

Profit and loss analogy:2

Special case: When the selling price of 2 articles are same and the profit and loss percentage of both of them are equal.

Let x_1 and x_2 be the cost prices of articles 1 and 2 respectively. Let Y be the selling price of both of them.

Let a denote the common profit/loss percentage.

Then,

$$a = \frac{(Y - x_1)}{x_1} * 100 \dots\dots\dots(1) \text{(For profit)}$$

$$a = \frac{(x_2 - Y)}{x_2} * 100 \dots\dots\dots(2) \text{(For loss)}$$

Equating (1) and (2), we get finally,

$$Y = \frac{2 * x_1 * x_2}{(x_1 + x_2)} \dots\dots\dots(3)$$

The common profit/loss percentage in terms of only cost prices is given by,

$$a = \frac{(x_2 - x_1)}{(x_2 + x_1)} * 100 \dots\dots\dots(4)$$

Overall loss percentage:

$$\text{Overall loss percentage} = \frac{((2Y) - (x_1 + x_2))}{(x_1 + x_2)} * 100$$

Substituting the value of Y from equation(3) and modifying we get,

$$\text{Overall loss percentage} = \frac{(x_2 - x_1)^2}{(x_1 + x_2)^2} * 100 \dots\dots\dots(5)$$

Comparing equations (4) and(5) we get,

$$\text{Overall loss percentage} = \frac{a^2}{100} \dots\dots\dots(6)$$

$$\text{Overall loss value} = (x_1 + x_2) - 2Y \dots\dots\dots(7)$$

Substituting the value of Y from equation (3) in (7) we get,

$$\text{Overall loss value} = \frac{(x_2 - x_1)^2}{(x_2 + x_1)} \dots\dots\dots(8)$$

Example 1: When the cost price of 2 articles are Rs 100 and Rs 150 and the selling price is same and the loss and profit percentage of the 2 articles are same,

- 1. Find the common selling price.**
- 2. Find the common profit/loss percentage.**

3. Find the overall loss percentage.

4. Find the actual overall loss.

Solution:

- 1. Common selling price $Y = (2 \times 100 \times 150) / (100 + 150)$ (From equation (3))
= Rs 120.**
- 2. Common profit / loss percentage $a = ((150 - 100) / (150 + 100))$ (From equation (4))
= 20**
- 3. Overall loss percentage = $20^2 / 100$ (Using equation (6) and using value of a from equation (4)).
= 4**
- 4. Actual overall loss = $(150 - 100)^2 / (100 + 150)$ (From equation (8)).
= Rs 10.**