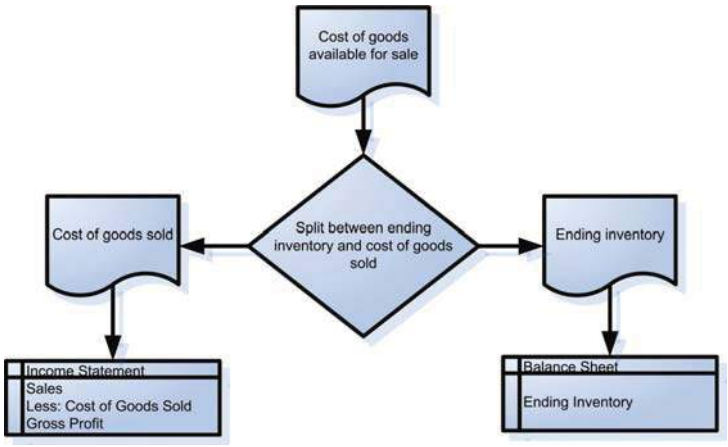
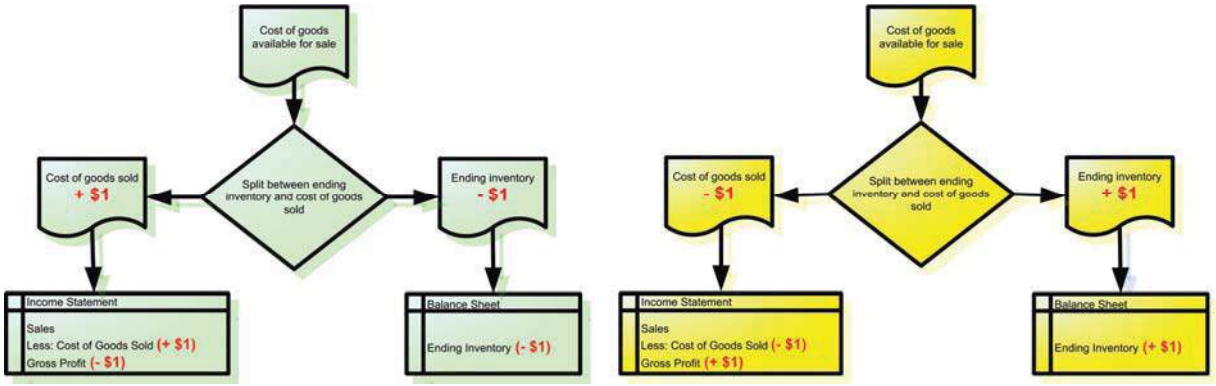
# 16. Inventory Costing Methods

Even a casual observer of the stock markets will note that stock values often move significantly on information about a company's earnings. Now, you may be wondering why a discussion of inventory would begin with this observation. The reason is that inventory measurement bears directly on the determination of income! Recall from earlier chapters this formulation:


Notice that the goods available for sale are "allocated" to ending inventory and cost of goods sold. In the graphic, the units of inventory appear as physical units. But, in a company's accounting records, this flow must be translated into units of money. After all, the balance sheet expresses inventory in money, not units. And, cost of goods sold on the income statement is also expressed in money:




This means that allocating $1 less of the total cost of goods available for sale into ending inventory will necessarily result in placing $1 more into cost of goods sold (and vice versa). Further, as cost of goods sold is increased or decreased, there is an opposite effect on gross profit. Remember, sales minus cost of goods sold equals gross profit. Thus, a critical factor in determining income is the allocation of the cost of goods available for sale between ending inventory and cost of goods sold:




## 16.1 Determining the Cost of Ending Inventory

In earlier chapters, the dollar amount for inventory was simply given. Not much attention was given to the specific details about how that cost was determined. To delve deeper into this subject, let's begin by considering a general rule: Inventory should include all costs that are "ordinary and necessary" to put the goods "in place" and "in condition" for their resale.

This means that inventory cost would include the invoice price, freight-in, and similar items relating to the general rule. Conversely, "carrying costs" like interest charges (if money was borrowed to buy the inventory), storage costs, and insurance on goods held awaiting sale would not be included in inventory accounts; instead those costs would be expensed as incurred. Likewise, freight-out and sales commissions would be expensed as a selling cost rather than being included with inventory.

## 16.2 Costing Methods

Once the unit cost of inventory is determined via the preceding rules of logic, specific costing methods must be adopted. In other words, each unit of inventory will not have the exact same cost, and an assumption must be implemented to maintain a systematic approach to assigning costs to units on hand (and to units sold).

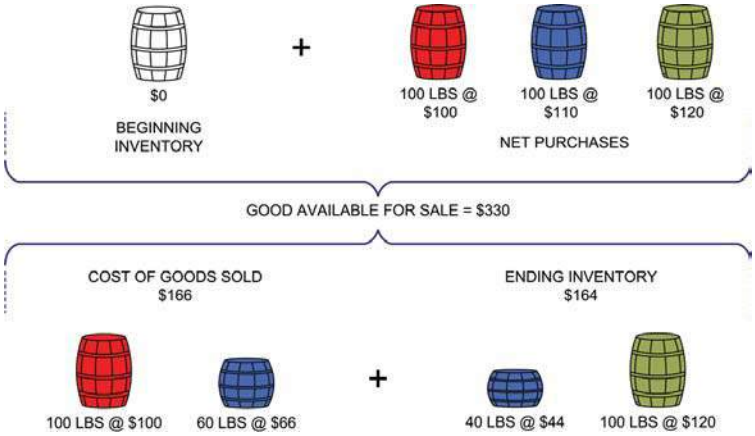
To solidify this point, consider a simple example: Mueller Hardware has a storage barrel full of nails. The barrel was restocked three times with 100 pounds of nails being added at each restocking. The first batch cost Mueller $100, the second batch cost Mueller $110, and the third batch cost Mueller $120. Further, the barrel was never allowed to empty completely and customers have picked all around in the barrel as they bought nails from Mueller (and new nails were just dumped in on top of the remaining pile at each restocking). So, its hard to say exactly which nails are "physically" still in the barrel. As you might expect, some of the nails are probably from the first purchase, some from the second purchase, and some from the final purchase. Of course, they all look about the same. At the end of the accounting period, Mueller weighs the barrel and decides that 140 pounds of nails are on hand (from the 300 pounds available). The accounting question you must consider is: what is the cost of the ending inventory? Remember, this is not a trivial question, as it will bear directly on the determination of income! To deal with this very common accounting question, a company must adopt an inventory costing method (and that method must be applied consistently from year to year). The methods from which to choose are varied, generally consisting of one of the following:

- First-in, first-out (FIFO)
- Last-in, first-out (LIFO)
- Weighted-average

Each of these methods entail certain cost-flow assumptions. Importantly, the assumptions bear no relation to the physical flow of goods; they are merely used to assign costs to inventory units. (Note: FIFO and LIFO are pronounced with a long "i" and long "o" vowel sound). Another method that will be discussed shortly is the specific identification method; as its name suggests, it does not depend on a cost flow assumption.

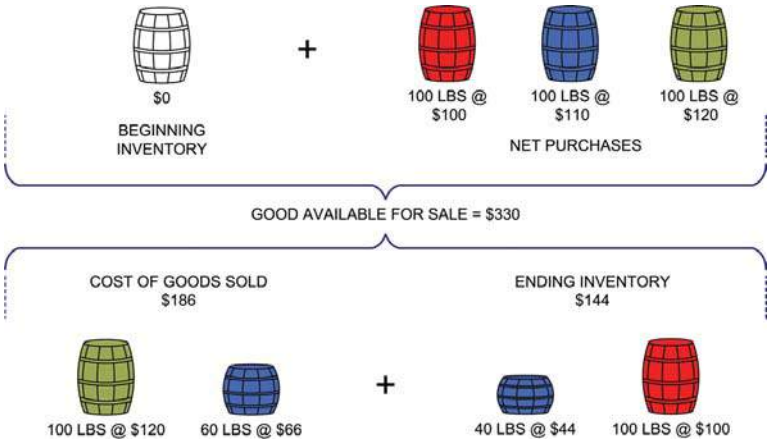
## 16.3 First-in, First-out Calculations

With first-in, first-out, the oldest cost (i.e., the first in) is matched against revenue and assigned to cost of goods sold. Conversely, the most recent purchases are assigned to units in ending inventory. For Mueller's nails the FIFO calculations would look like this:



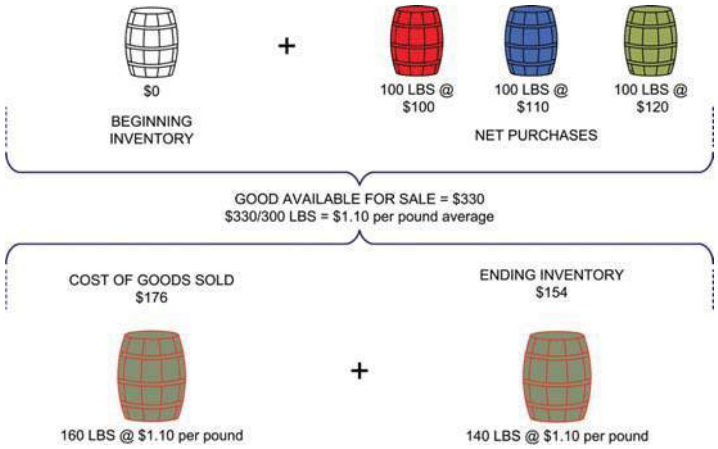
## 16.4 Last-in, First-out Calculations

Last-in, first-out is just the reverse of FIFO; recent costs are assigned to goods sold while the oldest costs remain in inventory:



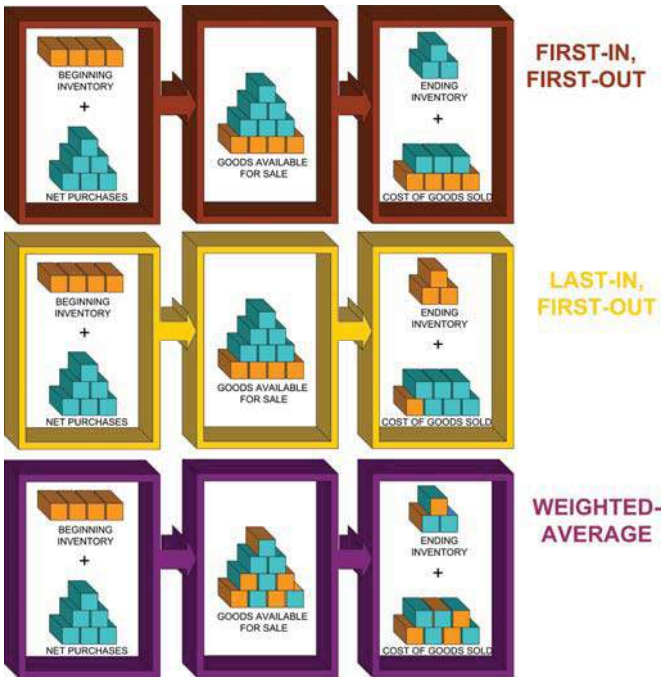

## 16.5 Weighted-Average Calculations

The weighted-average method relies on average unit cost to calculate cost of units sold and ending inventory. Average cost is determined by dividing total cost of goods available for sale by total units available for sale. Mueller Hardware paid $330 for 300 pounds of nails, producing an average cost of $1.10 per pound ($330/300). The ending inventory consisted of 140 pounds, or $154. The cost of goods sold was $176 (160 pounds X $1.10):




## 16.6 Preliminary Recap and Comparison

The preceding discussion is summarized by the following comparative illustrations. Examine each, noting how the cost of beginning inventory and purchases flow to ending inventory and cost of goods sold. As you examine this drawing, you need to know that accountants usually adopt one of these cost flow assumptions to track inventory costs within the accounting system. The actual physical flow of the inventory may or may not bear a resemblance to the adopted cost flow assumption.




## 16.7 Detailed Illustrations

Having been introduced to the basics of FIFO, LIFO, and weighted average, it is now time to look at a more comprehensive illustration. In this illustration, there will also be some beginning inventory that is carried over from the preceding year. Assume that Gonzales Chemical Company had a beginning inventory balance that consisted of 4,000 units with a cost of $12 per unit. Purchases and sales are shown in the schedule. The schedule suggests that Gonzales should have 5,000 units on hand at the end of the year. Assume that Gonzales conducted a physical count of inventory and confirmed that 5,000 units were actually on hand.

| Date | Purchases | Sales | Units on Hand |
|---|---|---|---|
| 1-JAN | | | 4,000 |
| 5-MAR | 6,000 UNITS @ $16 EACH | | 10,000 |
| 17-APR | | 7,000 UNITS @ $22 EACH | 3,000 |
| 7-SEP | 8,000 UNITS @ $17 EACH | | 11,000 |
| 11-NOV | | 6,000 UNITS @ $25 EACH | 5,000 |

Based on the information in the schedule, we know that Gonzales will report sales of $304,000. This amount is the result of selling 7,000 units at $22 ($154,000) and 6,000 units at $25 ($150,000). The dollar amount of sales will be reported in the income statement, along with cost of goods sold and gross profit. How much is cost of goods sold and gross profit? The answer will depend on the cost flow assumption adopted by Gonzales.

## 16.8 FIFO

If Gonzales uses FIFO, ending inventory and cost of goods sold calculations are as follows, producing the financial statements at right:

| | | |
|---|---|---|
| **Beginning inventory**<br>4,000 X $12 = $48,000 | + | **Net purchases ($232,000 total)**<br>6,000 X $16 = $96,000<br>8,000 X $17 = $136,000 |
| = | | |
| **Cost of goods available for sale ($280,000 total)**<br>4,000 X $12 = $48,000<br>6,000 X $16 = $96,000<br>8,000 X $17 = $136,000 | | |
| = | | |
| **Ending inventory ($85,000)**<br>5,000 X $17 = $85,000 | + | **Cost of goods sold ($195,000 total)**<br>4,000 X $12 = $48,000<br>6,000 X $16 = $96,000<br>3,000 X $17 = $51,000 |

GONZALES CHEMICAL COMPANY
Income Statement
For the Year Ending December 31, 20XX

| | | |
|---|---|---|
| REVENUES | | |
| Net sales | | $304,000 |
| COST OF GOODS SOLD | | |
| Beginning inventory, Jan. 1 | $ 48,000 | |
| Net purchases | 232,000 | |
| Goods available for sale | $280,000 | |
| Less: Ending inventory, Dec. 31 | 85,000 | |
| Cost of goods sold | | 195,000 |
| GROSS PROFIT | | $109,000 |
| . . . | | |

GONZALES CHEMICAL COMPANY
Balance Sheet
December 31, 20XX

| | |
|---|---|
| ASSETS | |
| . . . | |
| Inventory | 85,000 |

## 16.9 LIFO

If Gonzales uses LIFO, ending inventory and cost of goods sold calculations are as follows, producing the financial statements at right:

| | | |
|---|---|---|
| Beginning inventory<br>4,000 X $12 = $48,000 | + | Net purchases ($232,000 total)<br>6,000 X $16 = $96,000<br>8,000 X $17 = $136,000 |
| = | | |
| Cost of goods available for sale ($280,000 total)<br>4,000 X $12 = $48,000<br>6,000 X $16 = $96,000<br>8,000 X $17 = $136,000 | | |
| = | | |
| Ending inventory ($64,000)<br>4,000 X $12 = $48,000<br>1,000 X $16 = $16,000 | + | Cost of goods sold ($216,000 total)<br>8,000 X $17 = $136,000<br>5,000 X $16 = $80,000 |

GONZALES CHEMICAL COMPANY
Income Statement
For the Year Ending December 31, 20XX

| | | |
|---|---|---|
| REVENUES | | |
| Net sales | | $304,000 |
| COST OF GOODS SOLD | | |
| Beginning inventory, Jan. 1 | $ 48,000 | |
| Net purchases | 232,000 | |
| Goods available for sale | $280,000 | |
| Less: Ending inventory, Dec. 31 | 64,000 | |
| Cost of goods sold | | 216,000 |
| GROSS PROFIT | | $ 88,000 |
| . . . | | |

GONZALES CHEMICAL COMPANY
Balance Sheet
December 31, 20XX

| | |
|---|---|
| ASSETS | |
| . . . | |
| Inventory | 64,000 |

## 16.10 Weighted-Average

If the company uses the weighted-average method, ending inventory and cost of goods sold calculations are as follows, producing the financial statements at right:

| | |
|---|---|
| Cost of goods available for sale | $280,000 |
| Divided by units (4,000 + 6,000 + 8,000) | 18,000 |
| Average unit cost (note: do not round) | $15.5555 per unit |
| Ending inventory (5,000 units @ $15.5555) | $77,778 |
| Cost of goods sold (13,000 units @ $15.5555) | $202,222 |

GONZALES CHEMICAL COMPANY
Income Statement
For the Year Ending December 31, 20XX

| | | |
|---|---|---|
| REVENUES | | |
| Net sales | | $304,000 |
| COST OF GOODS SOLD | | |
| Beginning inventory, Jan. 1 | $ 48,000 | |
| Net purchases | 232,000 | |
| Goods available for sale | $280,000 | |
| Less: Ending inventory, Dec. 31 | 77,778 | |
| Cost of goods sold | | 202,222 |
| GROSS PROFIT | | $101,778 |
| . . . | | |

GONZALES CHEMICAL COMPANY
Balance Sheet
December 31, 20XX

| | |
|---|---|
| ASSETS | |
| . . . | |
| Inventory | 77,778 |

## 16.11 Comparing Inventory Methods

The following table reveals that the amount of gross profit and ending inventory numbers appear quite different, depending on the inventory method selected:

| | FIFO | LIFO | Weighted-Average |
|---|---|---|---|
| Sales | $304,000 | $304,000 | $304,000 |
| Cost of Goods Sold | 195,000 | 216,000 | 202,222 |
| Gross Profit | $109,000 | $ 88,000 | $101,778 |
| Ending Inventory | $ 85,000 | $ 64,000 | $ 77,778 |

The results above are consistent with the general rule that LIFO results in the lowest income (assuming rising prices, as was evident in the Gonzales example), FIFO the highest, and weighted average an amount in between. Because LIFO tends to depress profits, you may wonder why a company would select this option; the answer is sometimes driven by income tax considerations. Lower income produces a lower tax bill, thus companies will tend to prefer the LIFO choice. Usually, financial accounting methods do not have to conform to methods chosen for tax purposes. However, in the USA, LIFO "conformity rules" generally require that LIFO be used for financial reporting if it is used for tax purposes. In many countries LIFO is not permitted for tax or accounting purposes.

Accounting theorists may argue that financial statement presentations are enhanced by LIFO because it matches recently incurred costs with the recently generated revenues. Others maintain that FIFO is better because recent costs are reported in inventory on the balance sheet. Whichever side of this debate you find yourself, it is important to note that the inventory method in use must be clearly communicated in the financial statements and related notes. Companies that use LIFO will frequently augment their reports with supplement data about what inventory would be if FIFO were instead used. No matter which method is selected, consistency in method of application should be maintained. This does not mean that changes cannot occur; however, changes should only be made if financial accounting is improved.

## 16.12 Specific Identification

As was noted earlier, another inventory method is specific identification. This method requires a business to identify each unit of merchandise with the unit's cost and retain that identification until the inventory is sold. Once a specific inventory item is sold, the cost of the unit is assigned to cost of goods sold. Specific identification requires tedious record keeping and is typically only used for inventories of uniquely identifiable goods that have a fairly high per-unit cost (e.g., automobiles, fine jewelry, and so forth).