ACCT 101, Session 5: Inventory and merchandizing

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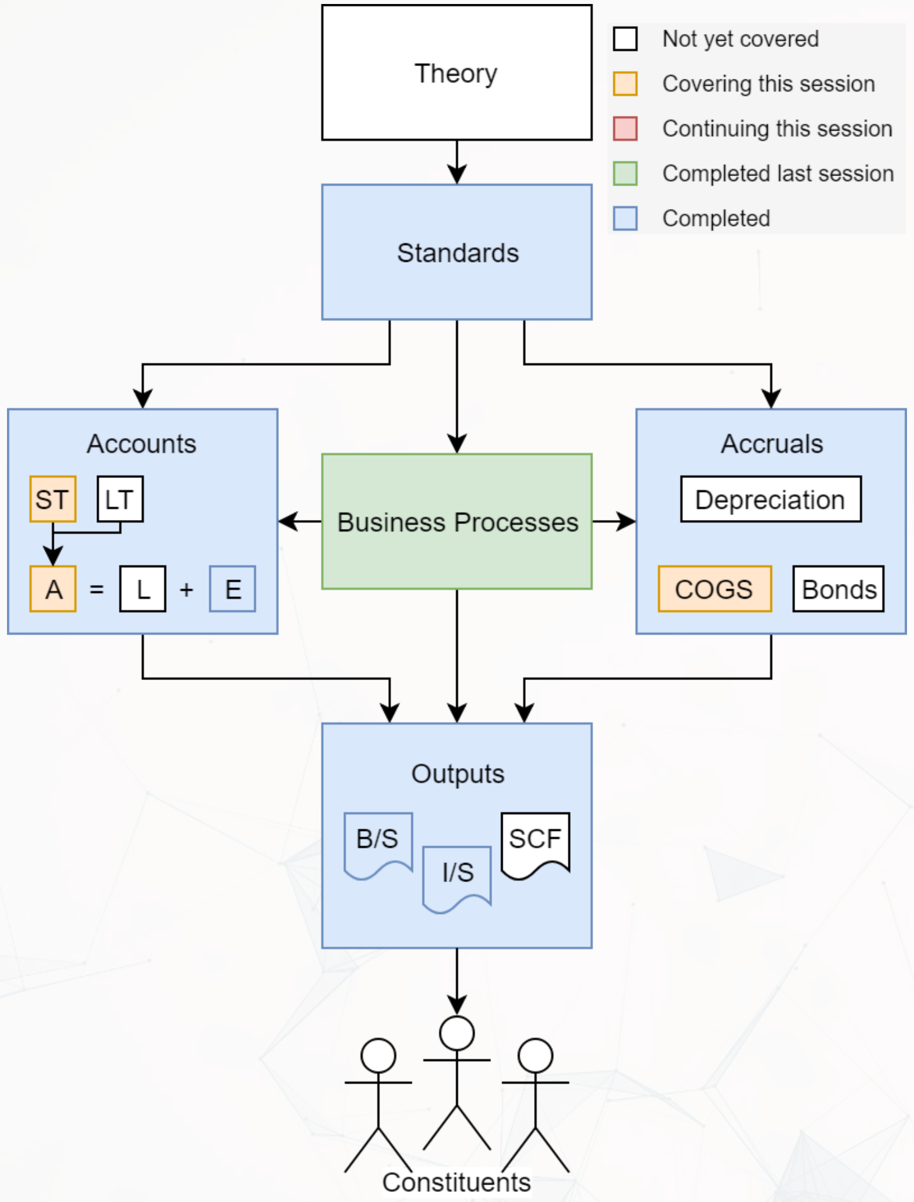
Learning objectives



Starting part 2 of the course

- Deep dive into transactions

Inventory (Chapter 6)

1. Understand the nature of inventory operations
2. Record inventory transactions
3. Determine inventory and COGS value

Nature of firms

What is inventory?

Definition from FRS2-6

Inventories are assets, held for sale in the ordinary course of business, or in the process of production for such sale, or in the form of materials or supplies to be consumed in the production process or in the rendering of services.

> Unsold inventory is an asset

> Sold inventory is converted to COGS (expense)

Importance of inventory

- Why hold inventory?
  - Supply can be erratic
  - No inventory could mean missed sales
  - Can buy more in low cost periods
    - Low costs from shipping, production, purchasing, etc.
- Drawbacks of inventory
  - Cost of holding
    - Warehousing, electricity, …
  - Liquidity – Cash tied up as inventory
  - Inventory obsolescence
  - Adverse price changes
    - Buy low, sell lower

Firm types

- Service firms
  1. Have little to no inventory
- Merchandisers
  1. Get inventory items
  2. Sell them at a higher price
     - Than inventory cost + overhead
- Manufacturers
  1. Get *raw materials*
  2. Transform raw materials into *finished goods*
  3. Sell them at a higher price
     - Than raw materials + transformation + overhead

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How to account for individual items?

1. Inventories recorded at cost of purchase
    - Will need a price and quantity
2. Add any conversion costs (manufacturing)
3. Add delivery fees to get the item
4. Subtract any discounts received
5. Make sure the above is lower than the intended selling price
    - If it’s not, decrease the value to selling price
        - Like with treasury stock and retained earnings, the decrease in value can be reversed later

> The above works for individual items, but we’ll need a way to track items purchased and used.

Inventory systems

Inventory systems

	Perpetual	Periodic
Inventory cost	Any	Low cost only
How?	Maintain a running total of all goods bought, sold, and available	Primarily through counts
Counting frequency	At least once per year	At least once per year, usually more often
Used by	Large businesses	Small businesses
Best for	Keeping an accurate account of inventory and COGS	Keeping tracking costs low

> Perpetual is better, but periodic is easier

Perpetual inventories

- Usually barcode based.
  - Allows efficient tracking

- Record two entries per transaction
  - DR Cash or A/R (↑), CR Revenue (↑)
  - DR COGS (↑), CR Inventory (↓)

Example: Perpetual inventory

Date	Account	DR	CR
20YY.MM.DD	Cash	100	
	Revenue		100
Made a $100 sale for cash			
20YY.MM.DD	COGS	50	
	Inventory		50
Used $50 of inventory to make the sale			

Periodic inventory

- Relies on counts for data
- Simpler, but less efficient
- One entry to record revenue
  - DR Cash or A/R (↑), CR Revenue (↑)
- Adjusting entry at end of each period
  - DR COGS (↑), CR Inventory (↓)

> Not practical for businesses that need close tracking of inventory

Inventory purchasing

Simple case

- Buying on cash or A/P
- Paying full amount

Example: Buying inventory, simple, cash

Date	Account	DR	CR
20YY.MM.DD	Inventory	100	
	Cash		100
Purchased $100 of inventory on cash			

Example: Buying inventory, simple, A/P

Date	Account	DR	CR
20YY.MM.D1	Inventory	100	
	A/P		100
Purchased $100 of inventory on A/P			
20YY.MM.D2	A/P	100	
	Cash		100
Paid A/P for inventory in full			

Shipping

- If there are shipping costs to *receive* the inventory, we add those to the inventory value itself
  - Debit inventory
  - Credit cash

Example: Purchased inventory on account, no transportation costs

Date	Account	DR	CR
20YY.MM.01	Inventory	100	
	A/P		100
Purchased $100 of inventory on A/P			
20YY.MM.15	A/P	100	
	Cash		100
Paid for inventory			

Example: Inventory on account, $10 transportation costs in cash

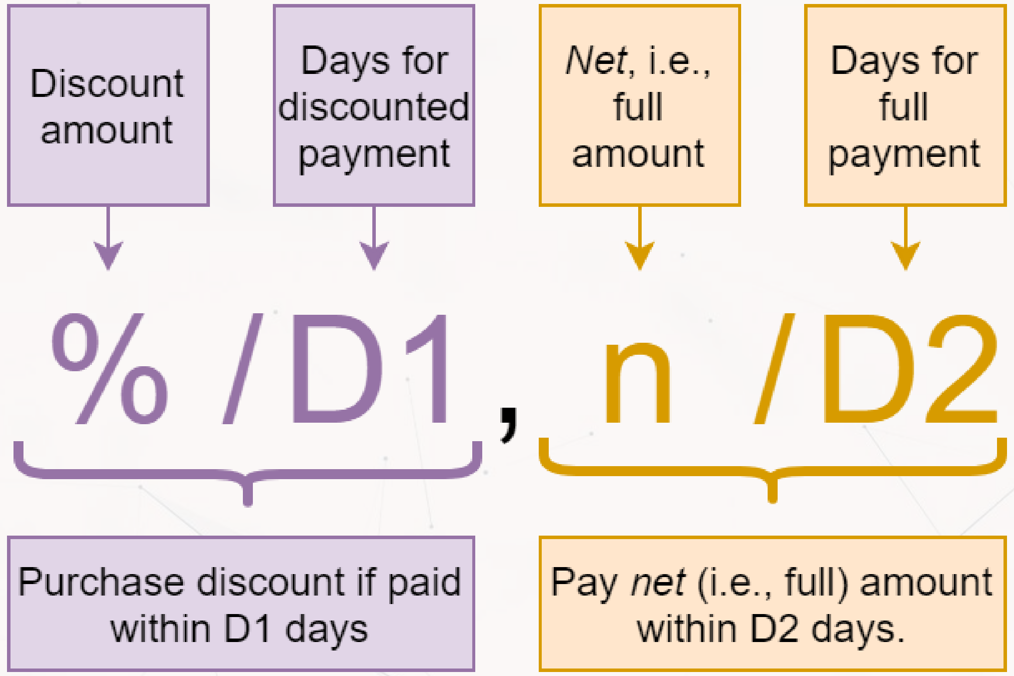
Date	Account	DR	CR
20YY.MM.01	Inventory	110	
	A/P		100
	Cash		10
Purchased $100 of inventory on A/P; paid $10 for delivery			
20YY.MM.15	A/P	100	
	Cash		100
Paid for inventory			

Returns

- Sometimes inventory needs to be returned
  - Wrong or faulty/broken items
- To record:
  - Directly credit the inventory account for the amount returned
    - OR: Credit "Purchase returns," a contra-asset to inventory
  - Debit…
    - A/P if not yet paid
    - Cash if paid and receiving cash now
    - A/R if paid and receiving credit now or cash later

Payment and discounts

- Sometimes companies offer discounts for paying early
- There is a standard format for B2B discounts:



- Ex.: 2/10, n/30 =
  - Get a 2% discount if paid in 10 days
  - Pay the full amount by 30 days.

Discounts in journal entries

- Record discount as a decrease in inventory
  - Remember: we record assets at cost paid for them
  - Can also record to a "purchase discounts" contra-asset

> Situation: Purchase inventory on account for $100 with 2/10 n/30 terms

Example: Purchase discounts, paying in discount period

Date	Account	DR	CR
20YY.MM.01	Inventory	100	
	A/P		100
Purchased $100 of inventory on A/P with 2/10, n/30 terms			
20YY.MM.05	A/P	100	
	Cash		98
	Inventory		2
Paid for inventory within 2/10 discount period (got 2% discount)			

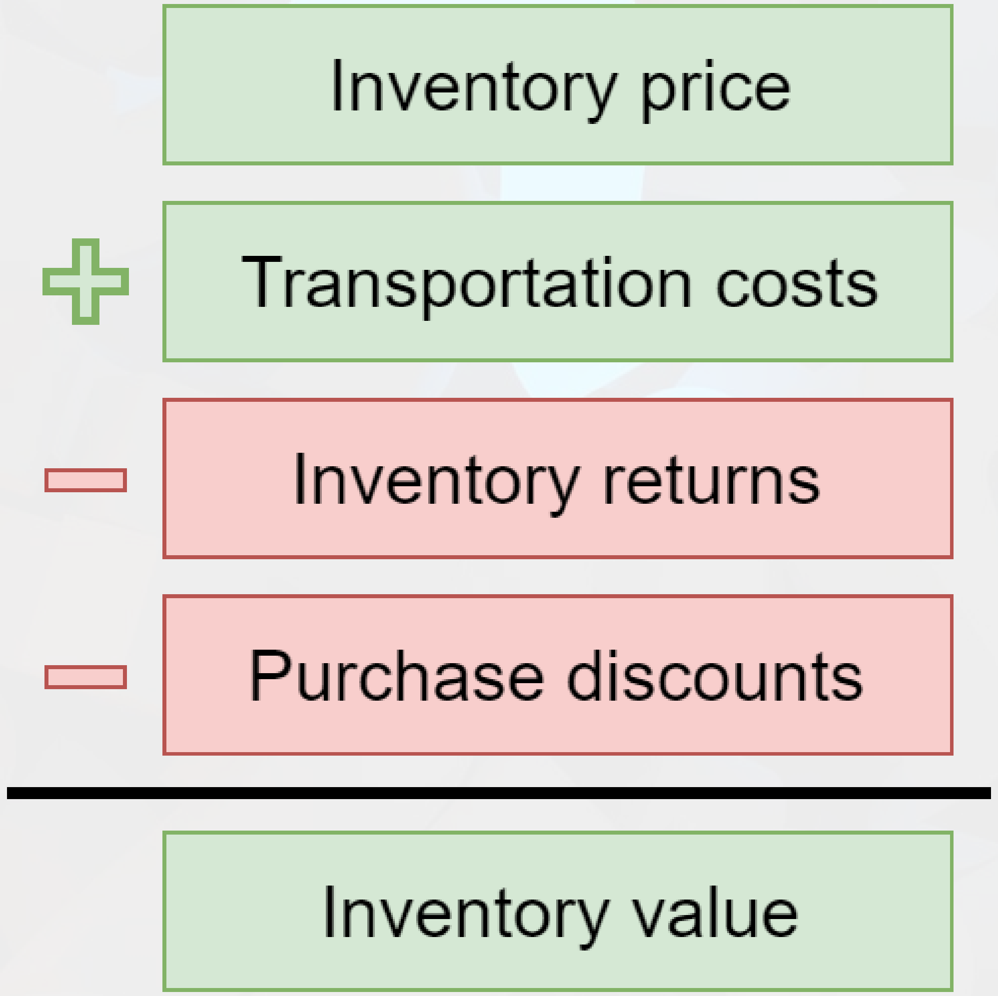
Example: Purchase discounts, paying outside discount period

Date	Account	DR	CR
20YY.MM.01	Inventory	100	
	A/P		100
Purchased $100 of inventory on A/P with 2/10, n/30 terms			
20YY.MM.15	A/P	100	
	Cash		100
Paid for inventory within n/30 discount period (paid full amount)			

Bringing it all together

Practice question (3 entries):

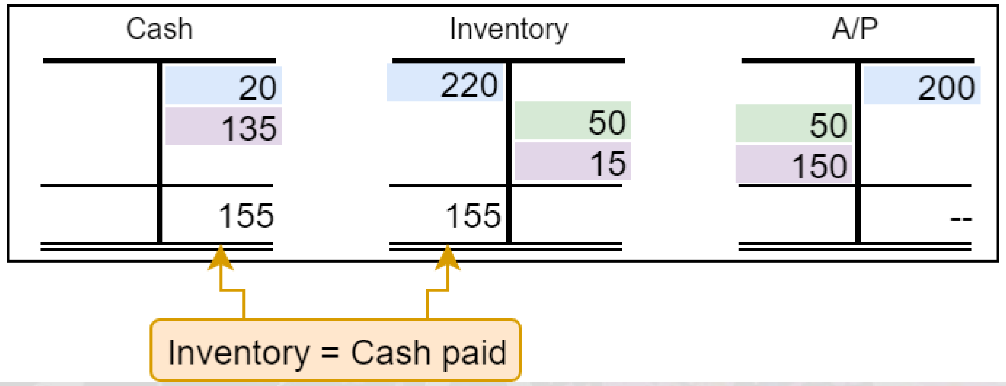
1. Purchased $200 of inventory on account with 10/5, n/45 terms
   - Also paid $20 in shipping to DHL on delivery
2. $50 of inventory was damaged, which we returned
3. Paid payable 3 days after receiving inventory



Practice solution

Full inventory purchasing example

Date	Account	DR	CR
20YY.MM.01	Inventory	220	
	Cash		20
	A/P		200
Purchased $200 of inventory on A/P with 10/5, n/45 terms. Paid $20 for delivery.			
20YY.MM.02	A/P	50	
	Inventory		50
Returned $50 of inventory			
20YY.MM.04	A/P	150	
	Cash		135
	Inventory		15
Paid payable in during discount period (10% discount)			



Inventory sales

General case

- Selling for cash or A/R
- Receiving full amount

Example: Selling inventory, simple, A/R

Date	Account	DR	CR
20YY.MM.D1	A/R	100	
	Revenue		100
Made $100 sale using $50 of inventory			
20YY.MM.D1	COGS	50	
	Inventory		50
Recorded usage of $50 of inventory			
20YY.MM.D2	Cash	100	
	A/R		100
Received A/R payment in full			

Revenue for goods

- Recognize revenue when earned
  - Recall from lesson 2: Revenue recognition principle
- FOB shipping point: record when given to shipping company
- FOB destination: Record when customer receives goods
  - Since we will need to pay shipping, we will have a *Delivery expense* account, an operating expense

Example: Selling inventory, simple, A/R

Date	Account	DR	CR
20YY.MM.D1	A/R	100	
	Revenue		100
Made $100 sale using $50 of inventory			
20YY.MM.D1	COGS	50	
	Inventory		50
Recorded usage of $50 of inventory			
20YY.MM.D1	Delivery expense	10	
	Cash		10
Paid for shipping for sale			

Returns, revisited

- Sometimes our sales are returned: Wrong or faulty/broken items
- To record, debit…
  - If faulty: *sales returns and allowances*
    - Contra-equity to revenue
- And credit…
  - A/R if not yet paid
  - Cash if paid and returning cash now
  - A/P if paid and giving credit now or returning cash later
- If reusable: also DR inventory and CR COGS

Example: Returned sales

Date	Account	DR	CR
20YY.MM.D1	A/R	100	
	Revenue		100
20YY.MM.D1	COGS	50	
	Inventory		50
Made a $100 sale, recorded $50 inventory usage			
20YY.MM.D2	Sales returns and allowances	40	
	A/R		40
Customer returned 40% of sale due to faulty items before paying			

Note: we only reverse the COGS part of the first entry if the goods are still usable.

Faulty = not usable
Wrong item = usable

Discounts, revisited

- We use the same discount terminology here
- Record any discount as a debit to *Sales discount*
  - Another contra-equity to revenue

> Situation: Sold inventory of $50 for $100 on account with 2/10 n/30 terms

Example: Discounts on sales

Date	Account	DR	CR
20YY.MM.01	A/R	100	
	Revenue		100
20YY.MM.01	COGS	50	
	Inventory		50
Made a $100 sale, recorded $50 inventory usage, terms are 2/10, n/30			
20YY.MM.05	Cash	98	
	Sales discount	2	
	A/R		100
Customer paid within discount period			

Example: No discount on sales

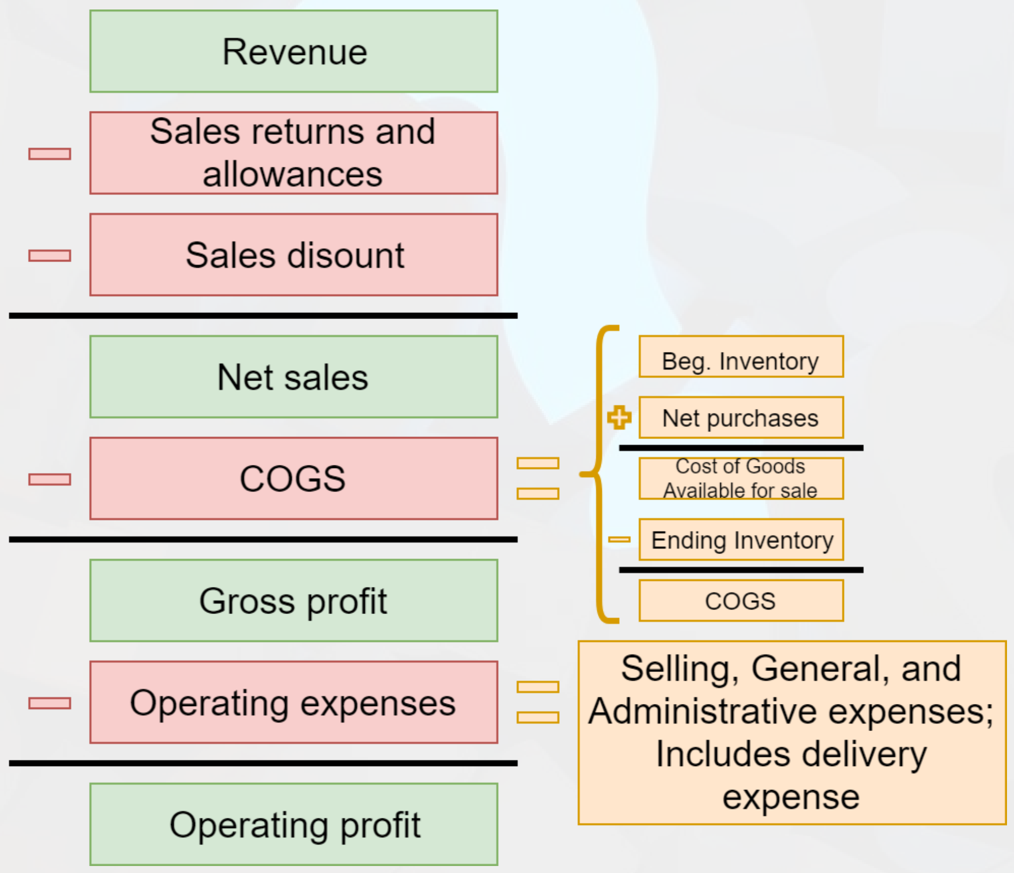
Date	Account	DR	CR
20YY.MM.01	A/R	100	
	Revenue		100
20YY.MM.01	COGS	50	
	Inventory		50
Made a $100 sale, recorded $50 inventory usage, terms are 2/10, n/30			
20YY.MM.05	Cash	100	
	A/R		100
Customer paid after discount period ended			

Bringing it all together

Practice question:

Determine the journal entries, and then calculate Net sales, Gross profit, and operating profit

1. Sold $155 of inventory for $300 on account with 10/5, n/45 terms
   - Also paid $20 in shipping to DHL for delivery
2. $50 of goods were damaged, which were returned to us
3. Customer Paid receivable 3 days after receiving goods



Practice solution

Full sales example

Date	Account	DR	CR
20YY.MM.01	A/R	300	
	Revenue		300
	COGS	155	
	Inventory		155
	Delivery expense	20	
	Cash		20
Sold $155 of inventory for $300 on 10/5, n/45 terms; paid $20 for shipping			
20YY.MM.02	Sales returns and allowances	50	
	A/R		50
Customer returned $50 of inventory due to damaged goods			
20YY.MM.04	Cash	225	
	Sales discounts	25	
	A/R		250
Received payment on A/R within the discount window (10% discount given)			

$300 Revenue
− $50 Sales returns and allowances
− $25 Sales discounts
$225 Net sales
− $155 COGS
$70 Gross profit
− $20 Delivery expense
$50 Operating profit

Inventory valuation

Net realizable value

- At the end of the day, we need inventory to be priced below *what we can earn from it*
  - We call this "what we can make from it" *net realizable value* (NRV)

> NRV is the estimated selling price in the ordinary course of business, less the estimated cost of completion and the estimated costs necessary to make the sale. [IAS 2.6]

- If Inventory < NRV
  - Do nothing, unless we previously wrote it down
- If Inventory > NRV
  - Need to *write down* to NRV

Buy low, selling lower…

- Need to write down your inventory value
  - If book value of inventory > *lower of cost or NRV*

> Situation: Inventory is valued at $1,500, but NRV is $1,000

Example: Inventory write-down

Date	Account	DR	CR
20YY.MM.DD	Inventory write-down	500	
	Inventory		500
Wrote down inventory to NRV			

- Can be reversed if the value goes back up
  - Only up to the amount originally written down
  - Credit *gain* when reversing

Note on conventions

- Using *Inventory writedown* is **always** correct
- Using *COGS* for inventory writedowns is fine for small adjustments
  - Usually when writing down by of inventory
  - Can use COGS for small theft $< 5\%$
  - Do not use COGS for major price drops

> Wrong in some parts of the book. Use the slides here!

> When in doubt, use *Inventory writedown*. This is always a correct answer.

Inventory errors

Problem, Year 1	Effect, Year 1	Effect, Year 2	Effect, Year 3
Overstated inventory (understated COGS)	I/S: Gross profit and net income overstated. B/S: Assets and equity overstated.	I/S: Gross profit and net income understated. B/S: Assets and equity back to normal.	I/S: Back to normal. B/S: No change.
Understated inventory (overstated COGS)	I/S: Gross profit and net income understated. B/S: Assets and equity understated.	I/S: Gross profit and net income overstated. B/S: Assets and equity back to normal.	I/S: Back to normal. B/S: No change.

> An error in 1 year leads to an error in the following year in the opposite direction

Gross profit method

- When you have a fixed margin, you can use this to determine COGS
  - Fixed margin means that COGS = constant % of sales
- Allows you to avoid counting inventory
- Example:
  - Coffee corp always sells bags of beans at a 25% markup. Revenue from selling bags of beans for the year was $10,000. What was the COGS for selling bags of beans?
  -
  - $Gross\ Margin = 1 - \frac{1}{1+Markup\ \%} = 1 - \frac{1}{1+25\%} = 20\%$
    $COGS = Sales \times (1 - Gross\ Marin) = \$10,000 \times (1 - 20\%) = \$8,000$

Practice: Gross profit method

> Situation: Coffee Corp sells all of their products using fixed margins. Determine the COGS for each product below, using the given revenues.

1. $50,000 worth of lattes were sold with a fixed gross margin of 70%
2. $9,000 worth of travel mugs were sold at a 50% mark-up
3. $1,000 worth of espresso cups were sold, comprising 50 cups each sold with $8 profit (all cups cost the same)



Solution: Gross profit method

> Situation: Coffee Corp sells all of their products using fixed margins. Determine the COGS for each product below, using the given revenues.

1. $50,000 worth of lattes were sold with a fixed gross margin of 70%
2. $9,000 worth of travel mugs were sold at a 50% mark-up
3. $1,000 worth of espresso cups were sold, comprising 50 cups each sold with $8 profit (all cups cost the same)

Solution

1. $COGS = \$50,000 \times (1 - 70\%) = \$15,000$
2. $COGS = \$9,000 \times \frac{1}{1+50\%} = \$6,000$
3. $COGS = \$1,000 - 50 \times \$8 = \$600$

Inventory costing

Inventory tracking methods

1. FIFO
   - **F**irst **I**n, **F**irst **O**ut

2. LIFO
   - **L**ast **I**n, **F**irst **O**ut

3. Average cost
   - Value / number of items

4. Specific identification
   - One-to-one tracking

> LIFO *is not allowed under IFRS* – but you need to know it

> First three only require minimal tracking, and are used when you have multiple orders of the same thing at different prices

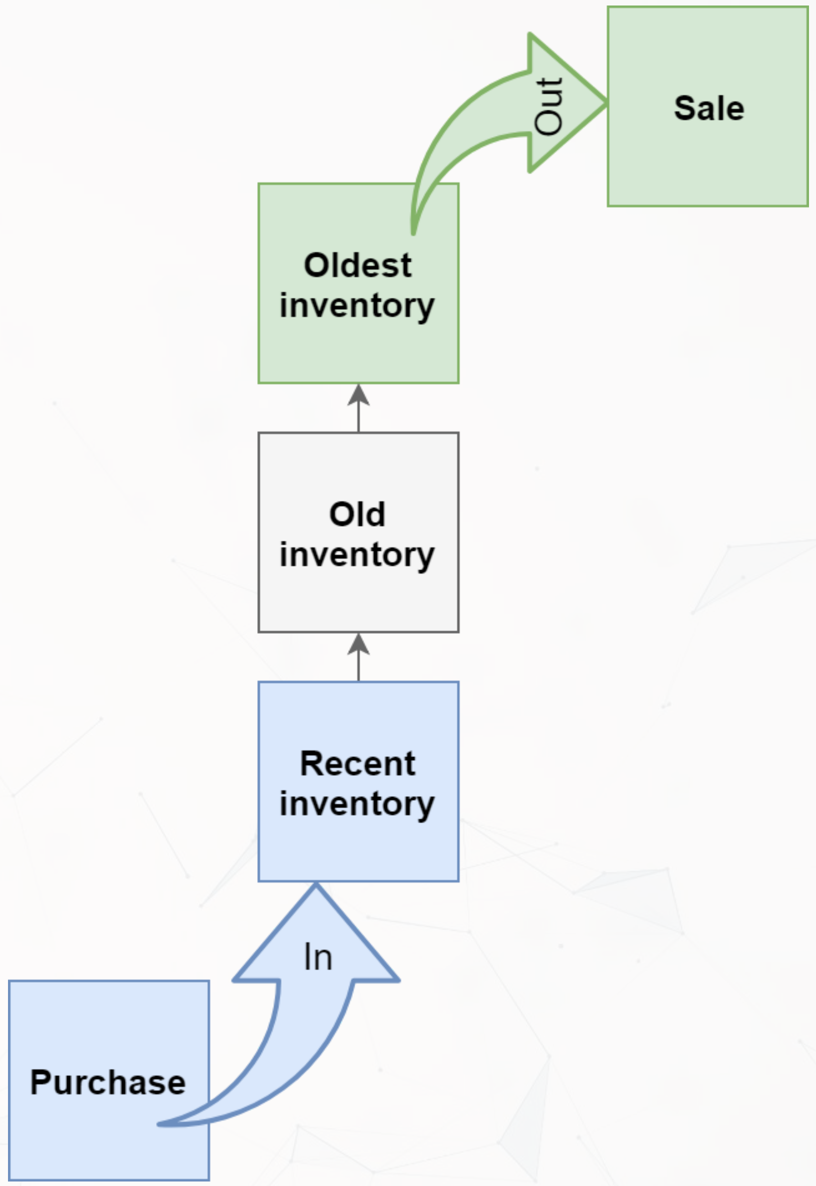
Specific identification

- Only used with expensive items
  - Too costly to track individual items otherwise
- Examples
  - Cars
  - Luxury goods
  - Real estate

Record COGS with revenue

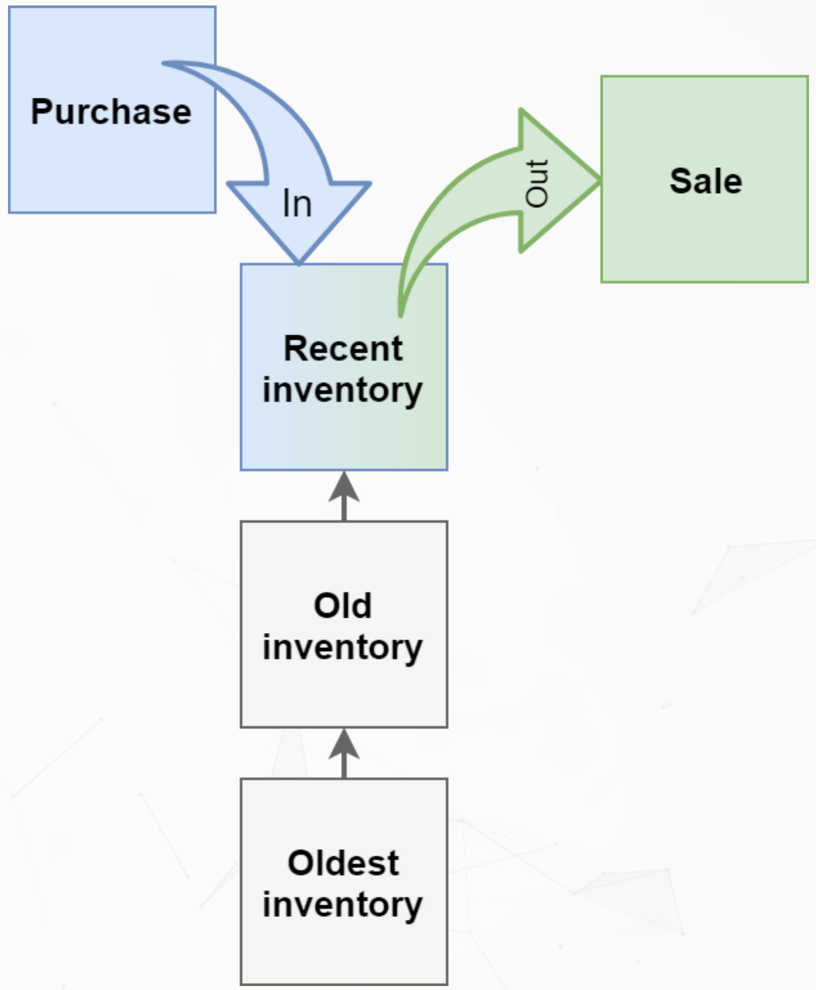
FIFO

- First In, First Out
- Assumes you sell items in the order you received them
- Ex.: You buy 5 bags of coffee beans for \$10 each, and then another 5 at \$12 each. You sell 3 bags and then 4 bags.
  - The first 3:
    - $$3 \times 10 = \$30$$
  - The next 4:
    - $$2 \times 10 + 2 \times 12 = \$44$$
  - COGS: \$74 for 7 bags



LIFO

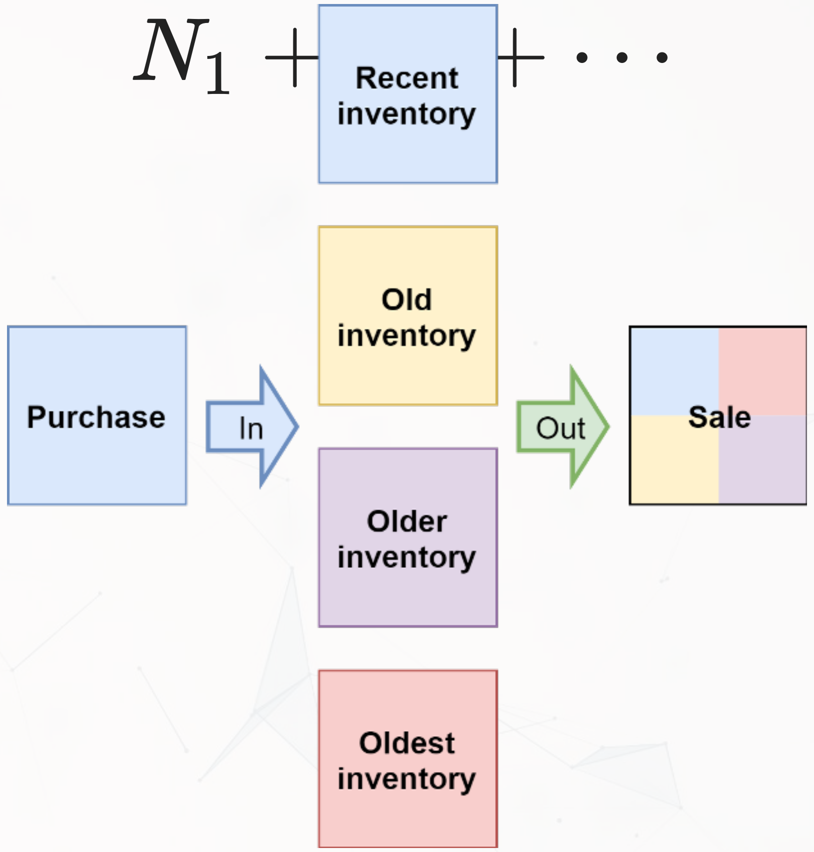
- Last In, First Out
- Assumes you sell the most recent items first
- Ex.: You buy 5 bags of coffee beans for \$10 each, and then another 5 at \$12 each. You sell 3 bags and then 4 bags.
  - The first 3:
    - $3 \times 12 = \$36$
  - The next 4:
    - $2 \times 12 + 2 \times 10 = \$44$
  - COGS: \$80 for 7 bags



Average cost

- Assumes you sell a mix
  - Weighted average
- P_i: price per item for order i
- N_i: number of items in order i
- Ex: You buy 5 bags of coffee beans for \$10 each, and then another 5 at \$12 each. You sell 3 bags and then 4 bags.
  - Avg cost: $\frac{5\times10+5\times12}{5+5} = \$11$
  - COGS: $7 \times \$11 = \$77$

$$Price = \frac{P_1 \times N_1 + P_2 \times N_2 + \cdots}{N_1 + N_2 + \cdots}$$



Mixing in perpetual/periodic

Perpetual

1. Calculate COGS for sales up to first purchase
2. Add in first purchase
3. Calculate COGS for sales up to next purchase
4. Add in next purchase
5. Repeat 3 and 4 until done

Periodic

1. Write out all your inventory for the period
2. Determine what was sold

> Equivalent to assuming we bought all inventory before making any sales.

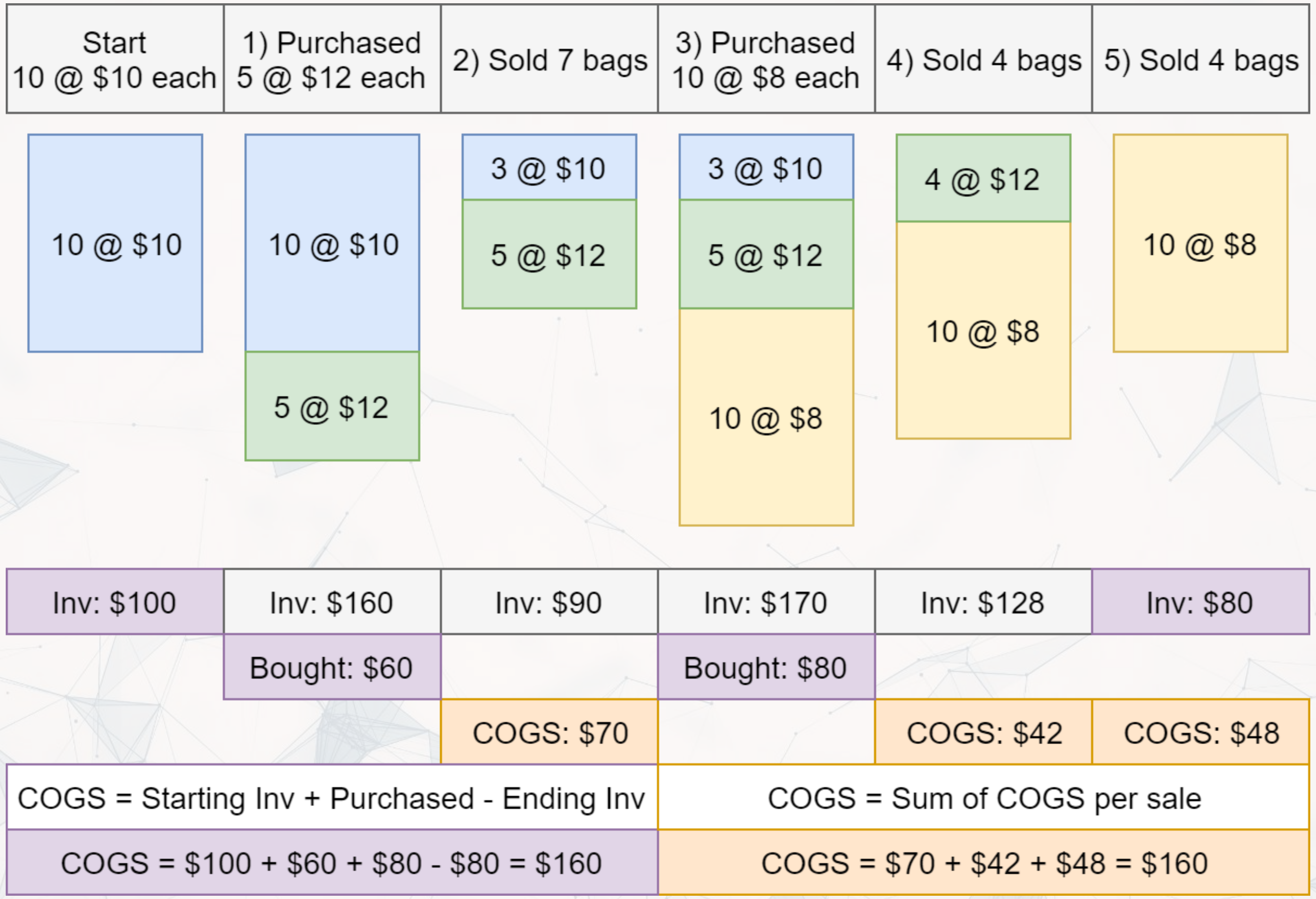
> Note: Perpetual and Periodic give the same answer under FIFO!

Comparison

- Profit depends on method choice!
  - FIFO typically leads to higher net income
  - Real effect: taxes depend on net income!
    - Use LIFO to minimize taxes?
- Choice can affect important ratios used in debt contracting
- Changing methods is allowed, but you need to report using **both** then
  - From our enhancing characteristic of *comparability*
- Reliability
  - FIFO leaves the most recent purchases in inventory, so the balance sheet numbers are more reliable
  - LIFO puts the most recent purchases in COGS, so the income statement numbers are more reliable
  - Average cost is between the two

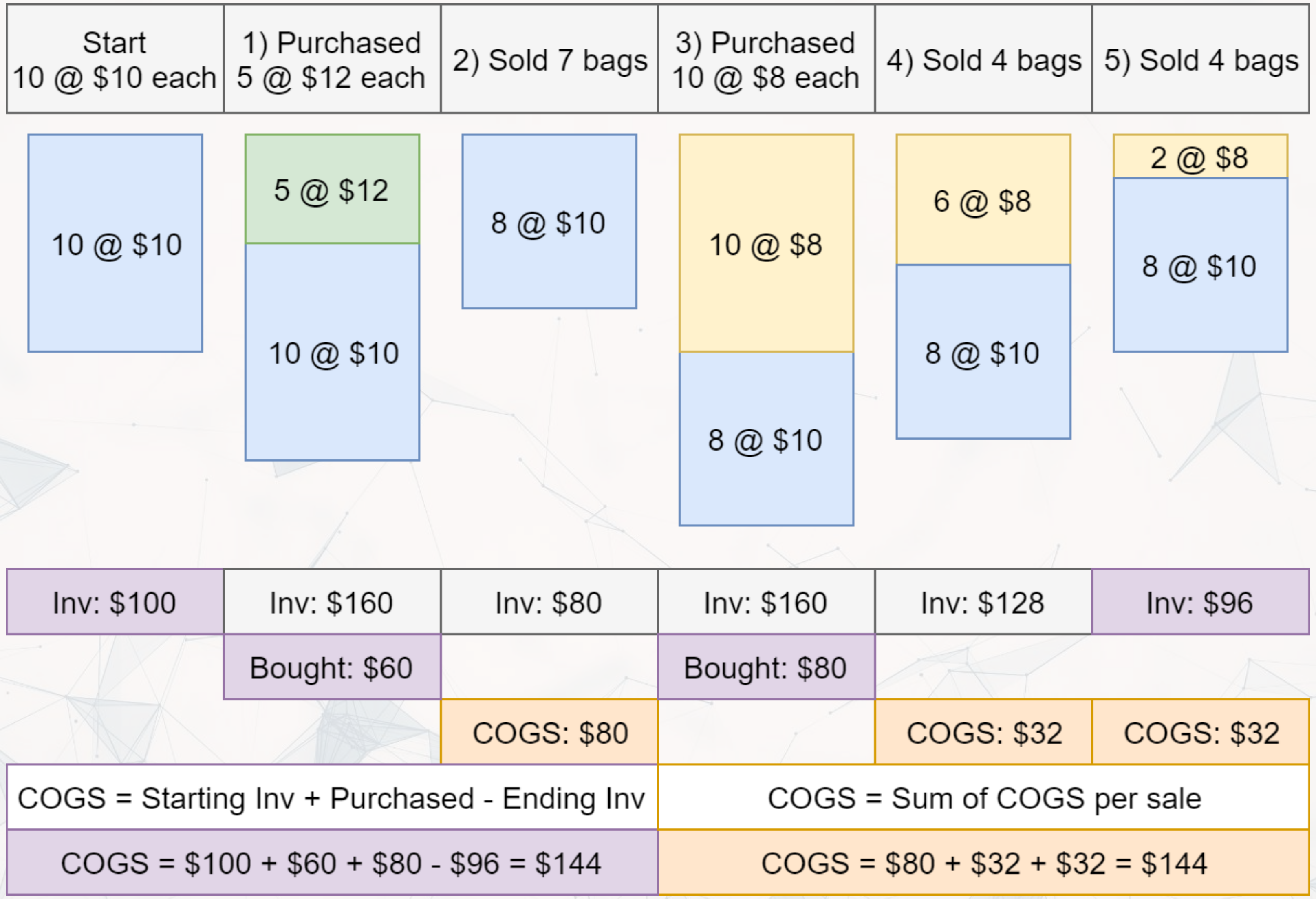
Example: FIFO, perpetual

> Started with 10 bags of coffee beans at $10 each. Then: 1) purchased 5 bags at $12 each; 2) Sold 7 bags; 3) Bought 10 bags at $8 each; 4) Sold 4 bags; 5) Sold 4 bags. Determine COGS.



Example: LIFO, perpetual

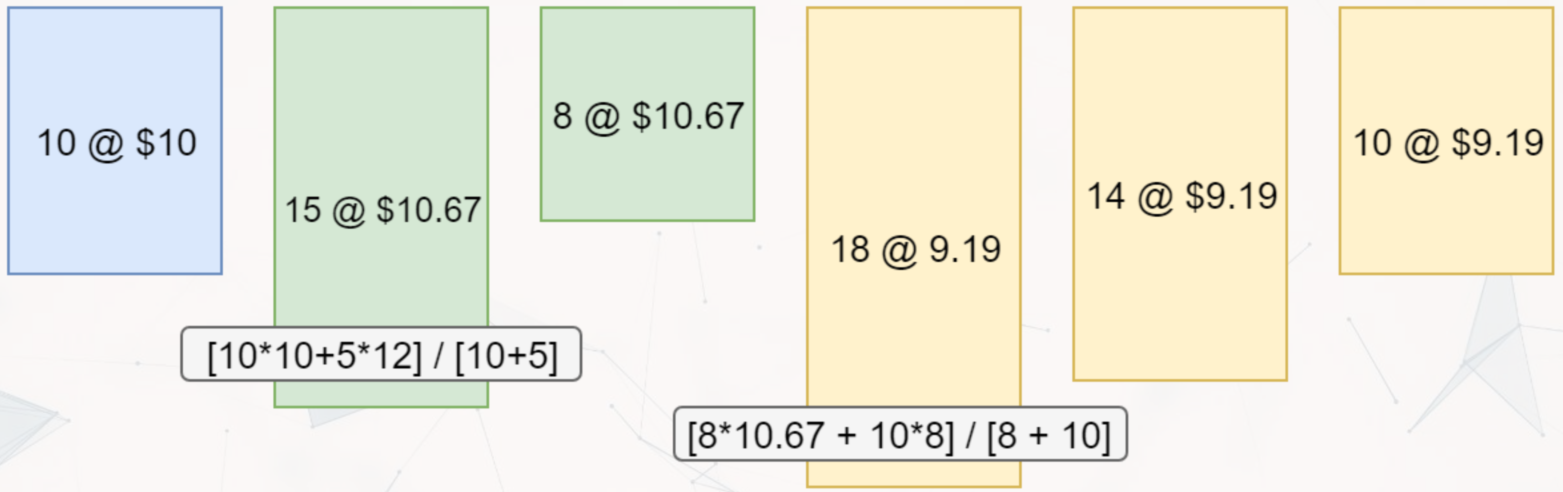
> Started with 10 bags of coffee beans at $10 each. Then: 1) purchased 5 bags at $12 each; 2) Sold 7 bags; 3) Bought 10 bags at $8 each; 4) Sold 4 bags; 5) Sold 4 bags. Determine COGS.



Example: Average cost, perpetual

> Started with 10 bags of coffee beans at $10 each. Then: 1) purchased 5 bags at $12 each; 2) Sold 7 bags; 3) Bought 10 bags at $8 each; 4) Sold 4 bags; 5) Sold 4 bags. Determine COGS.

Start 10 @ $10 each	1) Purchased 5 @ $12 each	2) Sold 7 bags	3) Purchased 10 @ $8 each	4) Sold 4 bags	5) Sold 4 bags

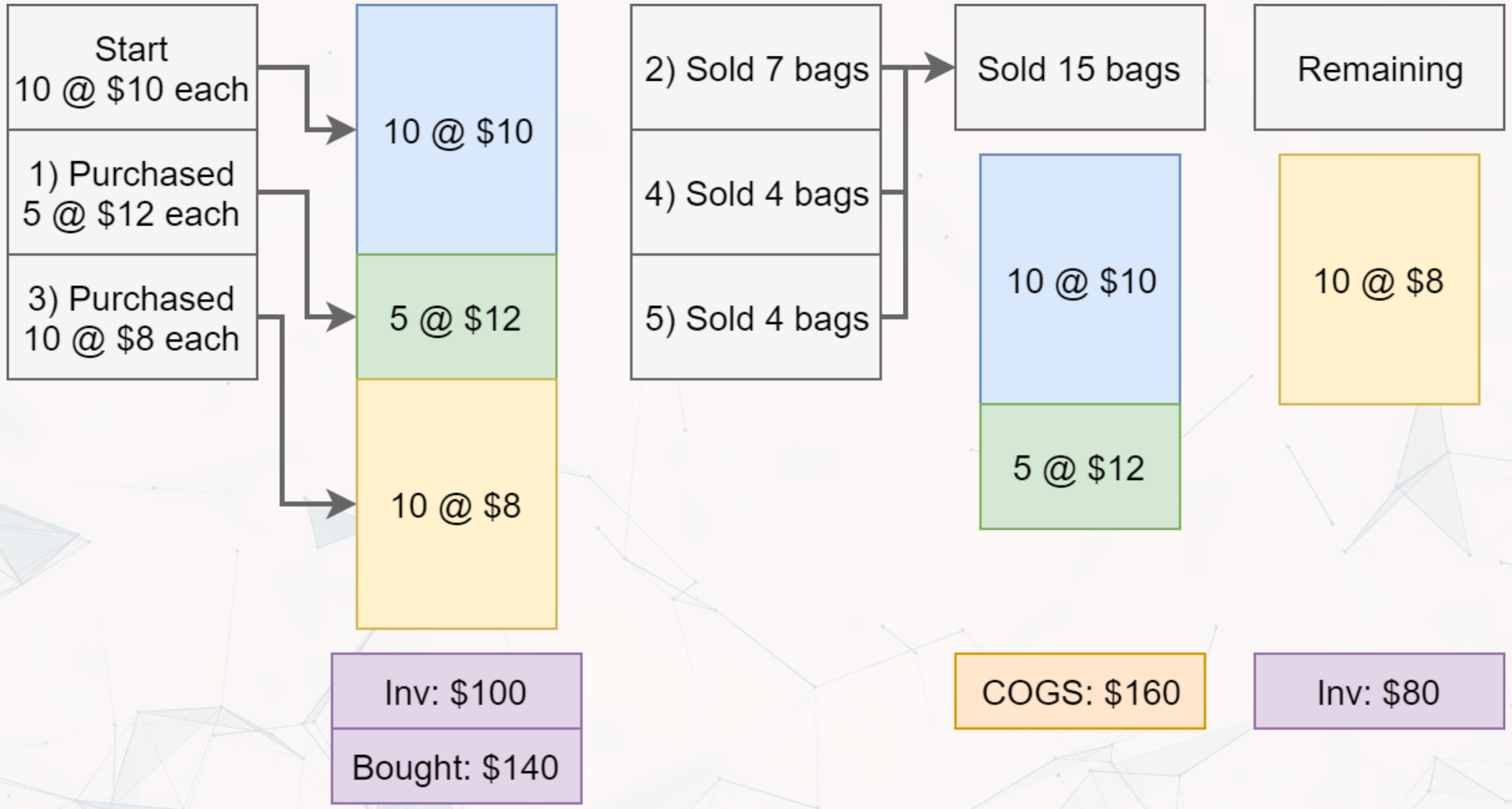


Inv: $100	Inv: $160	Inv: $85.33	Inv: $165.33	Inv: $128.59	Inv: $91.85
	Bought: $60		Bought: $80		
		COGS: $74.67		COGS: $36.74	COGS: $36.74

COGS = Starting Inv + Purchased - Ending Inv	COGS = Sum of COGS per sale
COGS = $100 + $60 + $80 - $91.85 = $148.15	COGS = $74.67 + $36.74 + $36.74 = $148.15

Example: FIFO, periodic

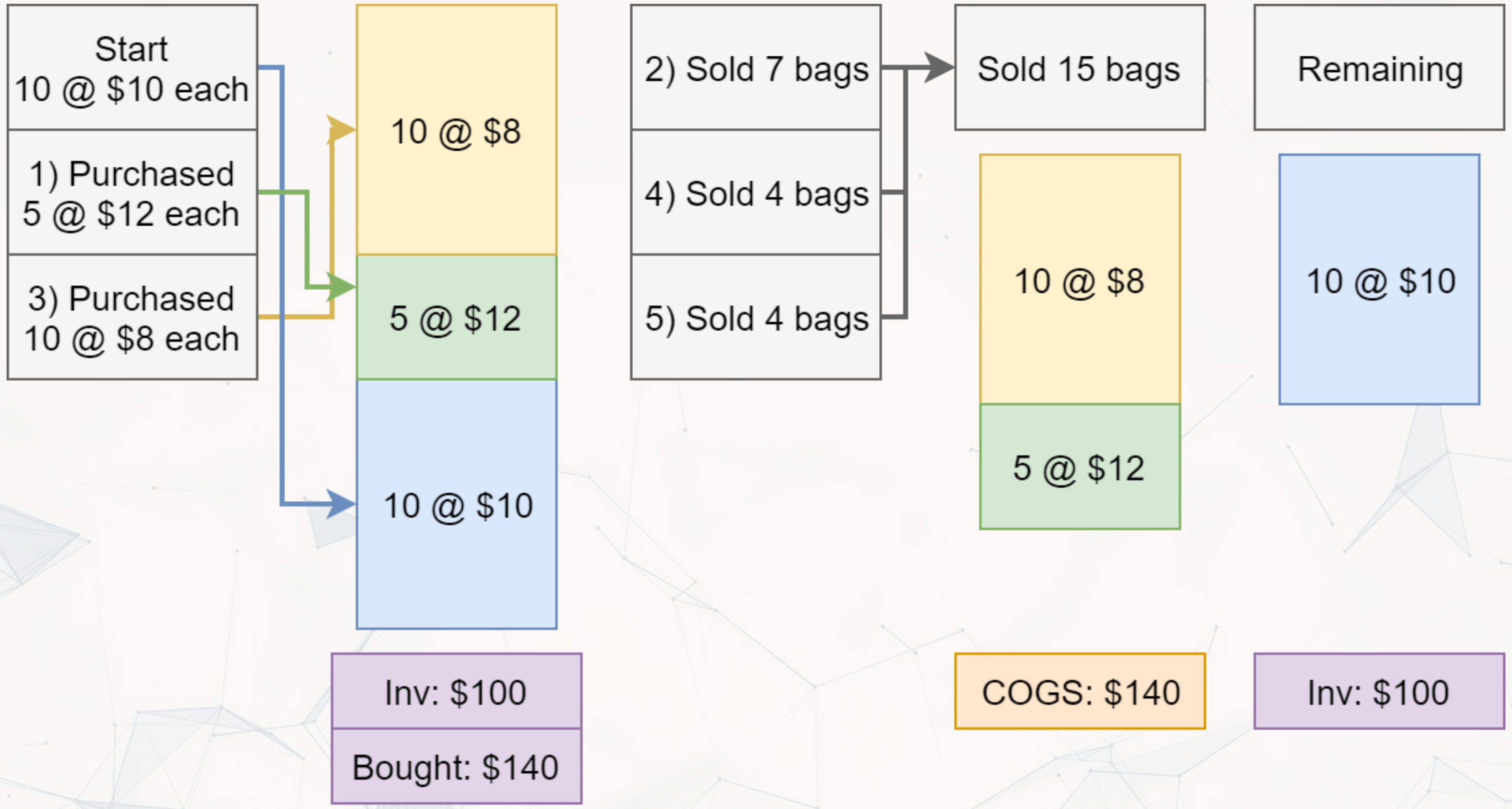
> Started with 10 bags of coffee beans at $10 each. Then: 1) purchased 5 bags at $12 each; 2) Sold 7 bags; 3) Bought 10 bags at $8 each; 4) Sold 4 bags; 5) Sold 4 bags. Determine COGS.



COGS = Starting Inv + Purchased - Ending Inv	COGS = Sum of COGS per sale
COGS = $100 + $140 - $80 = $160	COGS = $160

Example: LIFO, periodic

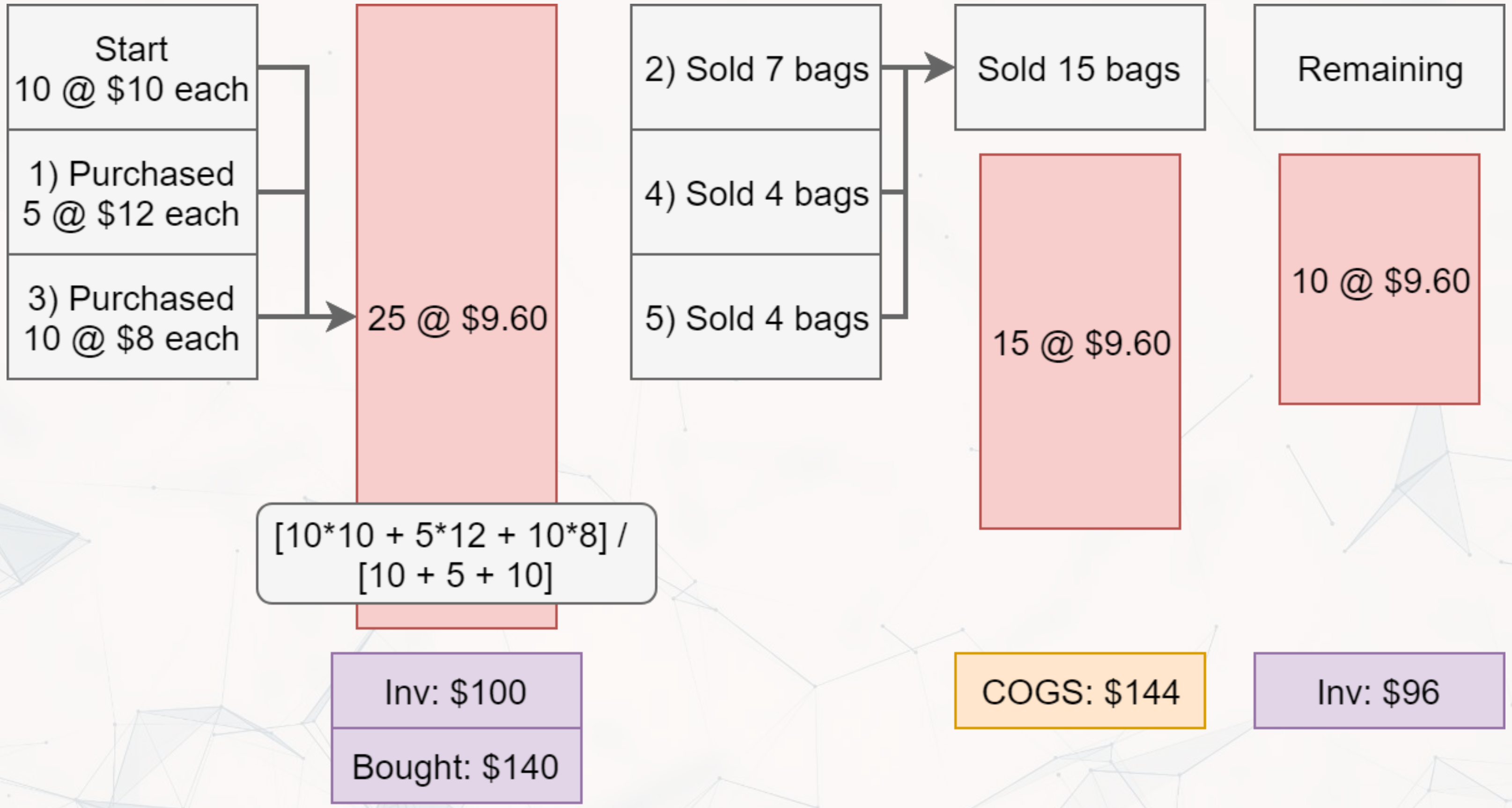
> Started with 10 bags of coffee beans at $10 each. Then: 1) purchased 5 bags at $12 each; 2) Sold 7 bags; 3) Bought 10 bags at $8 each; 4) Sold 4 bags; 5) Sold 4 bags. Determine COGS.



COGS = Starting Inv + Purchased - Ending Inv	COGS = Sum of COGS per sale
COGS = $100 + $140 - $100 = $140	COGS = $140

Example: Average cost, periodic

> Started with 10 bags of coffee beans at $10 each. Then: 1) purchased 5 bags at $12 each; 2) Sold 7 bags; 3) Bought 10 bags at $8 each; 4) Sold 4 bags; 5) Sold 4 bags. Determine COGS.



COGS = Starting Inv + Purchased - Ending Inv	COGS = Sum of COGS per sale
COGS = $100 + $140 - $96 = $144	COGS = $144

Inventory: Effects on Financial statements

- Inventory goes to the balance sheet
  - Almost always a current asset
    - Slow moving inventories can be non-current assets
- Purchase discounts decrease inventory
- COGS is an expense $\Rightarrow$ goes to income statement
- Sales returns and allowance, sales discount affect income statement
  - Decrease net revenue
- Inventory write-downs decrease net income
  - Reversals are gains $\Rightarrow$ increase OCI

Practice

Situation: Coffee Corp started the year with 100 coffee cups for sale, each originally purchased at $8. Determine the cost of goods sold under each inventory system given the transactions on the right.

- FIFO, Perpetual
- LIFO, Perpetual
- Average cost, Perpetual
- FIFO, Periodic
- LIFO, Periodic
- Average cost, Periodic

1. Sold 40 cups
2. Purchased 60 cups, $10 each
3. Sold 90 cups
4. Purchased 90 cups, $12 each
5. Sold 80 cups

An Excel template for this is on eLearn

Solutions

1. FIFO, Perpetual: $2,000
   - Remaining: 40 @ $12
2. LIFO, Perpetual: $2,120
   - Remaining: 10 @ $12, 30 @ $8
3. Average cost, Perpetual: $2,030
   - Remaining: 40 @ $11.25
4. FIFO, Periodic: $2,000
   - Remaining: 40 @ $12
5. LIFO, Periodic: $2,160
   - Remaining: 40 @ $8
6. Average cost, Periodic: $2,083.20
   - Remaining: 40 @ $9.92

Solution: FIFO, perpetual

Start 100 @ $8 each	1) Sold 40 cups	2) Bought 60 cups @ $10 each	3) Sold 90 cups	4) Bought 90 cups @ $12 each	5) Sold 80 cups
100 @ $8	60 @ $8	60 @ $8 60 @ $10	30 @ $10	30 @ $10 90 @ $12	40 @ $12
Inv: $800	Inv: $480	Inv: $1,080	Inv: $300	Inv: $1,380	Inv: $480
		Bought: $600		Bought: $1,080	
	COGS: $320		COGS: $780		COGS: $900

COGS = Starting Inv + Purchased - Ending Inv	COGS = Sum of COGS per sale
COGS = $800 + $600 + $1,080 - $480 = $2,000	COGS = $320 + $780 + $900 = $2,000

Solution: LIFO, perpetual

Start 100 @ $8 each	1) Sold 40 cups	2) Bought 60 cups @ $10 each	3) Sold 90 cups	4) Bought 90 cups @ $12 each	5) Sold 80 cups
100 @ $8	60 @ $8	60 @ $10	30 @ $8	90 @ $12	10 @ $12
		60 @ $8		30 @ $8	30 @ $8
Inv: $800	Inv: $480	Inv: $1,080	Inv: $240	Inv: $1,320	Inv: $360
		Bought: $600		Bought: $1,080	
	COGS: $320		COGS: $840		COGS: $960

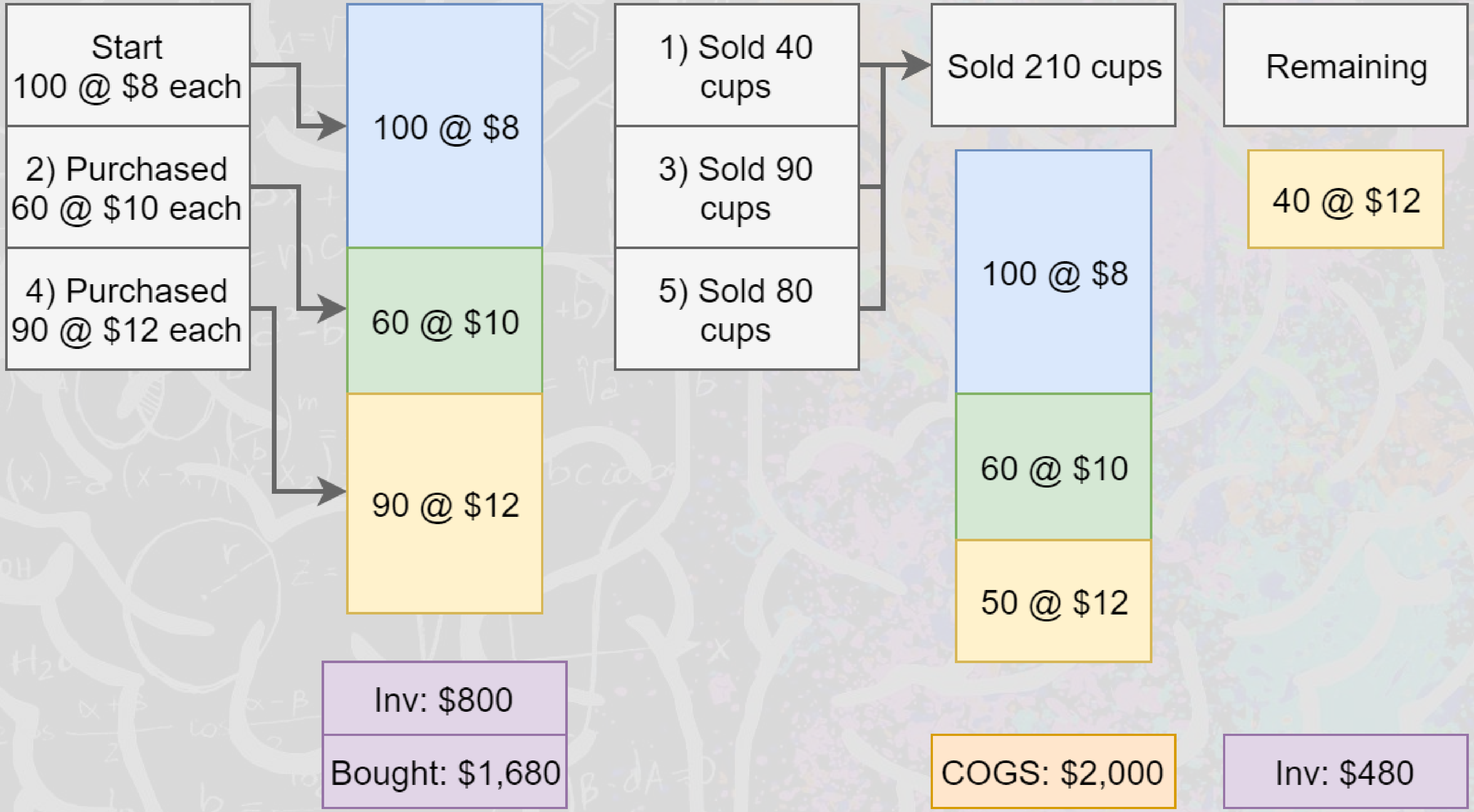
COGS = Starting Inv + Purchased - Ending Inv	COGS = Sum of COGS per sale
COGS = $800 + $600 + $1,080 - $360 = $2,120	COGS = $320 + $840 + $960 = $2,120

Solution: Average cost, perpetual

Start 100 @ $8 each	1) Sold 40 cups	2) Bought 60 cups @ $10 each	3) Sold 90 cups	4) Bought 90 cups @ $12 each	5) Sold 80 cups
100 @ $8	60 @ $8	120 @ $9	30 @ $9	120 @ $11.25	40 @ $11.25
		[60*8 + 60*10] / [60 + 60]		[30*9 + 90*12] / [30 + 90]	
Inv: $800	Inv: $480	Inv: $1,080	Inv: $270	Inv: $1,350	Inv: $450
		Bought: $600		Bought: $1,080	
	COGS: $320		COGS: $810		COGS: $900

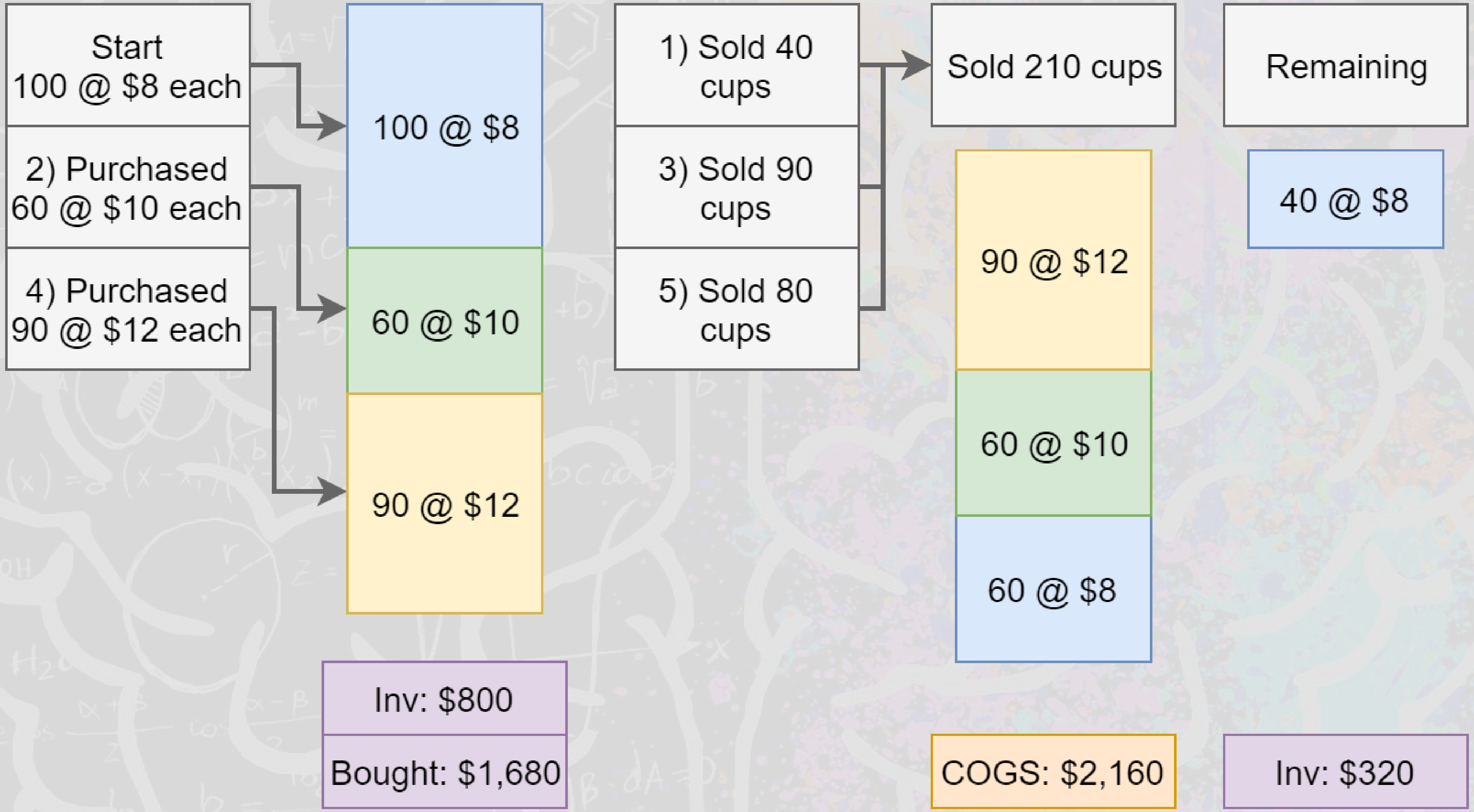
COGS = Starting Inv + Purchased - Ending Inv	COGS = Sum of COGS per sale
COGS = $800 + $600 + $1,080 - $450 = $2,030	COGS = $320 + $810 + $900 = $2,030

Solution: FIFO, periodic



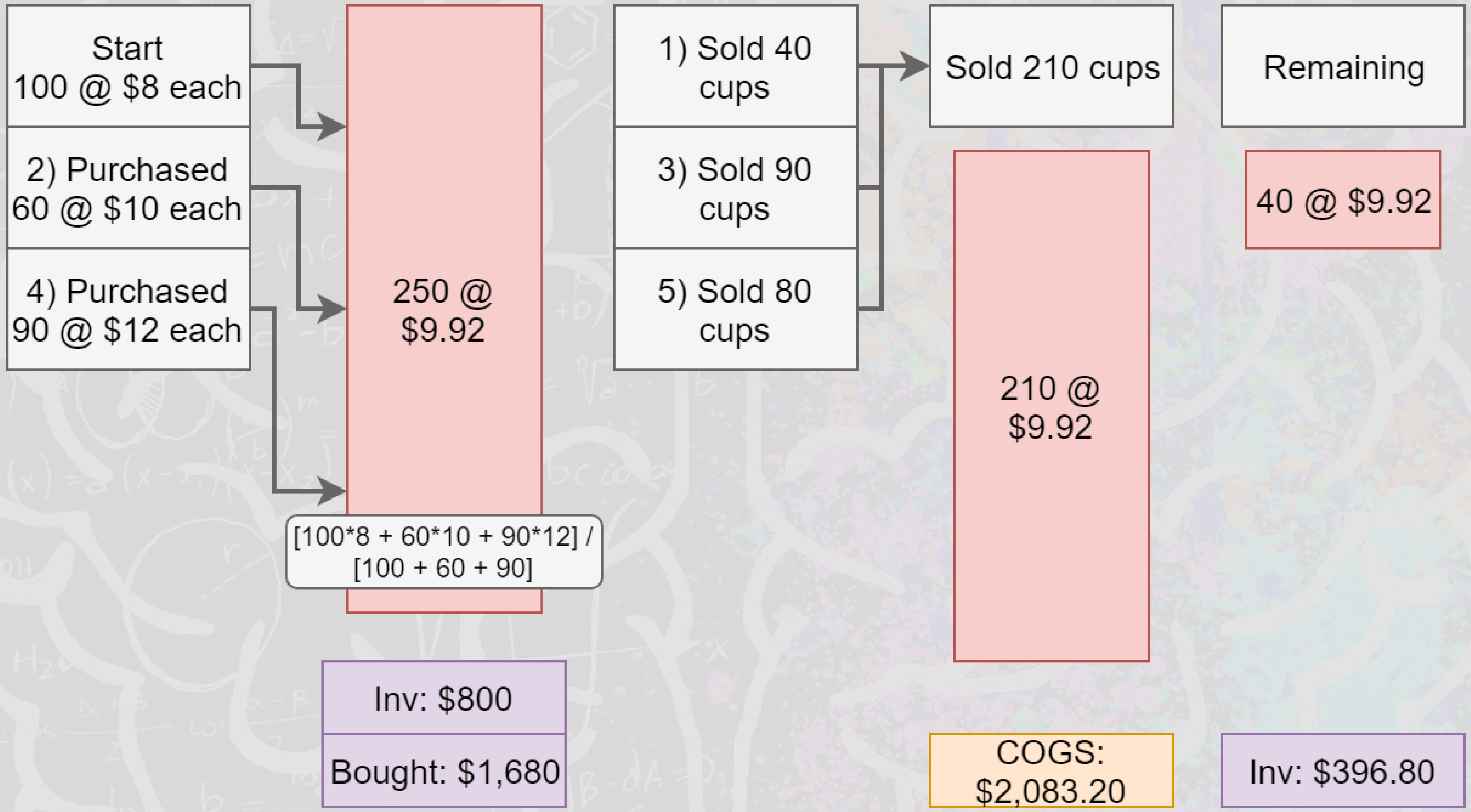
COGS = Starting Inv + Purchased - Ending Inv	COGS = Sum of COGS per sale
COGS = $800 + $1,680 - $480 = $2,000	COGS = $2,000

Solution: LIFO, periodic



COGS = Starting Inv + Purchased - Ending Inv	COGS = Sum of COGS per sale
COGS = $800 + $1,680 - $320 = $2,160	COGS = $2,160

Solution: Average cost, periodic



COGS = Starting Inv + Purchased - Ending Inv	COGS = Sum of COGS per sale
COGS = $800 + $1,680 - $396.80 = $2,083.20	COGS = $2,083.20

End matter

Wrap up

- For next week
  1. Recap the reading for this week
  2. Read the pages for next week
     - PP&E, Intangibles (Chapter 7)
  3. No homework
  4. Practice on eLearn
     - Practice on Inventory
     - Automatic feedback provided
- Survey on the class session at rmc.link/101survey5

Packages used for these slides

- kableExtra
- knitr
- revealjs