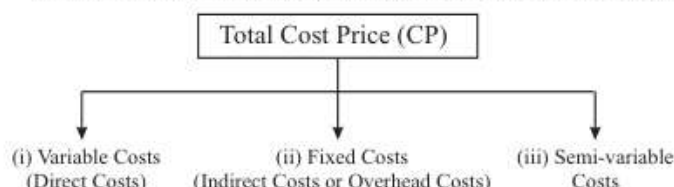


# PROFIT, LOSS AND DISCOUNT

## TOTAL COST PRICE (CP)

The total amount paid or expended in either purchasing an object (or a service) or producing an object (or a service) is known as its Total Cost Price of that object (or the service) for purchaser or producer respectively.

Total cost price is subdivided into three parts as given below:



## (I) Variable Costs (Direct Costs)

It is that part of the total cost that varies directly with the number of units of objects (or services) purchased or produced. For example price of raw material used in producing one unit of product. Wages to labour in producing one unit of the product when the wages are given on a piece rate basis, price per unit of an object at which a trader bought it, etc.

If price of raw material used for producing one unit of product is = ₹ 20. Then price of raw material used for producing five units of products = ₹ 20 × 5 = ₹ 100

If price of a note-book at which a trader bought it = ₹ 50

Then price of 10 note-books, which the trader paid to buy them = ₹ 50 × 10 = ₹ 500

Here, we clearly see that price of raw material varies directly with the number of product produced. Also price of note books that the trader paid to buy them varies directly with the number of note-books bought. Hence, they are the direct costs.

## (II) Fixed Costs (Indirect Costs or Overhead Costs)

This is the part of the total cost which incurred irrespective of the number of items produced or purchased for sale. For example, irrespective of the number of units of a product produced or purchased for sale, the rent of the premises, salary of the employees, etc. are fixed and hence are fixed costs.

## (III) Semi-variable Costs

Some costs like rent behave as fixed costs under normal circumstances but have to be increased after a certain level of production or purchase to sell, because the company needs additional space to accommodate the increased products and increased work load.

Here the rent is not fixed after a certain level therefore in the case mentioned here rent is neither completely fixed nor completely variable and hence rent is semi-variable costs.

Semi-variable costs are also a part of the total cost. Thus

$$\text{Total Cost Price} = (\text{Variable Costs}) + (\text{Fixed Costs}) + (\text{Semi-variable costs})$$

In most of the problems; Fixed costs and Semi-variable costs are neither given nor are to be found out for these problems,

$$\text{Total Cost Price} = \text{Variable Costs Price}$$

Total Cost Price is simply called Cost Price.

## SELLING PRICE (SP)

When a person (or an agency)  $P$  sells an object or a service to another person (or agency)  $Q$  at a price  $S$ , then  $P$  is called seller,  $Q$  is called purchaser and  $S$  is called Selling Price of the seller.  $S$  is also called variable cost of the purchaser. If there is no fixed cost and semi-variable cost of the purchaser, then  $S$  is called Total Cost Price or simply called cost price of the purchaser.

## PROFIT (OR GAIN) AND LOSS

(1) When selling price is more than cost price (i.e.  $SP > CP$ ) then profit has been incurred.

$$\begin{aligned} \text{(i)} \quad & \text{Profit} = SP - CP \\ & SP = CP + \text{Profit} \\ & CP = SP - \text{Profit} \end{aligned}$$

$$\text{(ii)} \quad \text{Percentage Profit (or profit percent)} = \frac{\text{Profit}}{\text{Cost Price}} \times 100\%$$

Percentage profit means profit when cost price is ₹ 100. Percentage profit is always calculated on CP unless otherwise stated.

## 98 • Profit, Loss and Discount

To understand the percentage profit clearly, suppose cost price (CP) and selling price (SP) of a book are ₹ 500 and ₹ 700

$$\text{Profit} = \text{SP} - \text{CP} = ₹ 700 - ₹ 500 = ₹ 200$$

Here, we see that, when CP is ₹ 500, then profit = ₹ 200

$$\Rightarrow \text{When CP will be ₹ 1, then profit} = ₹ \frac{200}{500}$$

$$\Rightarrow \text{When CP will be ₹ 100, then profit} = ₹ \frac{200}{500} \times 100$$

$$\text{or percentage profit} = \frac{200}{500} \times 100\% = 40\%$$

Hence, percentage profit (or profit per cent)

$$= \frac{\text{Profit}}{\text{Cost Price}} \times 100\%$$

Here profit and cost price means total profit and total cost price respectively.

$$\Rightarrow \text{Profit} = \frac{\text{CP} \times \text{Profit Per cent}}{100}, \text{ in terms of profit percent}$$

(iii)  $\text{SP} = \text{CP} + \text{Profit}$

If we substitute the value of profit in term of profit percent then

$$\text{SP} = \text{CP} + \frac{\text{CP} \times \text{Profit Percent}}{100}$$

$$\Rightarrow \text{SP} = \frac{\text{CP} (100 + \text{Profit Percent})}{100}$$

$$\Rightarrow \text{CP} = \frac{\text{SP} \times 100}{(100 + \text{Profit Percent})}$$

(2) When Selling Price is less than Cost Price (i.e.  $\text{SP} < \text{CP}$ ), then loss has been incurred.

$$\begin{aligned} \text{(i)} \quad & \text{Loss} = \text{CP} - \text{SP} \\ & \text{SP} = \text{CP} - \text{Loss} \\ & \text{CP} = \text{SP} + \text{Loss} \end{aligned}$$

(ii) Percentage Loss (or Loss Percent) =  $\frac{\text{Loss}}{\text{CP}} \times 100$ , here loss

and CP means total loss and total CP respectively.

Percentage loss means loss when cost price is ₹ 100.

Percentage loss is always calculated on CP unless otherwise stated.

Loss in terms of loss percent,

$$\text{Loss} = \frac{\text{CP} \times \text{Loss Percent}}{100}$$

(iii) Since,  $\text{SP} = \text{CP} - \text{Loss}$

In terms of loss percent,

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

$$\Rightarrow \text{SP} = \frac{\text{CP} (100 - \text{Loss Percent})}{100}$$

$$\Rightarrow \text{CP} = \frac{\text{SP} \times 100}{100 - \text{Loss Percent}}$$

**Illustration 1:** If the cost price is 96% of the selling price, then what is the profit percent?

- (a) 4.5% (b) 4.2%  
(c) 4% (d) 3.8%

**Solution:** (b) Let S.P. = ₹ 100. Then, C.P. = ₹ 96; Profit = ₹ 4.

$$\therefore \text{Profit \%} = \left( \frac{4}{96} \times 100 \right) \% = \frac{25}{6} \% = 4.17\% \approx 4.2\%$$

**Illustration 2:** Arun got ₹ 0.70 as gain over ₹ 70. Find his gain percent.

- (a) 1% (b) 0.01%  
(b) 0.1% (d) 7%

**Solution:** (a) Gain % =  $\frac{0.70}{70} \times 100 = 1\%$

**Illustration 3:** Vishal buys an old bike for ₹ 4700 and spends ₹ 800 on its repairs, then he sells it for ₹ 5800. Find his gain percent.

- (a) 5.2% (b)  $4\frac{4}{7}\%$   
(c) 5% (d)  $5\frac{5}{11}\%$

**Solution:** (d) Total C.P. for Vishal = 4700 + 800 = ₹ 5500

$$\text{S.P.} = ₹ 5800$$

$$\therefore \text{Gain} = 5800 - 5500 = ₹ 300$$

$$\text{Gain \%} = \frac{300}{5500} \times 100 = 5\frac{5}{11}\%$$

**Illustration 4:** P buys some toffees at 6 for a rupee and sells them at 4 for a rupee. Find his gain percent.

**Solution:** LCM of 6 and 4 is 12

$$\text{CP of 12 toffees} = \frac{1}{6} \times 12 = ₹ 2$$

$$\text{SP of 12 toffees} = \frac{1}{4} \times 12 = ₹ 3$$

$$\text{Gain} = 3 - 2 = ₹ 1$$

$$\therefore \text{Gain \%} = \frac{1}{2} \times 100 = 50\%$$

## MARKED PRICE, LIST PRICE, DISCOUNT AND SUCCESSIVE DISCOUNTS

### (i) Marked Price (MP)

In big shops and departmental stores, every article is tagged with a card and its price is written on the card. This is called the marked price of the article. Mark price of an article is the retail price, which is decided by the retail shopkeeper. So the marked price of the same article can be different on different shops.

### (ii) List Price

When a manufacturer decides the retail prices of its different products, then these retail prices are either printed on the products or a list of retail prices of different products is sent to all its retail shopkeepers. Since the list price is decided by the manufacturer and not by its retail shopkeeper, therefore it is the same at all retail shops.



**(iii) Discount**

In order to increase the sale or clear the old stock, sometimes the shopkeepers offer a certain percentage of rebate on the marked price or list price. This rebate is known as discount. Discount is always given on marked price or list price. Hence

$$\text{Selling price} = (\text{Marked price or List price}) - (\text{Discount})$$

**Illustration 5:** After allowing a discount of  $\frac{15}{2}\%$  on marked

price, an article is sold for ₹ 555. Find its M.P.

**Solution:** Let M.P. = ₹ 100

$$\text{Discount} = \frac{15}{2}\%$$

$$\text{S.P.} = 100 - 7.50 = 92.50$$

If SP is ₹ 92.50, then M.P. = ₹ 100

$$\text{If SP is ₹ 555, then M.P.} = \frac{100}{92.50} \times 555 = ₹ 600.$$

**Illustration 6:** A garment dealer allows his customers 10% discount on marked price of the goods and still makes a profit of 25%. Find the cost price of a shirt if it is marked at ₹ 1250.

**Solution:**

Marked Price (MP) = ₹ 1250,

Discount = 10%, Profit = 25%

Let Cost Price (C.P.) = ₹  $x$

Selling Price (S.P.) = M.P. - Discount

$$\text{SP} = 1250 - 10\% \text{ of } 1250$$

$$\text{SP} = 1250 - 125 = ₹ 1125$$

$$\text{Now, } \% \text{ Profit} = \frac{\text{SP} - \text{CP}}{\text{CP}} \times 100$$

$$25 = \left( \frac{1125 - x}{x} \right) \times 100$$

$$\Rightarrow x = 1125 \times 4 - 4x$$

$$\Rightarrow 5x = 1125 \times 4$$

$$\Rightarrow x = \frac{1125 \times 4}{5} = 225 \times 4$$

$$\therefore x = ₹ 900$$

$$\text{C.P.} = ₹ 900.$$

**Illustration 7:** What price should Neha mark on a sari which cost her ₹ 3000, so as to gain 20% after allowing a discount of 10%?

**Solution:**

Let Marked Price (MP) of sari = ₹  $x$ ,

Discount = 10%

C.P. = ₹ 3000, % gain = 20%

SP = MP - Discount

$$\text{SP} = x - 10\% \text{ of } x = x - \frac{10}{100}x = \frac{9x}{10}$$

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

$$20 = \frac{\frac{9x}{10} - 3000}{3000} \times 100 \Rightarrow 20 \times 30 = \frac{9x}{10} - 3000$$

$$\Rightarrow \frac{9x}{10} = 3600$$

$$\Rightarrow x = \frac{3600 \times 10}{9} = 4000$$

$$\therefore \text{MP of Sari} = ₹ 4000.$$

**Successive Discounts**

If two or more discounts are allowed one after the other then such discounts are known as successive discounts or discounts in series.

Suppose a discount of 15% is given, then on the reduced price a discount of 10% is also given. In such a case, we say that the successive discounts of 15% and 10% are given.

**Illustration 8:** Find the single discount equivalent to two successive discounts of 20% and 10%.

**Solution:**

$$\begin{array}{ccccc} 100 & \xrightarrow[20]{20\% \downarrow} & 80 & \xrightarrow[8]{10\% \downarrow} & 72 \\ (\text{CP}) & \text{(First discount)} & & \text{(Second discount)} & (\text{SP}) \end{array}$$

$\therefore$  Single discount equivalent to two given successive discounts

$$= (100 - 72)\% = 28\%.$$

**Illustration 9:** M.P. of a bed is ₹ 7500. The shopkeeper allows successive discounts of 8%, 5% and 2% on it. What is the net selling price?

**Solution:**

M.P. of bed = ₹ 7500

$$7500 \xrightarrow[600]{8\% \downarrow} 6900 \xrightarrow[345]{5\% \downarrow} 6555 \xrightarrow[131.10]{2\% \downarrow} 6423.90$$

$$\therefore \text{Net selling price} = ₹ 6423.90$$