11 FLEXIBLE BUDGET AND OVERHEAD ANALYSIS

DISCUSSION QUESTIONS

1. A static budget is for a particular level of activity. A flexible budget is one that can be established for any level of activity.

2. For performance reporting, it is necessary to compare the actual costs for the actual level of activity with the budgeted costs for the actual level of activity. A flexible budget provides the means to compute the budgeted costs for the actual level of activity, after the fact.

3. A flexible budget is based on a simple formula: Total costs (Y) = F + VX, where F = fixed costs and V = variable cost per unit; this requires knowledge of both fixed and variable components (see Cornerstone 11–2).

4. A before-the-fact flexible budget allows managers to engage in sensitivity analysis by looking at the financial outcomes possible for a number of different plausible scenarios.

5. An after-the-fact flexible budget facilitates performance evaluation by allowing the calculation of what spending should have been for the actual level of activity.

6. Part of a variable overhead spending variance can be caused by inefficient use of overhead resources.

7. Agree. This variance, assuming that variable overhead costs increase as labor usage increases, is caused by the efficiency or inefficiency of labor usage.

8. The variable overhead efficiency variance values the difference between the actual hours and the hours allowed using the standard variable overhead rate, while the labor efficiency variance values the difference using the standard labor rate.

9. Fixed overhead costs are either committed or discretionary. The committed costs will not differ by their very nature. Discretionary can vary, but the level the company wants to spend on these items is decided at the beginning of the time period and usually will be met unless there is a conscious decision to change the predetermined levels.

10. The volume variance occurs when the actual volume differing from the expected volume used to compute the predetermined standard fixed overhead rate. An unfavorable volume variance occurs when the actual volume is less than the expected volume. Thus, an unfavorable volume variance means that actual production is less than expected.

11. If the actual volume is different from the expected, then the company has either lost or earned contribution margin. The volume variance signals this outcome, and if the variance is large, then the loss or gain is large since the volume variance understates the effect.

12. The spending variance. This variance is computed by comparing actual expenditures with budgeted expenditures. The volume variance simply tells whether the actual volume is different from the expected volume.

13. An activity-based budget requires three steps: (1) identification of activities, (2) estimation of activity output demands, and (3) estimation of the costs of resources needed to provide the activity output demanded.

14. Functional-based flexible budgeting relies on unit-based drivers to build cost formulas for various cost items. Activity flexible budgeting uses activity drivers to build a cost formula for the costs of each activity.

15. An activity-based report compares the actual costs for the actual level of activity with the budgeted level for the actual level—but it does so for multiple activities and drivers. The increased accuracy results from the usage of drivers that have a causal relationship to predict what the costs should be for the actual level of activity.

MULTIPLE-CHOICE EXERCISES

11-1. **d**

11-2. **a**

11-3. **b**

11-4. **e**

11-5. **c**

11-6. **c**

11-7. **e**

11-8. **b**

11-9. **d**

11-10. **d**

11-11. **a**

11-12. **c**

11-13. **a**

11-14. **d**

11-15. **a**

11-16. **e**

11-17. **d**

11-18. **c**

CORNERSTONE EXERCISES

CE 11-19

1.

	Budgeted for 4,000 units	
Direct materials ($0.60 × 3 × 4,000)		$ 7,200
Direct labor ($16 × 0.5 × 4,000)		32,000
Variable overhead ($2.20 × 0.5 × 4,000)		4,400
Fixed overhead:		
Materials handling	$6,200	
Depreciation	2,600	8,800
Total		$52,400

2.

	Performance Report		
	Actual	Budgeted	Variance*
Units produced	3,800	4,000	200 U
Direct materials	$ 6,800	$ 7,200	$ (400) F
Direct labor	30,500	32,000	(1,500) F
Variable overhead	4,200	4,400	(200) F
Fixed overhead:			
Materials handling	6,300	6,200	100 U
Depreciation	2,600	2,600	0
Total	$50,400	$52,400	$(2,000) F

*Variances equal actual amounts less budgeted amounts. If actual cost is less than budgeted cost, the variance is F (favorable). If actual cost is more than budgeted cost, the variance is U (unfavorable).

CE 11-20

	2,500 units	3,000 units	3,500 units
Direct materials	$ 4,500	$ 5,400	$ 6,300
Direct labor	20,000	24,000	28,000
Variable overhead	2,750	3,300	3,850
Fixed overhead:			
Materials handling	6,200	6,200	6,200
Depreciation	2,600	2,600	2,600
Total	$36,050	$41,500	$46,950

CE 11-21

	Performance Report		
	Actual	Budgeted	Variance*
Units produced	3,800	3,800	-
Direct materials	$ 6,800	$ 6,840	$ (40) F
Direct labor	30,500	30,400	100 U
Variable overhead	4,200	4,180	20 U
Fixed overhead:			
Materials handling	6,300	6,200	100 U
Depreciation	2,600	2,600	0
Total	$50,400	$50,220	$180 U

*Variances equal actual amounts minus budgeted amounts. If actual cost is less than budgeted cost, the variance is F (favorable). If actual cost is more than budgeted cost, the variance is U (unfavorable).

CE 11-22

1. Actual variable overhead rate (AVOR) = Actual variable overhead / Actual direct labor hours
   = $206,816/56,200
   = $3.68 per direct labor hour

2. Applied variable overhead = Actual units × SH × SVOR
   = 14,000 × 4 × $3.70
   = $207,200

3.

Actual variable overhead	$206,816
Applied variable overhead	207,200
Total variable overhead variance	$ (384) F

Note: The total variable overhead variance can also be calculated using the formula:

Total variable overhead variance:

= (AH × AVOR) – (Actual units × SH × SVOR)
= (56,200 × $3.68) – (14,000 × 4 × $3.70)
= $(384) F

CE 11-23

1. Columnar approach:

1. AH × AVOR	2. AH × SVOR	3. SH × SVOR
56,200 × $3.68	56,200 × $3.70	56,000 × $3.70
$206,816	$207,940	$207,200
-$1,124 F	$740 U	
Spending	Efficiency	

2. Variable overhead spending variance = (AVOR – SVOR) AH
= ($3.68 – $3.70)56,200
= $ (1,124) F

3. Variable overhead efficiency variance = (AH – SH) SVOR
= (56,200 – 56,000)$3.70
= $740 U

4.

Variable overhead spending variance	$(1,124) F
Variable overhead efficiency variance	740 U
Total variable overhead variance	$ (384) F

CE 11-24

Overhead Cost Item	Cost Formula	Actual Cost	Budget for Actual Hours	Spending Variance	Budget for At Standard Hours	Efficiency Variance
Inspection	$2.00	$112,300	$112,400	$(100) F	$112,000	$400 U
Power	1.70	95,600	95,540	60 U	95,200	340 U
Total	$3.70	$207,900	$207,940	$ (40) F	$207,200	$740 U

CE 11-25

1. Standard hrs for actual units = SH per unit × Actual units produced
= 4 × 14,000
= 56,000

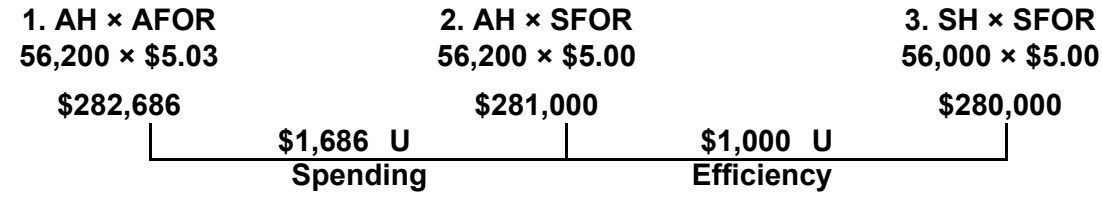
2. Applied fixed overhead = Standard hours for actual units × SFOR
= 56,000 × $5
= $280,000

3.

Actual fixed overhead	$281,680
Applied fixed overhead	280,000
Total fixed overhead variance	$ 1,680 U

CE 11-26

1. Columnar approach:



2. Fixed overhead spending variance = AFOR – SFOR) AH
= ($5.03 – $5.00)56,200
= $1,686 U

3. Fixed overhead efficiency variance = (AH – SH) SFOR
= (56,200 – 56,000)$5.00
= $1,000 U

4.

Fixed overhead spending variance	$1,686 U
Fixed overhead efficiency variance	1,000 U
Total fixed overhead variance	$2,686 U

CE 11-27

Salaries (6 inspectors × $32,000)	$192,000
Supplies (170,000 × $0.70)	119,000
Workbenches, computer depreciation	18,300
Factory space, utilities	12,600
Total inspection cost	$341,900

CE 11-28

	Fixed	Variable	40,000 units 60,000 mhrs	60,000 units 90,000 mhrs
Maintenance	$50,000	$1.80	$158,000	$212,000
Machining	25,000	3.00	205,000	295,000
Subtotal	$75,000	$4.80	$363,000	$507,000
	Fixed	**Variable**	**50 setups**	**70 setups**
Setting up	-	$2,100	$105,000	$147,000

CE 11-28 (Continued)

	Fixed	Variable	Purchase Orders 12,000	Purchase Orders 18,000
Purchasing	$75,000	$7.00	$159,000	$201,000
Total			$627,000	$855,000

CE 11-29

	Performance Report			
	Actual	Budgeted	Variance*	
Units produced	40,000	40,000	-	
Maintenance	$158,300	$158,000	$ 300	U
Machining	205,400	205,000	400	U
Setting up	106,700	105,000	1,700	U
Purchasing	158,800	159,000	(200)	F
Total	$629,200	$627,000	$2,200	U

***Variances equal actual amounts minus budgeted amounts. If actual cost is less than budgeted cost, the variance is F (favorable). If actual cost is more than budgeted cost, the variance is U (unfavorable).**

EXERCISES

E 11-30

1.

	Performance Report			
	Actual	Budgeted	Variance	
Units produced	4,100	4,000	100	F
Direct materials cost	$48,700	$48,000 [a]	$ 700	U
Direct labor cost	35,800	36,000 [b]	(200)	F
Total	$84,500	$84,000	$ 500	U

[a] 2 leather strips × $6 per strip × 4,000 units

[b] 0.5 direct labor hour × $18 × 4,000 units

2. The performance report compares costs at two different levels of activity—4,100 units actually produced and 4,000 units budgeted—and so cannot be used to assess efficiency.

E 11-31

1.

	Flexible Budget for			
	Cost Formula	3,500 units	4,000 units	4,500 units
Direct materials	$12.00	$42,000	$48,000	$ 54,000
Direct labor	9.00	31,500	36,000	40,500
Variable overhead	0.60	2,100	2,400	2,700
Fixed overhead	6,800	6,800	6,800	6,800
Total		$82,400	$93,200	$104,000

2. Unit cost at 3,500 units = $82,400/3,500 = $23.54*

Unit cost at 4,000 units = $93,200/4,000 = $23.30

Unit cost at 4,500 units = $104,000/4,500 = $23.11*

The cost per unit goes down as the number of units produced increases because fixed cost is spread over a greater number of units.

*Rounded

E 11-32

1.

Ionia Inc. Overhead Budget For the Coming Year		
	Formula	Activity Level 140,000 Hours
Variable costs:	$0.20	$ 28,000
Maintenance	0.45	63,000
Power	2.10	294,000
Indirect labor		$385,000
Total variable costs		
Fixed costs		
Maintenance		$173,000
Indirect labor		128,000
Rent		30,000
Total fixed costs		$331,000
Total overhead costs		$716,000

2. Direct labor hours for 15% higher production = 140,000 + 0.15(140,000)
= 161,000

Direct labor hours for 15% lower production = 140,000 – 0.15(140,000)
= 119,000

		Activity Level	
	Formula	161,000 Hours	119,000 Hours
Variable costs:			
Maintenance	$0.20	$ 32,200	$ 23,800
Power	0.45	72,450	53,550
Indirect labor	2.10	338,100	249,900
Total variable costs		$442,750	$327,250
Fixed costs:			
Maintenance		$173,000	$173,000
Indirect labor		128,000	128,000
Rent		30,000	30,000
Total fixed costs		$331,000	$331,000
Total overhead costs		$773,750	$658,250

E 11-33

	Performance Report		
	Actual	Budgeted	Variance
Direct labor hours based on actual	142,000	142,000	-
Variable overhead:			
Maintenance	$202,000	$201,400	$ 600 U
Power	63,000	63,900	(900) F
Indirect labor	426,100	426,200	(100) F
Rent	30,000	30,000	0
Total overhead	$721,100	$721,500	$(400) F

E 11-34

1. Standard direct labor hrs required:
   = Actual deliveries × Standard direct labor hrs
   = 38,600 × 0.80
   = 30,880 direct labor hours

2. Variable overhead analysis:

Actual VOH	Budgeted VOH	Applied VOH
	$5.10 × 31,000 hrs	$5.10 × 30,880 hrs
$157,700	$158,100	$157,488
$400 F (Spending)		$612 U (Efficiency)

E 11-35

1. Standard fixed overhead rate (SFOR) = $\frac{\text{Budgeted fixed overhead}}{\text{Practical capacity}}$
   = $400,000/32,000 DLH
   = $12.50

2. Fixed overhead analysis:

Actual FOH	Budgeted FOH	Applied FOH
	$12.50 × 32,000	$12.50 × 30,880
$403,400	$400,000	$386,000
$3,400 U (Spending)		$14,000 U (Volume)

E11-36

1. Variable overhead analysis:

Actual VOH	Budgeted VOH	Applied VOH
	$0.90 × 286,400	$0.90 × 286,800
$259,300	$257,760	$258,120
$1,540 U		$360 F
Spending		Efficiency

2. Fixed overhead analysis:

Actual FOH	Budgeted FOH	Applied FOH
	$4.30 × 288,000	$4.30 × 286,800
$1,235,900	$1,238,400	$1,233,240
$2,500 F		$5,160 U
Spending		Volume

Note: Practical volume in hours = 2 × 144,000 = 288,000 hours.

E 11-37

1. Fixed overhead rate = $1,326,000/1,560,000* = $0.85 per DLH

***Budgeted hours = 2,600,000 units × 0.6 direct labor hours = 1,560,000 hours**

SH = 2,560,000 units × 0.6 direct labor hours = 1,536,000 hours

Applied FOH = $0.85 × 1,536,000 = $1,305,600

2. Fixed overhead analysis:

Actual FOH	Budgeted FOH	Applied FOH
	$0.85 × 1,560,000	$0.85 × 1,536,000
$1,330,000	$1,326,000	$1,305,600
$4,000 U		$20,400 U
Spending		Volume

3. Variable OH rate = ($1,981,200 – $1,326,000)/1,560,000 hours
= $0.42 per DLH

4. Variable overhead analysis:

Actual VOH	Budgeted VOH	Applied VOH
	$0.42 × 1,535,400	$0.42 × 1,536,000
$644,100	$644,868	$645,120
$768 F		$252 F
Spending		Efficiency

E 11-38

1. Total applied fixed overhead = (Standard hours per unit × Actual units) × SFOR

= (0.9 × 143,000) × $11 = $1,415,700

2. Budgeted fixed overhead = Budgeted units × Standard hours per unit × SFOR

= 140,000 × 0.9 × $11 = $1,386,000

3. Actual fixed overhead = Budgeted fixed overhead + Unfavorable overhead spending variance

= $1,386,000 + $24,000 = $1,410,000

4. Total applied variable overhead = (Standard hours per unit × Actual units) × SVOR

= 0.9 × 143,000 × $6.36 = $818,532

5. Budgeted variable overhead based on actual hours = Applied variable overhead + Unfavorable variable overhead efficiency variance

= $818,532 + $1,272 = $819,804

Actual direct labor hours = $819,804/$6.36 = 128,900

6. Actual variable overhead = Budgeted variable overhead + Unfavorable variable overhead spending variance

= $819,804 + $9,196 = $829,000

E 11-39

Performance Report For the Year Ended December 31								
Cost	Cost Formula [a]	Actual Cost	Budget for Actual Hours [b]	Spending Variance [c]		Budget for Standard Hours [d]	Efficiency Variance [e]	
Labor	$20.00	$30,100	$30,600	$(500)	F	$30,000	$600	U
Supplies	2.40	4,400	3,672	728	U	3,600	72	U
Total	$22.40	$34,500	$34,272	$ 228	U	$33,600	$672	U

[a] Per direct labor hour.
[b] Computed using the cost formula and 1,530 actual hours.
[c] Spending variance = Actual costs – Budget for actual hours.
[d] Computed using the cost formula and 1,500 standard hours for actual production.
[e] Efficiency variance = Budget for actual hours – Budget for standard hours

E 11-40

1. Salaries (6 workers × $27,000) $162,000
   Supplies (130,000 × $0.80) 104,000
   Workbenches, computers depreciation 14,400
   Factory space, utilities 9,800
   Total receiving cost $290,200

2. Cost per receiving order = $290,200/130,000
   = $2.23* per receiving order

*Rounded

E 11-41

			Required for 40,000 units	Required for 50,000 units
	Fixed	Variable	500 eng. hrs	750 eng. hrs
Engineering	$67,000	$5.50	$69,750	$71,125
	Fixed	Variable	30,000 mhrs	37,500 mhrs
Machining	$36,000	$1.40	$78,000	$88,500
	Fixed	Variable	Receiving Orders 9,000	Receiving Orders 12,000
Receiving	$51,000	$3.75	$84,750	$96,000
Total			$232,500	$255,625

E 11-42

	Performance Report			
	Actual	Budgeted	Variance	
Units produced	312,000	312,000	-	
Maintenance	$179,600	$176,700	$2,900	U
Machining	90,500	89,800	700	U
Setting up	119,500	121,000	(1,500)	F
Purchasing	75,750	74,600	1,150	U
Total	$465,350	$462,100	$3,250	U

PROBLEMS

P 11-43

1. **Direct labor hours = (100,000 bags × 0.30 hours) +**
   (100,000 bags × 0.40 hours)
   = 30,000 hours + 40,000 hours
   = 70,000 direct labor hours

2.

Healthy Pet Company
Overhead Budget
For the Coming Year

	Formula	Activity Level 70,000 Hours*	
Variable costs:			
Maintenance	**$0.50**	**$ 35,000**	
Power	**0.70**	**49,000**	
Indirect labor	**1.60**	**112,000**	
Total variable costs			**$196,000**
Fixed costs			
Maintenance		**$ 21,000**	
Indirect labor		**38,500**	
Rent		**42,000**	
Total fixed costs			**101,500**
Total overhead costs			**$297,500**

***Based on Requirement 1**

P 11-44

1. **Direct labor hours for 10% higher = 70,000 hours + (0.10 × 70,000 hours)**
   = 77,000 direct labor hours

   Direct labor hours for 20% lower = 70,000 hours – (0.20 × 70,000 hours)
   = 56,000 direct labor hours

P 11-44 (Continued)

2. ***10% higher:***

Healthy Pet Company Overhead Budget For the Coming Year			
	Formula	Activity Level 77,000 Hours*	
Variable costs:			
Maintenance	$0.50	$38,500	
Power	0.70	53,900	
Indirect labor	1.60	123,200	
Total variable costs			$215,600
Fixed costs			
Maintenance		$21,000	
Indirect labor		38,500	
Rent		42,000	
Total fixed costs			101,500
Total overhead costs			$317,100

20% lower:

Healthy Pet Company Overhead Budget For the Coming Year			
	Formula	Activity Level 56,000 Hours*	
Variable costs:			
Maintenance	$0.50	$28,000	
Power	0.70	39,200	
Indirect labor	1.60	89,600	
Total variable costs			$156,800
Fixed costs			
Maintenance		$21,000	
Indirect labor		38,500	
Rent		42,000	
Total fixed costs			101,500
Total overhead costs			$258,300

P 11-45

1. Direct labor hours = (120,000 bags × 0.30 hours) + (100,000 bags × 0.40 hours)
= 36,000 hours + 40,000 hours
= 76,000 direct labor hours

2.

Healthy Pet Company
Performance Report
For the Current Year

	Actual	Budgeted	Variance*	
Units produced	**220,000**	**220,000**	**0**	
Production unit:*				
Maintenance	**$ 58,760**	**$ 59,000**	**$ 240**	**F**
Power	**54,150**	**53,200**	**950**	**U**
Indirect labor	**161,000**	**160,100**	**900**	**U**
Rent	**42,000**	**42,000**	**0**	
Total costs	**$315,910**	**$314,300**	**$1,610**	**U**

***Flexible budget amounts are based on = 76,000 direct labor hours DLH:**

Maintenance:	**$21,000 + $0.50(76,000)**	**=**	**$59,000**
Power:	**$0.70(76,000)**	**=**	**$53,200**
Indirect labor:	**$38,500 + $1.60(76,000)**	**=**	**$160,100**

3. All of the variances are small (less than 2% of budgeted amounts). Most would probably view the variances as immaterial. Reasons for variances are numerous. For example, a favorable maintenance variance could be caused by less preventive maintenance or by increased efficiency by individual maintenance workers. Indirect labor could be unfavorable because (among other things) higher-priced labor was used to carry out lower-skilled jobs. Power could be more expensive than planned because of a rate increase. An investigation would be needed to know exactly why the variances occurred.

P 11-46

1. Car W23 = 12/60(30,000) = 6,000 direct labor hours

Car Z280 = 24/60(60,000) = 24,000 direct labor hours

Total direct labor hours = 6,000 hours + 24,000 hours = 30,000 hours

2.

Spelzig Company
Overhead Budget
For the Month of November

	Formula	Activity Level 30,000 Hours*	
Variable costs:			
Maintenance	$3.80	$114,000	
Supplies	4.25	127,500	
Power	0.08	2,400	
Total variable costs			$243,900
Fixed costs (1/12 of annual amount)			
Depreciation		$ 12,058 *	
Salaries		15,742	
Total fixed costs			27,800
Total overhead costs			$271,700

*Rounded

P 11-47

1.

Item	Fixed	Variable*
Acquisition		$600
Freight		60
Duties		25
Engineering	$10,000,000	
Overhead	3,000,000	
Total	$13,000,000	$685

*Cost/level of activity

2.

	Pessimistic	Most Likely	Optimistic
Sales (@ $760)	$54,720,000	$114,000,000	$190,000,000
Less costs:			
Variable (@ $685)	49,320,000	102,750,000	171,250,000
Fixed	13,000,000	13,000,000	13,000,000
Projected income	$ (7,600,000)	$ (1,750,000)	$ 5,750,000

P 11-47 (Continued)

Before-the-fact flexible budgeting allows managers to assess risk and uncertainty. In this example, managers would see very quickly that the most likely scenario promises an expected loss. Only if the sales are in the optimistic range will the company show a positive return.

3. **The financial performance as revealed in Requirements 1 and 2 is not very promising. Two out of three scenarios lose money. Only the optimistic scenario promises a positive return, and it is only about 3% of sales. Most steering committees would be reluctant to press ahead with the new product given these projected financial results. One possibility is to instruct engineering to produce a design that reduces the cost—especially the acquisition cost. It may be possible to produce a design that lowers the manufacturing cost of the outsourced producers and Stillwater Designs' acquisition cost. By reducing the weight and bulkiness of the product, freight costs may also be reduced. After all the cost improvements are obtained that can be, then the question becomes—if the return is questionable—would the company still want to produce the product?**

   Producing a product that will not stand by itself is sometimes desirable. The product may be needed to enhance the image of the company—especially one that thrives on customers that like to impress others with the volume and loudness of speakers. The comments by potential customers on the loudness and the range of the subwoofer reveal the need to have this product for completeness. Having this product may increase the reputation of the entire product line and increase sales of smaller subwoofers. If so, then production of the Solo X18 may be justified.

P 11-48

1. **1,700 Direct labor hours:**

Maintenance [$7,500 + ($5 × 1,700)]	**$16,000**
Depreciation	**5,600**
Supervision	**22,000**
Supplies ($2.30 × 1,700)	**3,910**
Power ($0.60 × 1,700)	**1,020**
Other [$18,000 + ($1.25 × 1,700)]	**20,125**
Total	**$68,655**

P 11-48 (Continued)

2. For costs that don't change, the formula is simply the fixed component. To prepare the formulas for the costs that change, use the high-low method:

Maintenance:

V = ($17,500 – $12,500)/(2,000 – 1,000) = $5.00

$F = Y^2 – VX^2 =$ $17,500 – $5(2,000) = $7,500

Maintenance cost = $7,500 + $5.00X

Supplies:

V = ($4,600 – $2,300)/1,000 = $2.30

F = $4,600 – $2.30(2,000) = $0

Supplies cost = $2.30X

Power:

V = ($1,200 – $600)/1,000 = $0.60

F = $1,200 – $0.60(2,000) = $0

Power cost = $0.60X

Other:

V = ($20,500 – $19,250)/1,000 = $1.25

F = $20,500 – $1.25(2,000) = $18,000

Other costs = $18,000 + $1.25X

P 11-49

1. Since the specific production amounts expected for May are not given, we must assume that May uses 1/12 of the annual hours. Thus, the budget for May for each of the three levels is given below:

Orchard Fresh Inc. Overhead Budget For the Month of May				
		Activity Level (hours)*		
	Formula	200	240	280
Variable costs:				
Maintenance	$0.76	$ 152.00	$ 182.40	$ 212.80
Supplies	0.45	90.00	108.00	126.00
Power	0.20	40.00	48.00	56.00
Total variable costs		$ 282.00	$ 338.40	$ 394.80
Fixed costs:				
Depreciation		$ 400.00	$ 400.00	$ 400.00
Salaries		2,041.67	2,041.67	2,041.67
Total fixed costs		$2,441.67	$2,441.67	$2,441.67
Total overhead costs		$2,723.67	$2,780.07	$2,836.47

*annual hours/12

2. Without knowing the hours used per basket, there is no way to prepare a new overhead budget for May. For example, if the hours used per basket were 0.50, then the expected hours used would be 100. This would be multiplied by $1.41 to yield $141, which could then be added to May's original budget.

P 11-50

1. Flexible budget for a normal school month:

Revenue	
Sandwiches (5,000 × $4.50)	**$22,500**
Sodas (5,000 × $1.50)	**7,500**
Total revenue	**$30,000**
Variable costs:	
Food[a] (5,000 × $2.83)	**$14,150**
Soda[b] (5,000 × $0.24)	**1,200**
Monthly costs:	
Paper	**1,650**
Rent	**575**
Other	**1,800**
Direct labor[c] ($1,720 + $1,032)	**2,752**
Total costs	**$22,127**

[a]Cost per sandwich:

Meat: (4/16 × $7)	**$1.75**	
Cheese: (2/16 × $6)	**0.75**	
Roll: ($28.80/144)	**0.20**	
Lettuce: (0.05 × 1/24 × $12)	**0.03**	*****
Tomato: (0.25 × 1/20 × $4)	**0.05**	
Secret sauce: (1/128 × $6.40)	**0.05**	
	$2.83	

[b]Cost per 12 oz. drink

= 12/128 × $2.56 = $0.24

[c]Noon shift labor cost

= (4 hrs × 5 days × 2 workers × 4.3 weeks per month × $10)
= $1,720

Evening shift labor cost

= (4 hrs × 3 nights × 2 workers × 4.3 weeks per month × $10)
= $1,032

***Rounded**

P 11-50 (Continued)

2. Flexible budget for October:

Revenue		
Sandwiches (6,500 × $4.50)	**$29,250**	
Sodas (6,500 × $1.50)	**9,750**	
Total revenue	**$39,000**	
Variable costs:		
Food[a] (6,500 × $2.83)	**$18,395**	
Soda[b] (6,500 × $0.24)	**1,560**	
Monthly costs:		
Paper ($1,650 + $200)	**1,850**	
Rent	**575**	
Other	**1,800**	
Direct labor[c]	**2,912**	
Total costs	**$27,092**	

[a]Cost per sandwich:

Meat: (4/16 × $7)	**$1.75**	
Cheese: (2/16 × $6)	**0.75**	
Roll: ($28.80/144)	**0.20**	
Lettuce: (0.05 × 1/24 × $12)	**0.03**	*****
Tomato: (0.25 × 1/20 × $4)	**0.05**	
Secret sauce: (1/128 × $6.40)	**0.05**	
	$2.83	

[b]Cost per 12 oz. drink
= 12/128 × $2.56 = $0.24

[c]Noon shift labor cost
= (4 hrs × 5 days × 2 workers × 4.3 weeks per month × $10)
= $1,720

Homecoming weekend noon shifts
= (4 hrs × 2 days × 2 workers × $10)
= $160

Evening shift labor cost
= (4 hrs × 3 nights × 2 workers × 4.3 weeks per month × $10)
= $1,032

Total October labor cost = $1,720 + $160 + $1,032 = $2,912

3. Yes, the increase in revenue was $9,000 ($39,000 – $30,000) but cost increased by only $4,965 ($27,092 – $22,127). Thus, profit increases by $4,035.

***Rounded**

P 11-51

1.

	Actual Costs	Budgeted Costs	Budget Variance
Direct labor	$210,000	$200,000	$ 10,000 U
Power	135,000	85,000	50,000 U
Setups	140,000	100,000	40,000 U
Total	$485,000	$385,000	$100,000 U

***Note*: Budgeted costs use the actual direct labor hours and the labor-based cost formulas. Example: Direct labor cost = $10 × 20,000 = $200,000; power cost = $5,000 + ($4 × 20,000) = $85,000; and setup cost = $100,000 (fixed).**

2.

	Actual Costs	Budgeted Costs	Budget Variance
Direct labor	$210,000	$200,000	$10,000 U
Power	135,000	149,000	14,000 F
Setups	140,000	142,000	2,000 F
Total	$485,000	$491,000	$ 6,000 F

***Note*: Budgeted costs use the individual driver formulas: Direct labor = $10 × 20,000 = $200,000; Power = $68,000 + ($0.90 × 90,000) = $149,000; and Setups = $98,000 + ($400 × 110) = $142,000.**

3. The multiple cost driver approach captures the cause-and-effect cost relationships and, consequently, is more accurate than the direct labor-based approach.

P 11-52

1.

Westcott Inc.
Performance Report
For the Year 2012

	Actual Costs	Budgeted Costs*	Budget Variance
Direct materials	$ 440,000	$ 480,000	$40,000 F
Direct labor	355,000	320,000	35,000 U
Depreciation	100,000	100,000	0
Maintenance	425,000	435,000	10,000 F
Machining	142,000	137,000	5,000 U
Materials handling	232,500	240,000	7,500 F
Inspecting products	160,000	145,000	15,000 U
Total	$1,854,500	$1,857,000	$ 2,500 F

***Budget formulas for each item can be computed by using the high-low method (using the appropriate cost driver for each method). Using this approach, the budgeted costs for the actual activity levels are computed as follows:**

P 11-52 (Continued)

- **Direct Materials: $6 × 80,000 DLH**
- **Direct Labor: $4 × 80,000 DLH**
- **Maintenance: $60,000 + ($1.50 × 250,000 mhrs)**
- **Machining: $12,000 + ($0.50 × 250,000 mhrs)**
- **Materials handling: $40,000 + ($6.25 × 32,000 moves)**
- **Inspecting products: $25,000 + ($1,000 × 120 batches)**

2. Pool rates:

$1,100,000/100,000 DLH	=	$11	per direct labor hour
$672,000/300,000 mhrs	=	$2.24	per machine hour
$290,000/40,000 moves	=	$7.25	per move
$225,000/200 batches	=	$1,125	per batch

***Note*: The first pool has material and labor costs, as well as depreciation, included.**

Unit cost:

Pool 1: $11 × 10,000 DLH	=	$110,000
Pool 2: $2.24 × 15,000 mhrs	=	33,600
Pool 3: $7.25 × 500 moves	=	3,625
Pool 4: $1,125 × 5 batches	=	5,625
Total		$152,850
Units		10,000
Unit cost		$15.29 *

***Rounded**

3. Knowing the resources consumed by activities and how the resource costs change with the activity driver should provide more insight into managing the activity and its associated costs. For example, if moves are reduced to 20,000 from the expected 40,000, then costs can be reduced by not only eliminating the need for 4 operators, but by reducing the need to lease from 4 to 2 forklifts. However, in the short run, the cost of leasing forklifts may persist even though demand for their service is reduced.

	20,000 moves	40,000 moves
Materials handling:		
Forklifts	$ 40,000	$ 40,000
Operators	120,000	240,000
Fuel	5,000	10,000
Total	$165,000	$290,000

The detail assumes that forklift leases must continue in the short run but that the number of operators may be reduced (assumes each operator can do 5,000 moves per year.

P 11-53

1. Direct labor = $10 × Direct labor hours

Variable rate

$$= \frac{\text{High cost} - \text{Low cost}}{\text{High activity} - \text{Low activity}}$$

$$= \frac{\$1{,}200{,}000 - \$1{,}000{,}000}{120{,}000 \text{ hours} - 100{,}000 \text{ hours}}$$

= $10 per direct labor hour

Fixed cost = $1,200,000 – ($10)(120,000)
= $0

Supervision = $180,000

Utilities = $3,000 + ($0.15 × Direct labor hours)

Variable rate

$$= \frac{\text{High cost} - \text{Low cost}}{\text{High activity} - \text{Low activity}}$$

$$= \frac{\$21{,}000 - \$18{,}000}{120{,}000 \text{ hours} - 100{,}000 \text{ hours}}$$

= $0.15 per direct labor hour

Fixed cost = $21,000 – ($0.15)(120,000)
= $3,000

Depreciation = $225,000

Supplies = $0.25 × Direct labor hours

Variable rate

$$= \frac{\text{High cost} - \text{Low cost}}{\text{High activity} - \text{Low activity}}$$

$$= \frac{\$30{,}000 - \$25{,}000}{120{,}000 \text{ hours} - 100{,}000 \text{ hours}}$$

= $0.25 per direct labor hour

Fixed cost = $30,000 – ($0.25)(120,000)
= $0

Maintenance = $20,000 + ($2.20 × Direct labor hours)

Variable rate

$$= \frac{\text{High cost} - \text{Low cost}}{\text{High activity} - \text{Low activity}}$$

$$= \frac{\$284{,}000 - \$240{,}000}{120{,}000 \text{ hours} - 100{,}000 \text{ hours}}$$

= $2.20 per direct labor hour

Fixed cost = $284,000 – ($2.20)(120,000)
= $20,000

Rent = $120,000

Other = $10,000 + ($0.50 × Direct labor hours)

P 11-53 (Continued)

Variable rate = $\frac{\text{High cost – Low cost}}{\text{High activity – Low activity}}$

= $\frac{\$70,000 – \$60,000}{120,000 \text{ hours} – 100,000 \text{ hours}}$

= $0.50 per direct labor hour

Fixed cost = $70,000 – ($0.50)(120,000)

= $10,000

2.

Thorpe Inc.
Conversion Cost Report
For Last Year

Conversion Cost	Actual	Budget	Variance	
Direct labor[a]	$ 963,200	$1,120,000	$156,800	F
Supervision	190,000	180,000	10,000	U
Utilities[b]	20,500	19,800	700	U
Depreciation	225,000	225,000	0	
Supplies[c]	24,640	28,000	3,360	F
Maintenance[d]	237,000	266,400	29,400	F
Rent	120,000	120,000	0	
Other[e]	60,500	66,000	5,500	F
Total conversion cost	$1,840,840	$2,025,200	$184,360	F

[a] ($10)(112,000 DLH) = $1,120,000

[b] $3,000 + ($0.15 × 112,000 DLH) = $19,800

[c] ($0.25)(112,000 DLH) = $28,000

[d] $20,000 + ($2.20 × 112,000 DLH) = $266,400

[e] $10,000 + ($0.50 × 112,000 DLH) = $66,000

The direct labor cost variance should be given special attention because it is such a large variance compared to the other variances. The figures should be checked for accuracy and to be sure that all direct labor costs are being accounted for.

P 11-54

1. Standard fixed overhead rate = $2,160,000/(120,000 units × 5 units)
= $3.60 per DLH

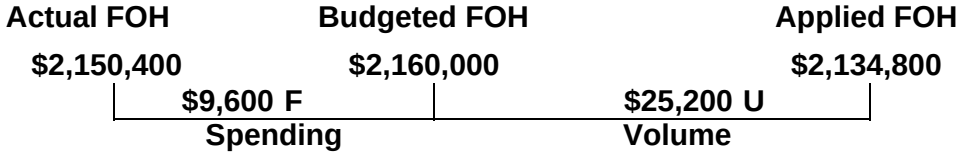
Standard variable overhead rate = $1,440,000/600,000 DLH
= $2.40 per DLH

2. Fixed: 118,600 × 5 × $3.60 = $2,134,800
Variable: 118,600 × 5 × $2.40 = $1,423,200

Total FOH variance = $2,150,400 – $2,134,800
= $15,600 U

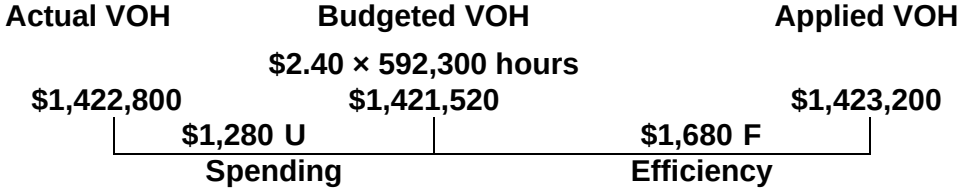
Total VOH variance = $1,422,800 – $1,423,200
= $400 F

3. Fixed overhead analysis:



The spending variance is the difference between planned and actual costs. Each item's variance should be analyzed to see if these costs can be reduced. The volume variance is the incorrect prediction of volume, or alternatively, it is a signal of the loss or gain that occurred because of producing at a level different from the expected level.

4. Variable overhead analysis:



The variable overhead spending variance is the difference between the actual variable overhead costs and the budgeted costs for the actual hours used. The variable overhead efficiency variance is the savings or extra cost attributable to the efficiency of labor usage.

P 11-54 (Continued)

5. Overhead variance isolation:

Journal				
Date		Account & Explanation	Debit	Credit
		VOH Control	400	
		VOH Spending Variance	1,280	
		VOH Efficiency Variance		1,680
		FOH Volume Variance	25,200	
		FOH Spending Variance		9,600
		FOH Control		15,600

Closing to Cost of Goods Sold:

Journal				
Date		Account & Explanation	Debit	Credit
		Cost of Goods Sold	26,480	
		FOH Spending Variance		1,280
		FOH Volume Variance		25,200
		FOH Spending Variance	9,600	
		VOH Efficiency Variance	1,680	
		Cost of Goods Sold		11,280

P 11-55

1. Variable overhead variances:

Actual VOH	Budgeted VOH	Applied VOH
	$10 × 82,000 hrs	$10 × 80,000 hrs
$860,000	$820,000	$800,000
	$40,000 U (Spending)	$20,000 U (Efficiency)

Formula approach:

VOH spending variance = Actual VOH – (SVOR × AH)
= $860,000 – ($10 × 82,000)
= $40,000 U

VOH efficiency variance = (AH – SH)SVOR
= (82,000 – 80,000)$10
= $20,000 U

P 11-55 (Continued)

2. Fixed overhead variances:

Actual FOH	Budgeted FOH	Applied FOH
	$6 × 1.60 hrs × 60,000 units	$6 × 1.60 hrs × 50,000 units
$556,000	$576,000	$480,000
	$20,000 F (Spending)	$96,000 U (Volume)

The volume is a measure of unused capacity. This cost is reduced as production increases. Thus, selling more goods is the key to reducing this capacity (at least in the short run).

P 11-56

1. Standard fixed overhead rate = $1,286,400/(120,000 hrs × 4 units)
= $2.68 per direct labor hour

Standard variable overhead rate = $888,000/480,000 hours
= $1.85 per direct labor hour

2. Fixed: 119,000 × 4 × $2.68 = $1,275,680
Variable: 119,000 × 4 × $1.85 = $880,600

Total FOH variance = $1,300,000 – $1,275,680
= $24,320 Underapplied

Total VOH variance = $927,010 – $880,600
= $46,410 Underapplied

3. Fixed overhead analysis:

Actual FOH	Budgeted FOH	Applied FOH
$1,300,000	$1,286,400	$1,275,680
	$13,600 U (Spending)	$10,720 U (Volume)

The spending variance is the difference between planned and actual costs. Each item's variance should be analyzed to see if these costs can be reduced. The volume variance is the incorrect prediction of volume, or alternatively, it is a signal of the loss or gain that occurred because of producing at a level different from the expected level. If practical volume is used to compute the fixed overhead rate, it is a measure of unused productive capacity.

P 11-56 (Continued)

4. Variable overhead analysis:

Actual VOH	Budgeted VOH	Applied VOH
	$1.85 × 487,900 hours	$1.85 × 476,000 hours
$927,010	$902,615	$880,600
	$24,395 U	$22,015 U
	Spending	Efficiency

The variable overhead spending variance is the difference between the actual variable overhead costs and the budgeted costs for the actual hours used. It is similar in some ways to the direct materials and direct labor price variances, but variances can also be caused by inefficiency. The variable overhead efficiency variance is the savings or extra cost attributable to the efficiency of direct labor usage.

P 11-57

1. The budgeted overhead costs are broken down into fixed and variable costs by the high-low method:

$$\text{Standard VOH rate} = \frac{\text{Change in cost}}{\text{Change in activity}}$$
$$= \$144{,}000/12{,}000 \text{ hours}$$
$$= \$12 \text{ per hour}$$

$$\text{FOH rate} = \text{Total rate} - \text{VOH rate}$$
$$= \$18 - \$12$$
$$= \$6$$

2. $$\text{Budgeted fixed overhead} = Y_2 - VX_2$$
$$= \$540{,}000 - \$12(30{,}000)$$
$$= \$180{,}000$$

$$\text{FOH spending variance} = \text{Actual FOH} - \text{Budgeted FOH}$$
$$= \$200{,}000 - \$180{,}000 = \$20{,}000 \text{ U}$$

3. To find the VOH spending variance, we need to find the actual hours. To find AH, we first need to find the standard hours, SH:

$$\text{Fixed OH volume variance} = \text{Budgeted fixed overhead} - (\text{Fixed overhead rate} \times \text{SH})$$
$$\$20{,}000 = \$180{,}000 - (\$6.00 \times \text{SH})$$
$$\$160{,}000 = \$6.00 \times \text{SH}$$
$$\text{SH} = 26{,}667^* \text{ hours}$$

***Rounded**

P 11-57 (Continued)

Next, the actual hours need to be found:

VOH efficiency variance	**= (AH – SH)SVOR**
-$18,000	**= (AH – 26,667)$12**
-$1,500	**= AH – 26,667**
AH	**= 25,167**

VOH spending variance = Actual VOH – (VOH rate × AH)
= $310,000 – ($12 × 25,167)
= $310,000 – $302,004
= $7,996 U

4. 26,667 hours/100,000 units = 0.26667 hour per unit

P 11-58

1.

Shumaker Company
Performance Report

	Actual Costs	Costs*	Budgeted Variance	
Direct materials	**$ 775,000**	**$ 750,000**	**$25,000**	**U**
Direct labor	**590,000**	**600,000**	**10,000**	**F**
Variable overhead	**310,000**	**300,000**	**10,000**	**U**
Fixed overhead	**180,000**	**165,000**	**15,000**	**U**
Total	**$1,855,000**	**$1,815,000**	**$40,000**	**U**

***Uses the variable unit standard costs for materials, labor, and variable overhead (e.g., DM = $15 × 50,000); fixed overhead = $3.00 × 55,000 (the FOH rate is based on expected production).**

2. a. FOH variances:

Spending variance = Actual FOH – Budgeted FOH
= $180,000 – $165,000
= $15,000 U

Volume variance = Budgeted FOH – (FOH rate × SH)
= $165,000 – ($2.50 × 60,000)
= $15,000 U

Note: **FOH rate is calculated as follows:**

Hours allowed = 60,000 hours/50,000 units
= 1.20 hours per unit

P 11-58 (Continued)

Standard FOH rate = $3.00 per unit /1.20 hours per unit
= $2.50 per hour

b. VOH variances:

Variable OH rate = $300,000/60,000 hours
= $5.00 per hour

Spending variance = Actual VOH – (SVOR × AH)
= $310,000 – ($5.00 × 63,000)
= $5,000 F

Efficiency variance = (AH – SH)SVOR
= (63,000 – 60,000)$5.00
= $15,000 U

CASES

Case 11-59

1. Fixed overhead rate = $2,400,000/600,000 hours*
= $4 per hour

***Standard hours allowed = 2 × 300,000 units.**

2. Athens plant:

Actual FOH	Budgeted FOH	Applied FOH
$2,500,000	$2,400,000	$4 × 600,000 hours

$100,000 U (Spending) | 0 (Volume)

Little Rock plant:

Actual FOH	Budgeted FOH	Applied FOH
$2,500,000	$2,400,000	$4 × 480,000 hours

$100,000 U (Spending) | $480,000 U (Volume)

The spending variance is almost certainly caused by supervisor salaries (for example, an unexpected midyear increase due to union pressures). It is unlikely that the lease payments or depreciation would be greater than budgeted. Changing the terms on a 10-year lease in the first year would be unusual (unless there is some sort of special clause permitting increased payments for something like unexpected inflation). Also, the depreciation should be on target (unless more equipment was purchased or the depreciation budget was set before the price of the equipment was known with certainty).

The volume variance is easy to explain. The Little Rock plant produced less than expected, and so there was an unused capacity cost: $4 × 120,000 hours = $480,000. The Athens plant had no unused capacity.

Case 11-59 (Continued)

3. **It appears that the 120,000-hour unused capacity (60,000 subassemblies) is permanent for the Little Rock plant. This plant has 10 supervisors, each making $50,000. Supervision is a step-cost driven by the number of production lines. Unused capacity of 120,000 hours means that 2 lines can be shut down, saving the salaries of two supervisors ($100,000 at the original salary level). The equipment for the 2 lines is owned. If it could sold, then the money could be reinvested and the depreciation charge would be reduced by 20% (2 lines shut down out of 10). There is no way to directly reduce the lease payments for the building. Perhaps the company could use the space to establish production lines for a different product. Or perhaps the space could be subleased. Another possibility is to keep the supervisors and equipment and try to fill the unused capacity with special orders-orders for the subassembly below the regular selling price from a market not normally served. If the selling price is sufficient to cover the variable costs and cover at least the salaries and depreciation for the two lines, then the special order option may be a possibility. This option, however, is fraught with risks, e.g., the risk of finding enough orders to justify keeping the supervisors and equipment, the risk of alienating regular customers who pay full price, and the risk of violating price discrimination laws. [*Note:* You may wish to point out the value of the resource usage model in answering this question (see Chapter 3)].**

4. **For each plant, the standard fixed overhead rate is $4 per direct labor hour. Since each subassembly should use two hours, the fixed overhead cost per unit is $8, regardless of where they are produced. Should they differ? Some may argue that the rate for the Little Rock plant needs to be recalculated. For example, one possibility is to use expected actual capacity, instead of practical capacity. In this case, the Little Rock plant would have a fixed overhead rate of $2,400,000/480,000 hours = $5 per hour and a cost per subassembly of $10. The question is: Should the subassemblies be charged for the cost of the unused capacity? ABC suggests a negative response. Products should be charged for the resources they use, and the cost of unused capacity should be reported as a separate item to draw management's attention to the need to manage this unused capacity.**

Case 11-60

1. **If reducing negative environmental impacts is a legitimate firm-wide objective or if legally mandated, then there is an ethical obligation to help achieve the desired reduction. Furthermore, if it is possible to reduce environmental impacts while simultaneously reducing costs, then this would seem to be an outcome that ought to be pursued for the well-being of the firm; thus, it can be argued that in this case there is also an ethical obligation to act. In terms of ethical standards, that of competence is the most obvious category for sustaining the argument that an ethical obligation exists to help in reducing environmental impacts. Ethical professional practice requires continuous development of knowledge and skills and performance of duties in accordance with relevant laws, regulations, and technical standards. Flexible budgeting uses cost formulas and thus requires the financial expert to identify costs that vary with specific drivers. Some of these drivers can be environmental variables such as kilowatt hours, gallons of fuel, pounds of toxic chemicals, etc. Thus, reducing the output should reduce the projected cost either by reducing the output itself or by reducing the unit variable cost.**

2. **Any financial officer should be concerned with cost reduction. If reducing environmental waste or pollutants also produces a reduction in cost, then it seems like there is an ethical obligation to undertake and support these objectives. To refuse to engage in acts that will simultaneously reduce costs and negative environmental impacts seems unethical. There is an issue of credibility (Standard IV)—the need to communicate information in the right way and to disclose all relevant information. There is also a need for competence (Standard I)—an obligation to have the knowledge and skills needed to support such actions.**

3. **A variety of answers will emerge. There are always ethical dilemmas that can surface when performance evaluations occur. For example, is it ethical for a financial executive to deliberately and systematically overstate the unit variable cost in a flexible budget? (The objective may be to force subordinate managers to find ways to reduce costs.) Alternatively, a subordinate manager may report more maintenance hours than actually used, and simultaneously reduce preventive maintenance. The flexible budget will then project a higher expected cost than the actual costs incurred. The objective may be to achieve a bonus or salary increase.**