Chapter 11
Flexible Budgets and Overhead Analysis

Solutions to Questions

11-1 A static budget is a budget prepared for a single level of activity that remains unchanged even if the activity level subsequently changes.

11-2 A flexible budget can be adjusted to reflect any level of activity. By contrast, a static budget is prepared for a single level of activity and is not subsequently adjusted.

11-3 Criteria for choosing an activity base:
    1. The activity base and overhead cost should be causally related.
    2. The activity base should not be expressed in dollars.
    3. The activity base should be simple and easy to understand.

11-4 If the flexible budget is based on actual hours worked, then only a spending variance will be produced on the performance report. Both a spending and an efficiency variance will be produced if the flexible budget is based on both actual hours and standard hours.

11-5 Standard hours allowed means the time that should have been taken to complete the actual output of the period.

11-6 The materials price variance consists entirely of differences in price paid from standard. The variable overhead spending variance consists of two elements. One element is like a price variance and results from differences between actual and standard prices for variable overhead inputs. The other element is like a quantity variance and results from differences between the amount of variable overhead inputs that should have been used and the amounts that were actually used. Ordinarily these two elements are not separated.

11-7 The overhead efficiency variance does not really measure efficiency in the use of overhead. It actually measures efficiency in the use of the base underlying the flexible budget. This base could be direct labor-hours, machine-hours, or some other measure of activity.

11-8 A flexible budget provides the cost and activity data needed to compute the predetermined overhead rate, which is used in product costing.

11-9 The denominator level of activity is the denominator in the predetermined overhead rate.

11-10 A normal costing system was used in Chapter 3, whereas in Chapter 11 a standard cost system is used. Standard costing ensures that the same amount of overhead is applied to a product regardless of the actual amount of the application base (such as machine-hours or direct labor-hours) that is used during a period.

11-11 In a standard cost system both a budget variance and a volume variance are computed for fixed manufacturing overhead cost.

11-12 The fixed overhead budget variance is the difference between total budgeted fixed overhead cost and the total amount of fixed overhead cost incurred. If actual costs exceed budgeted costs, the variance is labeled unfavorable.

11-13 The volume variance is favorable when the activity level for a period, at standard, is greater than the denominator activity level. Conversely, if the activity level, at standard, is less than the denominator level of activity, the volume variance is unfavorable. The variance does not measure deviations in spending. It

measures deviations in actual activity from the denominator level of activity.

11-14 If fixed costs are expressed on a per unit basis, managers may be misled into thinking that they are really variable. This can lead to faulty predictions concerning cost behavior and to bad decisions and erroneous performance evaluations.

11-15 Under- or overapplied overhead can be factored into variable overhead spending and efficiency variances and the fixed overhead budget and volume variances.

11-16 The total of the overhead variances would be favorable, since overapplied overhead is equivalent to a favorable variance.

Exercise 11-1 (15 minutes)

Emory Corporation
Flexible Budget

	Cost Formula (per MH)	Machine-Hours		
		15,000	20,000	25,000
Variable costs:				
Utilities........................	$0.30	$ 4,500	$ 6,000	$ 7,500
Indirect labor...............	1.40	21,000	28,000	35,000
Supplies	0.20	3,000	4,000	5,000
Maintenance................	0.10	1,500	2,000	2,500
Total variable cost...........	$2.00	30,000	40,000	50,000
Fixed costs:				
Indirect labor...............		52,000	52,000	52,000
Maintenance................		18,000	18,000	18,000
Depreciation		90,000	90,000	90,000
Total fixed cost...............		160,000	160,000	160,000
Total overhead cost		$190,000	$200,000	$210,000

Exercise 11-2 (15 minutes)

1.

Orcas Boat Charter Service
Flexible Budget Performance Report
For the Month Ended July 31

	Cost Formula (per charter)	Actual Costs Incurred for 160 Charters	Budget Based on 160 Charters	Variance
Variable overhead costs:				
Cleaning................................	$ 60.50	$ 9,440	$ 9,680	$ 240 F
Maintenance...........................	35.25	5,980	5,640	340 U
Port fees	15.75	2,670	2,520	150 U
Total variable overhead costs....	$111.50	18,090	17,840	250 U
Fixed overhead costs:				
Salaries and wages		9,200	9,150	50 U
Depreciation		12,800	12,100	700 U
Utilities.................................		835	860	25 F
Moorage...............................		5,360	4,980	380 U
Total fixed overhead costs		28,195	27,090	1,105 U
Total overhead costs		$46,285	$44,930	$1,355 U

2. The addition of a new boat to the charter fleet apparently increased depreciation and moorage charges for the month above what had been anticipated. (A new boat adds to depreciation charges and a new boat needs to be moored, hence the higher moorage charges.) These two items are responsible for most of the $1,355 unfavorable total variance for the month.

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Exercise 11-3 (15 minutes)

Yung Corporation
Variable Overhead Performance Report
For the Year Ended December 31

Budgeted direct labor-hours 38,000
Actual direct labor-hours 34,000
Standard direct labor-hours allowed 35,000

Overhead Costs	Cost Formula (per DLH)	Actual Costs Incurred 34,000 DLHs (AH × AR)	Budget Based on 34,000 DLHs (AH × SR)	Spending Variance
Indirect labor	$0.60	$21,200	$20,400	$800 U
Supplies.......................	0.10	3,200	3,400	200 F
Electricity....................	0.05	1,600	1,700	100 F
Total variable over-head cost	$0.75	$26,000	$25,500	$500 U

Exercise 11-4 (20 minutes)

Yung Corporation
Variable Overhead Performance Report
For the Year Ended December 31

Budgeted direct labor-hours............................ 38,000
Actual direct labor-hours................................ 34,000
Standard direct labor-hours allowed................ 35,000

Overhead Costs	Cost Formula (per DLH)	(1) Actual Costs Incurred 34,000 DLHs (AH × AR)	(2) Budget Based on 34,000 DLHs (AH × SR)	(3) Budget Based on 35,000 DLHs (SH × SR)	(4) Total Variance (1)-(3)	Spending Variance (1)-(2)	Efficiency Variance (2)-(3)
Indirect labor...............	$0.60	$21,200	$20,400	$21,000	$200 U	$800 U	$600 F
Supplies	0.10	3,200	3,400	3,500	300 F	200 F	100 F
Electricity....................	0.05	1,600	1,700	1,750	150 F	100 F	50 F
Total variable over- head cost.................	$0.75	$26,000	$25,500	$26,250	$250 F	$500 U	$750 F

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Exercise 11-5 (15 minutes)

1. The total overhead cost at the denominator level of activity must be determined before the predetermined overhead rate can be computed.

Total fixed overhead cost per year	$250,000
Total variable overhead cost ($2 per DLH × 40,000 DLHs)......................................	80,000
Total overhead cost at the denominator level of activity....	$330,000

$$\frac{\text{Predetermined}}{\text{overhead rate}} = \frac{\text{Overhead at the denominator level of activity}}{\text{Denominator level of activity}}$$

$$= \frac{\$330,000}{40,000 \text{ DLHs}} = \$8.25 \text{ per DLH}$$

2. Standard direct labor-hours allowed for

the actual output (a)............................	38,000 DLHs
Predetermined overhead rate (b)	$8.25 per DLH
Overhead applied (a) × (b).....................	$313,500

Exercise 11-6 (15 minutes)

1.

$$\text{Fixed portion of the predetermined overhead rate} = \frac{\text{Fixed overhead}}{\text{Denominator level of activity}}$$

$$= \frac{\$250,000}{25,000 \text{ DLHs}}$$

$$= \$10.00 \text{ per DLH}$$

2.

$$\text{Budget variance} = \text{Actual fixed overhead cost} - \text{Budgeted fixed overhead cost}$$

$$= \$254,000 - \$250,000$$

$$= \$4,000 \text{ U}$$

$$\text{Volume variance} = \text{Fixed portion of the predetermined overhead rate} \times \left(\text{Denominator hours} - \text{Standard hours allowed} \right)$$

$$= \$10.00 \text{ per DLH } (25,000 \text{ DLHs} - 26,000 \text{ DLHs})$$

$$= \$10,000 \text{ F}$$

Exercise 11-7 (15 minutes)

Note: With the exception of the number of cars, all amounts below are in Swiss francs.

Lavage Rapide
Flexible Budget
For the Month Ended August 31

	Cost Formula (per car)	Activity (cars)		
Overhead Costs		8,000	9,000	10,000
Variable overhead costs:				
Cleaning supplies	0.80	6,400	7,200	8,000
Electricity	0.30	2,400	2,700	3,000
Maintenance	0.20	1,600	1,800	2,000
Total variable overhead cost	1.30	10,400	11,700	13,000
Fixed overhead costs:				
Operator wages		9,000	9,000	9,000
Depreciation		6,000	6,000	6,000
Rent...		8,000	8,000	8,000
Total fixed overhead cost		23,000	23,000	23,000
Total overhead cost		33,400	34,700	36,000

Exercise 11-8 (10 minutes)

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Lavage Rapide
Static Budget
For the Month Ended August 31
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Budgeted number of cars	<u>8,800</u>

Budgeted variable overhead costs:

Cleaning supplies (@ 0.80 SFr per car)	7,040 SFr
Electricity (@ 0.30 SFr per car)	2,640
Maintenance (@ 0.20 SFr per car)	<u>1,760</u>
Total variable overhead cost......................	<u>11,440</u>

Budgeted fixed overhead costs:

Operator wages	9,000
Depreciation	6,000
Rent..	<u>8,000</u>
Total fixed overhead cost	<u>23,000</u>
Total budgeted overhead cost	<u>34,440</u> SFr

Exercise 11-9 (15 minutes)

Note: With the exception of the number of cars, all amounts below are in Swiss francs.

Lavage Rapide
Flexible Budget Performance Report
For the Month Ended August 31

Budgeted number of cars............. 8,800
Actual number of cars................. 8,900

Overhead Costs	Cost Formula (per car)	Actual Costs Incurred for 8,900 Cars	Budget Based on 8,900 Cars	Variance
Variable overhead costs:				
Cleaning supplies	0.80	7,080	7,120	40 F
Electricity	0.30	2,460	2,670	210 F
Maintenance..........................	0.20	1,550	1,780	230 F
Total variable overhead cost.......	1.30	11,090	11,570	480 F
Fixed overhead costs:				
Operator wages		9,100	9,000	100 U
Depreciation		7,000	6,000	1,000 U
Rent......................................		8,000	8,000	0
Total fixed overhead cost		24,100	23,000	1,100 U
Total overhead cost		35,190	34,570	620 U

Students may question the variances for fixed costs. Operator wages can differ from what was budgeted for a variety of reasons including an unanticipated increase in the wage rate; changes in the mix of workers between those earning lower and higher wages; changes in the number of operators on duty; and overtime. Depreciation may have increased because of the acquisition of new equipment or because of a loss on equipment that must be scrapped—perhaps due to poor maintenance. (This assumes that the loss flows through the depreciation account on the performance report.)

Exercise 11-10 (20 minutes)

1.   Murray Company
            Variable Overhead Performance Report

Budgeted machine-hours 12,000
Actual machine-hours worked....... 11,500

	Actual 11,500 hours	Budget 11,500 hours	Spending Variance
Variable overhead costs:			
Supplies......................	$ 2,400	$ 2,300	$ 100 U
Maintenance................	8,000	9,200	1,200 F
Utilities	1,100	1,150	50 F
Rework time................	5,300	4,600	700 U
Total variable over-			
head cost	$16,800	$17,250	$ 450 F

2. Favorable variances can be as much a matter of concern as unfavorable variances. In particular, the favorable maintenance variance should be investigated. Is scheduled preventative maintenance being carried out? In terms of percentage deviation from budgeted allowances, the rework time variance is even more significant (equal to 15% of the budget allowance). This unfavorable rework time variance may be a result of poor maintenance of machines. Some may say that if the two variances are related, then the trade-off is a good one, since the savings in maintenance cost is greater than the added cost of rework time. But this is shortsighted reasoning. Poor maintenance can reduce the life of equipment, as well as decrease overall output, thereby costing far more in the long run than any short-run savings.

Exercise 11-11 (15 minutes)

Columbia National Bank
Check Clearing Office
Variable Overhead Performance Report
For the Month Ended September 30

Budgeted labor-hours	3,080
Actual labor-hours	3,100
Standard labor-hours allowed for the actual number of checks processed	3,200

		(1) Actual Costs Incurred for 3,100 Labor-Hours (AH × AR)	(2) Budget Based on 3,100 Labor-Hours (AH × SR)	(3) Budget Based on 3,200 Labor-Hours (SH × SR)		Breakdown of the Total Variance	
Overhead Costs	Cost Formula (per labor-hour)				Total Variance (1) – (3)	Spending Variance (1) – (2)	Efficiency Variance (2) – (3)
Variable overhead costs:							
Office supplies................	$0.10	$ 365	$ 310	$ 320	$ 45 U	$ 55 U	$ 10 F
Staff coffee lounge	0.20	520	620	640	120 F	100 F	20 F
Indirect labor	0.90	2,710	2,790	2,880	170 F	80 F	90 F
Total variable overhead cost	$1.20	$3,595	$3,720	$3,840	$245 F	$125 F	$120 F

Exercise 11-12 (15 minutes)

1.

$$\text{Predetermined overhead rate} = \frac{\text{Total overhead from the flexible budget at the denominator activity}}{\text{Denominator activity}}$$

$$= \frac{\$225,000}{30,000 \text{ DLHs}}$$

$$= \$7.50 \text{ per DLH}$$

Variable element: $57,000 ÷ 30,000 DLHs = $1.90 per DLH

Fixed element: $168,000 ÷ 30,000 DLHs = $5.60 per DLH

2.

Direct materials, 2.5 yards @ $8.60 per yard............	$21.50
Direct labor, 3 DLHs* @ $12.00 per DLH.................	36.00
Variable overhead, 3 DLHs @ $1.90 per DLH...........	5.70
Fixed overhead, 3 DLHs @ $5.60 per DLH...............	16.80
Total standard cost per unit	$80.00

*30,000 DLHs ÷ 10,000 units = 3 DLHs per unit.

Exercise 11-13 (15 minutes)

1. 9,500 units × 4 hours per unit = 38,000 hours.

2. and 3.

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
$198,700*	$200,000	38,000 hours × $5 per hour* = $190,000

$$\text{Budget Variance, } \$1,300 \text{ F} \qquad \text{Volume Variance, } \$10,000 \text{ U*}$$

*Given.

4.

$$\frac{\text{Fixed element of the}}{\text{predetermined overhead rate}} = \frac{\text{Budgeted fixed overhead cost}}{\text{Denominator activity}}$$

$$= \frac{\$200,000}{\text{Denominator activity}}$$

$$= \$5 \text{ per hour}$$

Therefore, the denominator activity is: $200,000 ÷ $5 per hour = 40,000 hours.

Exercise 11-14 (20 minutes)

1.

Total rate: $\dfrac{\$480,000}{60,000 \text{ MHs}}$ = $8 per MH

Variable rate: $\dfrac{\$180,000}{60,000 \text{ MHs}}$ = $3 per MH

Fixed rate: $\dfrac{\$300,000}{60,000 \text{ MHs}}$ = $5 per MH

2. The standard hours per unit of product are:
   60,000 hours ÷ 40,000 units = 1.5 hours per unit

   Given this figure, the standard hours allowed for the actual production would be:
   42,000 units × 1.5 hours per unit = 63,000 standard hours allowed.

3. Variable overhead spending variance:
   Variable overhead spending variance = (AH × AR) – (AH × SR)
   ($185,600) – (64,000 hours × $3 per hour) = $6,400 F

   Variable overhead efficiency variance:
   Variable overhead efficiency variance = SR (AH – SH)
   $3 per hour (64,000 hours – 63,000 hours) = $3,000 U

   The fixed overhead variances would be as follows:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
$302,400	$300,000*	63,000 hours × $5 per hour = $315,000

   Budget Variance, $2,400 U   Volume Variance, $15,000 F

   *As originally budgeted. This figure can be expressed as:
   60,000 denominator hours × $5 per hour = $300,000.

Exercise 11-14 (continued)

Alternative approach to the budget variance:

$$\text{Budget variance} = \text{Actual fixed overhead cost} - \text{Budgeted fixed overhead cost}$$

$$= \$302,400 - \$300,000$$

$$= \$2,400 \text{ U}$$

Alternative approach to the volume variance:

$$\text{Volume Variance} = \text{Fixed portion of the predetermined overhead rate} \left(\text{Denominator hours} - \text{Standard hours allowed} \right)$$

$$= \$5 \text{ per hour } (60,000 \text{ hours} - 63,000 \text{ hours})$$

$$= \$15,000 \text{ F}$$

Exercise 11-15 (15 minutes)

1. 14,000 units produced × 3 MHs per unit = 42,000 MHs

2. Actual fixed overhead costs incurred.......... $267,000
   Add: Favorable budget variance................ 3,000
   Budgeted fixed overhead cost $270,000

$$\frac{\text{Fixed element of the}}{\text{predetermined overhead rate}} = \frac{\text{Budgeted fixed overhead cost}}{\text{Denominator activity}}$$

$$= \frac{\$270,000}{45,000 \text{ MHs}}$$

$$= \$6 \text{ per MH}$$

3.
$$\frac{\text{Volume}}{\text{Variance}} = \frac{\text{Fixed portion of}}{\text{the predetermined}} \left(\frac{\text{Denominator}}{\text{hours}} - \frac{\text{Standard}}{\text{hours}} \right)$$
     overhead rate   allowed

$$= \$6 \text{ per MH (45,000 MHs - 42,000 MHs)}$$

$$= \$18,000 \text{ U}$$

Alternative solution to parts 1-3:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
$267,000*	$270,000[1]	42,000 MHs[2] × $6 per MH[3] = $252,000

Budget Variance, $3,000 F*   Volume Variance, $18,000 U

[1]$267,000 + $3,000 = $270,000.

[2]14,000 units × 3 MHs per unit = 42,000 MHs

[3]$270,000 ÷ 45,000 denominator MHs = $6 per MH

*Given.

Exercise 11-16 (10 minutes)

Company A: This company has a favorable volume variance since the standard hours allowed for the actual production are greater than the denominator hours.

Company B: This company has an unfavorable volume variance since the standard hours allowed for the actual production are less than the denominator hours.

Company C: This company has no volume variance since the standard hours allowed for the actual production and the denominator hours are the same.

Problem 11-17 (30 minutes)

1. The cost formulas in the flexible budget below report were obtained by dividing the costs on the static budget in the problem statement by the budgeted level of activity (500 liters). The fixed costs are carried over from the static budget.

<div align="center">

St. Lucia Blood Bank
Flexible Budget Performance Report
For the Month Ended September 30

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Budgeted activity (in liters) 500
Actual activity (in liters) 620

Costs	Cost Formula (per liter)	Actual Costs Incurred for 620 Liters	Budget Based on 620 Liters	Variance
Variable costs:				
Medical supplies	$15.00	$ 9,350	$ 9,300	$ 50 U
Lab tests.........................	12.00	6,180	7,440	1,260 F
Refreshments for donors..	2.00	1,340	1,240	100 U
Administrative supplies	0.50	400	310	90 U
Total variable cost..............	$29.50	17,270	18,290	1,020 F
Fixed costs:				
Staff salaries		10,000	10,000	0
Equipment depreciation ...		2,800	2,500	300 U
Rent...............................		1,000	1,000	0
Utilities		570	500	70 U
Total fixed cost		14,370	14,000	370 U
Total cost		$31,640	$32,290	$ 650 F

Problem 11-17 (continued)

2. The overall variance is favorable and none of the unfavorable variances is particularly large. Nevertheless, the large favorable variance for lab tests is worrisome. Perhaps the blood bank has not been doing all of the lab tests for HIV, hepatitis, and other blood-transmittable diseases that it should be doing. This is well worth investigating; favorable variances may warrant attention as much as unfavorable variances.

Some may wonder why depreciation has a variance. Fixed costs can change; they just don't vary with the level of activity. Depreciation may have increased because of the acquisition of new equipment or because of a loss on equipment that must be scrapped. (This assumes that the loss flows through the depreciation account on the performance report.)

Problem 11-18 (45 minutes)

1. Direct materials price and quantity variances:

   Materials price variance = AQ (AP – SP)
   64,000 feet ($8.55 per foot – $8.45 per foot) = $6,400 U

   Materials quantity variance = SP (AQ – SQ)
   $8.45 per foot (64,000 feet – 60,000 feet*) = $33,800 U

     *30,000 units × 2 feet per unit = 60,000 feet

2. Direct labor rate and efficiency variances:

   Labor rate variance = AH (AR – SR)
   43,500 DLHs ($15.80 per DLH – $16.00 per DLH) = $8,700 F

   Labor efficiency variance = SR (AH – SH)
   $16.00 per DLH (43,500 DLHs – 42,000 DLHs*) = $24,000 U

     *30,000 units × 1.4 DLHs per unit = 42,000 DLHs

3. a. Variable overhead spending and efficiency variances:

Actual Hours of Input, at the Actual Rate (AH × AR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Standard Hours Allowed for Output, at the Standard Rate (SH × SR)
$108,000	43,500 DLHs × $2.50 per DLH = $108,750	42,000 DLHs × $2.50 per DLH = $105,000

        Spending Variance,   Efficiency Variance,
           $750 F $3,750 U

Alternative solution:

   Variable overhead spending variance = (AH × AR) – (AH × SR)
   ($108,000) – (43,500 DLHs × $2.50 per DLH) = $750 F

   Variable overhead efficiency variance = SR (AH – SH)
   $2.50 per DLH (43,500 DLHs – 42,000 DLHs) = $3,750 U

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Problem 11-18 (continued)

b. Fixed overhead budget and volume variances:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
$211,800	$210,000*	42,000 DLHs × $6 per DLH = $252,000

        ↑   ↑   ↑

          Budget Variance,   Volume Variance,
             $1,800 U $42,000 F

*As originally budgeted. This figure can also be expressed as: 35,000 denominator DLHs × $6 per DLH = $210,000.

Alternative solution:

Budget variance:

$$\text{Budget variance} = \text{Actual fixed overhead cost} - \text{Budgeted fixed overhead cost}$$

$$= \$211,800 - \$210,000$$

$$= \$1,800 \text{ U}$$

Volume variance:

$$\text{Volume Variance} = \text{Fixed portion of the predetermined overhead rate} \left(\text{Denominator hours} - \text{Standard hours allowed} \right)$$

$$= \$6.00 \text{ per DLH } (35,000 \text{ DLHs} - 42,000 \text{ DLHs})$$

$$= \$42,000 \text{ F}$$

Problem 11-18 (continued)

4. The total of the variances would be:

> Direct materials variances:
>> Price variance.. $ 6,400 U
>> Quantity variance... 33,800 U
>
> Direct labor variances:
>> Rate variance .... 8,700 F
>> Efficiency variance .... 24,000 U
>
> Variable manufacturing overhead variances:
>> Spending variance .... 750 F
>> Efficiency variance .... 3,750 U
>
> Fixed manufacturing overhead variances:
>> Budget variance... 1,800 U
>> Volume variance .... <u>42,000</u> F
>> Total variance... <u>$18,300</u> U

Note that the total of the variances agrees with the $18,300 variance mentioned by the president.

It appears that not everyone should be given a bonus for good cost control. The materials quantity variance and the labor efficiency variance are 6.7% and 3.6%, respectively, of the standard cost allowed and thus would warrant investigation.

The company's large unfavorable variances (for materials quantity and labor efficiency) do not show up more clearly because they are offset for the most part by the favorable volume variance. This favorable volume variance is a result of the company operating at an activity level that is well above the denominator activity level used to set predetermined overhead rates. (The company operated at an activity level of 42,000 standard hours; the denominator activity level set at the beginning of the year was 35,000 hours.) As a result of the large favorable volume variance, the unfavorable quantity and efficiency variances have been concealed in a small "net" figure. The large favorable volume variance may have been achieved by building up inventories.

Problem 11-19 (30 minutes)

1. Direct materials, 3 yards at $4.40 per yard $13.20
   Direct labor, 1 DLH at $12.00 per DLH 12.00
   Variable manufacturing overhead, 1 DLH at $5.00 per DLH*...... 5.00
   Fixed manufacturing overhead, 1 DLH at $11.80 per DLH** 11.80
   Standard cost per unit $42.00

      * $25,000 ÷ 5,000 DLHs = $5.00 per DLH.
      ** $59,000 ÷ 5,000 DLHs = $11.80 per DLH.

2. Materials variances:

    Materials price variance = AQ (AP – SP)
    24,000 yards ($4.80 per yard – $4.40 per yard) = $9,600 U

    Materials quantity variance = SP (AQ – SQ)
    $4.40 per yard (18,500 yards – 18,000 yards*) = $2,200 U

      *6,000 units × 3 yards per unit = 18,000 yards

   Labor variances:

    Labor rate variance = AH (AR – SR)
    5,800 DLHs ($13.00 per DLH – $12.00 per DLH) = $5,800 U

    Labor efficiency variance = SR (AH – SH)
    $12.00 per DLH (5,800 DLHs – 6,000 DLHs*) = $2,400 F

      *6,000 units × 1 DLH per unit = 6,000 DLHs

Problem 11-19 (continued)

3. Variable overhead variances:

Actual DLHs of Input, at the Actual Rate (AH × AR)	Actual DLHs of Input, at the Standard Rate (AH × SR)	Standard DLHs Allowed for Output, at the Standard Rate (SH × SR)
$29,580	5,800 DLHs × $5.00 per DLH = $29,000	6,000 DLHs × $5.00 per DLH = $30,000

Spending Variance, $580 U | Efficiency Variance, $1,000 F

Total Variance, $420 F

Alternative solution for the variable overhead variances:

Variable overhead spending variance = (AH × AR) – (AH × SR)
($29,580) – (5,800 DLHs × $5.00 per DLH) = $580 U

Variable overhead efficiency variance = SR (AH – SH)
$5.00 per DLH (5,800 DLHs – 6,000 DLHs) = $1,000 F

Fixed overhead variances:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
$60,400	$59,000	6,000 DLHs × $11.80 per DLH = $70,800

Budget Variance, $1,400 U | Volume Variance, $11,800 F

Problem 11-19 (continued)

Alternative approach to the budget variance:

$$\begin{array}{c}\text{Budget}\\\text{variance}\end{array} = \begin{array}{c}\text{Actual fixed}\\\text{overhead cost}\end{array} - \begin{array}{c}\text{Budgeted fixed}\\\text{overhead cost}\end{array}$$

$$= \$60,400 - \$59,000$$

$$= \$1,400 \text{ U}$$

Alternative approach to the volume variance:

$$\begin{array}{c}\text{Volume}\\\text{Variance}\end{array} = \begin{array}{c}\text{Fixed portion of}\\\text{the predetermined}\\\text{overhead rate}\end{array}\left(\begin{array}{c}\text{Denominator}\\\text{hours}\end{array} - \begin{array}{c}\text{Standard}\\\text{hours}\\\text{allowed}\end{array}\right)$$

$$= \$11.80 \text{ per DLH } (5,000 \text{ DLHs} - 6,000 \text{ DLHs})$$

$$= \$11,800 \text{ F}$$

4. The choice of a denominator activity level affects standard unit costs in that the higher the denominator activity level chosen, the lower standard unit costs will be. The reason is that the fixed portion of overhead costs is spread over more units as the denominator activity rises.

   The volume variance cannot be controlled by controlling spending. The volume variance simply reflects whether actual activity was greater than or less than the denominator activity. Thus, the volume variance is controllable only through activity.

Problem 11-20 (30 minutes)

1. The reports as presently prepared are of little use to the company. The problem is that the company is using a static budget to compare budgeted performance at one level of activity to actual performance at another level of activity. Although the reports do a good job of showing whether or not the budgeted level of activity was attained, they do not tell whether costs were controlled for the activity level that was actually worked during the period.

2. The company should use a flexible budget approach to evaluate control over costs. Under the flexible budget approach, the actual costs incurred during the quarter in working 35,000 machine-hours should be compared to budgeted costs at that activity level.

3.

<div align="center">

Westmont Company
Overhead Performance Report—Assembly Department
For the Quarter Ended March 31

</div>

Budgeted machine-hours 40,000
Actual machine-hours 35,000

	Cost Formula (per MH)	Actual 35,000 hours	Budget 35,000 hours	Spending or Budget Variance
Variable costs:				
Indirect materials.........	$0.80	$ 29,700	$ 28,000	$1,700 U
Rework time	0.20	7,900	7,000	900 U
Utilities.......................	1.40	51,800	49,000	2,800 U
Machine setup	0.30	11,600	10,500	1,100 U
Total variable cost...........	$2.70	101,000	94,500	6,500 U
Fixed costs:				
Maintenance................		79,200	80,000	800 F
Inspection		60,000	60,000	0
Total fixed cost..............		139,200	140,000	800 F
Total overhead cost		$240,200	$234,500	$5,700 U

Problem 11-21 (45 minutes)

1.
$$\text{Total rate:} \quad \frac{\text{PZ297,500}}{35,000 \text{ hours}} = \text{PZ8.50 per hour}$$

$$\text{Variable rate:} \quad \frac{\text{PZ87,500}}{35,000 \text{ hours}} = \text{PZ2.50 per hour}$$

$$\text{Fixed rate:} \quad \frac{\text{PZ210,000}}{35,000 \text{ hours}} = \text{PZ6.00 per hour}$$

2. 32,000 standard hours × PZ8.50 per hour = PZ272,000.

3. Variable overhead variances:

Actual Hours of Input, at the Actual Rate (AH × AR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Standard Hours Allowed for Output, at the Standard Rate (SH × SR)
PZ78,000	30,000 hours × PZ2.50 per hour = PZ75,000	32,000 hours × PZ2.50 per hour = PZ80,000

Spending Variance, PZ3,000 U | Efficiency Variance, PZ5,000 F

Alternative solution:

Variable overhead spending variance = (AH × AR) − (AH × SR)
(PZ78,000) − (30,000 hours × PZ2.50 per hour) = PZ3,000 U

Variable overhead efficiency variance = SR (AH − SH)
PZ2.50 per hour (30,000 hours − 32,000 hours) = PZ5,000 F

Problem 11-21 (continued)

Fixed overhead variances:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
PZ209,400	PZ210,000	32,000 hours × PZ6 per hour = PZ192,000

Budget Variance, PZ600 F	Volume Variance, PZ18,000 U

Alternative solution:

Budget variance:

$$\text{Budget variance} = \text{Actual fixed overhead cost} - \text{Budgeted fixed overhead cost}$$

$$= PZ209,400 - PZ210,000$$

$$= PZ600\ F$$

Volume variance:

$$\text{Volume Variance} = \text{Fixed portion of the predetermined overhead rate} \left(\text{Denominator hours} - \text{Standard hours allowed} \right)$$

$$= PZ6.00 \text{ per hour } (35,000 \text{ hours} - 32,000 \text{ hours})$$

$$= PZ18,000\ U$$

Verification:
  Variable overhead:
    Spending variance................ PZ 3,000 U
    Efficiency variance ....   5,000 F
  Fixed overhead:
    Budget variance ....   600 F
    Volume variance...................   18,000 U
  Underapplied overhead .... PZ15,400 U

Problem 11-21 (continued)

4. Variable overhead

Spending variance: This variance includes both price and quantity elements. The overhead spending variance reflects differences between actual and standard prices for variable overhead items. It also reflects differences between the amounts of variable overhead inputs that were actually used and the amounts that should have been used for the actual output of the period. Since the variable overhead spending variance is unfavorable, either too much was paid for variable overhead items or too many of them were used.

Efficiency variance: The term "variable overhead efficiency variance" is a misnomer, since the variance does not measure efficiency in the use of overhead items. It measures the indirect effect on variable overhead of the efficiency or inefficiency with which the activity base is utilized. In this company, the activity base is labor-hours. If variable overhead is really proportional to labor-hours, then more effective use of labor-hours has the indirect effect of reducing variable overhead. Since 2,000 fewer labor-hours were required than indicated by the labor standards, the indirect effect was presumably to reduce variable overhead spending by about PZ 5,000 (PZ 2.50 per hour × 2,000 hours).

Fixed overhead

Budget variance: This variance is simply the difference between the budgeted fixed cost and the actual fixed cost. In this case, the variance is favorable which indicates that actual fixed costs were lower than anticipated in the budget.

Volume variance: This variance occurs as a result of actual activity being different from the denominator activity in the predetermined overhead rate. In this case, the variance is unfavorable, so actual activity was less than the denominator activity. It is difficult to place much of a meaningful economic interpretation on this variance. It tends to be large, so it often swamps the other, more meaningful variances if they are simply netted against each other.

Problem 11-22 (45 minutes)

1.   Harper Company
            Flexible Budget—Assembly Department

Budgeted direct labor-hours   75,000

Overhead Costs	Cost Formula (per DLH)	Direct Labor-Hours		
		60,000	75,000	90,000
Variable costs:				
Utilities	$0.60	$ 36,000	$ 45,000	$ 54,000
Indirect labor...............	0.90	54,000	67,500	81,000
Supplies	0.30	18,000	22,500	27,000
Total variable cost	$1.80	108,000	135,000	162,000
Fixed costs:				
Insurance...................		8,000	8,000	8,000
Supervisory salaries		90,000	90,000	90,000
Depreciation................		160,000	160,000	160,000
Equipment rental		42,000	42,000	42,000
Total fixed cost		300,000	300,000	300,000
Total overhead cost		$408,000	$435,000	$462,000

2.   Total rate: $\dfrac{\$435,000}{75,000 \text{ DLHs}}$ = $5.80 per DLH

     Variable rate: $\dfrac{\$135,000}{75,000 \text{ DLHs}}$ = $1.80 per DLH

     Fixed rate: $\dfrac{\$300,000}{75,000 \text{ DLHs}}$ = $4.00 per DLH

3. a.   Manufacturing Overhead

Actual costs	425,700	406,000*	Applied costs
Underapplied overhead	19,700		

   *70,000 standard hours × 5.80 per hour = $406,000.

Problem 11-22 (continued)

b. Variable overhead variances:

Actual Hours of Input, at the Actual Rate (AH × AR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Standard Hours Allowed for Output, at the Standard Rate (SH × SR)
$124,100	73,000 hours × $1.80 per hour = $131,400	70,000 hours × $1.80 per hour = $126,000

	Spending Variance, $7,300 F	Efficiency Variance, $5,400 U

Alternative solution:

Variable overhead spending variance = (AH × AR) – (AH × SR)
($124,100) – (73,000 hours × $1.80 per hour) = $7,300 F

Variable overhead efficiency variance = SR (AH – SH)
$1.80 per hour (73,000 hours – 70,000 hours) = $5,400 U

Fixed overhead variances:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
$301,600	$300,000*	70,000 hours × $4 per hour = $280,000

	Budget Variance, $1,600 U	Volume Variance, $20,000 U

* As originally budgeted. 75,000 denominator hours × $4 per hour = $300,000.

Problem 11-22 (continued)

Alternative solution:

Budget variance:

$$\begin{array}{c} \text{Budget} \\ \text{variance} \end{array} = \begin{array}{c} \text{Actual fixed} \\ \text{overhead cost} \end{array} - \begin{array}{c} \text{Budgeted fixed} \\ \text{overhead cost} \end{array}$$

$$= \$301{,}600 - \$300{,}000$$

$$= \$1{,}600 \text{ U}$$

Volume variance:

$$\begin{array}{c} \text{Volume} \\ \text{Variance} \end{array} = \begin{array}{c} \text{Fixed portion of} \\ \text{the predetermined} \\ \text{overhead rate} \end{array} \left(\begin{array}{c} \text{Denominator} \\ \text{hours} \end{array} - \begin{array}{c} \text{Standard} \\ \text{hours} \\ \text{allowed} \end{array} \right)$$

$$= \$4 \text{ per hour } (75{,}000 \text{ hours} - 70{,}000 \text{ hours})$$

$$= \$20{,}000 \text{ U}$$

The overhead variances can be summarized as follows:

Variable overhead:		
Spending variance	$ 7,300	F
Efficiency variance	5,400	U
Fixed overhead:		
Budget variance...................................	1,600	U
Volume variance	20,000	U
Underapplied overhead for the year	$19,700	U

Managerial Accounting, 11th Edition

Problem 11-23 (30 minutes)

1. The company is using a static budget approach in which budgeted performance at one level of activity is compared to actual performance at a *higher* level of activity. The variable overhead variances are all unfavorable because of this mismatching of activity levels. The report in this format is not useful for measuring either operating efficiency or cost control. The only accurate piece of information it gives is that the department worked more than the 35,000 machine-hours budgeted for the month. It does not tell whether the actual output for the month was produced efficiently, nor does it tell whether overhead spending has been controlled during the month.

2. See the next page.

3. The stolen supplies would be included as part of the variable overhead spending variance for the month. Unlike the price variance for materials and the rate variance for labor, the spending variance measures both price and quantity (waste, theft) elements. This is why the variance is called a "spending" variance; total spending can be affected as much by waste or theft as by greater (or lesser) prices paid for items.

Problem 11-23 (continued)

2.
<div align="center">

Freemont Company
Overhead Performance Report—Machining Department

</div>

Budgeted machine-hours 35,000
Actual machine-hours 38,000
Standard machine-hours .... 40,000 *

Overhead Costs	Cost Formula (per MH)	Actual Costs Incurred (1)	Budget Based on 38,000 MHs (2)	Budget Based on 40,000 MHs (3)	Total Variance (1) – (3)	Spending Variance (1) – (2)	Efficiency Variance (2) – (3)
Variable costs:							
Utilities..................	$0.40	$ 15,700	$ 15,200	$ 16,000	$ 300 F	$ 500 U	$ 800 F
Indirect labor.........	2.30	86,500	87,400	92,000	5,500 F	900 F	4,600 F
Supplies	0.60	26,000	22,800	24,000	2,000 U	3,200 U	1,200 F
Maintenance..........	1.20	44,900	45,600	48,000	3,100 F	700 F	2,400 F
Total variable cost.....	$4.50	173,100	171,000	180,000	6,900 F	$2,100 U	$9,000 F
Fixed costs:							
Supervision............		38,000	38,000	38,000	0		
Maintenance..........		92,400	92,000	92,000	400 U		
Depreciation		80,000	80,000	80,000	0		
Total fixed cost.........		210,400	210,000	210,000	400 U		
Total cost.................		$383,500	$381,000	$390,000	$6,500 F		

*16,000 units × 2.5 hours per unit = 40,000 hours

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Problem 11-24 (20 minutes)

Budgeted machine-hours 11,250
Actual machine-hours 9,250
Standard machine-hours allowed 9,000

		(1)	(2)	(3)		Breakdown of the Total Variance	
	Cost	Actual Costs	Budget	Budget	Total	Spending	Efficiency
	Formula	Incurred	Based on	Based on	Variance	Variance	Variance
Overhead Item	(per MH)	9,250 MHs	9,250 MHs	9,000 MHs	(1) – (3)	(1) – (2)	(2) – (3)
Power	$0.30	$2,405	$2,775	$2,700	$ 295 F	$ 370 F	$ 75 U
Setup time	0.20	2,035	1,850	1,800	235 U	185 U	50 U
Polishing wheels	0.16	1,110	1,480	1,440	330 F	370 F	40 U
Maintenance	0.18	925	1,665	1,620	695 F	740 F	45 U
Total variable cost..	$0.84	$6,475	$7,770	$7,560	$1,085 F	$1,295 F	$210 U

Problem 11-25 (45 minutes)

1.

Total rate: $\dfrac{\$432,000}{40,000 \text{ DLHs}}$ = $10.80 per DLH

Variable rate: $\dfrac{\$72,000}{40,000 \text{ DLHs}}$ = $1.80 per DLH

Fixed rate: $\dfrac{\$360,000}{40,000 \text{ DLHs}}$ = $9 per DLH

2. Direct materials: 8 yards at $4.50 per yard.............. $36.00
   Direct labor: 2.5 DLHs at $12.00 per DLH 30.00
   Variable overhead: 2.5 DLHs at $1.80 per DLH 4.50
   Fixed overhead: 2.5 DLHs at $9 per DLH................. 22.50
   Standard cost per unit $93.00

3. See the graph at the end of this solution.

4. a. Fixed overhead variances:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
$361,800	$360,000	35,000 DLHs* × $9 per DLH = $315,000

↑   ↑   ↑

Budget Variance, $1,800 U   Volume Variance, $45,000 U
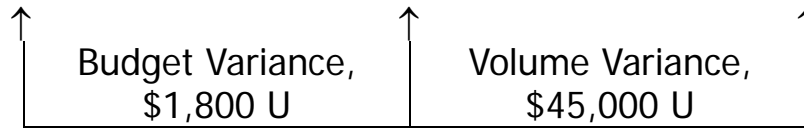
*14,000 units × 2.5 DLHs per unit = 35,000 DLHs

Problem 11-25 (continued)

Alternative approach:

Budget variance:

$$\begin{array}{c} \text{Budget} \\ \text{variance} \end{array} = \begin{array}{c} \text{Actual fixed} \\ \text{overhead cost} \end{array} - \begin{array}{c} \text{Budgeted fixed} \\ \text{overhead cost} \end{array}$$

= $361,800 - $360,000

= $1,800 U

Volume variance:

$$\begin{array}{c} \text{Volume} \\ \text{Variance} \end{array} = \begin{array}{c} \text{Fixed portion of} \\ \text{the predetermined} \\ \text{overhead rate} \end{array} \left(\begin{array}{c} \text{Denominator} \\ \text{hours} \end{array} - \begin{array}{c} \text{Standard} \\ \text{hours} \\ \text{allowed} \end{array} \right)$$

= $9 per DLH (40,000 DLHs - 35,000 DLHs)

= $45,000 U

b. See the graph at the end of this solution.

5. a. The fixed overhead budget variance will not change. The fixed overhead volume variance will be:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
$361,800	$360,000	50,000 DLHs* × $9 per DLH = $450,000

Budget Variance, $1,800 U   Volume Variance, $90,000 F

*20,000 units × 2.5 DLHs per unit = 50,000 DLHs

Problem 11-25 (continued)
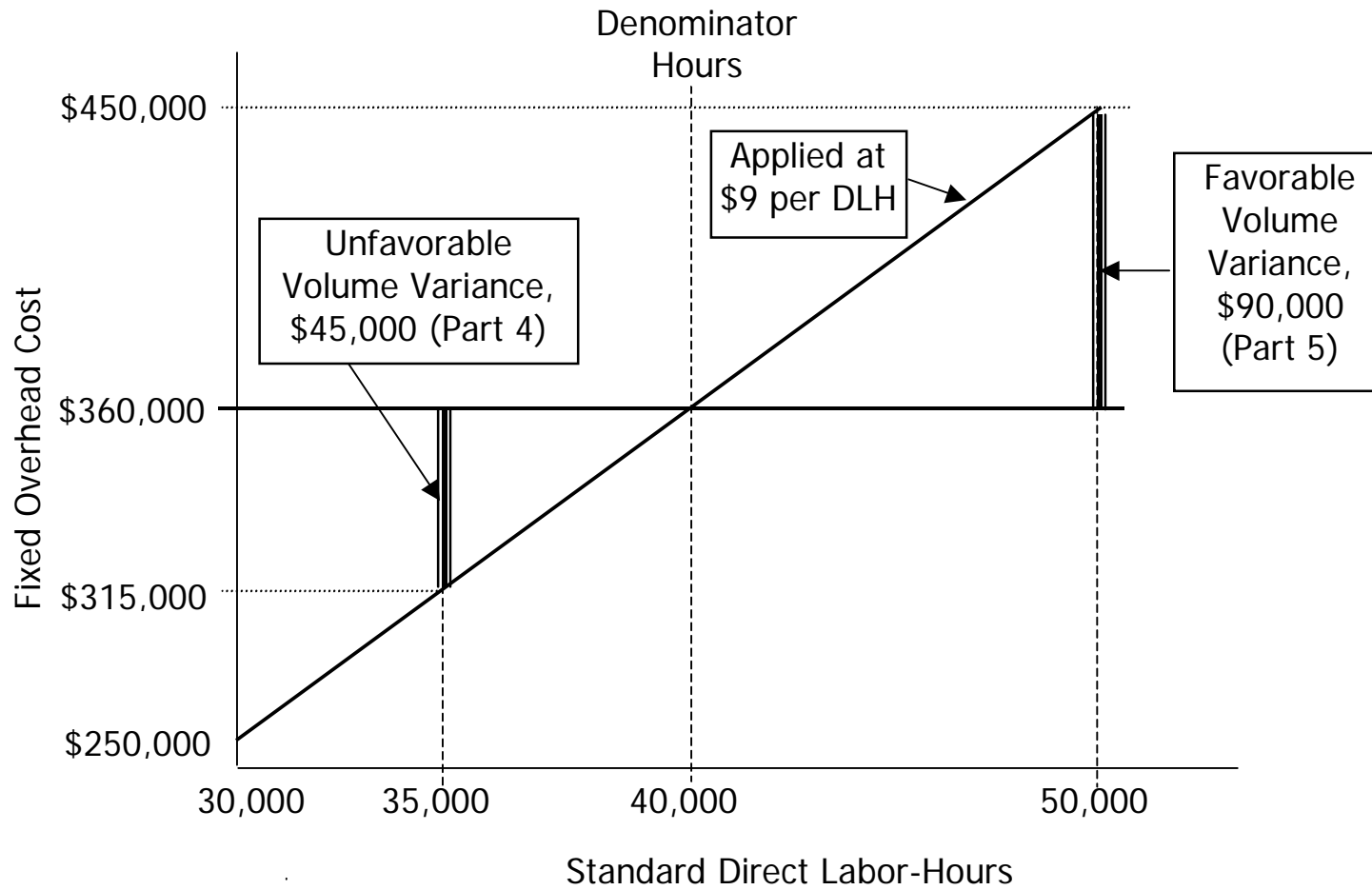
Alternative solution to the volume variance:

$$\text{Volume Variance} = \text{Fixed portion of the predetermined overhead rate}\left(\text{Denominator hours} - \text{Standard hours allowed}\right)$$

$$= \$9 \text{ per DLH } (40{,}000 \text{ DLHs} - 50{,}000 \text{ DLHs})$$

$$= \$90{,}000 \text{ F}$$

b. See the graph on the following page.

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Problem 11-25 (continued)

Denominator Hours

$450,000

Applied at $9 per DLH

Favorable Volume Variance, $90,000 (Part 5)

Unfavorable Volume Variance, $45,000 (Part 4)

Fixed Overhead Cost

$360,000

$315,000

$250,000

30,000   35,000   40,000   50,000

Standard Direct Labor-Hours

Problem 11-26 (45 minutes)

1. A flexible budget is clearer if the variable and fixed costs are shown
   separately, as illustrated in the text, and if individual cost formulas are
   given. Fixed and variable costs can be separated (and cost formulas de-
   termined) by the high-low method. Incorporating these ideas, the re-
   vised flexible budget would be:

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Gant Products, Inc.
Flexible Budget

</div>

Overhead Costs	Cost Formula (per MH)	Percentage of Capacity		
		80%	90%	100%
Machine-hours		4,800	5,400	6,000
Variable costs:				
Maintenance	$0.10	$ 480	$ 540	$ 600
Supplies..........................	0.40	1,920	2,160	2,400
Utilities	0.30	1,440	1,620	1,800
Machine setup..................	0.20	960	1,080	1,200
Total variable cost	$1.00	4,800	5,400	6,000
Fixed costs:				
Maintenance		1,000	1,000	1,000
Utilities		500	500	500
Supervision		3,000	3,000	3,000
Total fixed cost		4,500	4,500	4,500
Total overhead cost		$9,300	$9,900	$10,500

2. The cost formula for all overhead costs would be $4,500 plus $1.00 per
   machine-hour.

Problem 11-26 (continued)

3.   Gant Products, Inc.
                              Overhead Performance Report
                                  For the Month of April

Budgeted machine-hours 6,000
Standard machine-hours 5,600
Actual machine-hours .... 5,700 *

Overhead Costs	Cost Formula (per MH)	Actual 5,700 MH	Budgeted 5,700 MH	Spending Variance
Variable overhead:				
Maintenance...............	$0.10	$ 1,083 **	$ 570	$ 513 U
Supplies	0.40	3,420	2,280	1,140 U
Utilities......................	0.30	2,166 **	1,710	456 U
Machine setup	0.20	855	1,140	285 F
Total variable cost..........	$1.00	7,524	5,700	1,824 U
Fixed overhead:				
Maintenance...............		1,000	1,000	0
Utilities......................		500	500	0
Supervision.................		3,000	3,000	0
Total fixed cost..............		4,500	4,500	0
Total overhead cost		$12,024	$10,200	$1,824 U

    * 95% × 6,000 MHs = 5,700 MHs
  ** $2,083 less $1,000 fixed = $1,083.
     $2,666 less $500 fixed = $2,166.

4. a. Assuming that the variable overhead really should be proportional to
actual machine-hours, the unfavorable spending variance in this
situation could be the result of either higher prices or waste. Unlike
the price variance for materials and the rate variance for labor, the
spending variance for variable overhead measures both price and
waste elements. This is why the variance is called a "spending" vari-
ance. Total spending can be affected as much by waste as it can by
greater (or lesser) prices paid for items.

Problem 11-26 (continued)

b. Efficiency variance = SR (AH − SH)
$1 per MH (5,700 MHs − 5,600 MHs) = $100 U

The overhead efficiency variance is misnamed, since it does not measure efficiency (waste) in use of variable overhead items. The variance arises solely because of inefficiency in the *base* underlying the incurrence of variable overhead cost. If the incurrence of variable overhead costs is directly tied to the actual machine-hours worked, then the excessive number of machine-hours worked during April has caused the incurrence of an additional $100 in variable overhead costs.

Problem 11-27 (45 minutes)

1.
Total rate: $\dfrac{\$600,000}{60,000 \text{ DLHs}}$ = $10 per DLH

Variable rate: $\dfrac{\$120,000}{60,000 \text{ DLHs}}$ = $2 per DLH

Fixed rate: $\dfrac{\$480,000}{60,000 \text{ DLHs}}$ = $8 per DLH

2. Direct materials: 3 pounds at $7 per pound............. $21
   Direct labor: 1.5 DLHs at $12 per DLH 18
   Variable overhead: 1.5 DLHs at $2 per DLH............. 3
   Fixed overhead: 1.5 DLHs at $8 per DLH................. _12_
   Standard cost per unit $54

3. a. 42,000 units × 1.5 DLHs per unit = 63,000 standard DLHs.

   b.
	Manufacturing Overhead	
Actual costs 606,500	630,000	* Applied costs
	23,500	Overapplied overhead

   *63,000 standard DLHs × $10 per DLH = $630,000.

4. Variable overhead variances:

Actual Hours of Input, at the Actual Rate (AH × AR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Standard Hours Allowed for Output, at the Standard Rate (SH × SR)
$123,500	65,000 DLHs × $2 per DLH = $130,000	63,000 DLHs × $2 per DLH = $126,000
	Spending Variance, $6,500 F	Efficiency Variance, $4,000 U

Problem 11-27 (continued)

Alternative solution:

Variable overhead spending variance = (AH × AR) − (AH × SR)
($123,500) − (65,000 DLHs × $2 per DLH) = $6,500 F

Variable overhead efficiency variance = SR (AH − SH)
$2 per DLH (65,000 DLHs − 63,000 DLHs) = $4,000 U

Fixed overhead variances:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
$483,000	$480,000*	63,000 DLHs × $8 per DLH = $504,000

Budget Variance, $3,000 U   Volume Variance, $24,000 F

*Can be expressed as: 60,000 denominator DLHs × $8 per DLH = $480,000

Alternative solution:

Budget variance:

$$\text{Budget variance} = \text{Actual fixed overhead cost} - \text{Budgeted fixed overhead cost}$$

$$= \$483,000 - \$480,000$$

$$= \$3,000 \text{ U}$$

Volume variance:

$$\text{Volume Variance} = \text{Fixed portion of the predetermined overhead rate} \left(\text{Denominator hours} - \text{Standard hours allowed} \right)$$

$$= \$8 \text{ per DLH} (60,000 \text{ DLHs} - 63,000 \text{ DLHs})$$

$$= \$24,000 \text{ F}$$

Problem 11-27 (continued)

The company's overhead variances can be summarized as follows:

Variable overhead:
    Spending variance........................... $ 6,500 F
    Efficiency variance .... 4,000 U
Fixed overhead:
    Budget variance .... 3,000 U
    Volume variance............................. 24,000 F
Overapplied overhead—see part 3....... $23,500 F

5. Only the volume variance would have changed. It would have been un-favorable since the standard DLHs allowed for the year's production (63,000 DLHs) would have been less than the denominator DLHs (65,000 DLHs).

Problem 11-28 (30 minutes)

1.

FAB COMPANY
Flexible Budget
For the Month Ended March 31

Overhead Costs	Cost Formula (per MH)	Machine-Hours		
		20,000	25,000	30,000
Variable costs:				
Utilities	$0.90	$ 18,000	$ 22,500	$ 27,000
Maintenance..................	1.60	32,000	40,000	48,000
Machine setup	0.30	6,000	7,500	9,000
Indirect labor	0.70	14,000	17,500	21,000
Total variable cost	$3.50	70,000	87,500	105,000
Fixed costs:				
Maintenance..................		40,000	40,000	40,000
Indirect labor		130,000	130,000	130,000
Depreciation..................		70,000	70,000	70,000
Total fixed cost		240,000	240,000	240,000
Total overhead cost		$310,000	$327,500	$345,000

Problem 11-28 (continued)

2.

<div align="center">

FAB Company
Overhead Performance Report
For the Month Ended March 31

</div>

Budgeted machine-hours 30,000
Actual machine-hours 26,000

Overhead Costs	Cost Formula (per MH)	Actual 26,000 Hours	Budget 26,000 Hours	Spending or Budget Variance
Variable costs:				
Utilities	$0.90	$ 24,200	$ 23,400	$ 800 U
Maintenance*.........	1.60	38,100	41,600	3,500 F
Machine setup........	0.30	8,400	7,800	600 U
Indirect labor	0.70	19,600	18,200	1,400 U
Total variable cost	$3.50	90,300	91,000	700 F
Fixed costs:				
Maintenance		40,000	40,000	0
Indirect labor		130,000	130,000	0
Depreciation...........		71,500	70,000	1,500 U
Total fixed cost		241,500	240,000	1,500 U
Total overhead cost ...		$331,800	$331,000	$ 800 U

    * $78,100 total maintenance cost, less $40,000 fixed maintenance cost, equals $38,100 variable maintenance cost. The variable element of other costs is computed in the same way.

3. In order to compute an overhead efficiency variance, it would be necessary to know the standard hours allowed for the 15,000 units produced during March.

Problem 11-29 (45 minutes)

1. and 2.

	Per Direct Labor-Hour		
	Variable	Fixed	Total
Denominator of 30,000 DLHs:			
$135,000 ÷ 30,000 DLHs	$4.50		$ 4.50
$270,000 ÷ 30,000 DLHs		$9.00	9.00
Total predetermined rate			$13.50
Denominator of 40,000 DLHs:			
$180,000 ÷ 40,000 DLHs	$4.50		$ 4.50
$270,000 ÷ 40,000 DLHs		$6.75	6.75
Total predetermined rate			$11.25

3.

Denominator Activity: 30,000 DLHs		Denominator Activity: 40,000 DLHs	
Direct materials, 4 feet @			
$8.75 per foot	$35.00	Same	$35.00
Direct labor, 2 DLHs @			
$15 per DLH..................	30.00	Same	30.00
Variable overhead, 2			
DLHs @ $4.50 per DLH ...	9.00	Same	9.00
Fixed overhead, 2 DLHs		Fixed overhead, 2 DLHs	
@ $9 per DLH	18.00	@ $6.75 per DLH	13.50
Standard cost per unit	$92.00	Standard cost per unit ..	$87.50

4. a. 18,000 units × 2 DLHs per unit = 36,000 standard DLHs.

b.

Manufacturing Overhead		
Actual costs 446,400	486,000 *	Applied costs
	39,600	Overapplied overhead

*36,000 standard DLHs × $13.50 predetermined rate per DLH = $486,000.

Problem 11-29 (continued)

c. Variable overhead variances:

Actual DLHs of Input, at the Actual Rate (AH × AR)	Actual DLHs of Input, at the Standard Rate (AH × SR)	Standard DLHs Allowed for Output, at the Standard Rate (SH × SR)
$174,800	38,000 DLHs × $4.50 per DLH = $171,000	36,000 DLHs × $4.50 per DLH = $162,000

Spending Variance, $3,800 U   Efficiency Variance, $9,000 U

Alternative solution:

Variable overhead spending variance = (AH × AR) – (AH × SR)
($174,800) – (38,000 DLHs × $4.50 per DLH) = $3,800 U

Variable overhead efficiency variance =   SR (AH – SH)
$4.50 per DLH (38,000 DLHs – 36,000 DLHs) = $9,000 U

Fixed overhead variances:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
$271,600	$270,000*	36,000 DLHs × $9 per DLH = $324,000

Budget Variance, $1,600 U   Volume Variance, $54,000 F

*Can be expressed as: 30,000 denominator DLHs × $9 per DLH = $270,000.

Problem 11-29 (continued)

Alternative solution:

Budget variance:

$$\text{Budget variance} = \text{Actual fixed overhead cost} - \text{Budgeted fixed overhead cost}$$

$$= \$271,600 - \$270,000$$

$$= \$1,600 \text{ U}$$

Volume variance:

$$\text{Volume Variance} = \text{Fixed portion of the predetermined overhead rate} \left(\text{Denominator hours} - \text{Standard hours allowed} \right)$$

$$= \$9.00 \text{ per DLH } (30,000 \text{ DLHs} - 36,000 \text{ DLHs})$$

$$= \$54,000 \text{ F}$$

Summary of variances:

Variable overhead spending variance...........	$ 3,800 U
Variable overhead efficiency variance	9,000 U
Fixed overhead budget variance..................	1,600 U
Fixed overhead volume variance	54,000 F
Overapplied overhead	$39,600 F

Problem 11-29 (continued)

5. The major disadvantage of using normal activity is the large volume variance that ordinarily results. This occurs because the denominator activity used to compute the predetermined overhead rate is different from the activity level that is anticipated for the period. In the case at hand, the company has used a long-run normal activity figure of 30,000 DLHs to compute the predetermined overhead rate, whereas activity for the period was expected to be 40,000 DLHs. This has resulted in a huge favorable volume variance that may be difficult for management to interpret. In addition, the large favorable volume variance in this case has masked the fact that the company did not achieve the budgeted level of activity for the period. The company had planned to work 40,000 DLHs, but managed to work only 36,000 DLHs (at standard). This unfavorable result is concealed due to using a denominator figure that is out of step with current activity.

On the other hand, using long-run normal activity as the denominator results in unit costs that are stable from year to year. Thus, management's decisions are not clouded by unit costs that jump up and down as the activity level rises and falls.

Problem 11-30 (60 minutes)

1. The computations of the cost formulas appear below.

	Cost	Variable with respect to	Activity level	Cost per unit of activity
Actors and directors' wages................................	£216,000	performances	108	£ 2,000
Stagehands' wages	£32,400	performances	108	£300
Ticket booth personnel and ushers' wages...........	£16,200	performances	108	£150
Scenery, costumes, and props	£108,000	productions	6	£18,000
Theater hall rent...	£54,000	performances	108	£500
Printed programs..	£27,000	performances	108	£250
Publicity..	£12,000	productions	6	£2,000
Administrative expenses (15%)	£6,480	productions	6	£1,080
Administrative expenses (10%)	£4,320	performances	108	£40
Fixed administrative expenses (75%)	£32,400	—	—	—

2. The performance report is clearest when it is organized by cost behavior. The costs that are variable with respect to the number of productions come first, then the costs that are variable with respect to performances, then the administrative expenses as a special category.

<div align="center">

The Little Theatre
Flexible Budget Performance Report

</div>

Actual number of productions...............................	7
Actual number of performances per production........	24
Actual total number of performances.....................	168

The performance report is continued on the next page.

Problem 11-30 (continued)

Costs	Cost Formula Per Unit of Activity	Actual Costs Incurred	Budget Based on Actual Activity	Variance
Variable costs of productions:				
(Flexible budget based on 7 productions)				
Scenery, costumes, and props......................	£18,000	£130,600	£126,000	£ 4,600 U
Publicity	2,000	15,100	14,000	1,100 U
Total variable cost per production*	£20,000	145,700	140,000	5,700 U
Variable costs of performances:				
(Flexible budget based on 168 performances)				
Actors and directors' wages	£2,000	341,800	336,000	5,800 U
Stagehands' wages	300	49,700	50,400	700 F
Ticket booth personnel and ushers' wages	150	25,900	25,200	700 U
Theater hall rent	500	78,000	84,000	6,000 F
Printed programs	250	38,300	42,000	3,700 F
Total variable cost per performance*	£3,200	533,700	537,600	3,900 F
Administrative expenses:				
Variable per production	£1,080		7,560	
Variable per performance............................	£40		6,720	
Fixed...			32,400	
Total administrative expenses.........................		47,500	46,680	820 U
Total cost..		£726,900	£724,280	£ 2,620 U

*Excluding variable portion of administrative expenses

Problem 11-30 (continued)

3. The overall unfavorable variance is a very small percentage of the total cost, less than 0.4%. That suggests that costs are well under control. In addition, the pattern of the variances may reflect good management. The largest unfavorable variances are for value-added activities (scenery, costumes, props, actors and directors) that may warrant additional spending. These unfavorable variances are offset by favorable variances for theater hall rent and the printed programs. Assuming that the quality of the printed programs has not noticeably declined and that the favorable variance for the rent reflects a lower negotiated rental fee, management should be congratulated. They have saved in some areas and have apparently transferred the funds to other areas that may favorably impact the quality of the theater's productions.

4. The average costs may not be very good indicators of the additional costs of any particular production or performance. The averages gloss over considerable variations in costs. For example, a production of Peter the Rabbit may require only half a dozen actors and actresses and fairly simple costumes and props. On the other hand, a production of Cinderella may require dozens of actors and actresses and very elaborate and costly costumes and props. Consequently, both the production costs and the cost per performance will be much higher for Cinderella than for Peter the Rabbit. Managers of theater companies know that they must estimate the costs of each new production individually—the average costs are of little use for this purpose.

Managerial Accounting, 11th Edition

Case 11-31 (30 minutes)

It is difficult to imagine how Tom Kemper could ethically agree to go along with reporting the favorable $21,000 variance for industrial engineering on the final report, even if the bill were not actually received by the end of the year. It would be misleading to include all of the original contract price of $210,000 on the report, but to exclude part of the final cost of the contract. Collaborating in this attempt to mislead corporate headquarters would appear to be a violation of three of the Standards of Ethical Conduct for Management Accountants: Competence, Integrity, and Objectivity. These three violations are discussed below:

Competence   The competence standard requires that management accountants "prepare complete and clear reports and recommendations after appropriate analyses of relevant and reliable information." A report that omits mentioning the entire amount owed on the industrial engineering contract could hardly be called complete.

Integrity   The integrity standard requires that management accountants "communicate unfavorable as well as favorable information..." Withholding unfavorable information such as the entire amount owed on the industrial engineering contract violates this standard.

Objectivity   The objectivity standard requires that management accountants "disclose fully all relevant information that could reasonably be expected to influence the user's understanding of the reports, comments, and recommendations presented." Failing to disclose the entire amount owed on the industrial engineering contract violates this standard.

Individuals will differ in how they think Tom Kemper should handle this situation. In our opinion, he should firmly state that he is willing to call Laura, but even if the bill does not arrive, he is ethically bound to properly accrue the expenses on the report—which will mean an unfavorable variance for industrial engineering and an overall unfavorable variance. This would require a great deal of personal courage. If the general manager insists on keeping the misleading $21,000 favorable variance on the report, Kemper would have little choice under the Standards of Ethical Conduct. He would have to take the dispute to the next higher managerial level in the company.

Case 11-31 (continued)

It is important to note that the problem may be a consequence of inappropriate use of performance reports by corporate headquarters. If the performance report is being used as a way of "beating up" managers, corporate headquarters may be creating a climate in which managers such as the general manager at the Wichita plant will feel like they must always turn in positive reports. This creates pressure to bend the truth since reality isn't always positive.

Some students may suggest that Kemper redo the performance report to recognize efficiency variances. This might make the performance look better, or it might make the performance look worse; we cannot tell from the data in the case. Moreover, it is unlikely that corporate headquarters would permit a performance report that does not follow the usual format, which apparently does not recognize efficiency variances.

Case 11-32 (45 minutes)

1. Performance report:

University Motor Pool
Budget Report for March

	March Actual	Flexible Budget	Variance
Gasoline	$ 4,300	$ 4,410	$110 F
Oil, minor repairs, and parts......	380	378	2 U
Outside repairs.........................	50	236	186 F
Insurance	525	525	0
Salaries and benefits	2,500	2,500	0
Depreciation of vehicles	2,310	2,310	0
Total cost.................................	$10,065	$10,359	$294 F
Number of automobiles in use ...	21	21	0
Actual miles	63,000	63,000	0
Cost per mile	$0.1598	$0.1644	$0.0046 F

Supporting calculations for flexible budget amounts:

Gasoline:

$$\frac{63{,}000 \text{ miles}}{25 \text{ miles per gallon}} \times \$1.75 \text{ per gallon} = \$4{,}410$$

Oil, minor repairs, and parts:

63,000 miles × $0.006 per mile = $378

Outside repairs:

$$\frac{\$135 \text{ per auto} \times 21 \text{ autos}}{12 \text{ months}} = \$236.25$$

Insurance:

$6,000 ÷ 20 autos = $300 per auto

21 autos × $300 per auto = $6,300

$6,300 ÷ 12 months = $525 per month

Case 11-32 (continued)

Salaries and benefits (no change):

$$\frac{\$30,000 \text{ annual cost}}{12 \text{ months}} = \$2,500 \text{ per month}$$

Depreciation—Annual depreciation per auto:

$26,400 ÷ 20 autos = $1,320 per auto

Depreciation—Annual depreciation for 21 autos:

$1,320 per auto × 21 autos = $27,720

Depreciation—Monthly depreciation for 21 autos:

$27,720 ÷ 12 months = $2,310 per month

2. The performance report as originally prepared is based on a static budget approach that does not allow for variations in the number of miles driven from month to month, or for variations in the number of automobiles used. This causes the "monthly budget" figures for both variable and fixed costs to be unrealistic as benchmarks against which to compare actual costs for the month. For example, actual variable costs such as gasoline can't be compared to the "budgeted" cost, since the budgeted figure is based on only 50,000 miles; actual fixed costs such as insurance can't be compared to the "budgeted" costs, since the budgeted figure is based on only 20 automobiles.

The performance report in Part (1) above is more realistic since the benchmark figures are based on actual miles driven and on the actual number of automobiles used during the month.

Case 11-33 (60 minutes)

1. The number of units produced can be computed by using the total standard cost applied for the period for *any* input (materials, labor, or overhead), or it can be computed by using the total standard cost applied for all inputs together. Using only the standard cost applied for materials, we have:

$$\frac{\text{Total standard cost applied for the period}}{\text{Standard cost per unit}} = \frac{\$405,000}{\$18 \text{ per unit}}$$

$$= 22,500 \text{ units}$$

The same answer can be obtained by using any other cost input.

2. 138,000 pounds; see below for a detailed analysis.

3. $2.95 per pound; see below for a detailed analysis.

4. 19,400 direct labor-hours; see below for a detailed analysis.

5. $15.75 per direct labor-hour; see below for a detailed analysis.

6.
Standard variable overhead cost applied ..	$54,000
Add: Overhead efficiency variance...........	4,200 U (see below)
Deduct: Overhead spending variance.......	1,300 F
Actual variable overhead cost incurred	$56,900

7.
Standard fixed overhead cost applied	$126,000
Add: Unfavorable volume variance...........	14,000 U
Budgeted fixed overhead cost	$140,000

8.

$$\frac{\text{Budgeted fixed overhead cost}}{\text{Fixed portion of the predetermined overhead rate}} = \frac{\$140,000}{\$7 \text{ per DLH}}$$

$$= 20,000 \text{ DLHs}$$

Case 11-33 (continued)

Direct materials analysis:

Actual Quantity of Inputs, at Actual Price (AQ × AP)	Actual Quantity of Inputs, at Standard Price (AQ × SP)	Standard Quantity Allowed for Output, at Standard Price (SQ × SP)
138,000 pounds × $2.95 per pound*** = $407,100	138,000 pounds** × $3 per pound = $414,000	135,000 pounds* × $3 per pound = $405,000

Price Variance, $6,900 F   Quantity Variance, $9,000 U

Total Variance, $2,100 U

   * 22,500 units × 6 pounds per unit = 135,000 pounds
  ** $414,000 ÷ $3 per pound = 138,000 pounds
 *** $407,100 ÷ 138,000 pounds = $2.95 per pound

Direct labor analysis:

Actual Hours of Input, at the Actual Rate (AH × AR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Standard Hours Allowed for Output, at the Standard Rate (SH × SR)
19,400 DLHs × $15.75 per DLH*** = $305,550	19,400 DLHs** × $15 per DLH = $291,000	18,000 DLHs* × $15 per DLH = $270,000

Rate Variance, $14,550 U   Efficiency Variance, $21,000 U

Total Variance, $35,550 U

   * 22,500 units × 0.8 DLHs per unit = 18,000 DLHs
  ** $291,000 ÷ $15 per DLH = 19,400 DLHs
 *** $305,550 ÷ 19,400 DLHs = $15.75 per DLH

Case 11-33 (continued)

Variable overhead analysis:

Actual Hours of Input, at the Actual Rate (AH × AR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Standard Hours Allowed for Output, at the Standard Rate (SH × SR)
$56,900**	19,400 DLHs × $3 per DLH = $58,200	18,000 DLHs × $3 per DLH = $54,000

Spending Variance,   Efficiency Variance,
$1,300 F $4,200 U*

  * Computed using 19,400 actual DLHs at the $3 per DLH standard rate.
** $58,200 − $1,300 = $56,900.

Fixed overhead analysis:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
$139,500**	$140,000*	18,000 hours × $7 per hour = $126,000

Budget Variance,   Volume Variance,
$500 F $14,000 U

  * $126,000 + $14,000 = $140,000.
** $140,000 − $500 = $139,500.

Case 11-34 (45 minutes for each company; 90 minutes in total)

(Note to the Instructor: You may wish to assign only one company.)

		Company A	Company B
1.	Denominator activity in machine-hours ..	35,000	40,000 *
2.	Standard machine-hours allowed for units produced	32,000 *	42,000
3.	Actual machine-hours worked	30,000 *	45,000
4.	Flexible budget variable overhead per machine-hour....................................	$1.75	$2.80 *
5.	Budgeted fixed overhead (total)............	$210,000	$300,000
6.	Actual variable overhead cost................	$54,000 *	$117,000 *
7.	Actual fixed overhead cost....................	$209,400 *	$302,100 *
8.	Variable overhead cost applied to production..	$56,000	$117,600 *
9.	Fixed overhead cost applied to production	$192,000 *	$315,000
10.	Variable overhead spending variance	$1,500 U	$9,000 F
11.	Variable overhead efficiency variance	$3,500 F*	$8,400 U*
12.	Fixed overhead budget variance............	$600 F	$2,100 U*
13.	Fixed overhead volume variance............	$18,000 U*	$15,000 F
14.	Variable portion of the predetermined overhead rate....................................	$1.75	$2.80
15.	Fixed portion of the predetermined overhead rate....................................	$6.00	$7.50
16.	Underapplied (or overapplied) overhead	$15,400	($13,500)

*Given.

Case 11-34 (continued)

Analysis for Company A:

Variable overhead:

Actual Hours of Input, at the Actual Rate (AH × AR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Standard Hours Allowed for Output, at the Standard Rate (SH × SR)
$54,000*	30,000 MHs* × $1.75 per MH = $52,500	32,000 MHs* × $1.75 per MH** = $56,000

Spending Variance, $1,500 U   Efficiency Variance, $3,500 F*

Fixed overhead:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
$209,400*	$210,000	32,000 MHs* × $6 per MH = $192,000*

Budget Variance, $600 F   Volume Variance, $18,000 U*

* Given.

$$** \frac{\$3,500}{32,000 \text{ MHs} - 30,000 \text{ MHs}} = \$1.75 \text{ per MH}$$

Case 11-34 (continued)

Denominator activity in hours:

$$\frac{\text{Fixed element of the}}{\text{predetermined overhead rate}} = \frac{\text{Budgeted fixed overhead cost}}{\text{Denominator activity}}$$

$$= \frac{\$210,000}{\text{Denominator activity}}$$

$$= \$6 \text{ per MH}$$

Therefore, the denominator activity is: $210,000 ÷ $6 per MH = 35,000 MHs.

Underapplied overhead:

Variable overhead spending variance	$ 1,500	U
Variable overhead efficiency variance.........	3,500	F
Fixed overhead budget variance	600	F
Fixed overhead volume variance	18,000	U
Underapplied overhead	$15,400	U

Analysis for Company B:

Variable overhead:

Actual Hours of Input, at the Actual Rate (AH × AR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Standard Hours Allowed for Output, at the Standard Rate (SH × SR)
$117,000*	45,000 MHs × $2.80 per MH* = $126,000	42,000 MHs × $2.80 per MH* = $117,600*

Spending Variance, $9,000 F   Efficiency Variance, $8,400 U*

*Given.

Managerial Accounting, 11th Edition

Case 11-34 (continued)

Fixed overhead:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
$302,100*	$300,000	42,000 MHs × $7.50 per MH** = $315,000

Budget Variance, $2,100 U*   Volume Variance, $15,000 F

* Given
** $302,100 – $2,100 = $300,000; $300,000 ÷ 40,000 denominator MHs = $7.50 fixed predetermined overhead rate.

Overapplied overhead:

Variable overhead spending variance	$ 9,000	F
Variable overhead efficiency variance..........	8,400	U
Fixed overhead budget variance	2,100	U
Fixed overhead volume variance.................	15,000	F
Overapplied overhead.............................	$13,500	F

Group Exercise 11-35

1. The tighter standards for fixed manufacturing costs are a consequence of spreading fixed costs over more units, resulting in a smaller standard cost per unit. Unless the plant operates at practical capacity, the volume variance will be unfavorable.

   a. The possible negative behavioral effects include:
   - Employees may view the standards as unreasonable.
   - Employees may react negatively to the change, feeling that it has been imposed by the accounting department with little input from those who would be most affected.
   - Motivation may suffer if employees feel increased pressure to meet the tighter standards.
   - General resistance to change.

   b. To reduce the negative behavioral effects, management could:
   - Explain what is expected and why this change will further the company's objectives.
   - Adjust the performance evaluation system to reflect this change. For example, production managers would not be held responsible for volume variances so long as demand is satisfied and orders are shipped on time.

2. Tight standards can have positive behavioral effects because:
   - Employees may be energized by the challenge.
   - Tight standards may encourage teamwork.
   - Tight standards may foster problem-solving and creative thinking.

3. Representatives of all the parts of the organization that will be affected by the change should participate in setting standards. This would certainly include anyone whose performance evaluation is affected by a change in standards.

   Employee participation in standard setting should result in better goal congruence. The individuals who will be affected by the standards have first-hand operating knowledge, which should be invaluable in the standard setting process. In addition, their participation in standard setting will increase the likelihood that they will be committed to meeting the standards once they have been set.

<div align="right">(CMA unofficial solution, adapted)</div>

Group Exercise 11-36

The solution will depend on the particular college or university that the students investigate.