

ACC250: Intro to Financial Accounting
Ch7. Inventory & Cost of Goods Sold

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- 1 Introduction to Inventory
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Income Statement Equation

$$\text{Net Income} = \text{Revenues} - \text{Expenses}$$

Companies have incentives to

- Maximize Revenues.
- Minimize Expenses.

Companies care about the quality of their inventory.

- Damaged, expired, or obsolete inventory is not sellable. → Higher expenses.

Companies need to manage their inventory amount.

- Having too little inventory can lead to stockouts. → Lower revenues.
- Having too much inventory can lead to excess inventory. → Higher mgt expenses.¹

¹Management expenses include costs of maintaining and storing inventory, such as insurance.

Cost of Goods Sold (Expense)

The cost of the goods sold during a period.

Inventory (Asset)

The total value of the goods held for sale in the ordinary course of business.

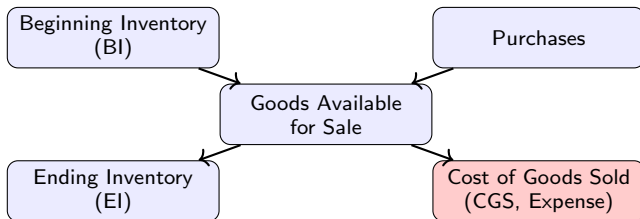
Recall: Inventory Equation

Inventory Equation

$$\text{End. Inventory} = \text{Beg. Inventory} + \text{Purchases} - \text{Cost of Goods Sold}$$

Inventory is

- **increased** when purchased;
- **decreased** when sold.



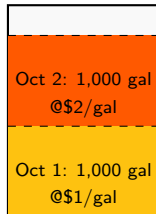
Opening Illustration 1

Suppose a gas station buys two batches of gasoline:

- Oct 1 – Purchased 1,000 gallons @ \$1/gallon = \$1,000
- Oct 2 – Purchased 1,000 gallons @ \$2/gallon = \$2,000
- Oct 2 – Sold 100 gallons to customers

Can we answer the following questions?

- How much have we paid for the gasoline (CGAS)?^a
- How much Cost of Goods Sold (CGS)?
- How much Ending Inventory (EI)?



^aCost of Goods Available for Sale. See Ch6.

Suppose Costco (COST) buys three batches of leggings from Lululemon (LULU):

- Oct 1 – Beginning Inventory: 10 units @ \$7 = \$70
- Oct 3 – Purchased 30 units @ \$8 = \$240
- Oct 5 – Purchased 10 units @ \$10 = \$100
- Oct 6 – Sold 35 units at \$20 each

Out of the 50 units available, if the firm sold 35 units at \$20 each, what would be the CGS and EI?

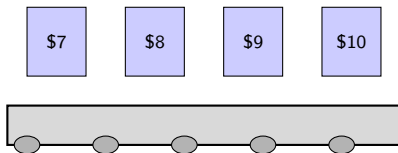
It'll be answered in Illustration 2!

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Inventory Costing Methods: Which one is assumed to be sold?

Four units of the same product but different input costs.
How much CGS if two units sold?



Inventory Costing Methods: Which one is assumed to be sold?

We need Cost Flow Assumption to calculate CGS and EI:

❶ Specific Identification

- ▶ Specific units are selected to be sold.
- ▶ Used by high-value items such as cars, jewelry, real estate.

❷ FIFO (First-In, First-Out)

- ▶ First units purchased are the first units sold.
- ▶ Used by most companies.

❸ LIFO (Last-In, First-Out)

- ▶ Last units purchased are the first units sold.
- ▶ Used by companies with rising prices.

Given the chosen inventory costing method, we follow the steps:

- ➊ Calculate the Cost of Goods Available for Sale (CGAS).
- ➋ Calculate the Cost of Goods Sold (CGS).
- ➌ Calculate the Ending Inventory (EI).

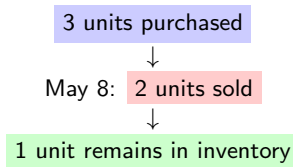
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Illustration 1: Specific Identification Method

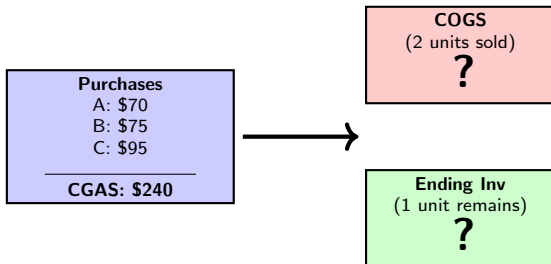
How much CGS and EI? Given Information:

- May 3 – Purchased 1 unit for \$70 (unit A)
- May 5 – Purchased 1 unit for \$75 (unit B)
- May 6 – Purchased 1 unit for \$95 (unit C)
- May 8 – Sold 2 units for \$125 each



Step 1: CGAS

We first calculate the Cost of Goods Available for Sale (CGAS). It does not depend on the inventory costing method.²

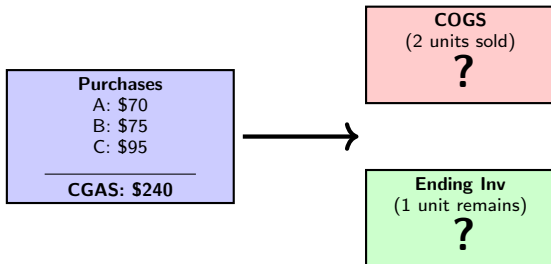


²Keep in mind that Cost Flow Assumption is about which units are assumed to be sold. CGAS is determined before the choice of inventory costing method.

Step 2 & 3 under Specific Identification Method

Specific Identification Method

- Specific units are selected to be sold.
- Used by high-value items such as cars, jewelry, real estate.



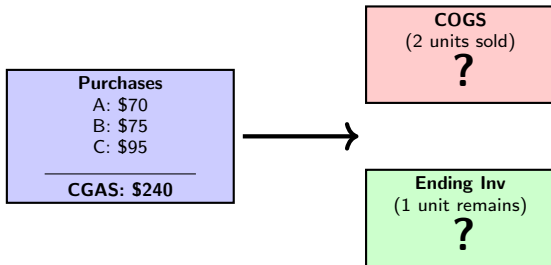
CGS and EI depend on the units that are assumed to be sold.

Which Units Sold?	CGAS	CGS	EI
A & B	\$240	$70 + 75 = \$145$	$\$95$
B & C	\$240	$75 + 95 = \$170$	$\$70$
A & C	\$240	$70 + 95 = \$165$	$\$75$

Step 2 & 3 under FIFO Method

FIFO Method (First-In, First-Out)

- First units purchased are the first units sold.
- Used by most companies.

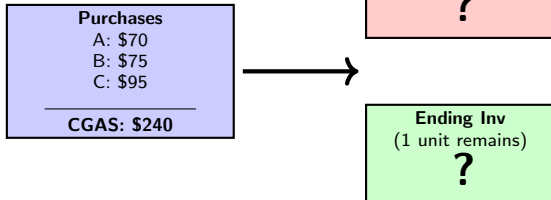


Method	CGAS	CGS	EI
FIFO	\$240	<u>70 + 75 = \$145</u>	<u>\$95</u>

Step 2 & 3 under LIFO Method

LIFO Method (Last-In, First-Out)

- Last units purchased are the first units sold.
- Used by companies with rising prices.



Method	CGAS	CGS	EI
LIFO	\$240	$95 + 75 = \$170$	$\$70$

Summary: Comparing Inventory Methods

We sold 2 units at \$125 each. So revenue is \$250.

Method	CGAS	COGS	Ending Inventory	Gross Profit
FIFO	\$240	\$145	\$95	<u>\$105</u>
LIFO	\$240	\$170	\$70	<u>80</u>
Specific ID	Varies	Varies	Varies	Varies

Implications: COGS, EI, and Gross Profit, and NI are different under different methods.

Summary: Comparing Inventory Methods

- Cash inflows (by selling inventory) are the same for all methods.
- Cash outflows (by purchasing inventory) are the same for all methods.
- But the allocation of CGAS to CGS and EI is different under different methods.

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Illustration 2: Multiple Purchases with Beginning Inventory

How much CGS and EI? Given Information:³

- Oct 1 – Beginning Inventory: 10 units @ \$7 = \$70
- Oct 3 – Purchased 30 units @ \$8 = \$240
- Oct 5 – Purchased 10 units @ \$10 = \$100
- Oct 6 – Sold 35 units (at \$20 each)

50 units available (10 + 30 + 10)



Oct 6: 35 units sold



15 units remain in inventory

³We focus on FIFO and LIFO. Too many items, so too many possibilities for Specific Identification.

Illustration 2: Multiple Purchases with Beginning Inventory

Oct 1: Beg. Inv.
10 units @ \$7

\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Oct 3: Purchase
30 units @ \$8

\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8
\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8
\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8

Oct 5: Purchase
10 units @ \$10

\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10
------	------	------	------	------	------	------	------	------	------

Question: Out of these 50 units, which 35 should be assigned to Cost of Goods Sold?

FIFO: First-In, First-Out (Sell oldest units first)

Oct 1: Beg. Inv.
10 units @ \$7

\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Oct 3: Purchase
30 units @ \$8

\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8
\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8
\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8

Oct 5: Purchase
10 units @ \$10

\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10
------	------	------	------	------	------	------	------	------	------

- CGS=Those in the dashed line= $7 * 10 + 8 * 25 = \$70 + \$200 = \$270$
- EI= Those not in the dashed line= $8 * 5 + 10 * 10 = \$40 + \$100 = \$140$

LIFO: Last-In, First-Out (Sell newest units first)

Oct 1: Beg. Inv.

10 units @ \$7

\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Oct 3: Purchase

30 units @ \$8

\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8
\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8
\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8

Oct 5: Purchase

10 units @ \$10

\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10
------	------	------	------	------	------	------	------	------	------

- CGS=Those in the dashed line = $10 * 10 + 25 * 8 = \$100 + \$200 = \$300$
- El= Those not in the dashed line = $10 * 7 + 5 * 8 = \$70 + \$40 = \$110$

Summary

Oct 1: Beg. Inv.
10 units @ \$7

\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Oct 3: Purchase
30 units @ \$8

\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8
\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8
\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8

Oct 5: Purchase
10 units @ \$10

\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10
------	------	------	------	------	------	------	------	------	------	------

	FIFO	LIFO
CGAS (Cost of Goods Available for Sale)	<u>\$410</u>	<u>\$410</u>
CGS (Cost of Goods Sold)	<u>\$270</u>	<u>\$300</u>
EI (Ending Inventory)	<u>\$140</u>	<u>\$110</u>

Impact on Gross Profit and Net Income

Suppose that the firm sold 35 units for \$20 each.

	FIFO	LIFO
Sales Revenues	\$700	\$700
Cost of Goods Sold (CGS)	<u>\$270</u>	<u>\$300</u>
Gross Profit	<u>\$430</u>	<u>\$400</u>
Expenses other than CGS	\$320	\$320
Net Income	<u>\$110</u>	<u>\$80</u>

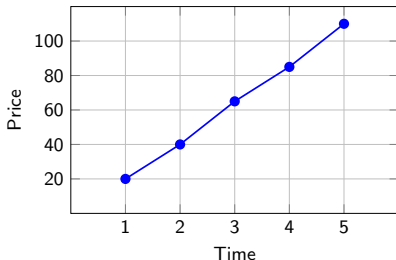
Implications: FIFO and LIFO can lead to different gross profit and net income.

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CGS and EI under Inflation

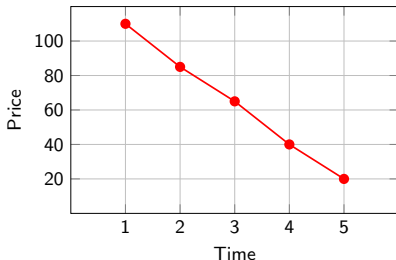
Suppose prices are rising.



	FIFO	LIFO
Units sold first?	The first units bought	The last units bought
The sold ones are:	the cheapest	the most expensive
Cost of Goods Sold	Lower	Higher
Ending Inventory	<u>Higher</u>	<u>Lower</u>
Gross Profit	<u>Higher</u>	<u>Lower</u>
Net Income	<u>Higher</u>	<u>Lower</u>

CGS and EI under Deflation

Suppose prices are falling.



	FIFO	LIFO
Units sold first?	The first units bought	The last units bought
The sold ones are:	the most expensive	the cheapest
Cost of Goods Sold	Higher	Lower
Ending Inventory	<u>Lower</u>	<u>Higher</u>
Gross Profit	<u>Lower</u>	<u>Higher</u>
Net Income	<u>Lower</u>	<u>Higher</u>

Perpetual inventory system (used in Ch6):

- This system is widely used in practice.
- But, it's more challenging to follow for some cost flow assumptions such as LIFO.

Periodic inventory system: Why do we use this here in Ch7?

- The majority of U.S. companies use FIFO.
- FIFO calculations don't differ between perpetual and periodic systems.
- So it's identical under both systems for FIFO.
- Additional benefits:
 - ▶ Easier to apply when calculating INVENTORY and CGS.
 - ▶ Easier to visualize the inventory flow.

Note: For further information, see **footnote 1** in Ch7; **Supplement 7A** for reasons why we use the perpetual inventory system in this chapter; and **Supplement 7B**, particularly for how to record inventory transactions using a FIFO perpetual inventory system. The details are beyond the scope of this course.

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Additional Exercise 1: Description

Exercise 1: JOP began operating on June 26 with no inventory on hand. The following transactions occurred during the month:

- June 27: Purchased 12 units at \$8 each.
- June 28: Purchased 38 units at \$9 each.
- June 29: Purchased 20 units at \$11 each.
- June 30: Sold 46 units.

Required:

- 1 Calculate the number of units and cost of goods available for sale.
- 2 Calculate the number of units in ending inventory at June 30.
- 3 Calculate the cost of ending inventory and the cost of goods sold under FIFO.
- 4 Calculate the cost of ending inventory and the cost of goods sold under LIFO.

Additional Exercise 1: FIFO case

June 27: Purchase

12 units @ \$8

\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8
\$8	\$8	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9
\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9
\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9
\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9
\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11
\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11

June 28: Purchase

38 units @ \$9

June 29: Purchase

20 units @ \$11

- The number of units available for sale: $12 + 38 + 20 = 70$ units.
- The cost of goods available for sale: \$658 (sum of the followings)
 - ▶ 12 units @ \$8 = \$96
 - ▶ 38 units @ \$9 = \$342
 - ▶ 20 units @ \$11 = \$220

Additional Exercise 1: FIFO case

Under **FIFO**: Which units are sold? CGS?

June 27: Purchase

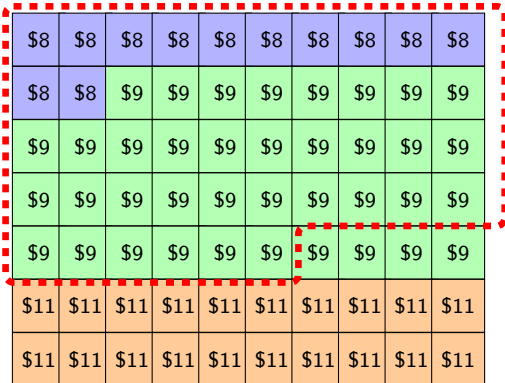
12 units @ \$8

June 28: Purchase

38 units @ \$9

June 29: Purchase

20 units @ \$11



\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8
\$8	\$8	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9
\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9
\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9
\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9
\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11
\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11

CGS= Sum of...

- 12 units @ \$8 = \$96
- 34 units @ \$9 = \$306

Additional Exercise 1: LIFO case

Under **LIFO**: Which units are sold? CGS?

June 27: Purchase

12 units @ \$8

\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8
\$8	\$8	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9

June 28: Purchase

38 units @ \$9

\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9
\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9
\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9

June 29: Purchase

20 units @ \$11

\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11
\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11

CGS= Sum of...

- 20 units @ \$11 = \$220
- 26 units @ \$9 = \$234

Additional Exercise 1: Summary Table

Summary of data:

Description	Value
Units of goods available for sale	70 units
Cost of goods available for sale	\$658
Units in EI	24 units
Units for CGS	46 units

	FIFO	LIFO
EI (cost)	\$256 (<u>20</u> × \$11 + <u>4</u> × \$9)	\$204 (<u>12</u> × \$8 + <u>12</u> × \$9)
CGS (cost)	\$402 (<u>12</u> × \$8 + <u>34</u> × \$9)	\$454 (<u>20</u> × \$11 + <u>26</u> × \$9)

Exercise 2: The following are the transactions for the month of July:

- July 1: Beginning Inventory - 50 units @ \$10 each.
- July 13: Purchase - 250 units @ \$13 each.
- July 25: Sold 100 units @ \$15 each.
- July 31: Ending Inventory - 200 units.

Required:

- 1 Calculate cost of goods available for sale and ending inventory under FIFO.
- 2 Calculate sales, cost of goods sold, and gross profit under FIFO.
- 3 Calculate cost of goods available for sale and ending inventory under LIFO.
- 4 Calculate sales, cost of goods sold, and gross profit under LIFO.

Assume a periodic inventory system is used.

Additional Exercise 2: Available for Sale

July 1: Beg. Inv.

50 units @ \$10

July 13: Purchase

250 units @ \$13

\$10	\$10	\$10	\$10	\$10	\$13	\$13	\$13	\$13	\$13
\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13
\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13

One box represents 10 units

- The number of units available for sale: $50 + 250 = 300$ units.
- The cost of goods available for sale: \$3,750 (sum of the followings)
 - ▶ 50 units @ \$10 = \$500
 - ▶ 250 units @ \$13 = \$3,250
- Units sold: 100 units
- Units in ending inventory: 200 units

Additional Exercise 2: FIFO case

Under **FIFO**: Which units are sold? COGS?

July 1: Beg. Inv.
50 units @ \$10

July 13: Purchase
250 units @ \$13



\$10	\$10	\$10	\$10	\$10	\$13	\$13	\$13	\$13	\$13
\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13
\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13

One box represents 10 units

COGS = Sum of...

- 50 units @ \$10 = \$500
- 50 units @ \$13 = \$650
- **Total COGS = \$1,150**

Ending Inventory:

- 200 units @ \$13 = \$2,600

Additional Exercise 2: FIFO - Income Statement

FIFO Periodic - Income Statement Items:

Item	Amount
Sales (100 units @ \$15)	\$1,500
Cost of Goods Sold	\$1,150
Gross Profit	\$350

Additional Exercise 2: LIFO case

Under **LIFO**: Which units are sold? COGS?

July 1: Beg. Inv.

50 units @ \$10

\$10	\$10	\$10	\$10	\$10	\$13	\$13	\$13	\$13	\$13
\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13
\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13

July 13: Purchase

250 units @ \$13

One box represents 10 units

COGS = Sum of...

- 100 units @ \$13 = \$1,300
- **Total COGS = \$1,300**

Ending Inventory:

- 50 units @ \$10 = \$500
- 150 units @ \$13 = \$1,950
- **Total Ending Inventory = \$2,450**

Additional Exercise 2: LIFO - Income Statement

LIFO Periodic - Income Statement Items:

Item	Amount
Sales (100 units @ \$15)	\$1,500
Cost of Goods Sold	\$1,300
Gross Profit	\$200

Additional Exercise 2: Summary Comparison

Summary of data:

Description	Value
Units of goods available for sale	300 units
Cost of goods available for sale	\$3,750
Units in EI	200 units
Units for COGS	100 units
Sales Revenue	\$1,500

	FIFO	LIFO
Ending Inventory (cost)	\$2,600	\$2,450
COGS (cost)	\$1,150	\$1,300
Gross Profit	\$350	\$200