

1.{S}a. Start with the basic inventory relationship

$$BI + P = COGS + EI$$

Opening inventory	400 units @ \$20	\$ 8,000
Purchases	1,000	25,000
Total	1,400 units	\$33,000

(i) Under FIFO, ending inventory consists of 600 units:

100 purchased in second quarter at \$24	\$2,400
300 purchased in third quarter at \$26	7,800
200 purchased in fourth quarter at \$28	5,600
600 units total	\$15,800

(ii) Under LIFO, ending inventory consists of 600 units:

400 inventory at January 1 at \$20	\$8,000
200 purchased in first quarter at \$22	4,400
600 units total	\$12,400

(iii) Under average cost, ending inventory consists of 600 units with an average cost of $\$33,000/1,400 = \23.5714 per unit or \$14,142.84 total.

b. COGS for the year equals the \$33,000 total of opening inventory plus purchases, less closing inventory under the method chosen:

(i) FIFO: \$33,000 less \$15,800 = \$17,200

(ii) LIFO: \$33,000 less \$12,400 = \$20,600

(iii) Average cost: \$33,000 less \$14,142.84 = \$18,857.16

c.(i) Reported income is highest under FIFO (lowest COGS) and lowest under LIFO (highest COGS). Average cost is in between FIFO and LIFO.

(ii) Stockholders' equity is highest under FIFO (highest inventory and retained earnings) and lowest under LIFO (lowest inventory and retained earnings), with average cost in between.

2.Using FIFO instead of LIFO when prices are rising and inventory quantities are stable has the following effects:

- 1) Gross profit margins are higher under FIFO than under LIFO because revenues at higher current prices are matched with cost-of-goods-sold measured using older (lower) prices.

- 2) Net income is lower under LIFO than under FIFO because cost-of-goods-sold is higher.
- 3) Cash from operations is higher under LIFO than under FIFO because income tax paid is lower.
- 4) Inventory balances are lower under LIFO than under FIFO because cost-of-goods-sold is higher and lower prices remain in inventory.
- 5) Inventory turnover is lower under FIFO than under LIFO because cost-of-goods-sold is lower and inventory balances higher. Both factors decrease the inventory turnover ratio.
- 6) Working capital is lower under LIFO than under FIFO because inventory balances are lower, despite partial offset from higher cash balances (because of lower tax payments).
- 7) Total assets are higher under FIFO because FIFO inventory balances are higher.
- 8) The debt-to-equity ratio is lower under FIFO than under LIFO because equity is higher, reflecting higher retained earnings.

3.a. Start with the basic inventory relationship

$$BI + P = COGS + EI$$

Since opening inventory is zero, both BI and P (purchases) are identical under FIFO and LIFO; the difference in COGS equals the difference in ending inventory. That difference can be computed as follows:

$$\begin{aligned} \text{Total purchases in units} &= (3 \times 100,000) + (3 \times 125,000) \\ &+ (3 \times 150,000) + (3 \times 200,000) = 1,725,000 \end{aligned}$$

$$\begin{aligned} \text{Total sales in units} &= (6 \times 100,000) + (6 \times 150,000) \\ &= 1,500,000. \end{aligned}$$

$$\begin{aligned} \text{Therefore units in ending inventory} &= \\ &1,725,000 - 1,500,000 = 225,000 \end{aligned}$$

- (i) Purchases are identical; there is no difference between methods.
- (ii) Closing inventory under FIFO uses the latest costs of \$15; under LIFO uses the earliest costs of \$25; the difference is \$10/unit x 225,000 = \$2,250,000 (LIFO higher).
- (iii) COGS is \$2,250,000 lower under LIFO, as the total of COGS and ending inventory is identical.
- (iv) As a result of lower COGS, LIFO pretax income is \$2,250,000 higher.

- (v) Income tax expense is higher under LIFO by
 $.40 \times \$2,250,000 = \$900,000$
- (vi) Net income is higher under LIFO by
 $.60 \times \$2,250,000 = \$1,350,000$
- (vii) Since income tax is higher under LIFO, cash flow from operations is lower by \$900,000 (assuming taxes paid in same year).
- (viii) From (ii) ending inventory is higher by \$2,250,000, but from (vii) cash is lower by \$900,000. Therefore, LIFO working capital is higher by $\$2,250,000 - \$900,000 = \$1,350,000$

The problem illustrates that, when prices are declining, LIFO results in higher inventory and higher net income than FIFO. This solution would, however, be modified in practice as all inventory must be reported at the lower of cost or market. Thus inventory would have to be written down to market value for financial reporting purposes (but not for tax).

- b. If all inventory units were liquidated, FIFO and LIFO would be identical in all respects.

4. We start by computing total inventory available for sale, using the second part of the identity $BI + P = COGS + EI$. Using the average cost amounts provided, the total must be $\$10,500 + \$3,500 = \$14,000$. We also know that Metro purchased:

On February 1, 1,000 units @ \$2	\$ 2,000
On April 1, 2,800 units @ \$3	8,400
Total	\$10,400

We can now infer that the August 1 purchase must be for \$3,600 (\$14,000 less \$10,400).

- a. The unit price for the August 1 purchase must be $\$3,600/1,000 = \3.60 .
- b. First, we need to determine the number of units in ending inventory. From the average cost data, 25% of costs ($\$3,500/\$14,000$) remain, implying 25% of the 4,800 units purchased. Thus 1,200 units remain in ending inventory.

[Alternate solution: as the average cost is \$2.9167, 3,600 units ($\$10,500/\2.9167) were sold.]

Under LIFO, these 1,200 units must be those first purchased:

1,000 units purchased February 1 @ \$2	\$2,000
200 units purchased April 1 @ \$3	600

1,200 total	\$2,600
Therefore COGS must be \$14,000 less \$2,600 = \$11,400	
Under FIFO, these 1,200 units must be those last purchased:	
1,000 units purchased August 1 @ \$3.60	\$3,600
200 units purchased April 1 @ \$3	600
1,200 total	\$4,200

Therefore COGS must be \$14,000 less \$4,200 = \$9,800