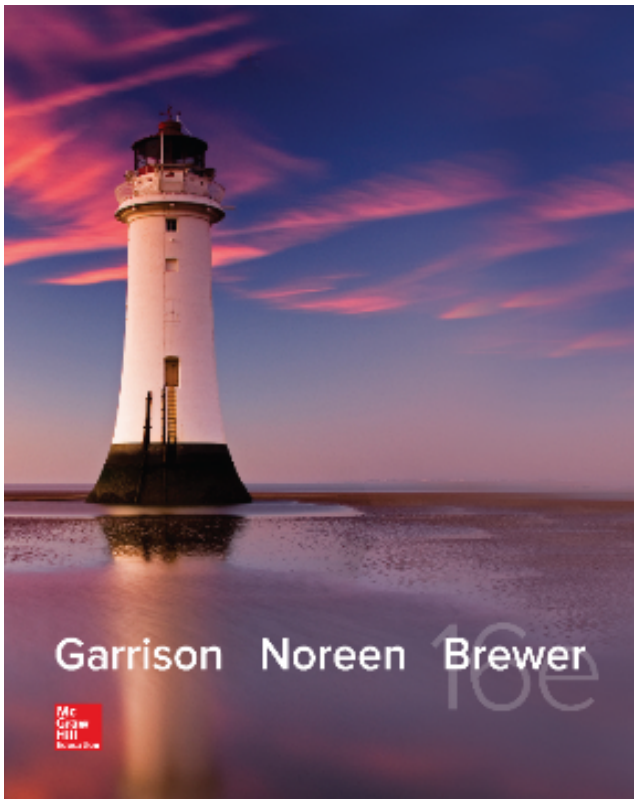
Standard Costs and Variances

CHAPTER 10



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Basic Definitions and Concepts

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

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

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

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

Setting Direct Materials Standards

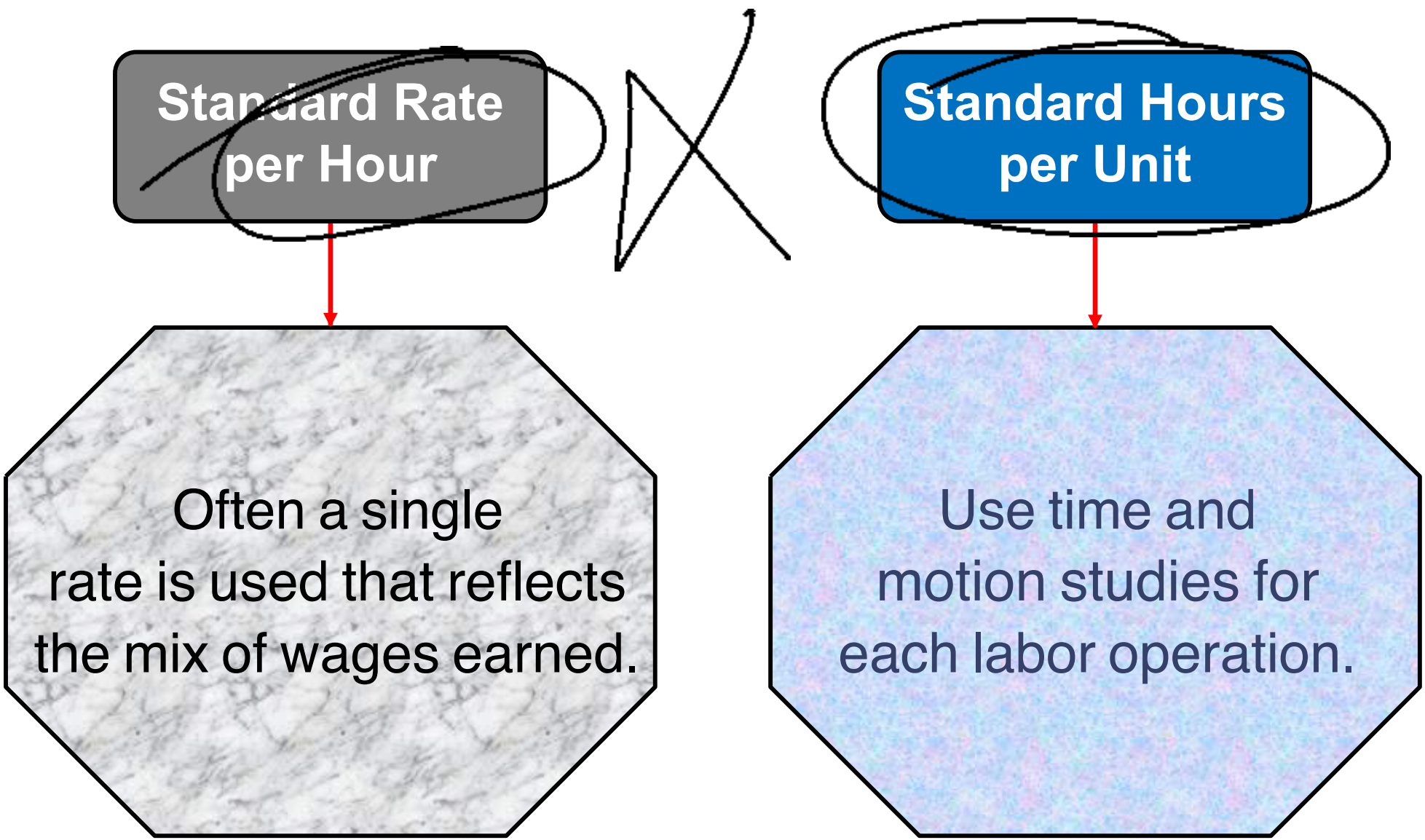
Standard Price per Unit

Final, delivered cost of materials, net of discounts.

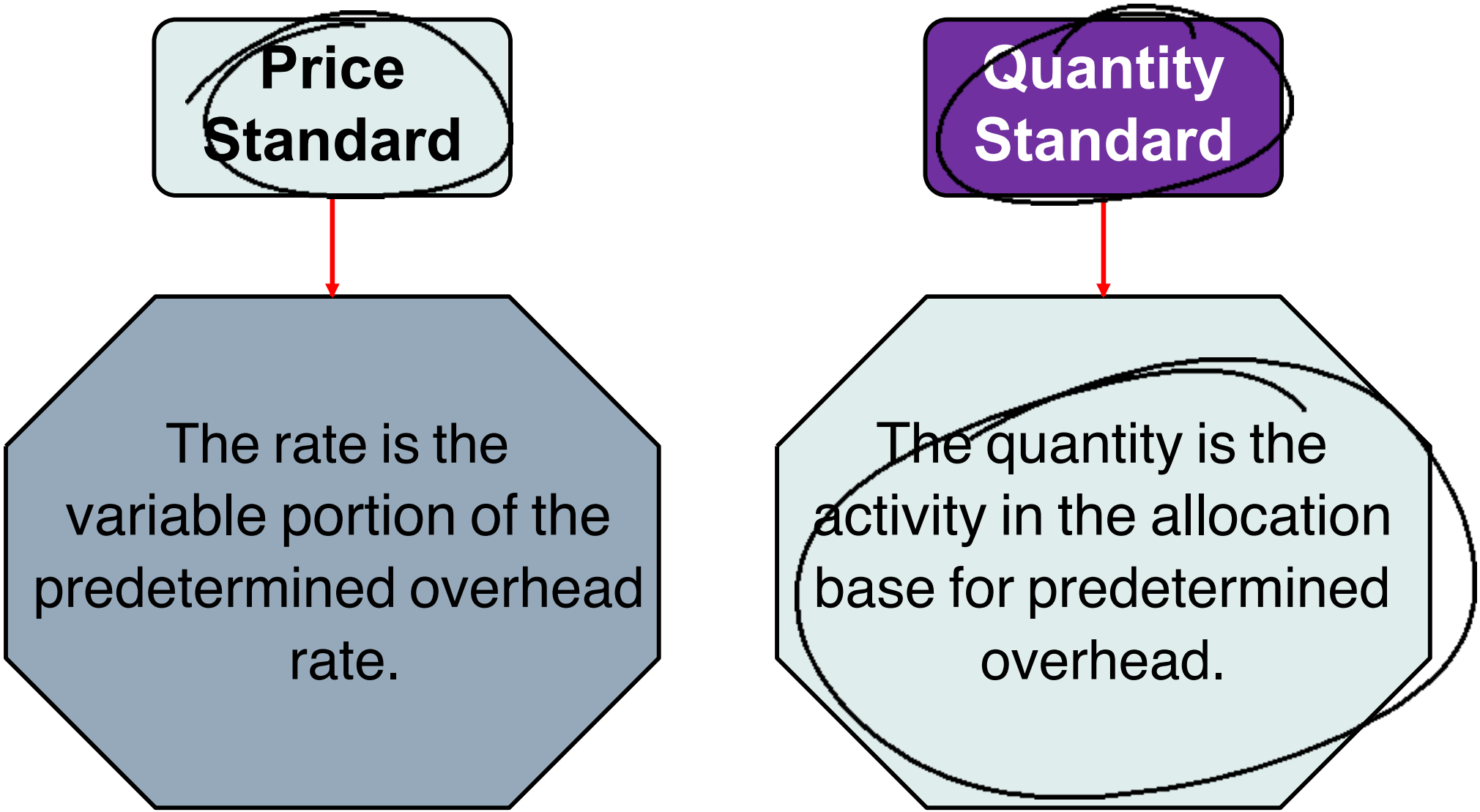
Standard Quantity per Unit

Summarized in a Bill of Materials.

Setting Direct Labor Standards



Setting Variable Manufacturing Overhead Standards



The Standard Cost Card

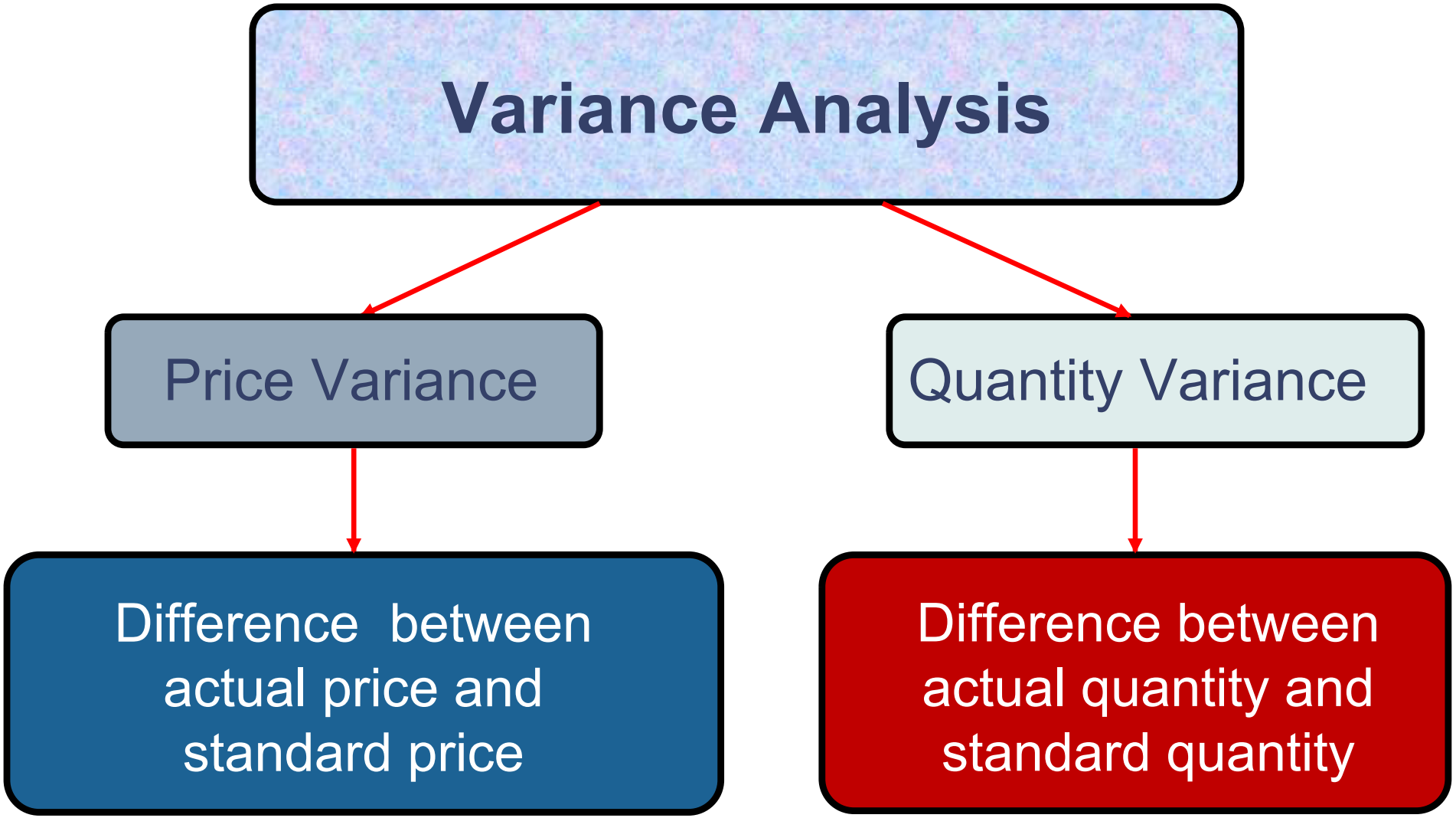
A standard cost card for one unit of product might look like this:

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.

General Model for Variance Analysis



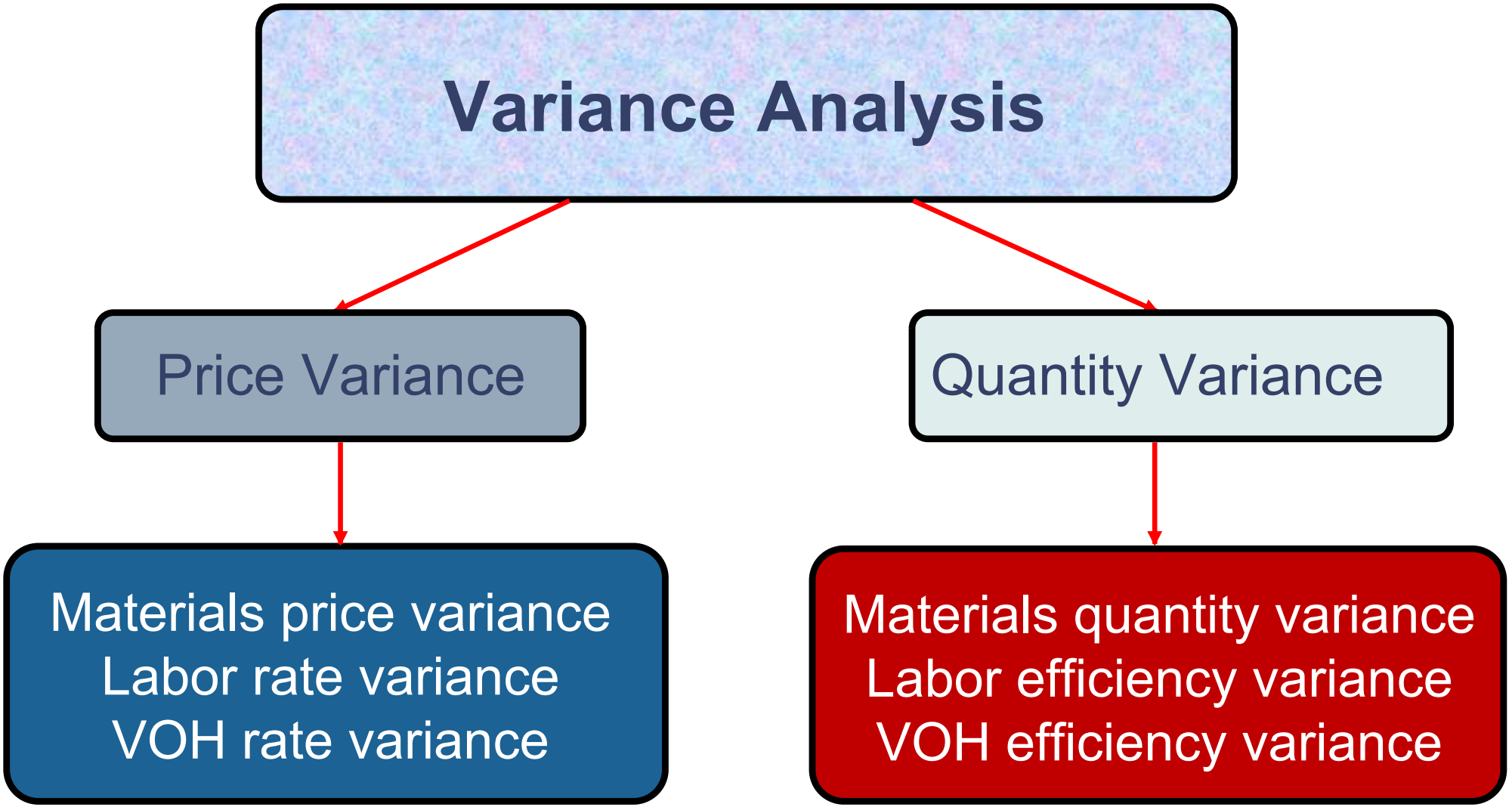
Price and Quantity Standards

Price and quantity standards are determined separately for two reasons:

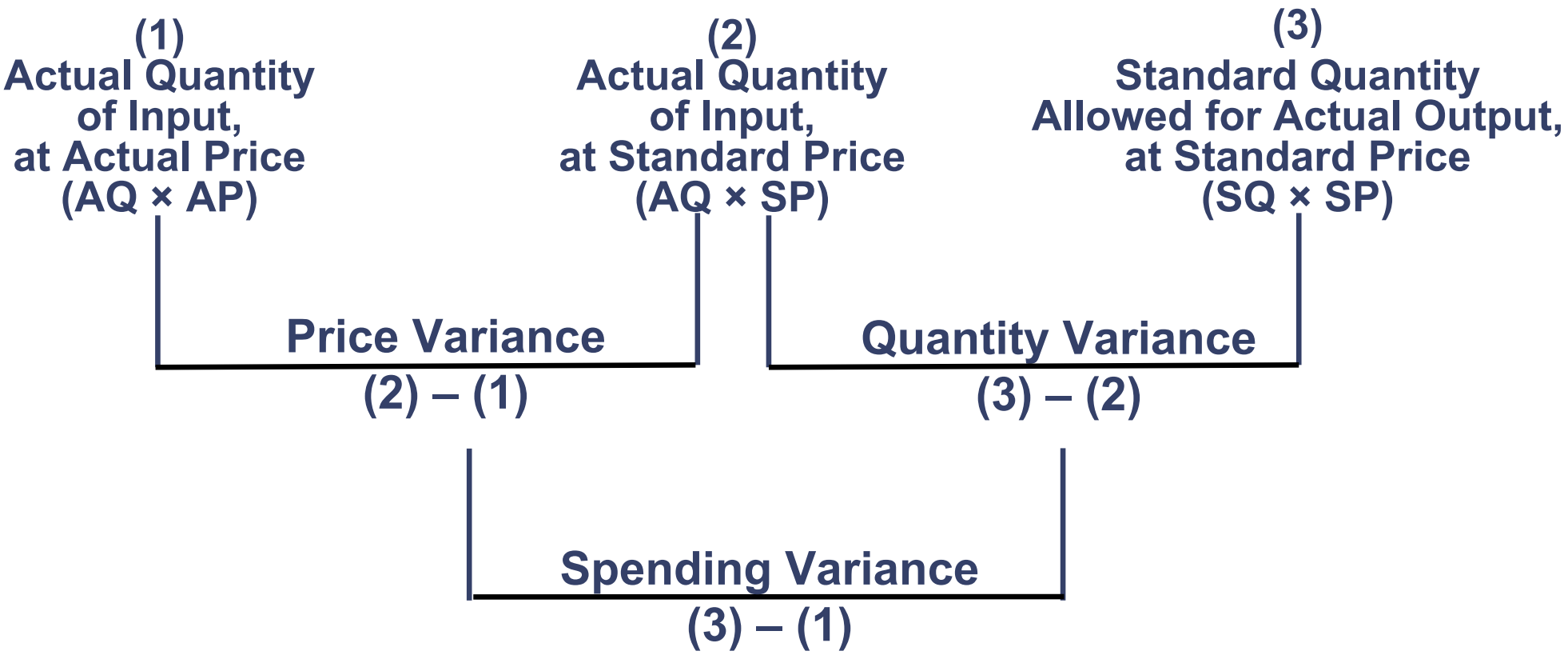
The purchasing manager is responsible for raw material purchase prices and the production manager is responsible for the quantity of raw material used.

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.

Variance Analysis

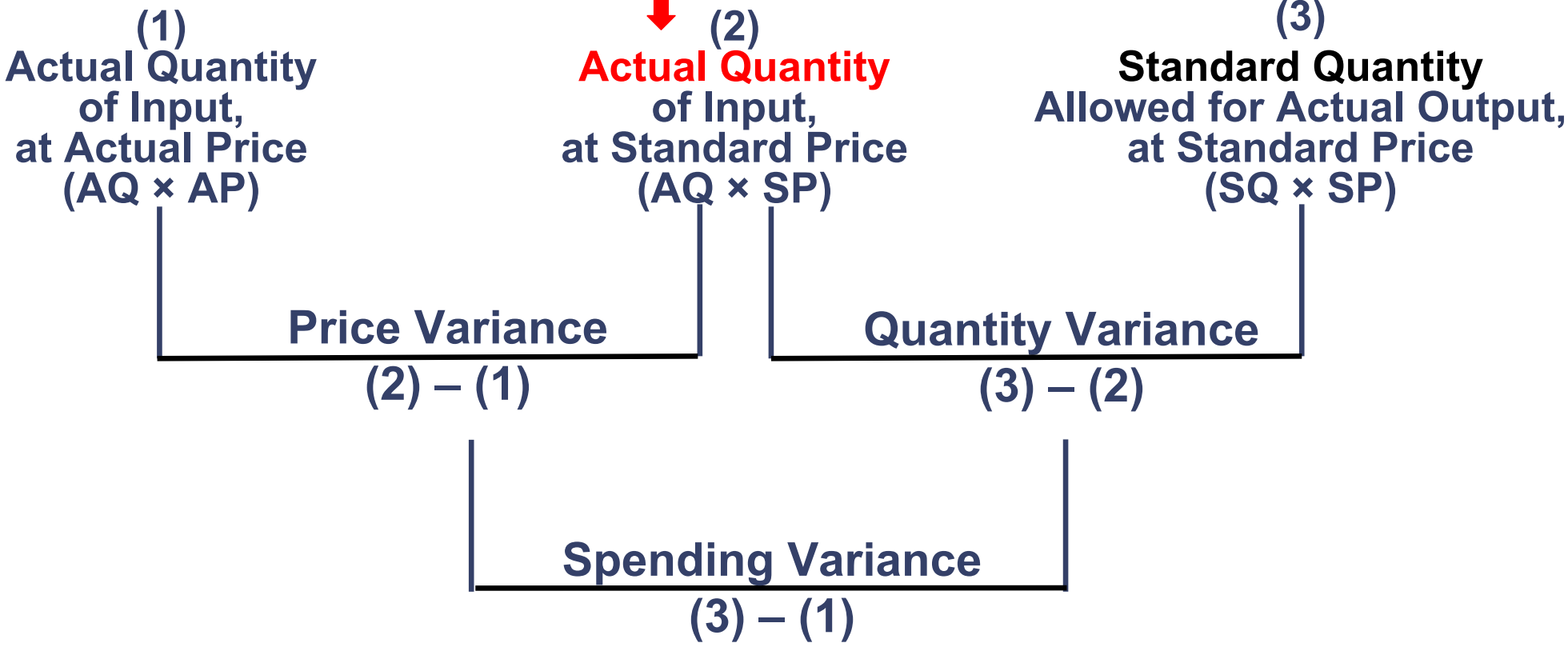


A General Model for Variance Analysis



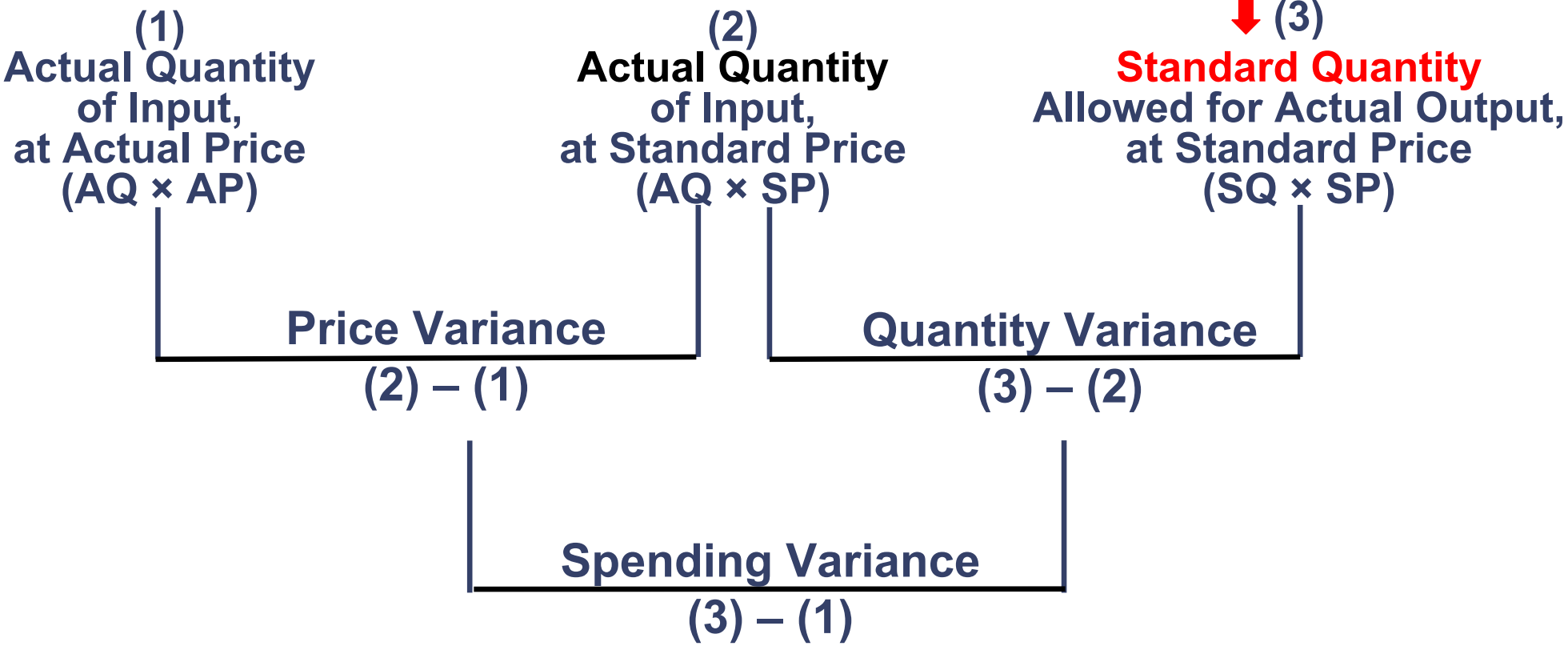
A General Model for Variance Analysis – Actual Quantity

Actual quantity is the amount of direct materials, direct labor, and variable manufacturing overhead actually used.



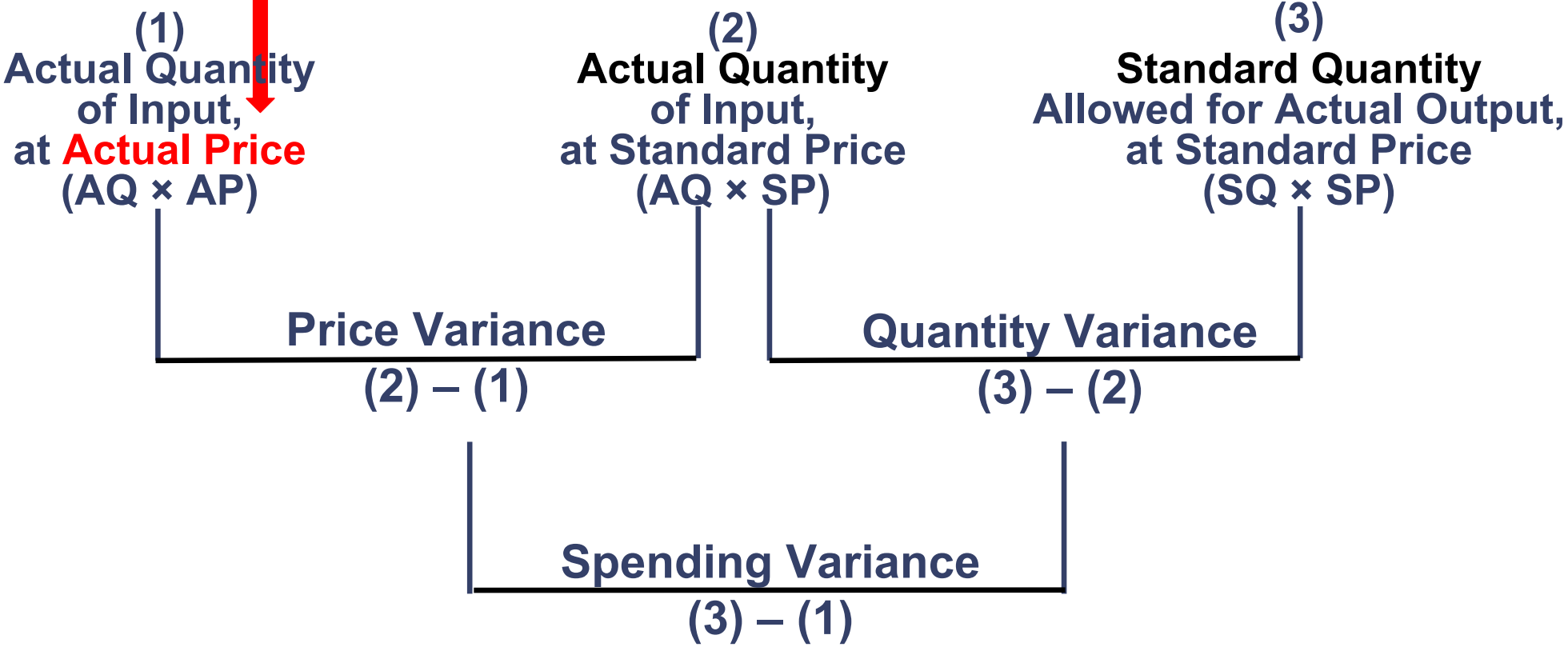
A General Model for Variance Analysis – Standard Quantity

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



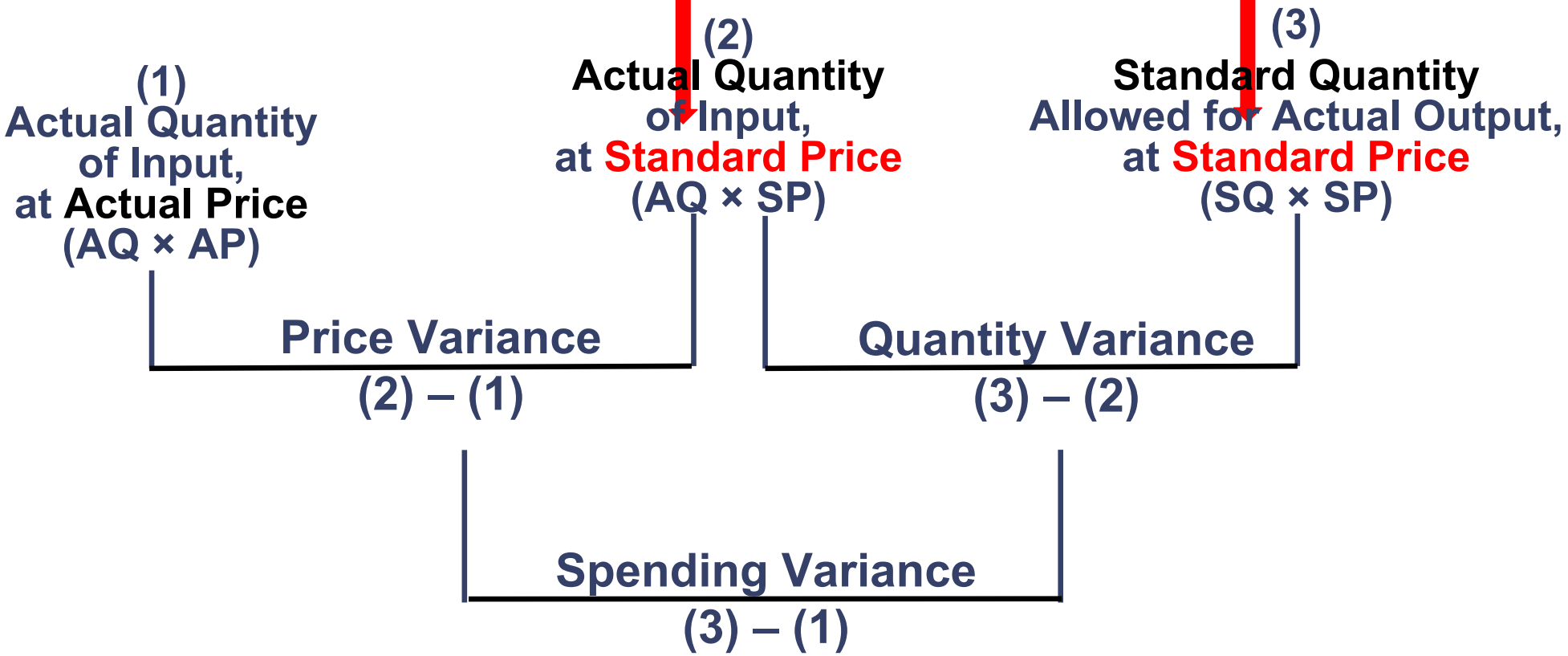
A General Model for Variance Analysis – Actual Price

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



A General Model for Variance Analysis – Standard Price

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



Learning Objective 1

Compute the direct materials price and quantity variances and explain their significance.

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 – Part 1

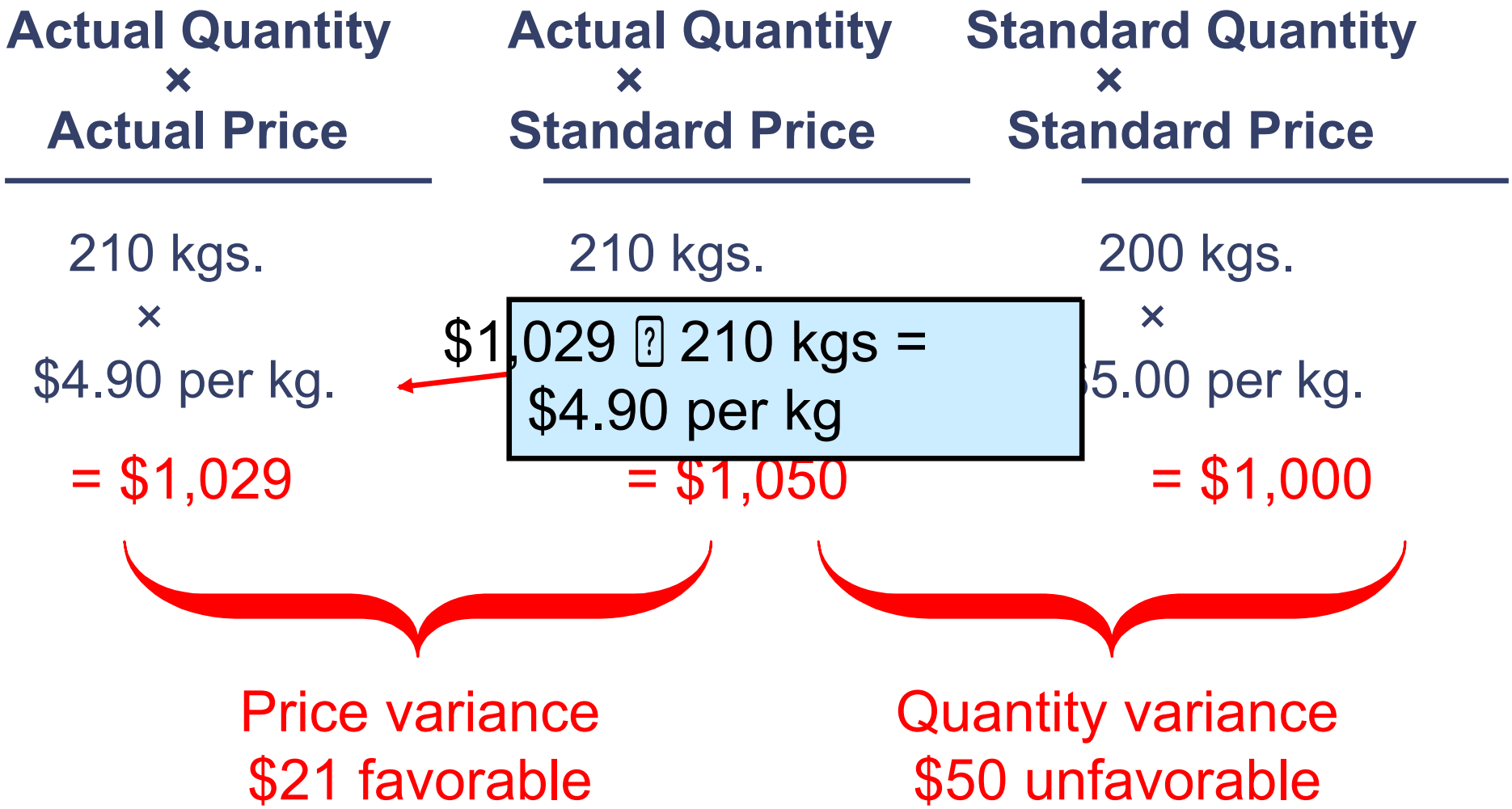
Actual Quantity × Actual Price	Actual Quantity × Standard Price	Standard Quantity × Standard Price
210 kgs. × $4.90 per kg.	210 kgs. × $5.00 per kg.	200 kgs. × $5.00 per kg.
= $1,029	= $1,050	= $1,000
	Price variance $21 favorable	Quantity variance $50 unfavorable

Materials Variances Summary – Part 2

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
	Price variance $21 favorable	Quantity variance $50 unfavorable

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

Materials Variances Summary – Part 3



Materials Variances: Using the Factored Equations

Materials price variance

$$MPV = (AQ \times AP) - (AQ \times SP)$$
$$= AQ(AP - SP)$$
$$= 210 \text{ kgs } (\$4.90/\text{kg} - \$5.00/\text{kg})$$
$$= 210 \text{ kgs } (-\$0.10/\text{kg}) = \$21 \text{ F}$$

Materials quantity variance

$$MQV = (AQ \times SP) - (SQ \times SP)$$
$$= SP(AQ - SQ)$$
$$= \$5.00/\text{kg } (210 \text{ kgs} - (0.1 \text{ kg/parka} \times 2{,}000 \text{ parkas}))$$
$$= \$5.00/\text{kg } (210 \text{ kgs} - 200 \text{ kgs})$$
$$= \$5.00/\text{kg } (10 \text{ kgs}) = \$50 \text{ U}$$

Responsibility for Materials Variances

Who is responsible for the Materials Price Variance?

The Purchasing Manager

Who is responsible for the Materials Quantity Variance?

The Production 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.

Controllability of Materials Variances

The materials variances are not always entirely controllable by one person or department. For example:

The **production manager** may schedule production in such a way that it requires express delivery of raw materials resulting in an unfavorable materials price variance.

The **purchasing manager** may purchase lower quality raw materials resulting in an unfavorable materials quantity variance for the production manager.

Quick Check 1

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 1a

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 1b

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.

The standard quantity is: 1,000 × 1.5 pounds per Zippy.

Quick Check 1c

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

a. $170 unfavorable.

b. $170 favorable.

c. $800 unfavorable.

d. $800 favorable.

Quick Check 1d

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

a. $170 unfavorable.

b. $170 favorable.

c. $800 unfavorable.

d. $800 fav

MQV = SP(AQ - SQ)
MQV = $4.00(1,700 lbs - 1,500 lbs)
MQV = $800 unfavorable

Quick Check 1e

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

a. $170 unfavorable.

b. $170 favorable.

c. $800 unfavorable.

d. $800 favorable.

Quick Check 1f

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

a. $170 unfavorable.

b. $170 favorable.

c. $800 unfavorable

d. $800 favorable

MPV = AQ(AP - SP)
MPV = 1,700 lbs. × ($3.90 - 4.00)
MPV = $170 Favorable

Quick Check 1g

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

Quick Check 1h

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 2

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 – Part 1

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 or inefficiency

Labor Variances Summary – Part 2

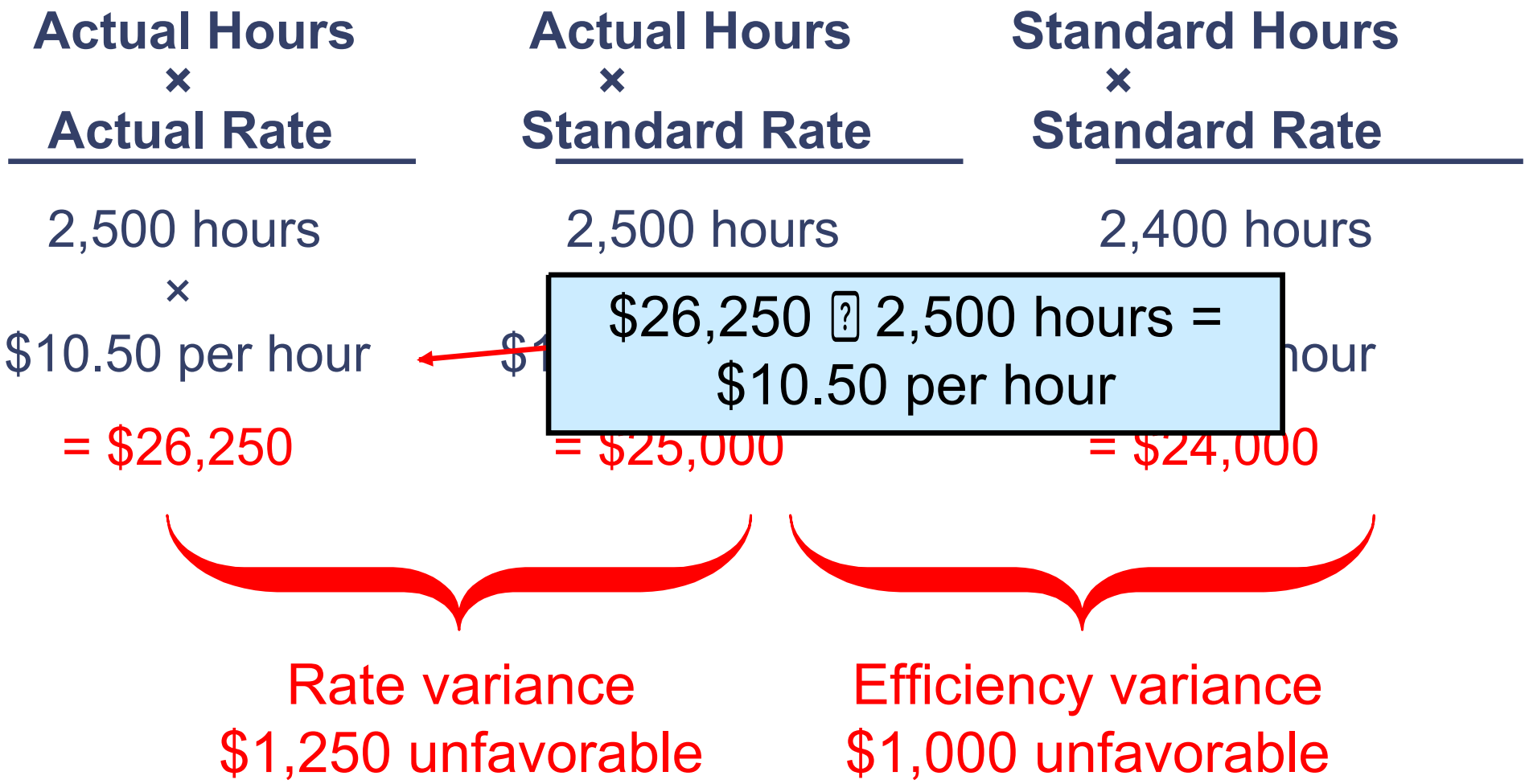
Actual Hours × Actual Rate	Actual Hours × Standard Rate	Standard Hours × Standard Rate
2,500 hours × $10.50 per hour	2,500 hours × $10.00 per hour	2,400 hours × $10.00 per hour
= $26,250	= $25,000	= $24,000

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

Rate variance
$1,250 unfavorable

Efficiency variance
$1,000 unfavorable

Labor Variances Summary – Part 3



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)

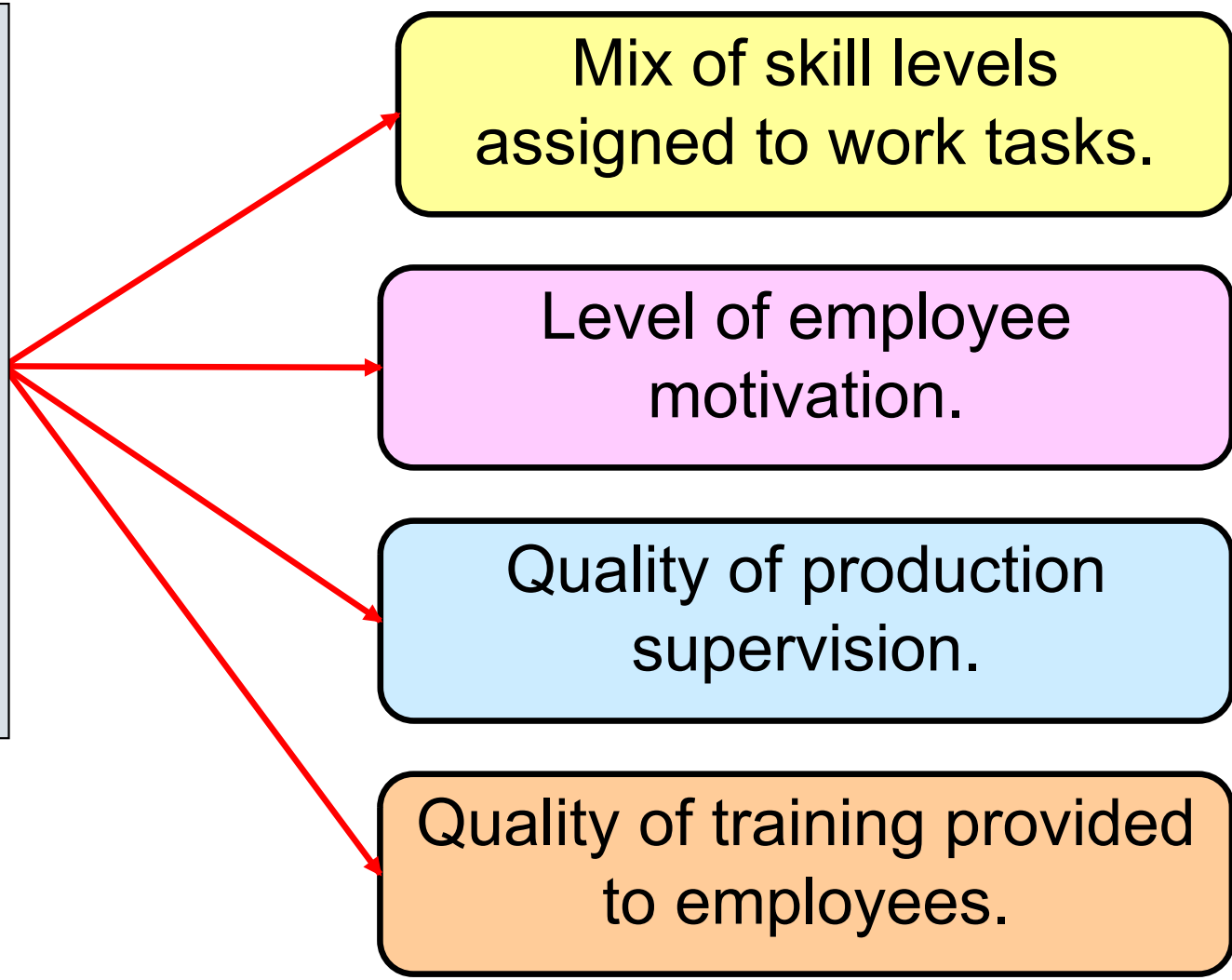
= $10.00 per hour (2,500 hours – 2,400 hours)

= $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 key factors.



Controllability of Labor Variances

The labor variances are not always entirely controllable by one person or department. For example:

The **Maintenance Department Manager** may do a poor job of maintaining production equipment. This may increase the processing time required per unit, thereby causing an unfavorable labor efficiency variance.

The **Purchasing Manager** may purchase lower quality raw materials resulting in an unfavorable labor efficiency variance for the production manager.

Quick Check 2

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 2a

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

a. $310 unfavorable.

b. $310 favorable.

c. $300 unfavorable.

d. $300 favorable.

Quick Check 2b

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

a. $310 unfavorable.

b. $310 favorable.

c. $300 unfa

d. $300 favo

LRV = AH(AR - SR)
LRV = 1,550 hrs.($12.20 - $12.00)
LRV = $310 unfavorable

Quick Check 2c

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

a. $590 unfavorable.

b. $590 favorable.

c. $600 unfavorable.

d. $600 favorable.

Quick Check 2d

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

a. $590 unfavorable.

b. $590 favorable.

c. $600 unfavorable.

d. $600 favorable.

LEV = SR(AH - SH)
LEV = $12.00(1,550 hrs. - 1,500 hrs.)
LEV = $600 unfavorable

Quick Check 2e

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 3

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

Variable Manufacturing Overhead Variances – An Example

Glacier Peak Outfitters uses direct labor-hours as the allocation base in its predetermined overhead rate. The company has the following standard variable manufacturing overhead cost for each mountain parka:

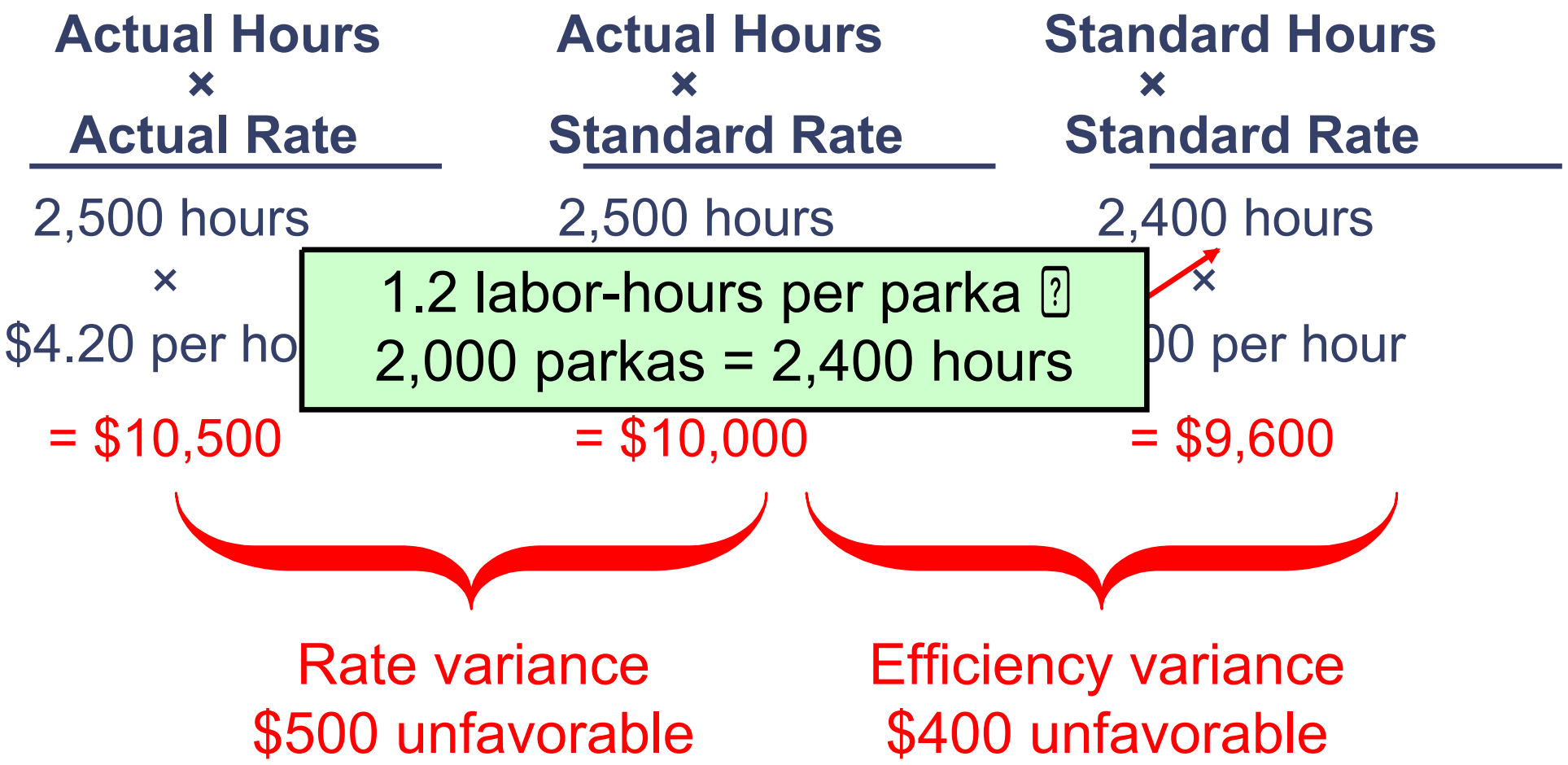
1.2 standard labor-hours per parka at $4.00 per labor-hour

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

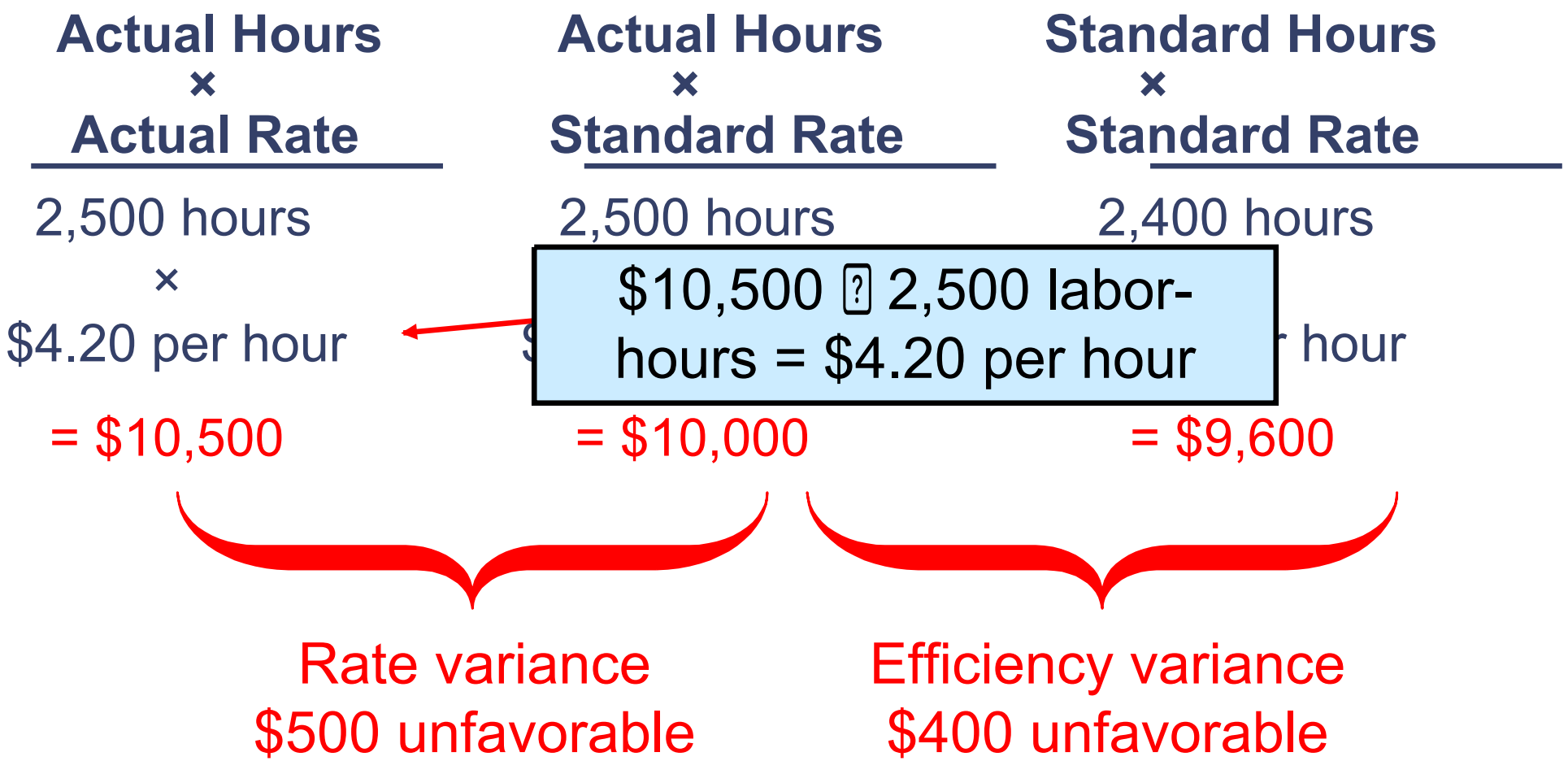
Variable Manufacturing Overhead Variances Summary – Part 1

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 – Part 2



Variable Manufacturing Overhead Variances Summary – Part 3



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 3

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

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

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

Quick Check 3a

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 3b

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

a. $465 unfavorable.

b. $400 favorable.

c. $335 unf

d. $300 fav

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

Quick Check 3c

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 3d

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 3e

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.

The price variance is computed on the entire quantity purchased.

Materials Variances – An Important Subtlety: 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 at a cost of $1,029. Glacier used 200 kgs. to make 2,000 parkas.

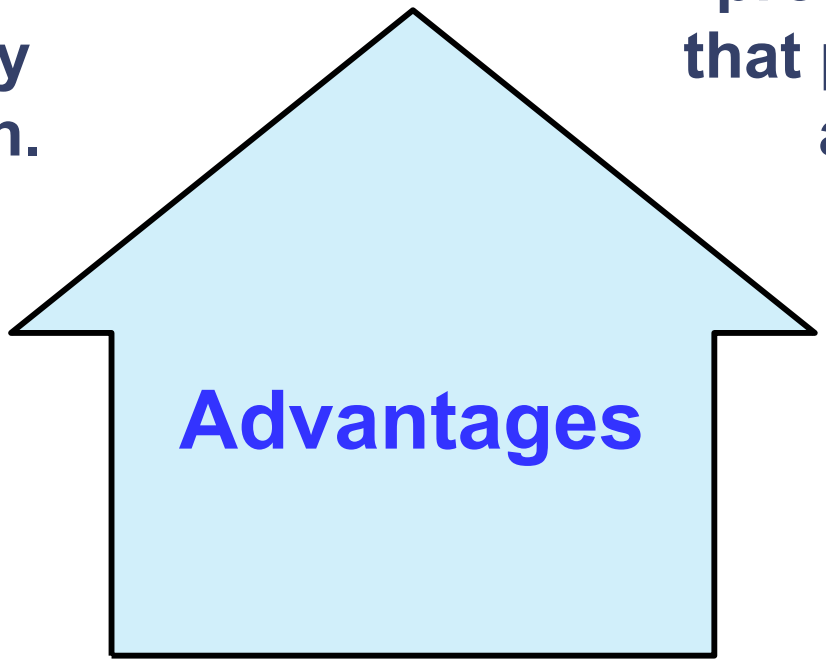
Materials Variances – An Important Subtlety: Example Solution

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

Advantages of Standard Costs

Standard costs are a key element of the management by exception approach.

Standards can provide benchmarks that promote economy and efficiency.

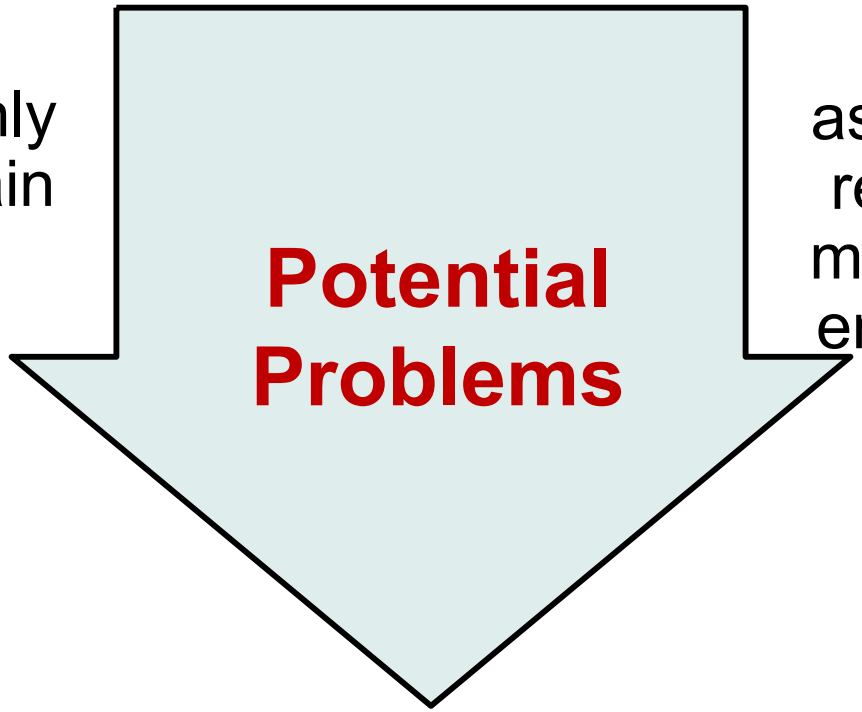


Standards can greatly simplify bookkeeping.

Standards can support responsibility accounting systems.

Potential Problems with Standard Costs – Part 1

Standard cost variance reports are usually prepared on a monthly basis and may contain information that is outdated.

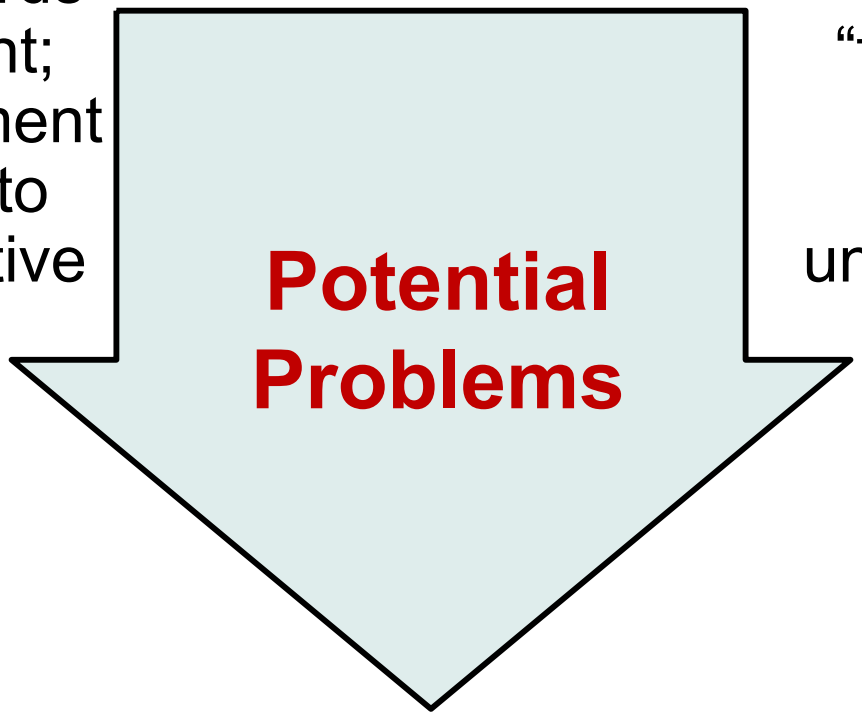


If variances are misused as a club to negatively reinforce employees, morale may suffer and employees may make dysfunctional decisions.

Labor variances assume that the production process is labor-paced and that labor is a variable cost. These assumptions are often invalid in today's automated manufacturing environment where employees are essentially a fixed cost.

Potential Problems with Standard Costs –Part 2

Just meeting standards may not be sufficient; continuous improvement may be necessary to survive in a competitive environment.



In some cases, a "favorable" variance can be as bad or worse than an unfavorable variance.

Excessive emphasis on meeting the standards may overshadow other important objectives such as maintaining and improving quality, on-time delivery, and customer satisfaction.

End of Chapter 10