

## **PROFIT AND LOSS**

Profit and loss is the second pillar of math out of four (namely percentage, profit and loss, ratio and proportion and average). In pre-exams 2-3 Word problems are asked directly and in the DI section many times DI based on profit and loss are asked. (like income expenditure DI sets)

If we talk about the mains exam the same pattern is followed in word problem section and in data interpretation section its importance becomes more as some direct DI sets are asked in examinations nowadays especially in PO mains exams. In short, we can say that this is a section you cannot leave for exams.

### **Profit and Loss terminologies**

#### **1. Cost Price (CP):**

The price, at which an article is purchased, is called its cost price, usually denoted by C.P. In simple words we can say the money that goes out of the pocket of the seller is added to its cost price. (like the price paid by the seller to the wholesaler, transportation cost, labour charges and different types of miscellaneous charges) Sometimes it is denoted by expenditure.

#### **2. Selling Price (SP):**

The price, at which an article is sold, is called its selling prices, abbreviated as S.P. In short, we can say that the amount that comes in the pocket of the seller is added to its selling price. Sometimes it is denoted by income

#### **3. Marked Price:**

When we purchase any item or article, we see that a price is marked on it and we pay the same or ask for some discount, this price marked on it is known as marked price. Sometimes it is denoted by labelled price or first price.

#### **4. Profit or Gain:**

If S.P. is greater than C.P., the seller is said to have a profit or gain. or we can say if the seller got somewhere more what he spends then its a case of profit.

#### **5. Loss:**

If S.P. is less than C.P., the seller is said to have incurred a loss. or we can say if the seller got somewhere less what he spends then its case of loss.

**6. Profit percentage** = Profit percentage is sometimes calculated on CP and sometimes SP. If profit percent is calculated on CP, then

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

If profit percent is calculated on SP, then

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

**7. Loss percentage**=Loss percentage is sometimes calculated on CP and sometimes SP. If loss percent is calculated on CP, then

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

If loss percent is calculated on SP, then

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

**8. Markup price**=Usually sellers mark the price of any article more than its cost price this percentage is called markup price. a percentage is sometimes calculated on CP and sometimes SP.

$$\text{Markup price} = \frac{MP - CP}{CP} \times 100\%$$

**9. Discount percentage**=Usually sellers give any article at some lower price than what is written on it. This percentage decrease in price of an article is called discount.

Discount percent is always calculated on marked price

$$D\% = \frac{MP - SP}{MP} \times 100$$

Note-Sometimes discount is given by the seller but not directly but in some conditional form like if you will buy 5 articles, I will give you 1 article absolutely free this is also a case of discount. How to calculate discount percent in these cases we will study ahead.

**10. Equivalent discount percent**= When two successive discounts are given then equivalent discount may be calculated easily by this formula

$$\text{Equivalent discount} = X + Y - \frac{XY}{100}$$

### Points to Remember

- $CP + \text{Profit} = SP$
- $CP - \text{Profit} = SP$
- $SP + \text{Discount} = MP$
- If there is a PROFIT of x%, the calculating figures would be 100 and  $(100 + x)$ .
- If there is a PROFIT of x%, the calculating figures would be 100 and  $(100 + x)$ .
- Calculating figures be Cost Price and Selling Price respectively.

Now let's discuss some examples and then we will study some important formulae

**Q1. A shopkeeper fixes the marked price of an item 35% above its cost price. The percentage of discount allowed to gain 8% is?**

- (1) 18%
- (2) 20%
- (C) 22%
- (4) 24%

(5) None of these

**Answer: (2) 20%**

**Explanation:**

Let the cost price = Rs.100/-

then, Marked price = Rs.135/-

Required gain = 8%,

So, Selling price = Rs.108/-

Discount =  $135 - 108 = 27$

Discount% =  $\frac{27}{135} \times 100\%$

=20%

**Q2. A person incurs a loss of 5% by selling a watch for Rs. 1140. At what price should the watch be sold to earn 5% profit?**

(1) Rs.1200

(2) Rs.1230

(3) Rs.1260

(4) Rs.1290

(5) None of these

**Answer: (3) Rs.1260**

**Explanation:**

Let CP=100

SP=95

New SP=105

Required answer =  $\frac{1140}{95} \times 105 = 1260$

**Q3. If the cost price of 12 bananas is equal to the selling price of 8 bananas, the gain percent is?**

(1)12%

(2)50%

(3)30%

(4)60%

(5) None of these

**Answer: 2**

**Explanation:**

We know we will need to gain an amount to get gain percent, right. So, let's get gain first.

Let the cost price of 1 banana is Rs 1

Cost of 8 bananas = Rs 8

Selling price of 8 bananas= 12

Gain =  $12 - 8 = 4$

Gain% =  $\frac{4}{8} \times 100\% = 50\%$

### Some Important Concept

**1.** If a person sells two similar articles, one at a gain of a% and another at a loss of a%, then the seller always has a loss which is given by

$$\text{Loss}\% = \left(\frac{a}{10}\right)^2$$

don't afraid this formula came from successive concepts and you can easily calculate it.

2. If a'th part of some items is sold at x% loss, then required gain per cent in selling rest of the items in order that there is neither gain nor loss in whole transaction, is

$$\frac{ax}{(1-a)}\%$$

3. If cost price of 'a' articles is equal to the selling price of 'b' articles, then profit percentage can be directly calculated by

$$\frac{(a-b)}{b} \times 100\%$$

4. If a dishonest trader professes to sell his items at CP but uses false weight, then

$$\text{Gain}\% = \frac{E}{T} \times 100\%$$

Where E= error

T= true value

5. If 'a' part of an article is sold at x% profit/loss, 'b' part at y% profit/loss and c part at z% profit/loss and finally there is a profit/loss of Rs. R, then Cost price of entire article

$$= \frac{R}{ax+by+cz} \times 100$$

### Some Formulae:

1) If an article is sold at a profit/gain of 30%, then S.P. = 130% of the C.P.

2) If an article is sold at a loss of 20%, then S.P. = 80% of the C.P.

3) When there are two successive Profit of x % and y % then the resultant profit per cent is given by

$$X+Y + \frac{XY}{100}$$

4) If there is a Profit of x% and loss of y % in a transaction, then the resultant profit or loss% is given by

$$X-Y - \frac{xy}{100}$$

#### Note

For profit use sign + in previous formula and for loss use – sign.

if resultant come + then there will be overall profit. if it comes – then there will be overall loss.

5) A man purchases a certain no. of articles at m a rupee and the same no. at n a rupee. He mixes them together and sold them at p a rupee then his gain or loss %

$$\left(\frac{2mn}{(m+n)} - 1\right) \times 100$$

**Note + =Profit, - = Loss**

6) If a seller marks his goods at x% above his cost price and allows purchasers a discount of y % for cash, then overall gain or loss

$$X - Y - \frac{xy}{100}$$

Profit or loss according to sign + = Gain, - = Loss.

## Solved Examples

### Type 1:

The cost price of 40 articles is the same as the selling price of 25 articles. Find the gain per cent.

- (a) 65%
- (b) 60%
- (c) 15%
- (d) 75%

**Answer: (b)** Gain per cent  $\frac{40-25}{25} \times 100 = 60\%$

### Type 2:

Bananas are bought at the rate of 6 for Rs. 5 and sold at the rate of 5 for Rs. 6. Profit per cent is

- (a) 36%
- (b) 42%
- (c) 44%
- (d) 48%

**Answer: (c)**

To avoid fraction, let the number of bananas bought LCM of 5 and 6 = 30

CP of 30 bananas =  $5 \times 6 = \text{Rs. } 25$

SP of 30 Bananas =  $6 \times 5$

= Rs. 30

Profit = Rs. (30-25) = Rs. 5

Profit % =  $\frac{5}{25} \times 100 = 20\%$

### Type 3:

A man bought oranges at the rate of 8 for Rs 34 and sold them at the rate of 12 for Rs. 57. How many oranges should be sold to earn a net profit of Rs 45?

- (a) 90
- (b) 100
- (c) 135
- (d) 150

**Answers: (a) 90**

Let the man buy 24 (LCM of 8 and 12) oranges.

C.P. of 24 oranges =  $\frac{34}{8} \times 24 = 102$

S.P. of 24 oranges =  $\frac{57}{12} \times 24 = 114$

Gain =  $114 - 102 = \text{Rs. } 12$

Rs. 12 = 24 oranges

$$\text{Rs. } 45 = \frac{24}{12} \times 45 = 90 \text{ oranges}$$

**Type 4:**

A shopkeeper earns a profit of 12% on selling a book at 10% discount on printed price. The ratio of the cost price to printed price of the book is ?

- (a) 45 : 56
- (b) 50 : 61
- (c) 90 : 97
- (d) 99 : 125

**Answer: (a) 45 : 56**

C.P. of the book = Rs. x

Printed price = Rs. Y

$$\frac{y \times 90}{100} = \frac{x \times 112}{100}$$

$$\frac{x}{y} = \frac{45}{56}$$

**Type 5:**

A dealer sold two types of goods for Rs 10,000 each. On one of them, he lost 20% and on the other he gained 20%. His gain or loss per cent in the entire transaction was

- (a) 2% loss
- (b) 2% gain
- (c) 4% gain
- (d) 4% loss

**Answers: (d) 4% loss**

Here, S.P. is the same, hence there is always a loss. Loss per cent =  $\frac{20 \times 20}{100} \times = 4\%$

**Type 6:**

On selling an article for Rs170, a shopkeeper loses 15%. In order to gain 20%, he must sell that article at rupees:

- (a) 215.50
- (b) 212.50
- (c) 240
- (d) 210

**Answer: (c) 240**

$$\text{C.P. of article} = \frac{170}{85} \times 120 = 240$$

**Type 7:**

An article is sold at a loss of 10%. Had it been sold for Rs. 9 more, there would have been a gain of 12.5% on it. The cost price of the article is

- (a) Rs. 40
- (b) Rs. 45
- (c) Rs. 50
- (d) Rs. 35

**Answers: (a) Rs. 40**

	CP	SP
--	----	----

Before	100	90
After	100	112.5

Now difference of S.P 22.5% = 9

So required answer= 40

**Type 8:**

**A sell a suitcase to B at 10% profit. B sells it to C at 30% profit. If C pays Rs 2860 for it, then the price at which a bought it is**

- (a) 1000
- (b) 1600
- (c) 2000
- (d) 2500

**Answer: (c) 2000**

If the C.P. of the suitcase for A be Rs. x, then

$$X \times \frac{110}{100} \times \frac{130}{100} = 2860$$

x= Rs. 2000