IMPORTANT FORMULA AND EQUATIONS

Gain = (S.P.) - (C.P.)

Loss = (C.P.) - (S.P.)

Gain Percentage: (Gain %)

$$\text{Gain \%} = \left(\frac{\text{Gain} \times 100}{\text{C.P.}}\right)$$

Loss Percentage: (Loss %)

$$\text{Loss \%} = \left(\frac{\text{Loss} \times 100}{\text{C.P.}}\right)$$

Selling Price: (S.P.)

$$\text{SP} = \left[\frac{(100 + \text{Gain \%})}{100} \times \text{C.P}\right]$$

Selling Price: (S.P.)

$$\text{SP} = \left[\frac{(100 - \text{Loss \%})}{100} \times \text{C.P.}\right]$$

Cost Price: (C.P.)

$$\text{C.P.} = \left[\frac{100}{(100 + \text{Gain \%})} \times \text{S.P.}\right]$$

Cost Price: (C.P.)

$$\text{C.P.} = \left[\frac{100}{(100 - \text{Loss \%})} \times \text{S.P.}\right]$$

When a person sells two similar items, one at a gain of say *x*%, and the other at a loss of *x*%, then the seller always incurs a loss given by:

$$\text{Loss \%} = \left(\frac{\text{Common Loss and Gain \%}}{10}\right)^2 = \left(\frac{x}{10}\right)^2.$$

If a trader professes to sell his goods at cost price, but uses false weights, then

$$\text{Gain \%} = \left[\frac{\text{Error}}{(\text{True Value}) - (\text{Error})} \times 100\%\right]$$

Key Notes

- When an article is sold at a profit of *x* %. If it would be sold for Rs. n less, there would be a loss of *y* %, then the cost price of the article C.P. $= \frac{n \times 100}{x + y}$
- A man sells an article at a gain of *x* %. If it would have been sold for Rs. n more, there would have a profit of *y* %, then C. P = $\frac{n \times 100}{y - x}$
- A person brought two articles for Rs n. On selling one article at *x* % profit and other at y% profit, he get the same selling price of each,then

C.P. of first article $= Rs.\frac{(100+y)n}{200+x+y}$

C.P. of second article $= Rs.\frac{(100+x)n}{200+x+y}$

- When m articles are bought for Rs. n and n articles are sold for Rs. m and m > n, then Profit % $= \frac{m^2-n^2}{n^2}\times 100$
- If A sells an article to B at a profit of r 1 %, B sells it to C at a profit of r 2 % and C sells it to D at a profit of r 3 %, then, cost price of D. $C.P.of\ D = C.P.of\ A\left(1+\frac{r_1}{100}\right)\left(1+\frac{r_2}{100}\right)\left(1+\frac{r_3}{100}\right)$
- If A sells an article to B at a loss of r 1 %, B sells it to C at a loss of r 2 % and C sells it to D at a loss of r 3 %, then, Cost Price of D = Cost price of $A\left(1-\frac{r_1}{100}\right)\left(1-\frac{r_2}{100}\right)\left(1-\frac{r_3}{100}\right)$
- A dealer purchases a certain number of articles at *x* articles for a rupee and the same number at *y* articles for a rupee. He mixes them together and sells at *z* articles for a rupee. Then his gain or loss % $= \left[\frac{2xy}{z(x+y)}-1\right]\times 100$ according to positive or negative sign.
- If 'P 1 ' is rate gain w r t selling price S 1 and 'P 2' is rate gain w r t selling price S 2 Then, C.P. = $\left(\frac{100}{P_1-P_2}\right)\times$ difference between selling prices.

  If 'P 1 ' is rate gain w r t selling price S 1 and 'P 2' is rate loss w r t selling price S 2 C.P. $= \left(\frac{100}{P_1+P_2}\right)\times$ difference between selling prices.
- When a man sells two things at the same price each and in this process his loss on first thing is *x* % and gain on second thing is *x* %, then in such a type question, there is always a loss. and Loss $= \frac{2\times S.P.}{\left(\frac{100}{x}\right)^2-1}$
- When a man buys two things on equal price each and in those things one is sold on the profit of *x* % and another is sold on the loss of *x* %, then there is no loss or no gain per cent.
- A sells an article at a profit of r 1 % to B . and B again sells it to C at a profit of r 2 %.. If C pays Rs. P to B, then, C. P. of the article for $A = Rs.\frac{100\times 100\times P}{(100+r_1)(100+r_2)}$

- When a shopkeeper on selling an article for Rs. n, gains as much per cent as the cost price of it, then C.P. of the article $= Rs.\left[-50 \pm 10\sqrt{25+r}\right]$

  If there is loss in place of profit, then C.P. of the article = $Rs.\left[50 \pm 10\sqrt{25-r}\right]$
- Discount% = Discount / Marked price * 100%
- An article sold at selling price(SP1) at a loss of x% is to be sold at selling price(SP2) to gain y%, then SP2 = SP1(100 + y) / (100 - x)
- If selling an object for Rs.x a person loses a certain sum and selling for Rs.y he gains the same amount, CP is given by CP = x + y / 2.
- When the price of an article is reduced by p% a man can buy x quantity of the article for Rs.y then

1. reduced price = 1/x (y * p / 100) per unit.
2. original price = reduced price * 100 / (100 - p).

- If the MP(marked price) of an article above CP is M% and after allowing a discount of d%, the gain is g%, then M% = d + g * 100% / 100 - d, and if there is a loss of l%, then M% = d - l * 100% / 100 - d.
- A person sells goods at a profit of x%. Had he sold it for Rs. X more, y% would have been gained. Then CP is given by Rs. X *100 / y - x.
- A person sells goods at a loss of x%. Had he sold it for Rs. X more, he would have gained y% . Then CP is given by Rs. X * 100 / y + x.
- When there are two successive profits of x% and y% the net gain% is given by: Net gain = [x + y + { xy / 100 }]%.
- When there are two successive losses of x% and y% the net loss% is given by: Net loss = [- x - y + { xy / 100 }]%.10)
- When there is a gain of x% and a loss of y% the net effect is given by: Net effect = [x - y - { xy / 100}]%.