PROFIT & LOSS
Part - 2

* Profit/Loss % are always calculated on **Cost Price**

* CP ✓   SP ✓

* CP = 500   Loss = 24%   SP = 38

SP ✓   Profit/Loss % ✓

$$CP = \frac{SP \times 100}{100 \pm Profit/Loss\%}$$

Agenda (Today's)

7 varieties of Question

$\longrightarrow$ 20 Question

If nothing is given
by default (Quantity)
is same

Q6 (a). A person purchased 3 articles at the rate of Rs.5 and sold 5 articles at the rate of Rs.8. Find his profit/loss %.

5×3 articles $\xrightarrow{\text{purchase}}$ 5 Rs

3×5 articles $\xrightarrow{\text{sold}}$ 8 Rs

$CP = 25$ Rs
$SP = 24$ Rs

$\frac{1}{25} \times 100$

$= 4\%$ loss

Ans. **4% loss**

Q6 (b). A person bought some articles at rate of 11 for Rs.10 and sold them at the rate of 10 for Rs.11. Find the profit/loss %.

10×11 articles $\xrightarrow{\text{purchase}}$ 10 Rs

11×10 articles $\xrightarrow{\text{sold}}$ 11 Rs

CP = 100

SP = 121

(a) $9\dfrac{1}{11}\%$ loss

(b) 10% profit

(c) 20% profit

(d) 21% profit

Ans. (d)

$$36x \begin{cases} \underline{5\alpha} \longrightarrow 1 Rs^{36Rs} \\ 4\alpha \longrightarrow 1 Rs^{45Rs} \end{cases} 45x \qquad \dfrac{9\alpha}{x40} \longrightarrow 2 Rs$$

Let no. of oranges → 180

(360 oranges)

$CP = 81 Rs$
$SP = 80 Rs$

360×30

$= \underline{10800}$

Q6 (c). A man buys some oranges at the rate of 5 for Rs.1 and same number of oranges at 4 for Rs.1. He sells all of them at 9 for Rs.2. During the whole transaction he incurs a loss of Rs.30. Find the number of oranges that he purchases.

(a) 11080

(b) 11000

(c) 10800

(d) 7200

Ans.   (c)

Q7 (a). A person sold an article at 20% profit. If he had purchased it at 10% less and sold it at Rs.12 less, then he would have gained 30% profit. Find his original CP.

20% profit

If purchased ↓ 10% less

sold ↓ 12 ₨ less

gained → 30%

$CP = ??$

Ist

$CP_1 = 100$ $CP_2 = 90$

$SP_1 = 120$ $SP_2 = 117$

$3₨ → 100$

$12₨ → 400$ ₨

Ans.   Rs.400 $\underline{II^{nd}}$

$CP_1 = X$ $CP_2 = 90\% \text{ of } X$

20% profit

$SP_1 = 120\% \text{ of } X$ $SP_2 = 120\% \text{ of } X - 12$

purches ↓ 10% less

sold ↓ 12₨ less

$$\frac{90\% \text{ of } X}{120\% \text{ of } X - 12} = \frac{10}{13}$$

30% profit   3/10

$120\% \text{ of } X - 12 = 117\% \text{ of } X$

$X = 400 \text{ Rs}$

Q7 (b). A person sold an article at 25% profit. If he had purchased it at 20% less and sold it at Rs.78 less, then he would have gained 40% profit. Find his original CP.

25% profit

purchased ↓20%

sold ↓78₆

Profit → 40%

$CP_1 = \boxed{100}$ $\qquad$ $CP_2 = 80$

$SP_1 = 125$ $\qquad\qquad$ $SP_2 = 112$

$\boxed{13} \rightarrow \boxed{100 \, Rs}$

$\times 6 \quad 78 \rightarrow \boxed{600 \, Rs}$

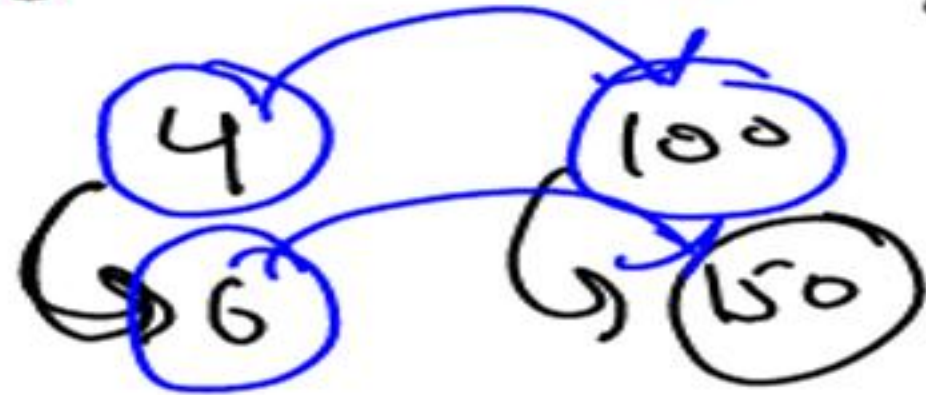**Ans.** Rs. 600

$CP_1 = 100$ $CP_2 = 96$

$SP_1 = 110$ $SP_2 = 114$

$18\frac{3}{4}\%$ of 96

$\frac{3}{16} \times 96 = 18$

Q7 (c). A book seller sells a book at a profit of 10%. If he had bought it at 4% less and sold it for Rs.6 more. He would have gained $18\frac{3}{4}\%$. The cost price of the book is:

(a) 100

(b) 120

(c) 150

(d) 160

PYQ of SSC

Ans.   (c)

$11\frac{1}{7}\%$ profit $\left(\frac{1}{9}\right)$

purchase $\boxed{1300\text{ \& less}}$

sold $\boxed{3000\text{ \& less}}$

less $9\frac{1}{11}\%$ $\left(\frac{1}{11}\right)$

Q7 (d). An article was sold at $11\frac{1}{9}\%$ profit. Had been it purchased at Rs.1300 less and sold at Rs.3000 less there would have been loss of $9\frac{1}{11}\%$. Find CP of article.

(a) 5400   (b) 7200

(c) 9000   (d) 10800

$\boxed{CP_1 = 9X}$ $CP_2 = 9X - 1300$

$SP_1 = 10X$ $SP_2 = 10X - 3000$

$$\frac{9X - 1300}{19X - 3000} = \frac{11}{10}$$

$$9X - 1300 = 11X - 3300$$

$$\boxed{X = 1000}$$

Ans.   (c)

$CP_1 = x$ $\qquad$ $CP_2 = x - 800$

$SP_1 = 120\% \text{ of } x$ $\qquad$ $SP_2 = 120\% \text{ of } x - 800$

Q7 (e). A book seller sells a book at a profit of 20%. If he had purchased it at Rs.800 less and sold it at Rs.800 less, then he would have gained 25%. Find the cost price of the book.

$$\frac{x - 800}{120\% \text{ of } x - 800} = \frac{4}{5}$$

$$5x - 4000 = 4.8x - 3200$$

$$0.2x = 800$$

$$x = 4000$$

$$20\% \left(\underbrace{x}\right) = 25\% \left(\underbrace{x - 800}\right)$$

$$x \to 4000$$

Ans. Rs.4,000

Detailed Approach

$CP = $ Profit% $= X$

Q8 (a). On selling an article at Rs.96, the profit % obtained is same as the cost price of the article. Find CP of the article.

$SP = 96$

$X + X\%$ of $X = 96$

$X + \dfrac{X}{100} \cdot X = 96 \quad \Rightarrow \quad 100X + X^2 = 9600$

$X^2 + 100X - 9600 = 0$

$X = -160 \quad \boxed{60}$

$\boxed{X = 60}$

Ans. Rs.60

Detailed Approach

Q8 (b). On selling an article at Rs.16, the loss % obtained is same as the cost price of the article. Find CP of the article.

$SP = 16$

$CP = loss\% = X$

$X - X\% \text{ of } X = 16$

$X - \dfrac{X^2}{100} = 16$

$100X - X^2 = 1600$

$X^2 - 100X + 1600 = 0$

$X = 20, 80$

Ans.   Rs.20 , Rs.80

$$SP = 96$$

$$CP = 10\left(11 - 5\right)$$

$$= 60$$

If CP = Profit %

$$CP = 10\left(\sqrt{SP + 25} - 5\right)$$

$$eg \quad SP = 16$$

$$CP = 10\left(5 \pm \sqrt{9}\right)$$

$$= 80, 20$$

If CP = Loss %

$$CP = 10\left(5 \pm \sqrt{25 - SP}\right)$$

Q8 (c). On selling an article at Rs.39, the profit % obtained is same as the cost price of the article. Find CP of the article.

$$CP = 10 \left(\sqrt{25 + 39} - 5 \right)$$

$$= 30$$

Ans. Rs.30

Q8 (d). On selling an article at Rs.24, the loss % obtained is same as the cost price of the article. Find CP of the article.

$$CP = 10\left(5 \pm \sqrt{25 - SP}\right)$$

$$= 10\left(5 \pm \sqrt{1}\right)$$

$$= 60, 40$$

Ans. Rs.60, Rs.40

Q9 (a). On selling an article at Rs. 360, there is a loss of 20%. If the article is sold at Rs.495, find his profit/loss %.

$$\frac{E_1 Q_1}{A_1} = \frac{E_2 Q_2}{A_2}$$

360 Rs $\longrightarrow$ 20% loss

495 B $\longrightarrow$ Profit/loss %

$$\frac{\cancel{2}}{\cancel{4} \times \cancel{360}} = \frac{E_2}{\cancel{495}}$$
$$55$$

$E_2 = 110$

10% profit

80% of CP $\rightarrow$ 360

$CP = 450$
$SP = 495$

$$\frac{45}{450} \cdot 100$$
$$= 10\% \text{ profit}$$

Ans. 10% profit

Amount $\underline{SP}$

$\boxed{A}$

Quantity

$\boxed{Q}$

Effective %

$\boxed{E}$

$$Effective\ \% \propto \frac{1}{Quantity}$$

$$Effective\ \% \propto Amount$$

$$\frac{E \cdot Q}{A} = Cons\tan t$$

$$\frac{E_1 \cdot Q_1}{A_1} = \frac{E_2 \cdot Q_2}{A_2}$$

Q9 (b). On selling 48 toffees in Rs.1, a person suffers a loss of 20%. How many toffees should he sell in Rs.1 to gain 20%?

$$\frac{E_r \cdot Q_1}{A_1} = \frac{E_2 \cdot Q_2}{A_2}$$

$$\frac{80 \cdot 48}{\cancel{x}} = \frac{120 \cdot Q_2}{\cancel{x}}$$

$$\boxed{Q_2 = 32} \checkmark$$

Ans. 32 toffees

Q9 (c). By selling 90 ball pens for Rs.160 a person looses 20%. The number of ball pens, which should be sold for Rs.96 so as to have a profit of 20% is:
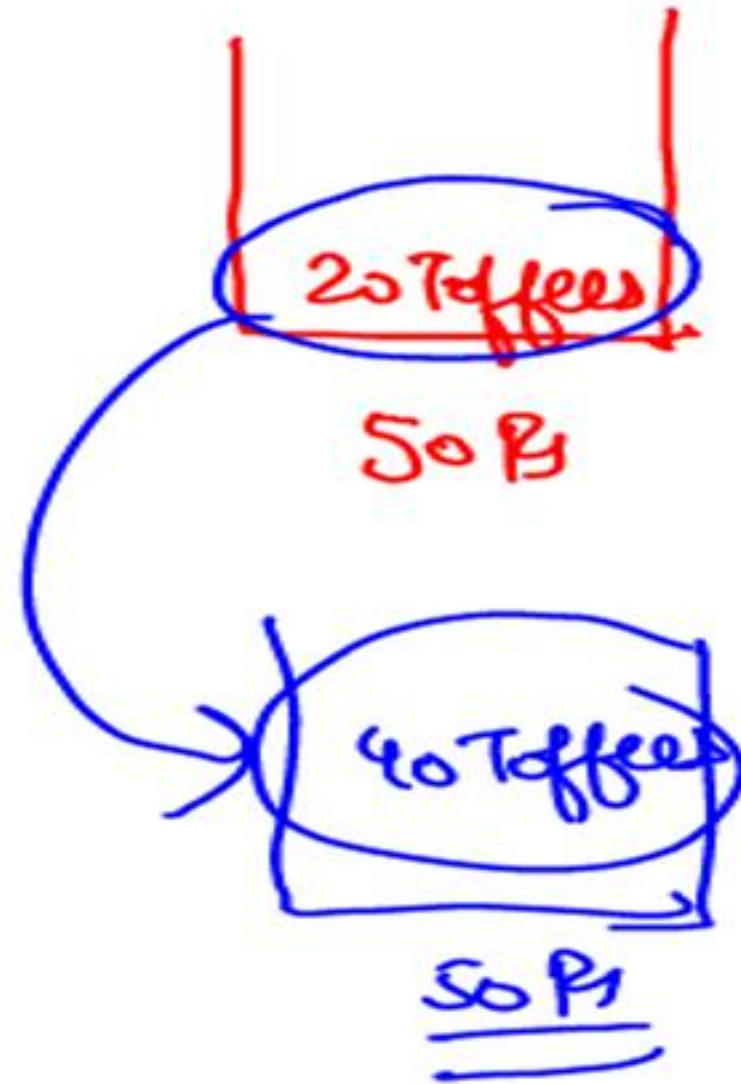
(a) 36   (b) 37

(c) 46   (d) 47

$$\frac{E_1 \cdot Q_1}{A_1} = \frac{E_2 \cdot Q_2}{A_2}$$

$$\frac{80 \cdot \overset{3}{\cancel{90}}}{\cancel{160}\,\cancel{2}} = \frac{\overset{Y}{\cancel{120}} \cdot Q_2}{\cancel{96}\,\cancel{24}\,12}$$

$$Q_2 = 36$$

Ans. (a)

If   Quantity ↑   Effective ↓

Toffee

CP of 1Toffee = 2Rs

20 Toffees
50 Rs

40 Toffees
50 Rs

Effective = 125

Effective = 62.5

A simplified formula for the previous variety of questions is:

$$\frac{E_1 Q_1}{A_1} = \frac{E_2 Q_2}{A_2}$$

$SP \longrightarrow \underline{Same}$

$25\% \text{ profit} \left(\dfrac{1}{4}\right)$

Q10 (a). Aman sells 2 articles for Rs.4000 each. He had sold the 1st article at the gain of 25% and in the overall transaction he neither gains nor looses. Find at what loss% he sold the 2nd article.

$CP_1 = 4$

$\text{Profit} = \textcircled{1}$

$SP_1 = 5$

$CP_2 = 6_i$

$\text{loss} = \textcircled{1}$

$SP_2 = \underline{5}$

$\dfrac{1}{6} \times 100$

(a) $16\dfrac{2}{3}\%$

(b) $18\dfrac{2}{9}\%$

(c) 20%

(d) 25%

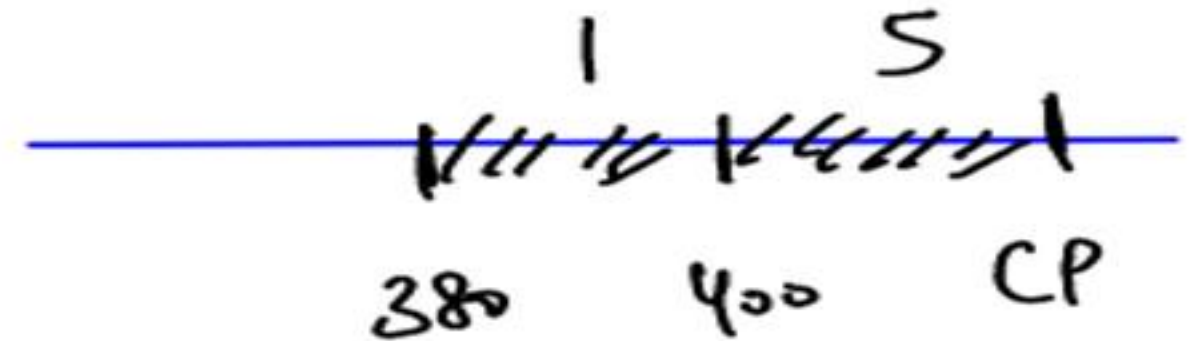**Ans.** (a)

Q10 (b). If a man decreases selling price of a fan from Rs.400 to Rs.380, then his loss increases by 20%. Find the CP of the fan.

$SP_1 = 400$

$CP_1 = X$

$Loss = \boxed{X - 400}$

$SP_2 = 380$

$CP_2 = X$

$loss = \boxed{X - 380}$

$1/5$

$$\frac{X - 380}{X - 400} = \frac{6}{5}$$

$$5X - 1900 = 6X - 2400$$

$$X = 500$$

$$\begin{array}{cc} 1 & 5 \\ \end{array}$$

$$380 \qquad 400 \qquad CP$$

$$1 \longrightarrow 20\%$$

$$CP = 500 \checkmark$$

Ans. Rs.500

Q10 (c). If a man decreases selling price of a fan from Rs.600 to Rs.480, then his loss % increases by 15. Find the CP of the fan.

$480 \qquad 600 \qquad CP$

$$\dfrac{\overset{8}{\cancel{120}}}{CP} \cdot 100 = \cancel{15}$$

$$CP = 800$$

Ans.   **Rs.800**

$\frac{3}{5} \rightarrow 20\% \text{ profit}$

$\frac{1}{10} \rightarrow 30\% \text{ profit}$

Q11. A person sold 3/5th of the material at 20% profit, 1/10th of the material at 30% profit and the rest at 25% loss. Find his overall profit/loss %.

rest $\rightarrow 25\% \text{ loss}$

$\boxed{I}$

$\dfrac{3 \cdot \overset{4}{\cancel{20}}}{\cancel{5}} + \dfrac{1 \cdot \cancel{30}}{\cancel{10}} + \dfrac{3}{10}(-25)$

$$\dfrac{1 - \dfrac{3}{5} - \dfrac{1}{10}}{} \rightarrow \dfrac{3}{10}$$

$\Rightarrow \quad 12 + 3 - 7 \cdot 5$

$= \underline{7 \cdot 5\% \text{ profit}}$

Ans.   15/2% profit

$$\frac{6}{\implies} \quad \underbrace{\frac{3}{5}} \rightarrow 20\% \, p$$

$$\frac{1}{\implies} \quad \underbrace{\frac{1}{10}} \rightarrow 3\% \, p$$

$$\frac{3}{\implies} \quad \text{Rest} \rightarrow 25\%, \text{loss}$$

Let   Total Articles $= \underset{\implies}{10}$

$$\frac{6 \cdot 20 + 1 \cdot 30 + 3(-25)}{10}$$

$$\frac{120 + 30 - 75}{10} = 7 \cdot 5\% \\ \text{profit}$$

Table **Chain**

$8\frac{1}{3}\%$

X Y

$$\frac{1}{12}X = \frac{1}{8}Y$$

$$\frac{X}{Y} = \frac{12}{8}\cdot\frac{3k}{2k}$$

Imp

Q12. A person sells his table at 12½ % profit and the chair at a loss of $8\frac{1}{3}$% then he gains Rs.25. On the other hand if he sells the table at a loss of $8\frac{1}{3}$% and the chair at a profit of 12½%, then he neither gains nor looses. Find the CP of the table.

$$\frac{1}{8}\cdot3k - \frac{1}{12}\cdot2k = 25$$

$$\frac{8k}{24} = 25$$

$$k = 120$$

Table → 360₢

Ans.   Rs.360

Effective %?

20% loss $\longrightarrow$ (80)%

20% profit $\longrightarrow$ 120%

18% loss $\longrightarrow$ 82

13% profit $\longrightarrow$ 113

10% profit $\longrightarrow$ (110)

28% loss $\longrightarrow$ (72)