}) - (\text{SQ} \times \text{SP}) & & \\
 (15,000 \times \$5.00) - (14,800 \times \$5.00) & & \\
 \$75,000 - \$74,000 & = & \$1,000 \text{ U}
 \end{array}$$

**Total labor variance:**

$$\begin{array}{rcl}
 (\text{AH} \times \text{AR}) - (\text{SH} \times \text{SR}) & & \\
 (14,900 \times \$12.20) - (14,800^* \times \$12.00) & & \\
 \$181,780 - \$177,600 & = & \$4,180 \text{ U}
 \end{array}$$

**\*7,400 X 2**

**Labor price variance:**

$$\begin{array}{rcl}
 (\text{AH} \times \text{AR}) - (\text{AH} \times \text{SR}) & & \\
 (14,900 \times \$12.20) - (14,900 \times \$12.00) & & \\
 \$181,780 - \$178,800 & = & \$2,980 \text{ U}
 \end{array}$$

**Labor quantity variance:**

$$\begin{array}{rcl}
 (\text{AH} \times \text{SR}) - (\text{SH} \times \text{SR}) & & \\
 (14,900 \times \$12.00) - (14,800 \times \$12.00) & & \\
 \$178,800 - \$177,600 & = & \$1,200 \text{ U}
 \end{array}$$

**Total overhead variance:**

$$\begin{array}{rcl}
 \text{Actual Overhead} - \text{Overhead Applied} & & \\
 (\$88,990 + \$44,000) - (14,800 \times \$9.00^*) & & \\
 \$132,990 - \$133,200 & = & \$210 \text{ F}
 \end{array}$$

**\*Standard per labor hour overhead cost (\$6 variable + \$3 fixed).**

## PROBLEM 25-1B (Continued)

**Overhead controllable variance:**

$$\begin{array}{rcl} \text{Actual} & & \text{Overhead} \\ \text{Overhead} & - & \text{Budgeted} \\ (\$88,990 + \$44,000) & - & [(\$45,000 + (14,800 \times \$6))] \\ \$132,990 & & \$133,800 \quad = \$810 \text{ F} \end{array}$$

**Overhead volume variance:**

$$\begin{array}{rcl} \text{Fixed Overhead} & \times & \left[ \begin{array}{c} \text{Normal} \\ \text{Capacity} \\ \text{Hours} \end{array} - \begin{array}{c} \text{Standard} \\ \text{Hours} \\ \text{Allowed} \end{array} \right] \\ \text{Rate} & & \\ 3.00/\text{hr.} & \times & (15,000 - 14,800) = \$600 \text{ U} \end{array}$$

<b>PROBLEM 25-2B</b>
----------------------

(a) (1) Total materials variance:

$$\begin{array}{rcl}
 (\text{AQ} \times \text{AP}) - (\text{SQ} \times \text{SP}) & & \\
 (17,500 \times \$3.40) - (18,000 \times \$3.00) & & \\
 \$59,500 - \$54,000 & = & \$5,500 \text{ U}
 \end{array}$$

Materials price variance:

$$\begin{array}{rcl}
 (\text{AQ} \times \text{AP}) - (\text{AQ} \times \text{SP}) & & \\
 (17,500 \times \$3.40) - (17,500 \times \$3.00) & & \\
 \$59,500 - \$52,500 & = & \$7,000 \text{ U}
 \end{array}$$

Materials quantity variance:

$$\begin{array}{rcl}
 (\text{AQ} \times \text{SP}) - (\text{SQ} \times \text{SP}) & & \\
 (17,500 \times \$3.00) - (18,000 \times \$3.00) & & \\
 \$52,500 - \$54,000 & = & \$1,500 \text{ F}
 \end{array}$$

(2) Total labor variance:

$$\begin{array}{rcl}
 (\text{AH} \times \text{AR}) - (\text{SH} \times \text{SR}) & & \\
 (2,900 \times \$11.80) - (3,000 \times \$12.50) & & \\
 \$34,220 - \$37,500 & = & \$3,280 \text{ F}
 \end{array}$$

Labor price variance:

$$\begin{array}{rcl}
 (\text{AH} \times \text{AR}) - (\text{AH} \times \text{SR}) & & \\
 (2,900 \times \$11.80) - (2,900 \times \$12.50) & & \\
 \$34,220 - \$36,250 & = & \$2,030 \text{ F}
 \end{array}$$

Labor quantity variance:

$$\begin{array}{rcl}
 (\text{AH} \times \text{SR}) - (\text{SH} \times \text{SR}) & & \\
 (2,900 \times \$12.50) - (3,000 \times \$12.50) & & \\
 \$36,250 - \$37,500 & = & \$1,250 \text{ F}
 \end{array}$$

(3) Total overhead variance:

$$\begin{array}{rcl}
 \text{Actual Overhead} - \text{Overhead Applied} & & \\
 \$87,500 - \$93,000 & = & \$5,500 \text{ F} \\
 & & (3,000 \times \$31^*)
 \end{array}$$

\*(\$20 + \$11)



## PROBLEM 25-2B (Continued)

Overhead controllable variance:

Actual		Overhead	
Overhead	–	Budgeted	
\$87,500	–	\$90,800	= \$3,300 F
		[(3,000 X \$20) + \$30,800*]	

\*2,800 X \$11

Overhead volume variance:

Fixed		Normal	Standard	
Overhead	X	Capacity	–	Hours
Rate		Hours		Allowed
\$11/hr.	X	(2,800	–	3,000)
				= \$2,200 F

(b)

### ORLANDA MANUFACTURING COMPANY Income Statement For the Month Ended July 31, 2008

Sales.....	\$240,000
Cost of goods sold (at standard).....	<u>184,500<sup>1</sup></u>
Gross profit (at standard) .....	55,500
Variances	
Materials price .....	\$ 7,000
Materials quantity .....	(1,500)
Labor price .....	(2,030)
Labor quantity .....	(1,250)
Overhead controllable.....	(3,300)
Overhead volume.....	<u>(2,200)</u>
Total variance—favorable .....	<u>(3,280)</u>
Gross profit (actual).....	58,780
Selling and administrative expenses .....	<u>25,000</u>
Net income .....	<u>\$ 33,780</u>

<sup>1</sup>Materials \$54,000 (18,000 X \$3) + Direct labor \$37,500 (3,000 X \$12.50) + Overhead applied \$93,000.

<b>PROBLEM 25-3B</b>
----------------------

(a) (1) Total materials variance:

$$\begin{array}{rcl}
 (\text{AQ} \times \text{AP}) - (\text{SQ} \times \text{SP}) & & \\
 (57,000 \times \$7.20) - (59,000^* \times \$6.80) & & \\
 \$410,400 - \$401,200 & = & \$9,200 \text{ U}
 \end{array}$$

\*11,800 X 5

Materials price variance:

$$\begin{array}{rcl}
 (\text{AQ} \times \text{AP}) - (\text{AQ} \times \text{SP}) & & \\
 (57,000 \times \$7.20) - (57,000 \times \$6.80) & & \\
 \$410,400 - \$387,600 & = & \$22,800 \text{ U}
 \end{array}$$

Materials quantity variance:

$$\begin{array}{rcl}
 (\text{AQ} \times \text{SP}) - (\text{SQ} \times \text{SP}) & & \\
 (57,000 \times \$6.80) - (59,000 \times \$6.80) & & \\
 \$387,600 - \$401,200 & = & \$13,600 \text{ F}
 \end{array}$$

(2) Total labor variance

$$\begin{array}{rcl}
 (\text{AH} \times \text{AR}) - (\text{SH} \times \text{SR}) & & \\
 (11,200 \times \$11.20) - (11,800 \times \$11.50) & & \\
 \$125,440 - \$135,700 & = & \$10,260 \text{ F}
 \end{array}$$

Labor price variance:

$$\begin{array}{rcl}
 (\text{AH} \times \text{AR}) - (\text{AH} \times \text{SR}) & & \\
 (11,200 \times \$11.20) - (11,200 \times \$11.50) & & \\
 \$125,440 - \$128,800 & = & \$3,360 \text{ F}
 \end{array}$$

Labor quantity variance:

$$\begin{array}{rcl}
 (\text{AH} \times \text{SR}) - (\text{SH} \times \text{SR}) & & \\
 (11,200 \times \$11.50) - (11,800 \times \$11.50) & & \\
 \$128,800 - \$135,700 & = & \$6,900 \text{ F}
 \end{array}$$

(3) Total overhead variance:

$$\begin{array}{rcl}
 \text{Actual Overhead} - \text{Overhead Applied} & & \\
 \$127,000 - \$109,740 & = & \$17,260 \text{ U} \\
 (\$90,000 + \$37,000) - (11,800 \times \$9.30) & & 
 \end{array}$$

### PROBLEM 25-3B (Continued)

**Overhead controllable variance:**

<b>Actual</b>		<b>Overhead</b>	
<b>Overhead</b>	<b>–</b>	<b>Budgeted</b>	
\$127,000	<b>–</b>	\$129,900	<b>= \$2,900 F</b>
(\$90,000 + \$37,000)		[(11,800 X \$3) + \$94,500]	

**Overhead volume variance:**

<b>Fixed Overhead</b>	<b>X</b>	<b>Normal</b>	<b>Standard</b>	
<b>Rate</b>		<b>Capacity</b>	<b>Hours</b>	
\$6.30/hr.	<b>X</b>	<b>Hours</b>	<b>Allowed</b>	
		(15,000	– 11,800)	<b>= \$20,160 U</b>

**(b) The following variances are more than 5% from standard:**

**Materials price variance.** The actual price of \$7.20 is 5.9% higher than the standard price of \$6.80.

The same result can be obtained by dividing the total variance by the total standard. For the materials price variance, the computation would be  $\$22,800 \div \$387,600 = 5.9\%$ .

**Labor quantity variance.** The actual hours of 11,200 is 5.1% under the standard hours of 11,800.

The same result can be obtained by dividing the total variance by the total standard. For example, for the labor quantity variance, the computation would be  $\$6,900 \div \$135,700 = 5.1\%$ .

The unfavorable materials price variance was caused by paying more than the standard cost for the materials purchased. This unfavorable variance may have been caused by price increases or the purchase of better quality materials. Since the labor quantity variance is favorable, the latter explanation is reasonable. Better quality materials may have required fewer hours of labor to construct the suits.

<b>PROBLEM 25-4B</b>
----------------------

- (a)  $\$7,100 \div 142,000 = \$0.05$ ;  $\$.90 - \$0.05 = \$.85$  standard materials price per pound. OR  
 $142,000 \times \$.90 = \$127,800$ ;  $\$127,800 - \$7,100 = \$120,700$ ;  $\$120,700 \div 142,000 = \$.85$ .
- (b)  $\$4,760 \div \$.85 = 5,600$  pounds;  $142,000 + 5,600 = 147,600$  standard quantity for 36,000 units or 4.1 pounds ( $147,600 \div 36,000$ ) per unit. OR  
 $\$120,700 + \$4,760 = \$125,460$ ;  $\$125,460 \div \$.85 = 147,600$ ;  $147,600 \div 36,000 = 4.1$  pounds per unit.
- (c) Standard hours allowed are 48,000 ( $36,000 \times 1\frac{1}{3}$ ).
- (d)  $\$8,400 \div \$12 = 700$  hours over standard; 48,000 standard hours + 700 hours = 48,700 actual hours worked. OR  
 $48,000 \times \$12 = \$576,000$ ;  $\$576,000 + \$8,400 = \$584,400$ ;  $\$584,400 \div \$12 = 48,700$  actual hours worked.
- (e)  $\$9,740 \div 48,700 = \$.20$ ;  $\$12.00 - \$.20 = \$11.80$  actual rate per hour.
- (f)  $\$327,600 \div 42,000 = \$7.80$  predetermined overhead rate per direct labor hour.
- (g) Direct materials 4.1 pounds  $\times \$0.85 = \$3.485$ ; direct labor  $1\frac{1}{3} \times \$12.00 = \$16.00$ ; manufacturing overhead  $1\frac{1}{3} \times \$7.80 = \$10.40$ .  $\$3.485 + \$16.00 + \$10.40 = \$29.885$  standard cost per unit.
- (h)  $48,000 \times \$7.80 = \$374,400$  overhead applied.
- (i) Standard hours allowed (48,000) – normal capacity hours (42,000) = 6,000 hours;  $6,000 \times \$2.50 = \$15,000$  overhead volume variance F.
- (j) Total overhead rate  $\$7.80$  less fixed overhead rate  $\$2.50 = \$5.30$  variable overhead rate;  $\$5.30 \times 48,000$  standard hours allowed =  $\$254,400$  budgeted variable overhead costs;  $\$254,400 - \$3,000 = \$251,400$  variable overhead costs incurred.
- (k)  $\$29.885$  [see (g) above]  $\times 36,000 = \$1,075,860$  or direct materials  $\$125,460$  + direct labor  $\$576,000$  + overhead applied  $\$374,400 = \$1,075,860$ .

<b>PROBLEM 25-5B</b>
----------------------

(a) **Materials price variance:**

$$\begin{array}{rclcl}
 (\text{AQ} \times \text{AP}) & - & (\text{AQ} \times \text{SP}) & & \\
 (2,020 \times \$2.10^*) & & (2,020 \times \$2.00) & & \\
 \$4,242 & - & \$4,040 & = & \$202 \text{ U}
 \end{array}$$

$$*\$4,242 \div 2,020$$

**Materials quantity variance:**

$$\begin{array}{rclcl}
 (\text{AQ} \times \text{SP}) & - & (\text{SQ} \times \text{SP}) & & \\
 (2,020 \times \$2.00) & & (2,000 \times \$2.00) & & \\
 \$4,040 & - & \$4,000 & = & \$40 \text{ U}
 \end{array}$$

**Labor price variance:**

$$\begin{array}{rclcl}
 (\text{AH} \times \text{AR}) & - & (\text{AH} \times \text{SR}) & & \\
 (995 \times \$21^*) & & (995 \times \$20) & & \\
 \$20,895 & - & \$19,900 & = & \$995 \text{ U}
 \end{array}$$

$$*\$20,895 \div 995$$

**Labor quantity variance:**

$$\begin{array}{rclcl}
 (\text{AH} \times \text{SR}) & - & (\text{SH} \times \text{SR}) & & \\
 (995 \times \$20) & & (1,000^* \times \$20) & & \\
 \$19,900 & - & \$20,000 & = & \$100 \text{ F}
 \end{array}$$

$$*2,000 \times .5$$

**Overhead controllable variance:**

$$\begin{array}{rclcl}
 \text{Actual Overhead} & - & \text{Overhead Budgeted} & & \\
 \$11,500 & - & \$11,600 & & \\
 [(\$8,100 + \$3,400)] & - & [(1,000 \times \$8) + \$3,600] & = & \$100 \text{ F}
 \end{array}$$

**Overhead volume variance:**

$$\begin{array}{rclcl}
 \text{Fixed Overhead Rate} & \times & \left( \begin{array}{cc} \text{Normal Capacity Hours} & \text{Standard Hours Allowed} \end{array} \right. & & \\
 \$3.00 & \times & (1,200^* - 1,000) & = & \$600 \text{ U}
 \end{array}$$

$$*\$3,600 \div \$3.00/\text{hour}$$

**PROBLEM 25-5B (Continued)**

**(b)**

**HI-TEK LABS**  
**Income Statement**  
**For the Month Ended May 31, 2008**

<b>Service revenue .....</b>		<b>\$45,000</b>
<b>Cost of service provided (at standard)</b>		
<b>(\$17.50 X 2,000) .....</b>		<b><u>35,000</u></b>
<b>Gross profit (at standard) .....</b>		<b>10,000</b>
<b>Variances</b>		
<b>Materials price .....</b>	<b>\$202</b>	
<b>Materials quantity .....</b>	<b>40</b>	
<b>Labor price .....</b>	<b>995</b>	
<b>Labor quantity .....</b>	<b>(100)</b>	
<b>Overhead controllable .....</b>	<b>(100)</b>	
<b>Overhead volume .....</b>	<b><u>600</u></b>	
<b>Total variance—unfavorable .....</b>		<b><u>1,637</u></b>
<b>Gross profit (at actual) .....</b>		<b>8,363</b>
<b>Selling and administrative expenses .....</b>		<b><u>2,000</u></b>
<b>Net income .....</b>		<b><u>\$ 6,363</u></b>

**(c) The unfavorable materials price variance could be caused by price increases, using the wrong shipping method, or rising prices.**

**The unfavorable materials quantity variance could be caused by inexperienced workers, carelessness, poor quality material, or faulty test procedures.**

**The unfavorable labor price variance could be caused by rising labor costs, or assigning the wrong workers to perform the tests.**

**The unfavorable overhead volume variance could be caused by a lack of test orders or the inefficient use of direct labor hours.**

<b>*PROBLEM 25-6B</b>
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(a)	1.	Raw Materials Inventory (6,100 X \$4.00) .....	24,400	
		Materials Price Variance.....		2,440
		[6,100 X (\$3.60 – \$4.00)]		
		Accounts Payable (6,100 X \$3.60) .....		21,960
	2.	Work in Process Inventory .....	22,960	
		(5,740* X \$4.00)		
		Materials Quantity Variance .....	1,440	
		[(6,100 – 5,740) X \$4.00]		
		Raw Materials Inventory .....		24,400
		*4,100 X 1.4		
	3.	Factory Labor (3,800 X \$9.00) .....	34,200	
		Labor Price Variance .....	950	
		[3,800 X (\$9.25 – \$9.00)]		
		Wages Payable (3,800 X \$9.25).....		35,150
	4.	Work in Process Inventory .....	36,900	
		(4,100 X \$9.00)		
		Labor Quantity Variance.....		2,700
		[(4,100 – 3,800) X \$9.00]		
		Factory Labor.....		34,200
	5.	Manufacturing Overhead.....	73,650	
		Accounts Payable.....		73,650
	6.	Work in Process Inventory .....	71,340	
		(4,100 X \$17.40)		
		Manufacturing Overhead.....		71,340
	7.	Finished Goods Inventory .....	131,200	
		(4,100 X \$32.00)		
		Work in Process Inventory .....		131,200
	8.	Accounts Receivable.....	250,000	
		Sales.....		250,000
		Cost of Goods Sold.....	131,200	
		Finished Goods Inventory .....		131,200
	9.	Selling and Administrative Expenses.....	61,000	
		Accounts Payable.....		61,000

## PROBLEM 25-6B (Continued)

(b)	<b>Raw Materials Inventory</b>		<b>Materials Price Variance</b>		<b>Work in Process Inventory</b>					
	(1)	24,400	(2)	24,400	(1)	2,440	(2)	22,960	(7)	131,200
							(4)	36,900		
							(6)	71,340		
	<b>Factory Labor</b>		<b>Materials Quantity Variance</b>		<b>Finished Goods Inventory</b>					
	(3)	34,200	(4)	34,200	(2)	1,440	(7)	131,200	(8)	131,200
	<b>Manufacturing Overhead</b>		<b>Labor Price Variance</b>		<b>Cost of Goods Sold</b>					
	(5)	73,650	(6)	71,340	(3)	950	(8)	131,200		
			<b>Labor Quantity Variance</b>							
					(4)	2,700				

- (c) Overhead Volume Variance (1)..... 4,000  
       Overhead Controllable Variance (2)..... 1,690  
       Manufacturing Overhead ..... 2,310  
       (1) \$10 X [4,500 (normal capacity) – 4,100 (standard hours allowed)].  
       (2) [(4,100 X \$7.40) + (\$10 X 4,500)] – \$73,650.

(d) **GIBSEN MANUFACTURING COMPANY**  
**Income Statement**  
**For the Month Ended January 31, 2008**

Sales .....	\$250,000
Cost of goods sold (at standard) .....	<u>131,200</u>
(4,100 X \$32)	
Gross profit (at standard) .....	118,800
Variances	
Materials price .....	\$(2,440)
Materials quantity .....	1,440
Labor price .....	950
Labor quantity .....	(2,700)
Overhead controllable .....	(1,690)
Overhead volume .....	<u>4,000</u>
Total variance—favorable .....	<u>(440)</u>
Gross profit (actual) .....	119,240
Selling and administrative expenses .....	<u>61,000</u>
Net income .....	<u>\$ 58,240</u>



- (a) When setting a standard for computer/labor hours usage, Colaw Professionals should consider the following factors:
- (1) A standard set conservatively high may discourage clients from purchasing the model.
  - (2) A standard set too low may encourage sales of the model, but if customers use more hours than the standard suggests, they may be upset at having been misled.
  - (3) Clients are likely to use the standard as an evaluation tool for their own employees operating the model. Standards set inappropriately may adversely affect productivity and/or morale of client employees.
- (b) Logical alternatives for the standard include:
- (1) 34 hours: The average number of hours used for one application by all five financial institutions.
  - (2) 45 hours: The conservatively high number experienced by one financial institution.
  - (3) 25 hours: The optimistic low number experienced by one financial institution.
  - (4) 30 hours: The number of hours required most frequently in the sample of five institutions.
- (c) In light of earlier factors listed, the second and third choices for the standard should be eliminated (i.e., 45 and 25 hours). The average 34 hours is probably the most representative. However, Colaw Professionals may select 30 hours, given that the company has a high incentive to sell the new model. Consequently, it may make the most sense to pick the lower of the two remaining choices (30 hours).

## **BYP 25-1 (Continued)**

**(d) Standard material cost for one model application:**

**User Manuals:**             $\$300 \div 20 \text{ manuals} = \underline{\$15/\text{application}}.$

**Computer Forms:**        $\$50 \div 250 \text{ forms} = \$.20/\text{form}$   
                                  $\$.20/\text{form} \times 50 \text{ forms} = \underline{\$10/\text{application}}.$

- (a) The overhead application rate is \$143,500 divided by 5,000 hours, or \$28.70 per direct labor hour.
- (b) The standard direct labor hours are used to apply overhead to production, so the calculation is  $\$28.70 \times 4,500$ , or \$129,150.
- (c) The overhead budgeted for 4,500 direct labor hours is computed below.

Fixed:  $\$22,000 + \$13,000 + \$27,000 + \$8,000 + \$3,000 + \$1,500 + \$500 + \$300 = \underline{\$75,300}$

Variable:  $(\$12,000 + \$43,000 + \$10,000 + \$2,500 + \$700) \div 5,000 = \underline{\$13.64}$

Fixed	\$ 75,300
Variable (4,500 X \$13.64)	<u>61,380</u>
	<u>\$136,680</u>

The variances are:

Controllable: Actual (\$149,000) – Budgeted (\$136,680) = \$12,320 U

Volume:  $\$15.06^*/\text{hr.} \times (5,000 - 4,500) = \underline{\$7,530 \text{ U}}$

\* $\$75,300 \div 5,000 \text{ hrs.}$

- (d) Both variances appear significant. The controllable variance is 9% of budgeted overhead ( $\$12,320 \div \$136,680$ ), and the volume variance is almost 6% of applied overhead ( $\$7,530 \div \$129,150$ ).
- (e) The controllable variance is caused by either spending more than expected on overhead items, or using more than expected of overhead items (for example, more indirect labor hours). The volume variance is caused by underutilizing factory time. To improve performance, management must spend less on overhead items, use them more efficiently, and increase production to 1,000 units.

- (a) Glassmaster is using standard costs because management states that a factor that contributed to improved margins (profit) was a favorable materials price variance.**
- (b) The materials price variance experienced should not lead to changes in the standard for the next fiscal year. Management indicates that the favorable variance is temporary and will begin to reverse itself as stronger worldwide demand for commodity products improves in tandem with the economy.**

- (a) The objectives for each perspective are:**
  - Financial: Profitability, fewer planes, increased revenues**
  - Customer: Flight is on-time, lowest prices, more customers**
  - Internal: Fast ground turnaround**
  - Learning: Ground crew alignment.**
- (b) To measure achievement of the customer perspective objective of on-time flights, lowest prices and more customers the company will use FAA on time arrival ratings, customer ranking, and number of customers.**
- (c) To achieve the learning perspective objective of ground crew alignment the company plans to implement an employee stock ownership plan and ground crew training.**

**To:           Professor Standard**

**From:       I. M. Smart**

**Subject:     Setting Standard Costs**

**This memorandum covers two points as follows:**

- (a) The comparative advantages and disadvantages of ideal versus normal standards.**

**Ideal standards represent optimum levels of performance under perfect operating conditions. In contrast, normal standards represent efficient levels of performance that are attainable under expected operating conditions.**

**An advantage of ideal standards is that they stimulate the conscientious worker to ever-increasing improvement. The disadvantage of ideal standards is that because they are so difficult to meet, they discourage self-improvement and lower the morale of the entire work force.**

**Normal standards are rigorous but attainable. Such standards should stimulate the worker to self-improvement without discouraging him or her or lowering the morale of the work force.**

- (b) Factors to be considered in setting standards for direct materials, direct labor, and manufacturing overhead.**
- 1. Direct materials. The direct materials price standard is the cost per unit of direct materials that should be incurred. This standard should be based on the purchasing department's best estimate of the cost of raw materials. The price standard should include allowances for related costs such as receiving and storing.**

## **BYP 25-5 (Continued)**

**The direct materials quantity standard is the quantity of direct materials that should be used per unit of finished goods. This standard is a physical measure and it should include allowances for unavoidable waste and normal spoilage.**

- 2. Direct labor. The direct labor price standard is the rate per hour that should be incurred for direct labor. This standard should be based on current wage rates adjusted for expected cost of living adjustments and employer payroll taxes and fringe benefits.**

**The direct labor quantity standard is the time that should be required to make one unit of product. In setting this standard, allowances should be made for rest periods, cleanup, and machine setup and downtime.**

- 3. Manufacturing overhead. For this standard, a standard predetermined overhead rate is used. This rate is determined by dividing budgeted overhead costs by an expected activity index. The budgeted overhead costs should be based on a realistic estimate of overhead costs at normal capacity.**

- (a) Ron and his fellow painters in the painting department will benefit from Ron's slow action. The company and its customers are harmed. The company will incur higher costs on the product and therefore will have to set a higher selling price or suffer a smaller gross profit. Customers will have to pay a greater price for the product or stockholders will obtain less benefit from their investment.**
  
- (b) Deliberately falsifying and distorting the time study was unethical. If every employee in every phase of producing this new product distorted the time study, the company would not be competitive. If the company is not competitive and profitable, it will eventually go out of business and Ron will be out of a job. It is in Ron's best interest to support the development of reasonable standards and improved efficiency.**
  
- (c) The company might conduct several time study tests using different employees. Or the company might conduct unannounced time studies. And the standard might be changed more often than every six months by conducting monthly time studies to effect continuous improvements in efficiency. Incentives might be offered to employees who produce the most efficient effort in the time studies, thereby discouraging distorted, inefficient performance.**



- (a) The panel made recommendations regarding a number of areas of concern in higher education. For example, it suggested that new approaches should be used to control costs, and it stated that the cost of tuition should grow no faster than median family income. It made recommendations to strengthen the Pell Grant program, which is the core of the federal financial aid program. It also recommended that public universities should use standardized tests to measure student learning.**
- (b) As discussed in the chapter, standards provide a mechanism for evaluating performance and, if used properly, can be used as a motivational tool. The results of standardized tests might help to evaluate the effectiveness of various approaches to education. They might also be used to “weed out” schools that are not meeting minimum expectations.**
- (c) Potential disadvantages of standards are that they might reduce the willingness of instructors or institutions to experiment with new teaching approaches. In addition, in order to obtain high scores, instructors might feel compelled to “teach to the exam,” thus narrowing the breadth of exposure obtained by the student. Also, by their very nature, standardized tests have a difficult time addressing differences across various instructional settings that can cause differences in results.**
- (d) Answers will vary depending on student response.**

