



مجموعة جامعة
الجميع الذكية
للتعليم القابضة

MIDOCEAN
UNIVERSITY

Accounting for Managers

Prepared by Dr. Sara Ahmed

MGM 341

Lecture 11



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Chapter 11: Standard Costs and Variances

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Chapter
11

Learning objectives

- Explain how and why standard costs are developed
- Compute and evaluate direct materials variances
- Compute and evaluate direct labor variances
- Compute and evaluate variable overhead variances
- Compute and evaluate fixed overhead variances

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.

Setting Direct Materials Standards

**Standard Quantity
per Unit**

**Standard Price
per Unit**

**Summarized in
a Bill of Materials**

**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.

Price Standard

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

The Standard Cost Card

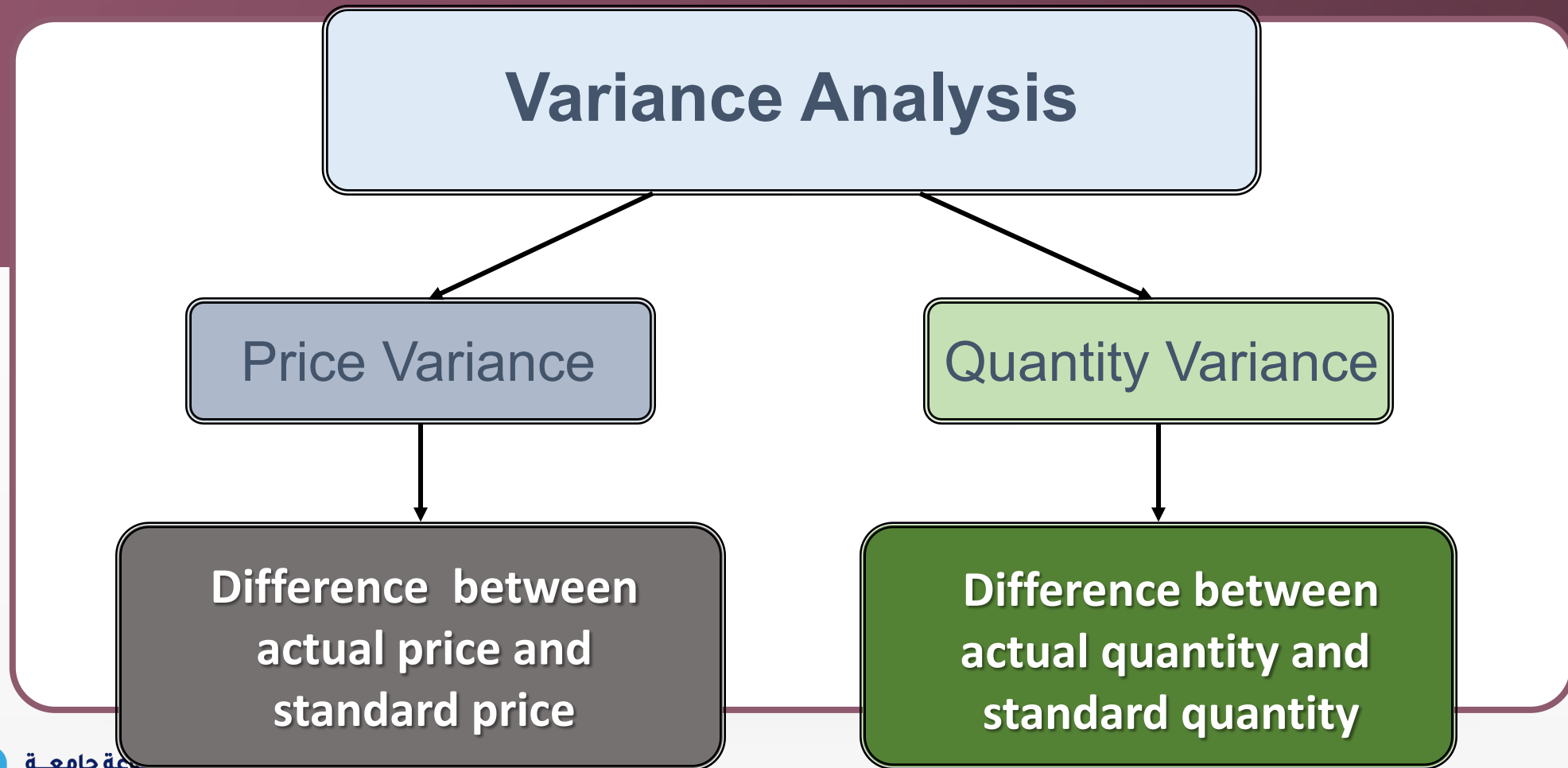
A standard cost card for one unit of product might look like this:

Inputs	A	B	A x B
	Standard Quantity or Hours	Standard Price or Rate	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

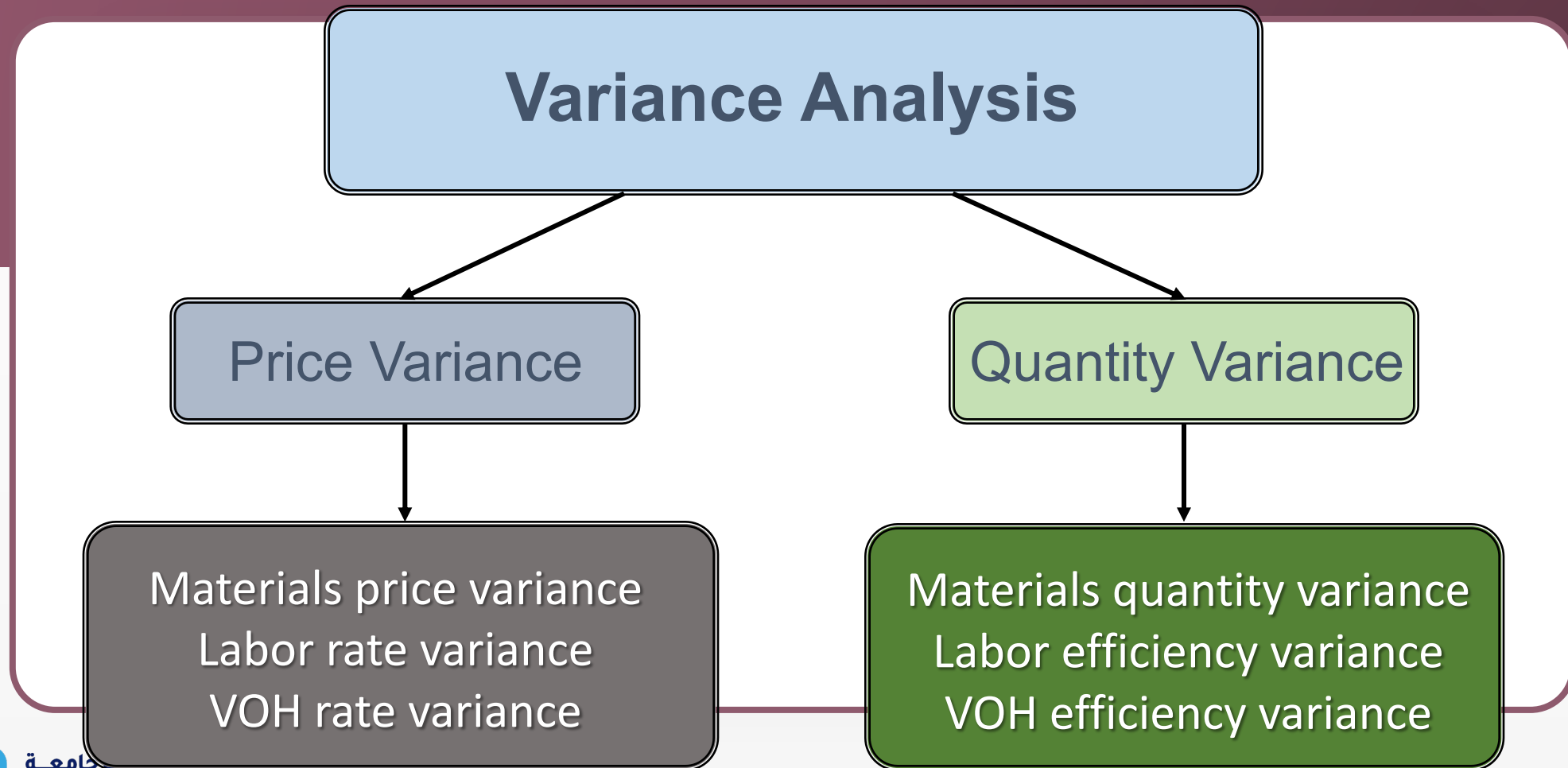
Standard costs per unit for direct materials, direct labor, and variable manufacturing overhead can be used to compute **activity** and **spending** variances.

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

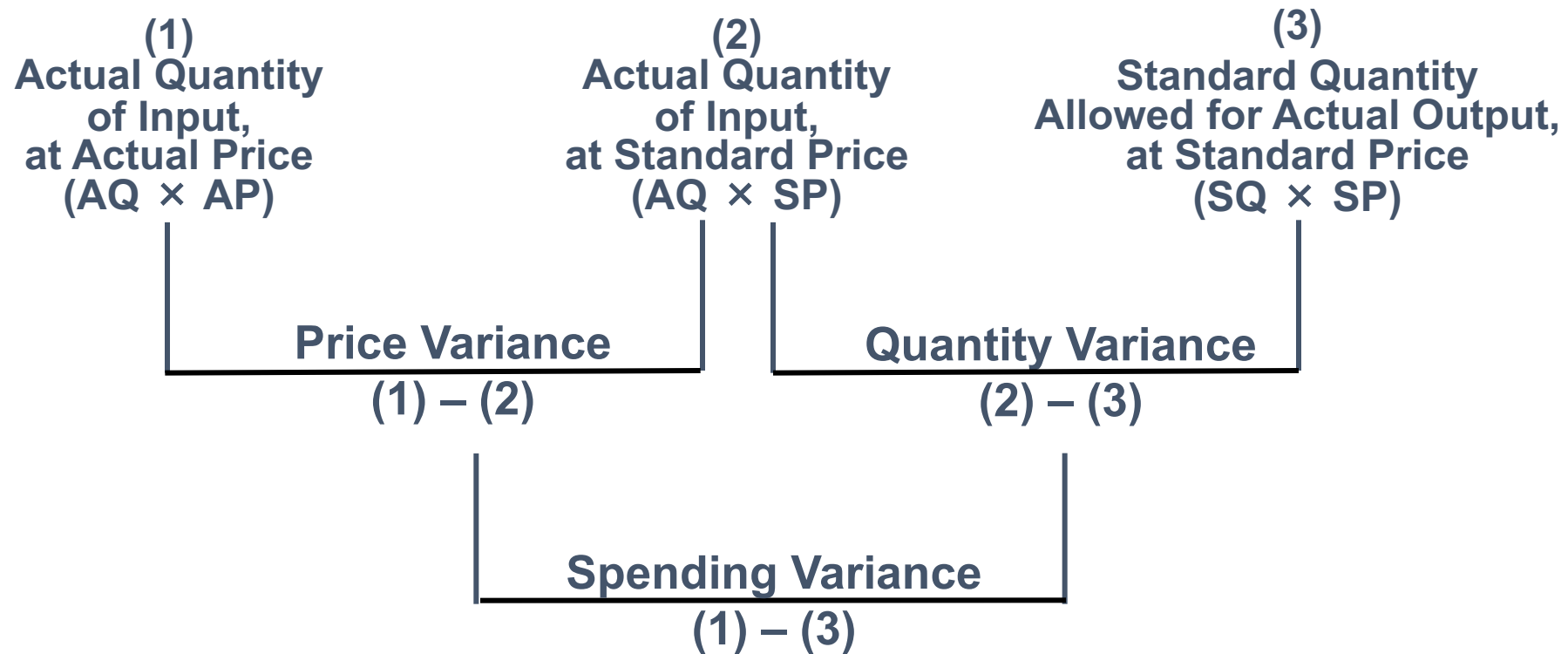


Price and quantity standards are determined separately for two reasons:

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.

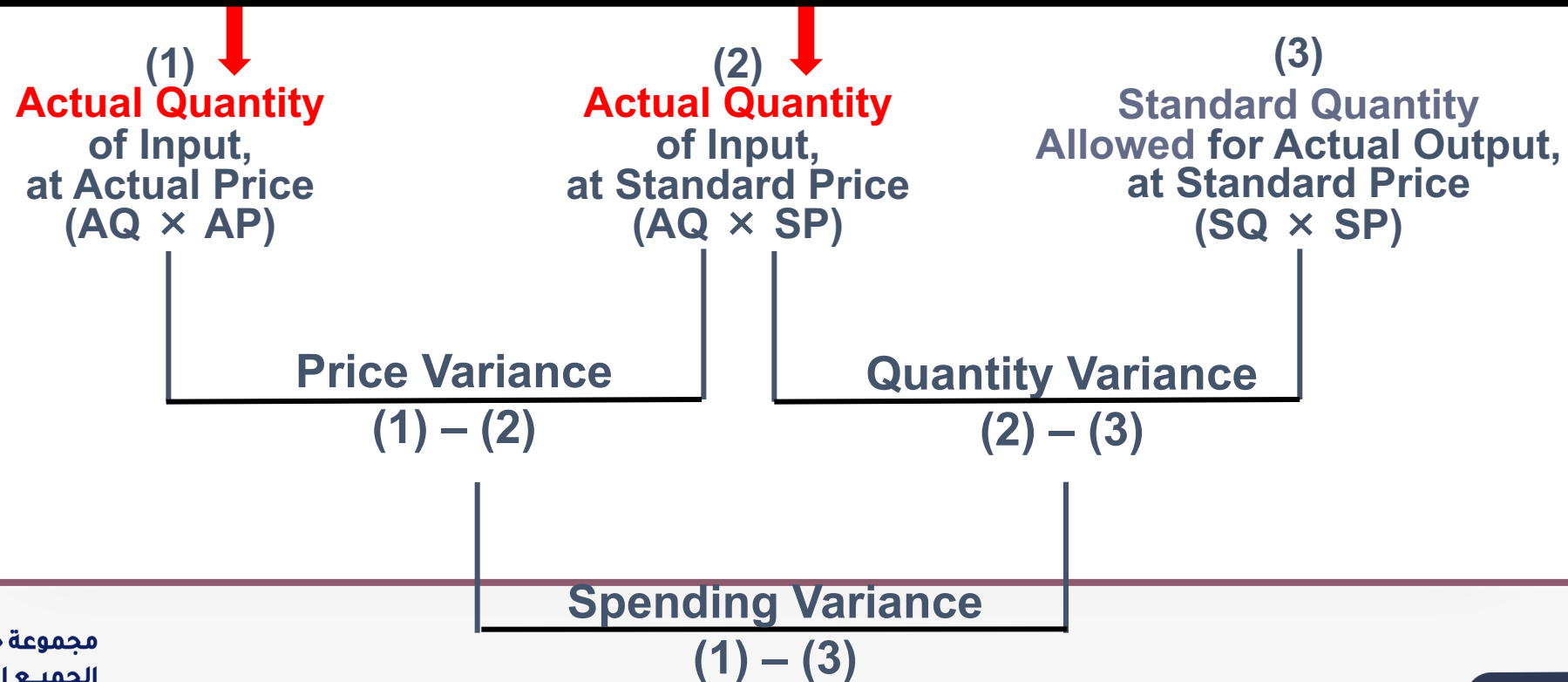


A General Model for Variance Analysis: Formulas



A General Model: Actual Quantity

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: Standard Quantity

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

(1)
Actual Quantity
of Input,
at Actual Price
(AQ × AP)

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

(3) ↓
Standard Quantity
Allowed for Actual Output,
at Standard Price
(SQ × SP)

Price Variance

(1) – (2)

Quantity Variance

(2) – (3)

Spending Variance

(1) – (3)

A General Model: Actual Price

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

(1)
Actual Quantity
of Input,
at **Actual Price**
(AQ × AP)

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

(3)
Standard Quantity
Allowed for Actual Output,
at Standard Price
(SQ × SP)

Price Variance

(1) – (2)

Quantity Variance

(2) – (3)

Spending Variance

(1) – (3)

A General Model: Standard Price

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

(1)
Actual Quantity
of Input,
at Actual Price
(AQ × AP)

(2)
Actual Quantity
of Input,
at **Standard Price**
(AQ × SP)

(3)
Standard Quantity
Allowed for Actual Output,
at **Standard Price**
(SQ × SP)

Price Variance

(1) – (2)

Quantity Variance

(2) – (3)

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 Overall Summary

Actual Quantity
×
Actual Price

210 kgs.

×

\$4.90 per kg.

= \$1,029

Actual Quantity
×
Standard Price

210 kgs.

×

\$5.00 per kg.

= \$1,050

Standard Quantity
×
Standard Price

200 kgs.

×

\$5.00 per kg.

= \$1,000

Price variance
\$21 favorable

Quantity variance
\$50 unfavorable

Materials Variances Summary: Standard Quantity Computation

Actual Quantity × <u>Actual Price</u>	Actual Quantity × <u>Standard Price</u>	Standard Quantity × <u>Standard Price</u>
---	---	---

210 kgs.
×
\$4.90 per

= \$1,029

Price variance
\$21 favorable

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

= \$1,050

Quantity variance
\$50 unfavorable

200 kgs.
×
\$5.00 per kg.

= \$1,000

Materials Variances Summary: Actual Price Computation

Actual Quantity
×
Actual Price

210 kgs.

×

\$4.90 per kg.

= \$1,029

Actual Quantity
×
Standard Price

210 kgs.

\$1,029 ÷ 210 kgs
= \$4.90 per kg

= \$1,050

Standard Quantity
×
Standard Price

200 kgs.

×

\$5.00 per kg.

= \$1,000

Price variance
\$21 favorable

Quantity variance
\$50 unfavorable

Materials Variances: Using the Factored Equations

Materials price variance

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

Materials quantity variance

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

Responsibility for Materials Variances: Price Variance

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: Quantity Variance

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

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.

Concept 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.

Concept 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.

The standard quantity is:
 $1,000 \times 1.5$ pounds per Zippy.

Concept Check

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

- a. \$170 unfavorable.
- b. \$170 favorable.
- c. \$800 unfavorable.
- d. \$800 favorable.

Concept Check

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

- a. \$170 unfavorable.
- b. \$170 favorable.
- c. \$800 unfavorable.
- d. \$800 favorable.

$$\text{MQV} = \text{SP}(\text{AQ} - \text{SQ})$$

$$\text{MQV} = \$4.00(1,700 \text{ lbs} - 1,500 \text{ lbs})$$

$$\text{MQV} = \$800 \text{ unfavorable}$$

Concept Check

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

- a. \$170 unfavorable.
- b. \$170 favorable.
- c. \$800 unfavorable.
- d. \$800 favorable.

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

- a. \$170 unfavorable.
- b. \$170 favorable.
- c. \$800 unfavorable.
- d. \$800 favorable.

$$\text{MPV} = \text{AQ}(\text{AP} - \text{SP})$$

$$\text{MPV} = 1,700 \text{ lbs.} \times (\$3.90 - 4.00)$$

$$\text{MPV} = \$170 \text{ Favorable}$$

Concept Check

Actual Quantity
 ×
Actual Price

1,700 lbs.
 ×
 \$3.90 per lb.

= \$6,630

Actual Quantity
 ×
Standard Price

1,700 lbs.
 ×
 \$4.00 per lb.

= \$ 6,800

Standard Quantity
 ×
Standard Price

1,500 lbs.
 ×
 \$4.00 per lb.

= \$6,000

Price variance
\$170 favorable

Quantity variance
\$800 unfavorable

Concept Check

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

Actual Quantity
×
Actual Price

1,700 lbs.
×
\$3.90 per lb.

= \$6,630

Actual Quantity
×
Standard Price

1,700 lbs.
×
\$4.00 per lb.

= \$ 6,800

Standard Quantity
×
Standard Price

1,500 lbs.
×
\$4.00 per lb.

= \$6,000

Price variance
\$170 favorable

Quantity variance
\$800 unfavorable

**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 Overall Summary

Actual Hours × <u>Actual Rate</u>	Actual Hours × <u>Standard Rate</u>	Standard Hours × <u>Standard Rate</u>
2,500 hours	2,500 hours	2,400 hours
×	×	×
\$10.50 per hour	\$10.00 per hour	\$10.00 per hour
= \$26,250	= \$25,000	= \$24,000
Rate variance \$1,250 unfavorable		Efficiency variance \$1,000 unfavorable

Labor Variances Summary: Standard Hours Computation

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

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

Labor Variances Summary: Actual Rate Computation

Actual Hours × Actual Rate	Actual Hours × Standard Rate	Standard Hours × Standard Rate
2,500 hours × \$10.50 per hour = \$26,250	2,500 hours × \$26,250 ÷ 2,500 hours = \$10.50 per hour = \$25,000	2,400 hours × \$10.00 per hour = \$24,000
Rate variance \$1,250 unfavorable		Efficiency variance \$1,000 unfavorable

Labor Variances: Using the Factored Equations

Labor rate variance

$$\begin{aligned}\text{LRV} &= (\text{AH} \times \text{AR}) - (\text{AH} \times \text{SR}) \\ &= \text{AH} (\text{AR} - \text{SR}) \\ &= 2,500 \text{ hours } (\$10.50 \text{ per hour} - \$10.00 \text{ per hour}) \\ &= 2,500 \text{ hours } (\$0.50 \text{ per hour}) \\ &= \$1,250 \text{ unfavorable}\end{aligned}$$

Labor efficiency variance

$$\begin{aligned}\text{LEV} &= (\text{AH} \times \text{SR}) - (\text{SH} \times \text{SR}) \\ &= \text{SR} (\text{AH} - \text{SH}) \\ &= \$10.00 \text{ per hour } (2,500 \text{ hours} - 2,400 \text{ hours}) \\ &= \$10.00 \text{ per hour } (100 \text{ hours}) \\ &= \$1,000 \text{ unfavorable}\end{aligned}$$

Responsibility for Labor Variances

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

Production Manager

Mix of skill levels assigned to work tasks.

Level of employee motivation.

Quality of production supervision.

Quality of training provided to employees.

Responsibility for Labor Variances: Manager Responses

I am not responsible for the unfavorable labor efficiency variance!

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

Maintenance Manager

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

Purchasing Manager

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.

Concept Check 6

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

- a. \$310 unfavorable.
- b. \$310 favorable.
- c. \$300 unfavorable.
- d. \$300 favorable.

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

a. \$310 unfavorable.

b. \$310 favorable.

c. \$300 unfavorable.

d. \$300 favorable.

$$\text{LRV} = \text{AH}(\text{AR} - \text{SR})$$

$$\text{LRV} = 1,550 \text{ hrs}(\$12.20 - \$12.00)$$

$$\text{LRV} = \$310 \text{ unfavorable}$$

Concept Check

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

- a. \$590 unfavorable.
- b. \$590 favorable.
- c. \$600 unfavorable.
- d. \$600 favorable.

Concept Check 7a

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

- a. \$590 unfavorable.
- b. \$590 favorable.
- c. \$600 unfavorable.
- d. \$600 favorable.

$$\text{LEV} = \text{SR}(\text{AH} - \text{SH})$$

$$\text{LEV} = \$12.00(1,550 \text{ hrs} - 1,500 \text{ hrs})$$

$$\text{LEV} = \$600 \text{ unfavorable}$$

Concept Check

Actual Hours × Actual Rate	Actual Hours × Standard Rate	Standard Hours × Standard Rate
1,550 hours × \$12.20 per hour = \$18,910	1,550 hours × \$12.00 per hour = \$18,600	1,500 hours × \$12.00 per hour = \$18,000
Rate variance \$310 unfavorable		Efficiency variance \$600 unfavorable

**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 Overall Summary

Actual Hours × <u>Actual Rate</u>	Actual Hours × <u>Standard Rate</u>	Standard Hours × <u>Standard Rate</u>
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: Standard Hours Computation

Actual Hours × <u>Actual Rate</u>	Actual Hours × <u>Standard Rate</u>	Standard Hours × <u>Standard Rate</u>
2,500 hours × \$4.20 per hour = \$10,500	2,500 hours × 1.2 hours per parka × 2,000 parkas = 2,400 hours × \$4.00 per hour = \$10,000	2,400 hours × \$4.00 per hour = \$9,600
Rate variance \$500 unfavorable		Efficiency variance \$400 unfavorable

Variable Manufacturing Overhead Variances

Summary: Actual Rate Computation

Actual Hours × Actual Rate	Actual Hours × Standard Rate	Standard Hours × Standard Rate
2,500 hours × \$4.20 per hour	2,500 hours × \$10,500 ÷ 2,500 hours = \$4.20 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: Using Factored Equations

Variable manufacturing overhead rate variance

$$\begin{aligned}\text{VMRV} &= (\text{AH} \times \text{AR}) - (\text{AH} \times \text{SR}) \\ &= \text{AH} (\text{AR} - \text{SR}) \\ &= 2,500 \text{ hours } (\$4.20 \text{ per hour} - \$4.00 \text{ per hour}) \\ &= 2,500 \text{ hours } (\$0.20 \text{ per hour}) \\ &= \$500 \text{ unfavorable}\end{aligned}$$

Variable manufacturing overhead efficiency variance

$$\begin{aligned}\text{VMEV} &= (\text{AH} \times \text{SR}) - (\text{SH} \times \text{SR}) \\ &= \text{SR} (\text{AH} - \text{SH}) \\ &= \$4.00 \text{ per hour } (2,500 \text{ hours} - 2,400 \text{ hours}) \\ &= \$4.00 \text{ per hour } (100 \text{ hours}) \\ &= \$400 \text{ unfavorable}\end{aligned}$$

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.

Concept 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.

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.

$$\text{VMRV} = \text{AH}(\text{AR} - \text{SR})$$

$$\text{VMRV} = 1,550 \text{ hrs}(\$3.30 - \$3.00)$$

$$\text{VMRV} = \$465 \text{ unfavorable}$$

Concept 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.

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.

$$1,000 \text{ units} \times 1.5 \text{ hrs per unit}$$

$$\text{VMEV} = \text{SR}(\text{AH} - \text{SH})$$

$$\text{VMEV} = \$3.00(1,550 \text{ hrs} - 1,500 \text{ hrs})$$

$$\text{VMEV} = \$150 \text{ unfavorable}$$

Concept Check

$$\begin{array}{r}
 \text{Actual Hours} \\
 \times \\
 \hline
 \text{Actual Rate} \\
 \hline
 1,550 \text{ hours} \\
 \times \\
 \$3.30 \text{ per hour}
 \end{array}$$

= \$5,115

$$\begin{array}{r}
 \text{Actual Hours} \\
 \times \\
 \hline
 \text{Standard Rate} \\
 \hline
 1,550 \text{ hours} \\
 \times \\
 \$3.00 \text{ per hour}
 \end{array}$$

= \$4,650

$$\begin{array}{r}
 \text{Standard Hours} \\
 \times \\
 \hline
 \text{Standard Rate} \\
 \hline
 1,500 \text{ hours} \\
 \times \\
 \$3.00 \text{ per hour}
 \end{array}$$

= \$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

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: Materials Quantity Variance

Materials Quantity Variance

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

Price variance
\$21 favorable

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

Quantity variance
\$0

Materials Variances—An Important Subtlety: Materials Price Variance

Materials Price Variance

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

Price variance
\$21 favorable



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

Quantity variance
\$0



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Thank You

