

Profit and Loss

Cost Price (CP): Amount paid to buy a product

Selling Price (SP): Amount for which the product is sold

Marked Price (MP): Amount decided by the seller for the product. SP is lower than MP.

Discount: $MP - SP$

Overhead expenses: Expenses occurred due to transportation, repair, etc.

Overall CP = CP + overhead expenses

Profit (Gain) = $SP - CP$

Loss = $CP - SP$

$$Gain\% = \frac{SP - CP}{CP} \times 100$$

$$Loss\% = \frac{CP - SP}{CP} \times 100$$

General equation including marked price, discount, overhead expenses

$$Gain\% = \frac{(MP - Discount) - (CP + OE)}{(CP + OE)} \times 100$$

$$Loss\% = \frac{(CP + OE) - (MP - Discount)}{(CP + OE)} \times 100$$

If there is no discount, $SP = MP$

Example 1:

A trader bought two chairs for the same price. He sold one at a profit of 25%, other at a loss of 5%. What is the net profit?

CP is same for both. SP is different.

$Gain\% = \frac{SP_1 - CP}{CP} \times 100 = 25$	$\frac{SP_1}{CP} = \frac{25}{100} + 1 = \frac{5}{4}$	$SP_1 = \frac{5}{4} CP$
$Loss\% = \frac{CP - SP_2}{CP} \times 100 = 5$	$\frac{SP_2}{CP} = 1 - \frac{5}{100} = \frac{19}{20}$	$SP_2 = \frac{19}{20} CP$

$$\text{Net profit}\% = \frac{\text{Total SP} - \text{Total CP}}{\text{Total CP}} \times 100$$

$$\text{Total SP} = SP_1 + SP_2 = \frac{5}{4}CP + \frac{19}{20}CP = \frac{11}{5}CP$$

$$\text{Total CP} = CP + CP = 2CP$$

$$\text{Net profit}\% = \frac{\frac{11}{5}CP - 2CP}{2CP} \times 100 = 10\%$$

Example 2:

A trader mixes 26 kg of rice at Rs 20 per kg with 30 kg of rice of other variety at Rs 36 per kg and sells the mixture at Rs 30 per kg. Find his profit percent.

	Rice	Cost/kg	CP
	26 kg	Rs.20	26 x 20 = 520
	30 kg	Rs.36	30 x 36 = 1080
Total	56 kg		Rs.1600

$$SP = 30/\text{kg} \times 56 = \text{Rs.}1680$$

$$\text{Profit}\% = \frac{SP - CP}{CP} \times 100 = \frac{1680 - 1600}{1600} \times 100 = 5\%$$

Example 3:

A dishonest shopkeeper professes to sell pulses at his cost price but uses a false weight of 950 gm for each kilogram. Find his gain percent.

Let CP for 1 kg be Rs.100

He sells 0.95 kg for Rs.100

CP for 1 kg = Rs.100

SP for 0.95 kg = Rs.100.

SP for 1 kg = 100/0.95

$$\text{Profit}\% = \frac{SP - CP}{CP} \times 100 = \frac{\frac{100}{0.95} - 100}{100} \times 100 = 5.26\%$$

Example 4:

By selling 90 ball pens for Rs 160, a person loses 20%. How many ball pens should be sold for Rs 96 to have a profit of 20%?

SP for 90 pens = Rs.160

SP for 1 pen = Rs.16/9

$$Loss\% = \frac{CP - SP}{CP} \times 100 = 1 - \frac{16/9}{CP} = \frac{20}{100}$$

CP for 1 pen = Rs.20/9

To have profit of 20% -

$$Gain\% = \frac{SP - CP}{CP} \times 100 = \frac{SP}{20/9} - 1 = \frac{20}{100}$$

SP for 1 pen = Rs.8/3

Number of pens sold for Rs.96 at this profit% = 36