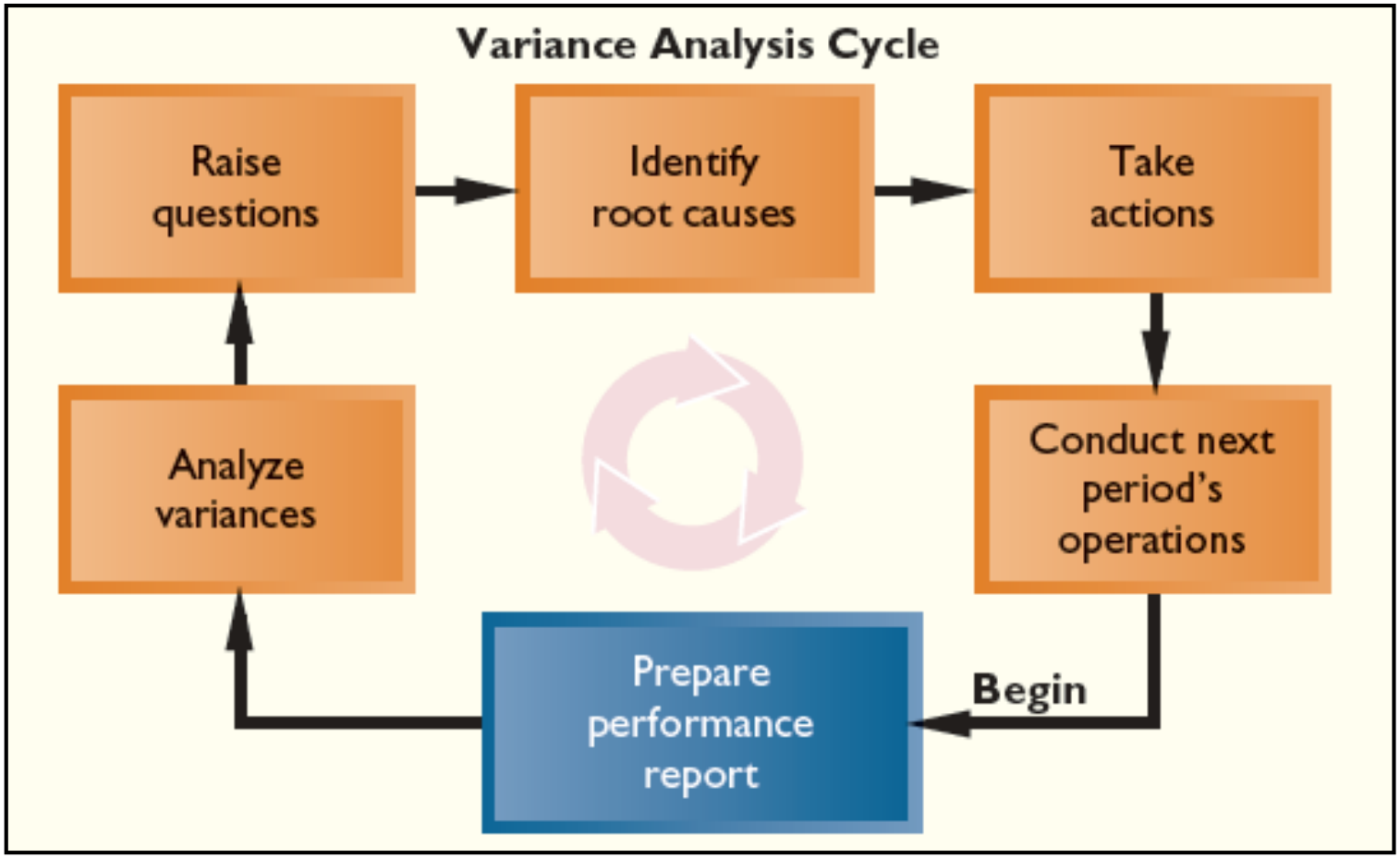
Variance Analysis Cycle



Learning Objective

Prepare a flexible budget.

Deficiencies of the Static Planning Budget

Larry's Lawn Service provides lawn care in a planned community where all lawns are approximately the same size. At the end of May, Larry prepared his June budget based on mowing 500 lawns. Since all of the lawns are similar in size, Larry felt that the number of lawns mowed in a month would be the best way to measure overall activity for his business.

Larry's Budget

Deficiencies of the Static Planning Budget

Larry's Planning Budget

Larry's Lawn Service
For the Month Ended June 30

	Revenue/Cost Formulas	Planning Budget
Number of lawns (Q)		500
Revenue	($75Q)	$ 37,500
Expenses:		
Wages and salaries	($5,000 + $30Q)	$ 20,000
Gasoline and supplies	($9Q)	4,500
Equipment maintenance	($3Q)	1,500
Office and shop utilities	($1,000)	1,000
Office and shop rent	($2,000)	2,000
Equipment Depreciation	($2,500)	2,500
Insurance	($1,000)	1,000
Total expenses		32,500
Net operating income		$ 5,000

Mixed Costs

Variable Costs

Fixed Costs

Deficiencies of the Static Planning Budget

Larry's Actual Results

Larry's Lawn Service
For the Month Ended June 30

	Actual Results
Number of lawns	550
Revenue	$ 43,000
Expenses:	
Wages and salaries	$ 23,500
Gasoline and supplies	5,100
Equipment maintenance	1,300
Office and shop utilities	950
Office and shop rent	2,000
Equipment Depreciation	2,500
Insurance	1,200
Total expenses	36,550
Net operating income	$ 6,450

Deficiencies of the Static Planning Budget

Larry's Actual Results Compared with the Planning Budget

Larry's Lawn Service
For the Month Ended June 30

	Revenue/Cost Formulas	Actual Results	Planning Budget	Variances	
Number of lawns (Q)		550	500		
Revenue	($75Q)	$ 43,000	$ 37,500	$ 5,500	F
Expenses:					
Wages and salaries	($5,000 + $30Q)	$ 23,500	$ 20,000	$ 3,500	U
Gasoline and supplies	($9Q)	5,100	4,500	600	U
Equipment maintenance	($3Q)	1,300	1,500	200	F
Office and shop utilities	($1,000)	950	1,000	50	F
Office and shop rent	($2,000)	2,000	2,000	-	
Equipment Depreciation	($2,500)	2,500	2,500	-	
Insurance	($1,000)	1,200	1,000	200	U
Total expenses		36,550	32,500	4,050	U
Net operating income		$ 6,450	$ 5,000	$ 1,450	F

Deficiencies of the Static Planning Budget

Larry's Actual Results Compared with the Planning Budget

F = Favorable variance that occurs when actual revenue is greater than budgeted revenue.

U = Unfavorable variance that occurs when actual costs are greater than budgeted costs.

F = Favorable variance that occurs when actual costs are less than budgeted costs.

	Revenue/Cost Formulas	Actual Results	Planning Budget	Variances	
Number of lawns (Q)		550	500		
Revenue	($75Q)	$ 43,000	$ 37,500	$ 5,500	F
Expenses:					
				$ 3,500	U
				600	U
				200	F
Office and shop utilities	($1,000)	950	1,000	50	F
				-	
				-	
				200	U
Total expenses		36,550	32,500	4,050	U
Net operating income		$ 6,450	$ 5,000	$ 1,450	F

Deficiencies of the Static Planning Budget

Larry's Actual Results Compared with the Planning Budget

Larry's Lawn Service
For the Month Ended June 30

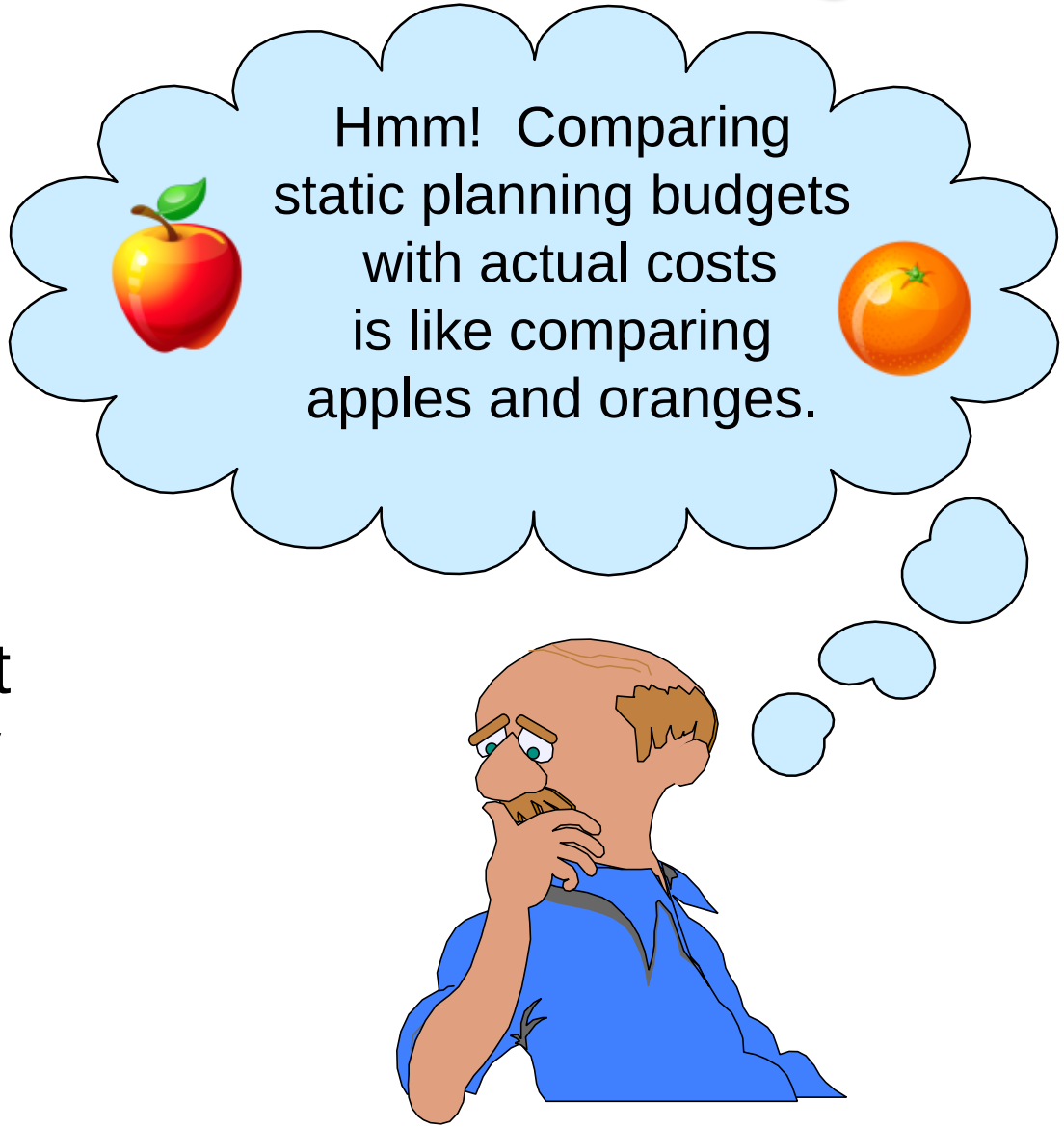
	Revenue/Cost Formulas	Actual Results	Planning Budget	Variances	
Number of lawns (Q)		550	500		
Revenue	($75Q)	$ 43,000	$ 37,500	$ 5,500	F
Expenses:					
				$ 3,500	U
				600	U
				200	F
Office and shop utilities	($1,000)	950	1,000	50	F
				-	
				-	
				200	U
Total expenses		36,550	32,500	4,050	U
Net operating income		$ 6,450	$ 5,000	$ 1,450	F

Since these variances are unfavorable, has Larry done a poor job controlling costs?

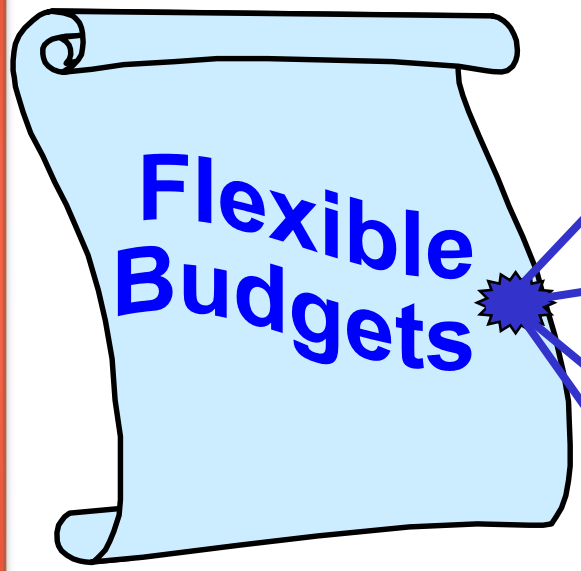
Since these variances are favorable, has Larry done a good job controlling costs?

Characteristics of Flexible Budgets

Planning budgets are prepared for a single, planned level of activity. Performance evaluation is difficult when actual activity differs from the planned level of activity.



Characteristics of Flexible Budgets



May be prepared for any activity level in the relevant range.

Show costs that should have been incurred at the actual level of activity, enabling “apples to apples” cost comparisons.

Help managers control costs.

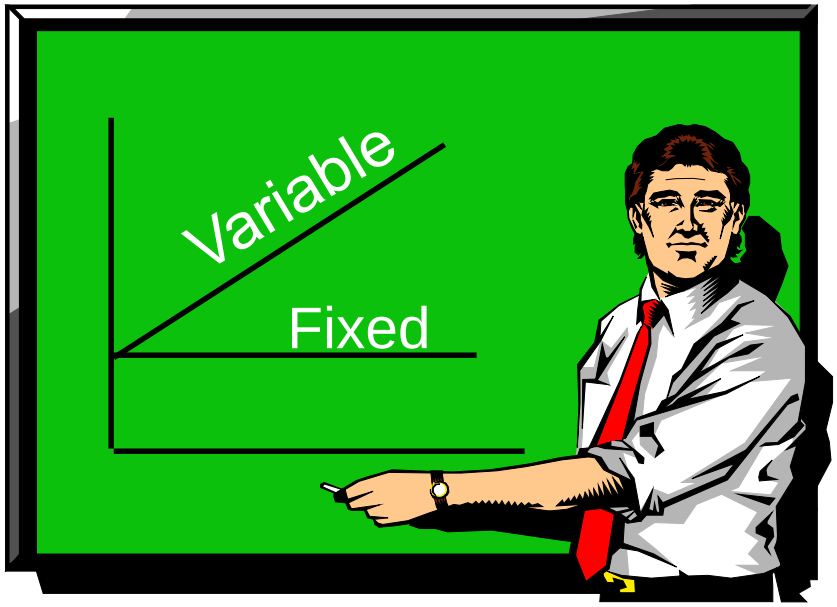
Improve performance evaluation.

Let’s look at Larry’s Lawn Service.

How a Flexible Budget Works

To **flex** a budget, we need to know that:

- Total variable costs change in direct proportion to changes in activity.
- Total fixed costs remain unchanged within the relevant range.



Preparing a Flexible Budget

Larry's Flexible Budget

Larry's Lawn Service
For the Month Ended June 30

	Revenue/Cost Formulas	Flexible Budget
Number of lawns (Q)		550
Revenue	($75Q)	$ 41,250
Expenses:		
Wages and salaries	($5,000 + $30Q)	$ 21,500
Gasoline and supplies	($9Q)	4,950
Equipment maintenance	($3Q)	1,650
Office and shop utilities	($1,000)	1,000
Office and shop rent	($2,000)	2,000
Equipment Depreciation	($2,500)	2,500
Insurance	($1,000)	1,000
Total expenses		34,600
Net operating income		$ 6,650

Quick Check ✓

What should the total wages and salaries cost be in a flexible budget for 600 lawns?

a. $18,000.

b. $20,000.

c. $23,000.

d. $25,000.

Revenue and Spending Variances

Larry's Flexible Budget Compared with the Actual Results

Revenue Variance $1,750 favorable

Larry's Lawn Service
For the Month Ended June 30

	Revenue/Cost Formulas	Actual Results	Flexible Budget	Revenue and Spending Variances	
Number of lawns (Q)		550	550		
Revenue	($75Q)	$ 43,000	$ 41,250	$ 1,750	F
Expenses:					
Wages and salaries	($5,000 + $30Q)	$ 23,500	$ 21,500	$ 2,000	U
Gasoline and supplies	($9Q)	5,100	4,950	150	U
Equipment maintenance	($3Q)	1,300	1,650	350	F
Office and shop utilities	($1,000)	950	1,000	50	F
Office and shop rent	($2,000)	2,000	2,000	-	
Equipment Depreciation	($2,500)	2,500	2,500	-	
Insurance	($1,000)	1,200	1,000	200	U
Total expenses		36,550	34,600	1,950	U
Net operating income		$ 6,450	$ 6,650	$ 200	U

Revenue and Spending Variances

Larry's Flexible Budget Compared with the Actual Results

Spending Variances
$1,950 unfavorable total

Larry's Lawn Service
For the Month Ended June

	Revenue/Cost Formulas	Actual Results	Flexible Budget	Revenue and Spending Variances	
Number of lawns (Q)		550	550		
Revenue	($75Q)	$ 43,000	$ 41,250	$ 1,750	F
Expenses:					
Wages and salaries	($5,000 + $30Q)	$ 23,500	$ 21,500	$ 2,000	U
Gasoline and supplies	($9Q)	5,100	4,950	150	U
Equipment maintenance	($3Q)	1,300	1,650	350	F
Office and shop utilities	($1,000)	950	1,000	50	F
Office and shop rent	($2,000)	2,000	2,000	-	
Equipment Depreciation	($2,500)	2,500	2,500	-	
Insurance	($1,000)	1,200	1,000	200	U
Total expenses		36,550	34,600	1,950	U
Net operating income		$ 6,450	$ 6,650	$ 200	U

Standard Costs

Standards are benchmarks or "norms" for measuring performance. In managerial accounting, two types of standards are commonly used.

Quantity standards specify how much of an input should be used to make a product or provide a service.

Price standards specify how much should be paid for each unit of the input.

Examples: Firestone, Sears, McDonald's, hospitals, construction, and manufacturing companies.

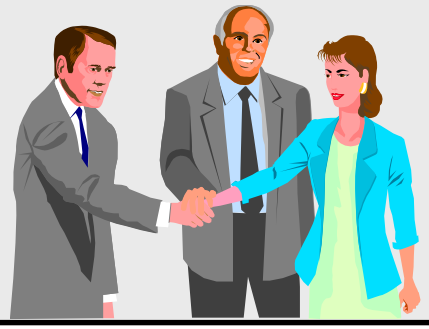
Setting Direct Materials Standards

Standard Quantity per Unit

Summarized in a Bill of Materials

Standard Price per Unit

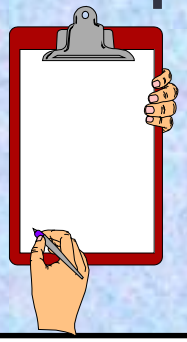
Final, delivered cost of materials, net of discounts



Setting Direct Labor Standards

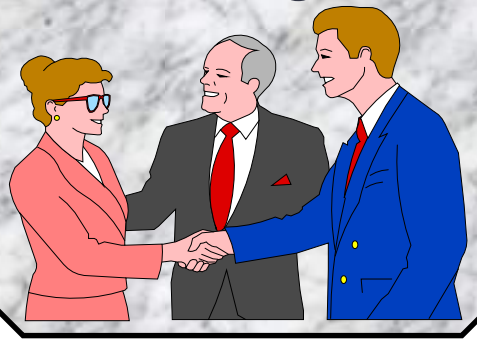
Standard Hours per Unit

Use time and motion studies for each labor operation



Standard Rate per Hour

Often a single rate is used that reflects the mix of wages earned



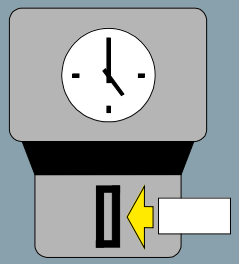
Setting Variable Manufacturing Overhead Standards

Quantity Standard

The quantity is the activity in the allocation base for predetermined overhead Direct labor hours or cost, machine hours…

Price Standard

The rate is the variable portion of the predetermined overhead rate.



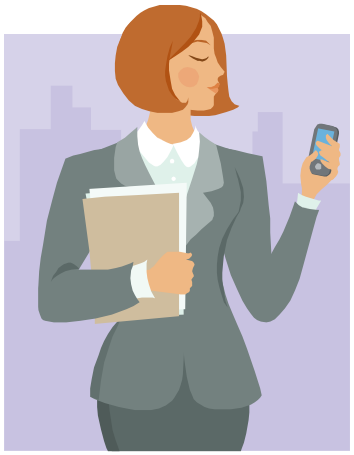
The Standard Cost Card

A standard cost card for one unit of product might look like this:

Inputs	A Standard Quantity or Hours	B Standard Price or Rate	A x B Standard Cost per Unit
Direct materials	3.0 lbs.	$ 4.00 per lb.	$ 12.00
Direct labor	2.5 hours	14.00 per hour	35.00
Variable mfg. overhead	2.5 hours	3.00 per hour	7.50
Total standard unit cost			$ 54.50

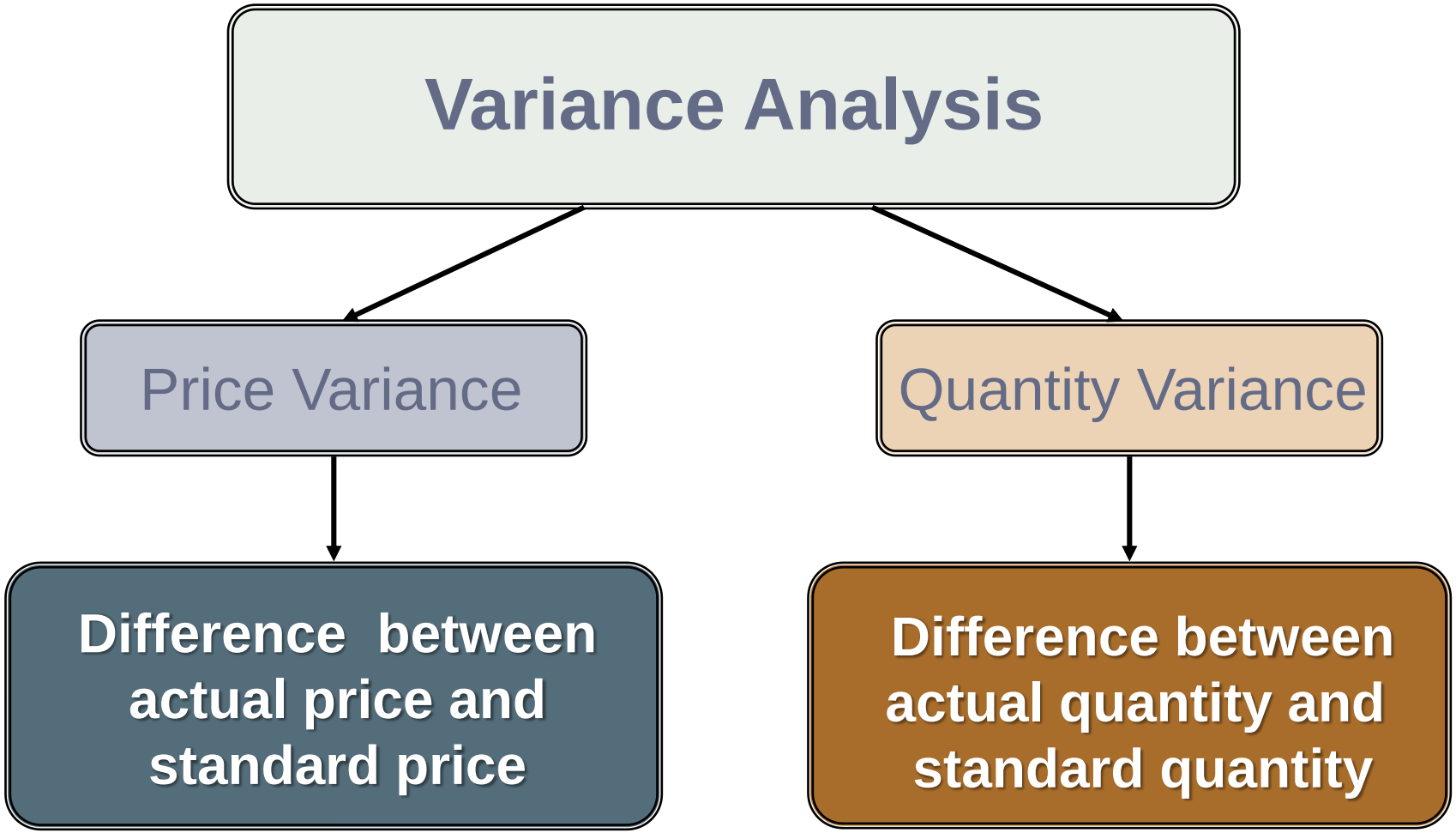
Using Standards in Flexible Budgets

Standard costs per unit for direct materials, direct labor, and variable manufacturing overhead can be used to compute **activity** and **spending** variances.



Spending variances become more useful by breaking them down into price and quantity variances.

A General Model for Variance Analysis



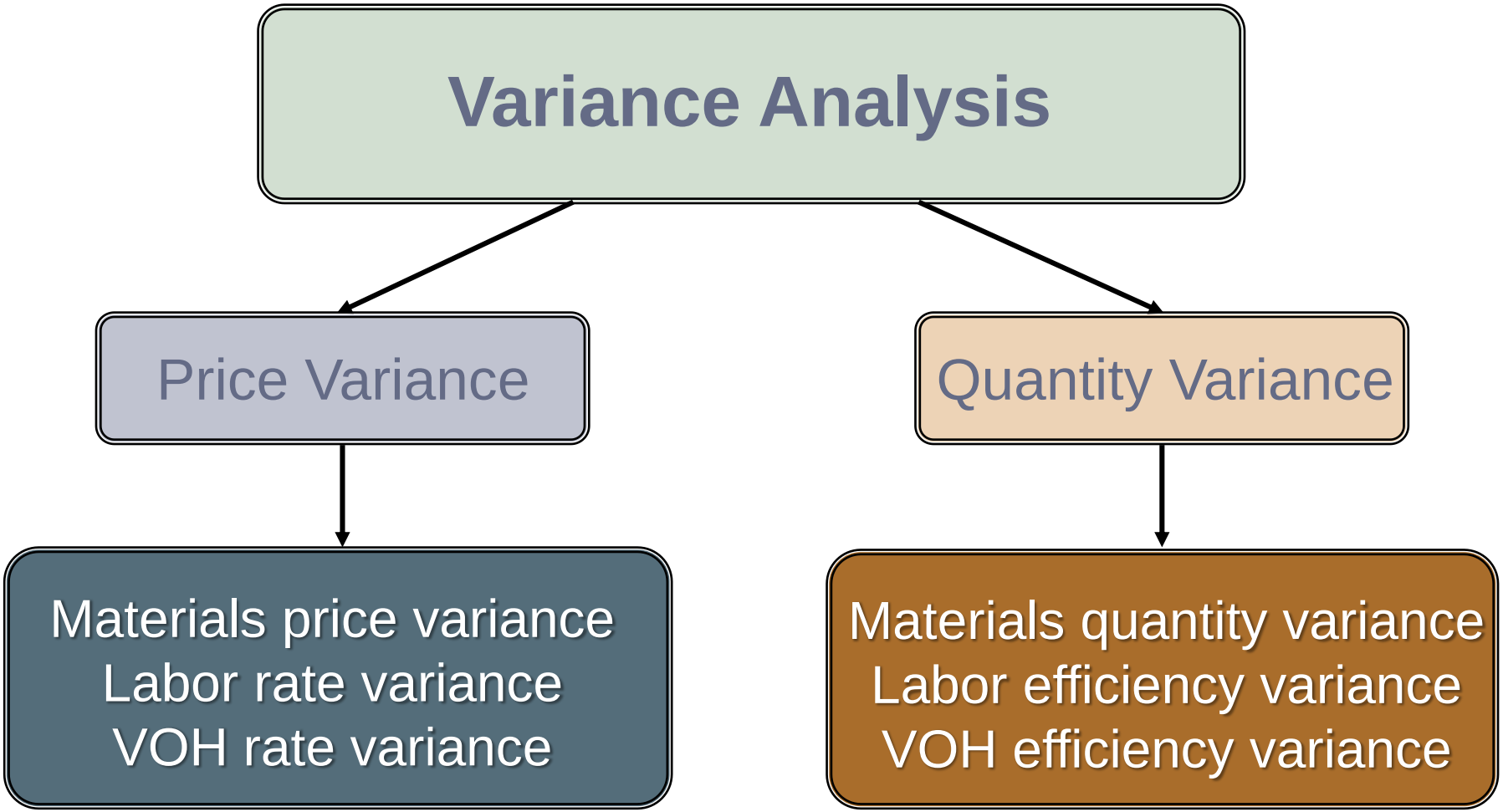
Price and Quantity Standards

Price and quantity standards are determined separately for two reasons:

1. Different managers are usually responsible for buying and using inputs. For example, the purchasing manager is responsible for raw material purchase prices and the production manager is responsible for the quantity of raw material used.

2. The buying and using activities occur at different times. Raw material purchases may be held in inventory for a period of time before being used in production.

A General Model for Variance Analysis



A General Model for Variance Analysis

(1)
Actual Quantity of Input, at Actual Price
(total AQ × AP/unit)
Total actual cost

(2)
Actual Quantity of Input, at Standard Price
(total AQ × SP/unit)

(3)
Standard Quantity Allowed for Actual, at Standard Price
Total standard cost
(total SQ × SP/unit)

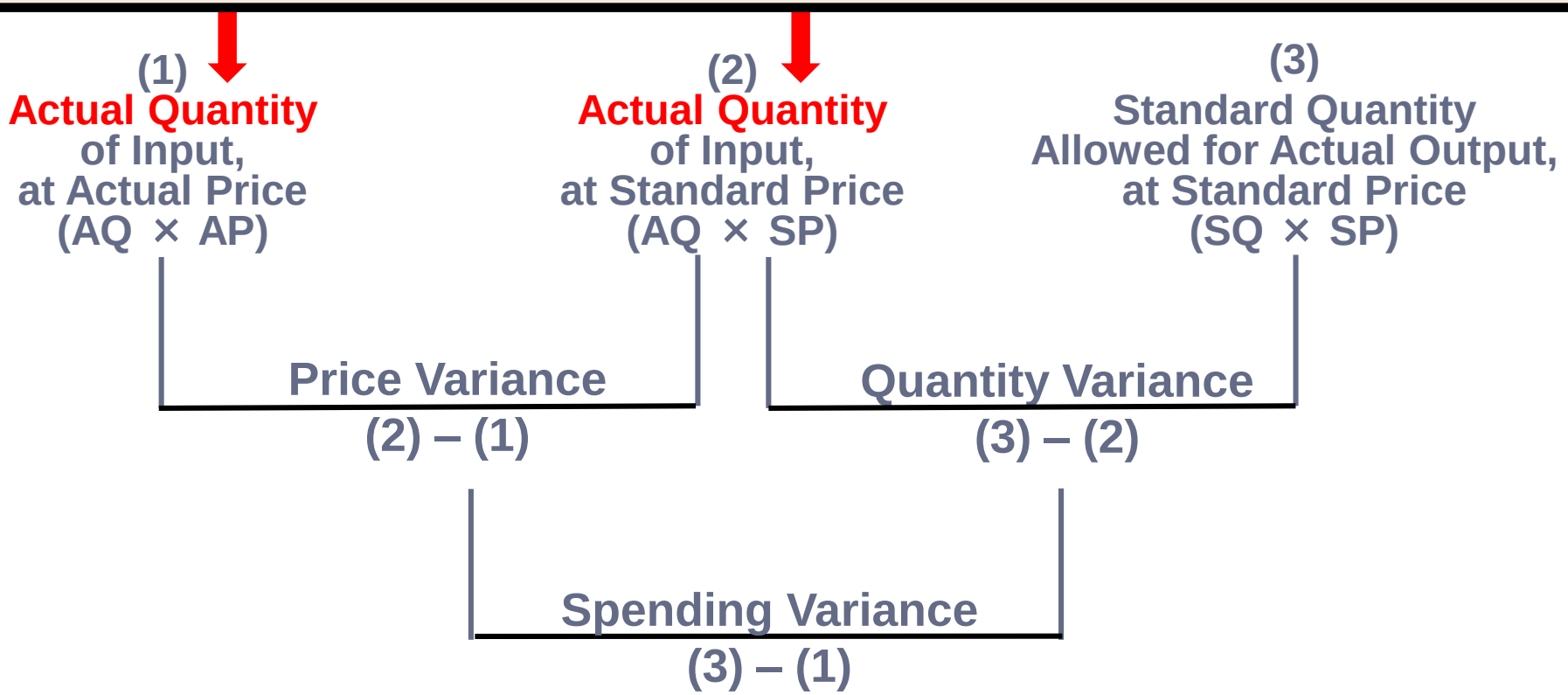
Price Variance
AQX(SP – AP)
(2) – (1)

Quantity Variance
(3) – (2)

Spending Variance
(3) – (1)

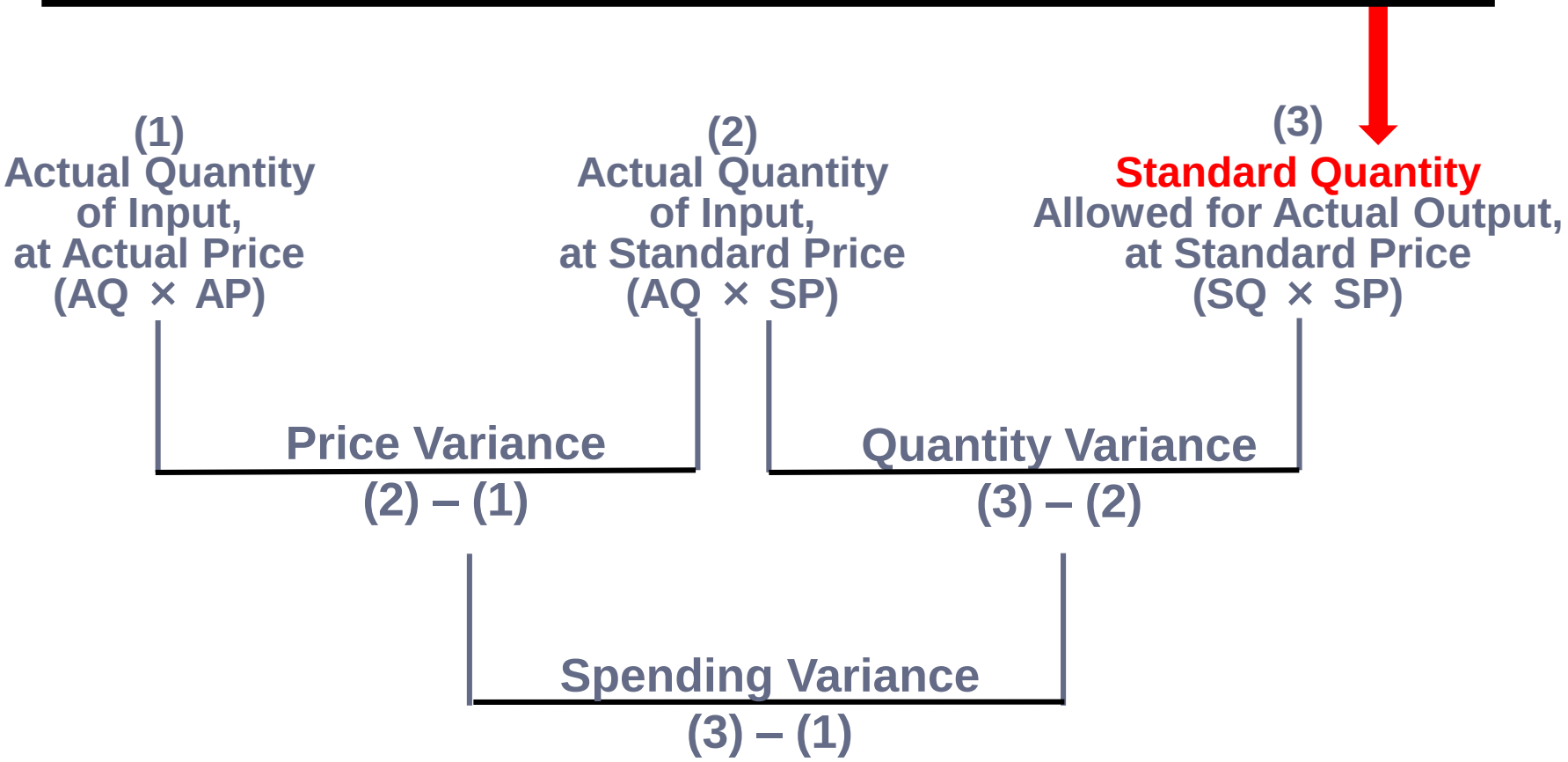
A General Model for Variance Analysis

Actual quantity is the amount of direct materials, direct labor, and variable manufacturing overhead actually used. (The quantities pertain to input items.)



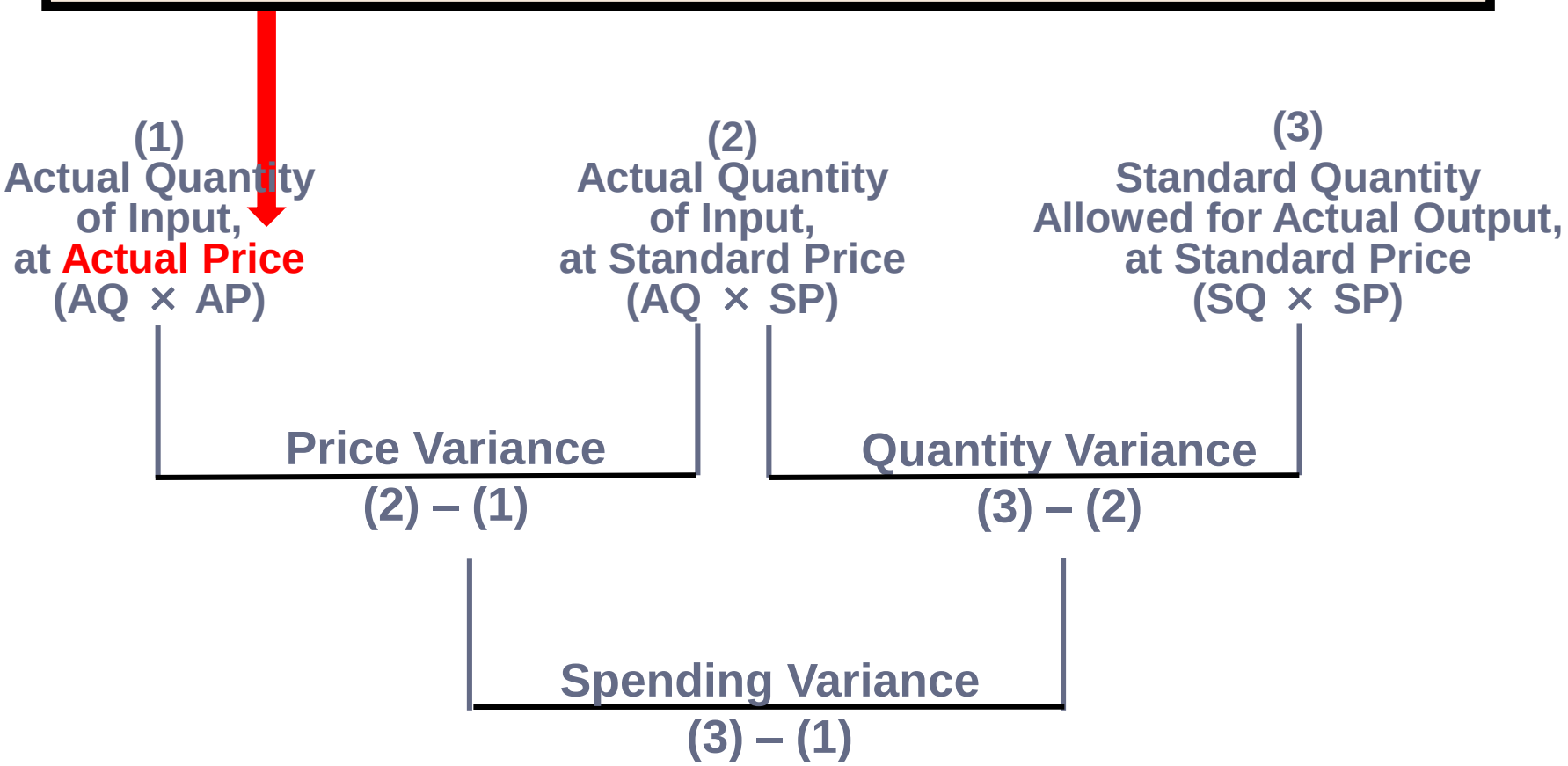
A General Model for Variance Analysis

Standard quantity is the standard quantity allowed for the actual output of the period.



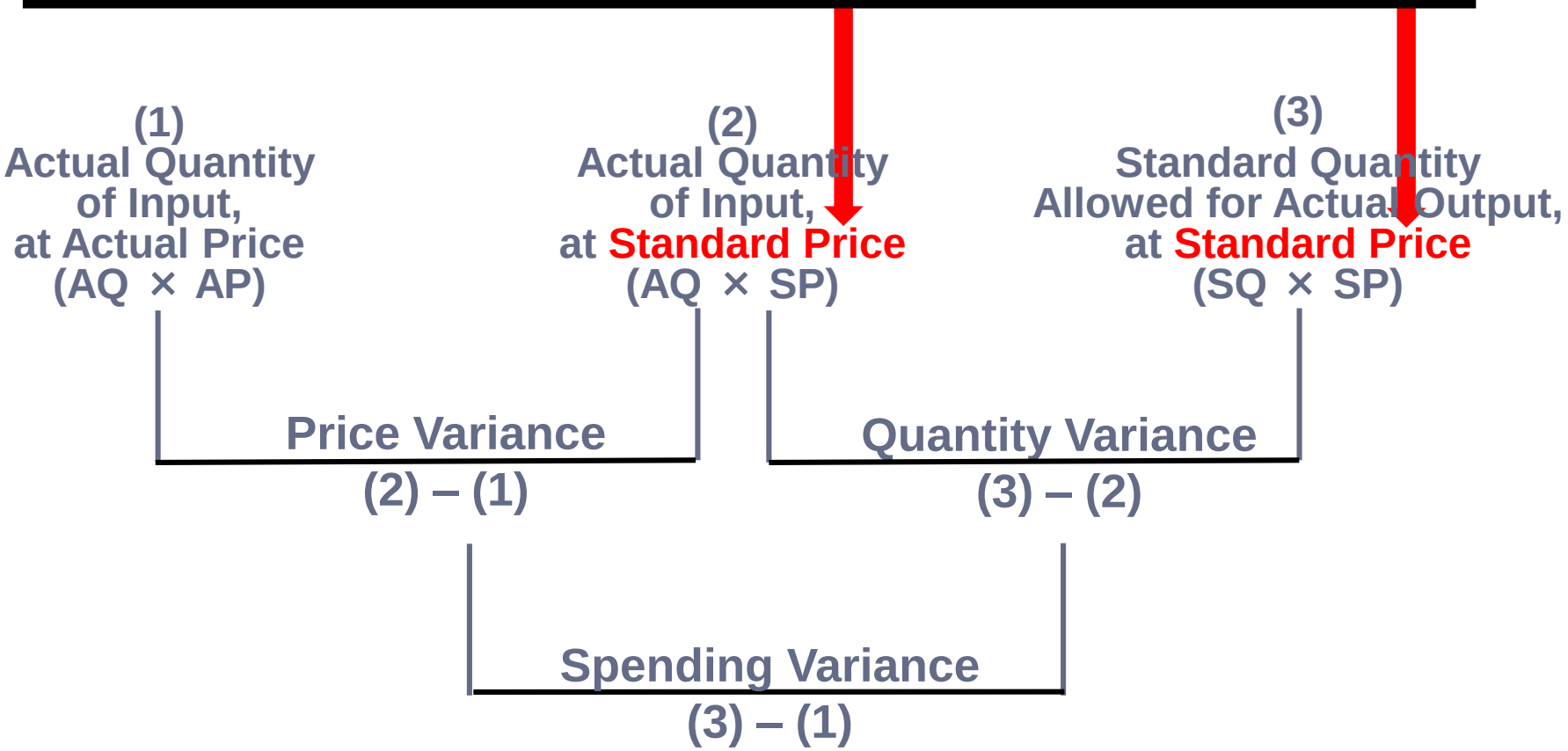
A General Model for Variance Analysis

Actual price is the amount actually paid for the input used.



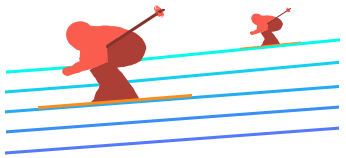
A General Model for Variance Analysis

Standard price is the amount that should have been paid for the input used.



Materials Variances – An Example

- Glacier Peak Outfitters has the following direct materials standard for the fiberfill in its mountain parka.
- 0.1 kg. of fiberfill per parka at $5.00 per kg.
- Last month 210 kgs. of fiberfill were purchased and used to make 2,000 parkas.
- The materials cost a total of $1,029.



Materials Variances Summary

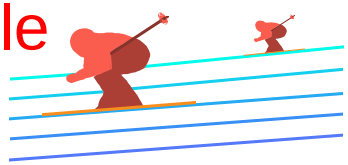
0.1 kg per parka × 2,000 parkas = 200 kgs

Actual Quantity × Actual Price	Actual Quantity × Standard Price	Standard Quantity × Standard Price
210 kgs. × $4.90 per kg.	210 kgs. × $5.00 per kg.	200 kgs. × $5.00 per kg.
= $1,029	= $1,050	= $1,000

$1,029 ÷ 210 kgs = $4.90 per kg

Price variance
$21 favorable

Quantity variance
$50 unfavorable



Materials Variances: Using the Factored Equations

Materials price variance

MPV = (AQ × AP) – (AQ × SP)

= AQ(AP – SP)

= 210 kgs ($4.90/kg – $5.00/kg)

= 210 kgs (– $0.10/kg) = $21 F

Materials quantity variance

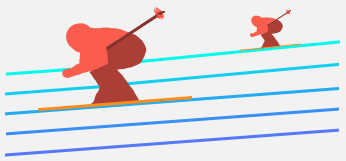
MQV = (AQ × SP) – (SQ × SP)

= SP(AQ – SQ)

= $5.00/kg (210 kgs – (0.1 kg/parka × 2,000 parkas))

= $5.00/kg (210 kgs – 200 kgs)

= $5.00/kg (10 kgs) = $50 U



Responsibility for Materials Variances

Materials Quantity Variance

Production Manager

Materials Price Variance

Purchasing Manager

The standard price is used to compute the quantity variance so that the production manager is not held responsible for the purchasing manager's performance.

Responsibility for Materials Variances

I am not responsible for this unfavorable materials quantity variance.

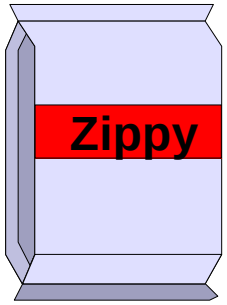
You purchased cheap material, so my people had to use more of it.

Production Manager

Your poor scheduling sometimes requires me to rush order materials at a higher price, causing unfavorable price variances.

Purchasing Manager

Quick Check ✓

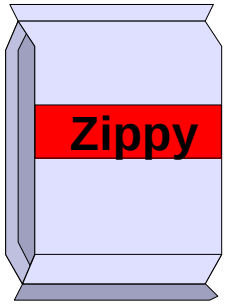


Hanson Inc. has the following direct materials standard to manufacture one Zippy:

1.5 pounds per Zippy at $4.00 per pound

Last week, 1,700 pounds of materials were purchased and used to make 1,000 Zippies. The materials cost a total of $6,630.

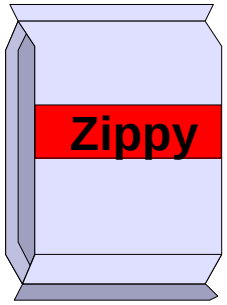
Quick Check ✓



How many pounds of materials should Hanson have used to make 1,000 Zippies?

a. 1,700 pounds.
b. 1,500 pounds.
c. 1,200 pounds.
d. 1,000 pounds.

Quick Check ✓



Hanson's materials quantity variance (MQV) for the week was:

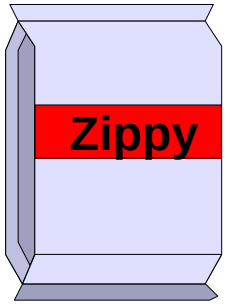
a. $170 unfavorable.

b. $170 favorable.

c. $800 unfavorable.

d. $800 favorable.

Quick Check ✓



Hanson's materials price variance (MPV) for the week was:

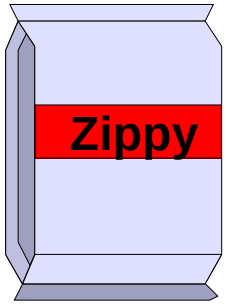
a. $170 unfavorable.

b. $170 favorable.

c. $800 unfavorable.

d. $800 favorable.

Quick Check ✓



Recall that the standard quantity for 1,000 Zippies is 1,000 × 1.5 pounds per Zippy = 1,500 pounds.

Actual Quantity × Actual Price	Actual Quantity × Standard Price	Standard Quantity × Standard Price
1,700 lbs. × $3.90 per lb.	1,700 lbs. × $4.00 per lb.	1,500 lbs. × $4.00 per lb.
= $6,630	= $ 6,800	= $6,000
Price variance $170 favorable		Quantity variance $800 unfavorable

Learning Objective

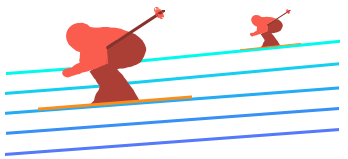
Compute the direct labor rate and efficiency variances and explain their significance.

Labor Variances – An Example

Glacier Peak Outfitters has the following direct labor standard for its mountain parka.

1.2 standard hours per parka at $10.00 per hour

Last month, employees actually worked 2,500 hours at a total labor cost of $26,250 to make 2,000 parkas.

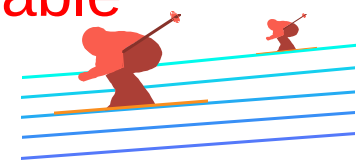


Labor Variances Summary

Actual Hours × Actual Rate	Actual Hours × Standard Rate	Standard Hours × Standard Rate
2,500 hours × $10.50 per hour	2,500 hours × $10.00 per hour	2,400 hours × $10.00 per hour
= $26,250	= $25,000	= $24,000

Rate variance
$1,250 unfavorable

Efficiency variance
$1,000 unfavorable



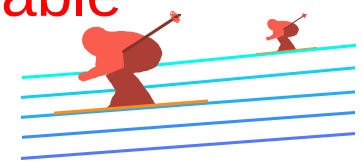
Labor Variances Summary

Actual Hours × Actual Rate	Actual Hours × Standard Rate	Standard Hours × Standard Rate
2,500 hours × $10.50 per hour	2,500 hours × $10.00 per hour	2,400 hours × $10.00 per hour
= $26,250	= $25,000	= $24,000

1.2 hours per parka × 2,000 parkas = 2,400 hours

Rate variance
$1,250 unfavorable

Efficiency variance
$1,000 unfavorable



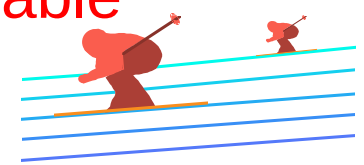
Labor Variances Summary

Actual Hours × Actual Rate	Actual Hours × Standard Rate	Standard Hours × Standard Rate
2,500 hours × $10.50 per hour	2,500 hours	2,400 hours × 0.00 per hour
= $26,250	= $25,000	= $24,000

$26,250 ÷ 2,500 hours = $10.50 per hour

Rate variance
$1,250 unfavorable

Efficiency variance
$1,000 unfavorable



Labor Variances: Using the Factored Equations

Labor rate variance

LRV = (AH × AR) – (AH × SR)

= AH (AR – SR)

= 2,500 hours ($10.50 per hour – $10.00 per hour)

= 2,500 hours ($0.50 per hour)

= $1,250 unfavorable

Labor efficiency variance

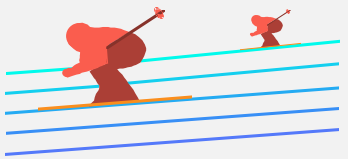
LEV = (AH × SR) – (SH × SR)

= SR (AH – SH)

= $10.00 per hour (2,500 hours – 2,400 hours)

= $10.00 per hour (100 hours)

= $1,000 unfavorable



Responsibility for Labor Variances

Production managers are usually held accountable for labor variances because they can influence the:

- Mix of skill levels assigned to work tasks.
- Level of employee motivation.
- Quality of production supervision.
- Quality of training provided to employees.

Production Manager

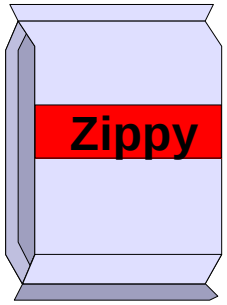
Responsibility for Labor Variances

I am not responsible for the unfavorable labor efficiency variance!

You purchased cheap material, so it took more time to process it.

I think it took more time to process the materials because the Maintenance Department has poorly maintained your equipment.

Quick Check ✓

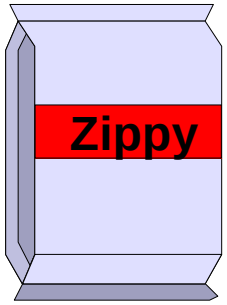


Hanson Inc. has the following direct labor standard to manufacture one Zippy:

1.5 standard hours per Zippy at $12.00 per direct labor hour

Last week, 1,550 direct labor hours were worked at a total labor cost of $18,910 to make 1,000 Zippies.

Quick Check ✓



Hanson's labor rate variance (LRV) for the week was:

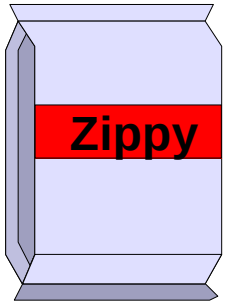
a. $310 unfavorable.

b. $310 favorable.

c. $300 unfavorable.

d. $300 favorable.

Quick Check ✓



Hanson's labor efficiency variance (LEV) for the week was:

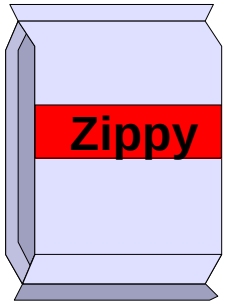
a. $590 unfavorable.

b. $590 favorable.

c. $600 unfavorable.

d. $600 favorable.

Quick Check ✓



Actual Hours × Actual Rate	Actual Hours × Standard Rate	Standard Hours × Standard Rate
1,550 hours × $12.20 per hour	1,550 hours × $12.00 per hour	1,500 hours × $12.00 per hour
= $18,910	= $18,600	= $18,000

Rate variance
$310 unfavorable

Efficiency variance
$600 unfavorable

Learning Objective

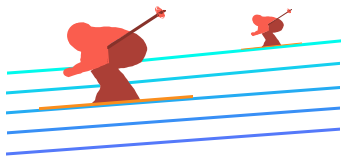
Compute the variable manufacturing overhead rate and efficiency variances and explain their significance.

Variable Manufacturing Overhead Variances – An Example

Glacier Peak Outfitters has the following direct variable manufacturing overhead labor standard for its mountain parka.

1.2 standard hours per parka at $4.00 per hour

Last month, employees actually worked 2,500 hours to make 2,000 parkas. Actual variable manufacturing overhead for the month was $10,500.

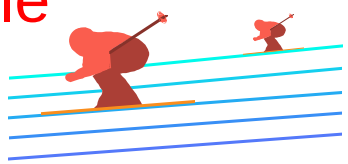


Variable Manufacturing Overhead Variances Summary

Actual Hours × Actual Rate	Actual Hours × Standard Rate	Standard Hours × Standard Rate
2,500 hours × $4.20 per hour	2,500 hours × $4.00 per hour	2,400 hours × $4.00 per hour
= $10,500	= $10,000	= $9,600

Rate variance
$500 unfavorable

Efficiency variance
$400 unfavorable



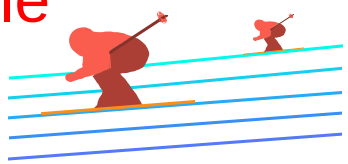
Variable Manufacturing Overhead Variances Summary

Actual Hours × Actual Rate	Actual Hours × Standard Rate	Standard Hours × Standard Rate
2,500 hours × $4.20 per h	2,500 hours ×	2,400 hours × $4.00 per hour
= $10,500	= $10,000	= $9,600

1.2 hours per parka × 2,000 parkas = 2,400 hours

Rate variance
$500 unfavorable

Efficiency variance
$400 unfavorable



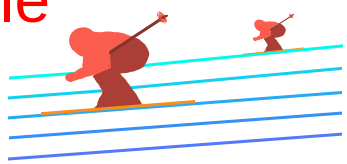
Variable Manufacturing Overhead Variances Summary

Actual Hours × Actual Rate	Actual Hours × Standard Rate	Standard Hours × Standard Rate
2,500 hours × $4.20 per hour	2,500 hours	2,400 hours × $4.00 per hour
= $10,500	= $10,000	= $9,600

$10,500 ÷ 2,500 hours = $4.20 per hour

Rate variance
$500 unfavorable

Efficiency variance
$400 unfavorable



Variable Manufacturing Overhead Variances: Using Factored Equations

Variable manufacturing overhead rate variance

VMRV = (AH × AR) – (AH – SR)

= AH (AR – SR)

= 2,500 hours ($4.20 per hour – $4.00 per hour)

= 2,500 hours ($0.20 per hour)

= $500 unfavorable

Variable manufacturing overhead efficiency variance

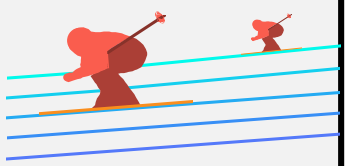
VMEV = (AH × SR) – (SH – SR)

= SR (AH – SH)

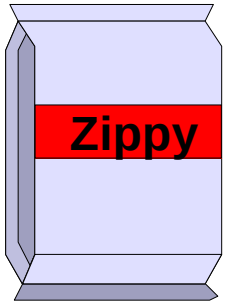
= $4.00 per hour (2,500 hours – 2,400 hours)

= $4.00 per hour (100 hours)

= $400 unfavorable



Quick Check ✓

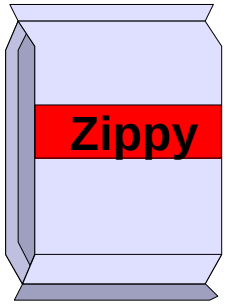


Hanson Inc. has the following variable manufacturing overhead standard to manufacture one Zippy:

1.5 standard hours per Zippy at $3.00 per direct labor hour

Last week, 1,550 hours were worked to make 1,000 Zippies, and $5,115 was spent for variable manufacturing overhead.

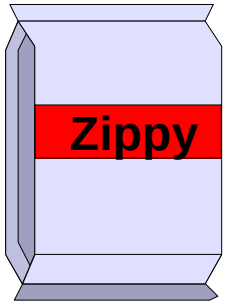
Quick Check ✓



Hanson's rate variance (VMRV) for variable manufacturing overhead for the week was:

a. $465 unfavorable.
b. $400 favorable.
c. $335 unfavorable.
d. $300 favorable.

Quick Check ✓

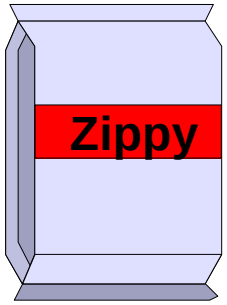


Hanson's rate variance (VMRV) for variable manufacturing overhead for the week was:

a. $465 unfavorable.
b. $400 favorable.
c. $335 unfavorab
d. $300 favorable.

VMRV = AH(AR - SR)
VMRV = 1,550 hrs($3.30 - $3.00)
VMRV = $465 unfavorable

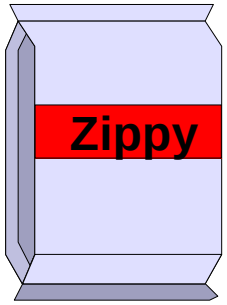
Quick Check ✓



Hanson's efficiency variance (VMEV) for variable manufacturing overhead for the week was:

a. $435 unfavorable.
b. $435 favorable.
c. $150 unfavorable.
d. $150 favorable.

Quick Check ✓



Hanson's efficiency variance (VMEV) for variable manufacturing overhead for the week was:

a. $435 unfavorable.

b. $435 favorable.

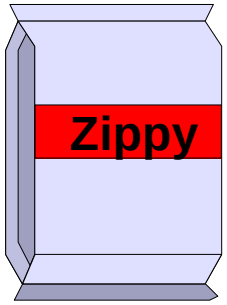
c. $150 unfavorable.

d. $150 favorable

1,000 units × 1.5 hrs per unit

VMEV = SR(AH - SH)
VMEV = $3.00(1,550 hrs - 1,500 hrs)
VMEV = $150 unfavorable

Quick Check ✓



Actual Hours × Actual Rate	Actual Hours × Standard Rate	Standard Hours × Standard Rate
1,550 hours × $3.30 per hour	1,550 hours × $3.00 per hour	1,500 hours × $3.00 per hour
= $5,115	= $4,650	= $4,500

Rate variance
$465 unfavorable

Efficiency variance
$150 unfavorable

Materials Variances—An Important Subtlety

The quantity variance is computed only on the quantity used in production.

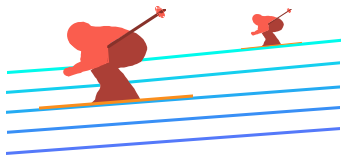
The price variance is computed on the entire quantity purchased.

Materials Variances—An Important Subtlety

Glacier Peak Outfitters has the following direct materials standard for the fiberfill in its mountain parka.

0.1 kg. of fiberfill per parka at $5.00 per kg.

Last month 210 kgs. of fiberfill were purchased at a cost of $1,029. Glacier used 200 kgs. to make 2,000 parkas.



Materials Variances—An Important Subtlety

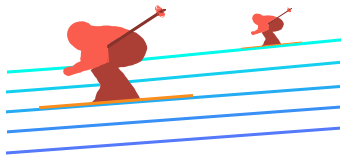
Actual Quantity Purchased × Actual Price	Actual Quantity Purchased × Standard Price
210 kgs. × $4.90 per kg.	210 kgs. × $5.00 per kg. .
= $1,029	= $1,050

Price variance
$21 favorable

Materials Quantity Variance

Actual Quantity Used × Standard Price	Standard Quantity × Standard Price
200 kgs. × $5.00 per kg.	200 kgs. × $5.00 per kg.
= $1,000	= $1,000

Quantity variance
$0



Materials Variances—An Important Subtlety

Materials Price Variance

Actual Quantity Purchased × Actual Price	Actual Quantity Purchased × Standard Price	Actual Quantity Used × Standard Price	Standard Quantity × Standard Price
210 kgs. × $4.90 per kg.	210 kgs. × $5.00 per kg. .	200 kgs. × $5.00 per kg.	200 kgs. × $5.00 per kg.
= $1,029	= $1,050	= $1,000	= $1,000
Price variance $21 favorable		Quantity variance $0