9 Profit and Loss

Teaching students about profit and loss is giving them life skills. Lessons on how to stay solvent are useful even for those students who choose not to work in business. For those whogo on to employment in the commercial sector, having knowledge of how costs and revenues affect the economic viability of a company is essential. A profit and loss, or P&L, forecast is a projection of how much money you will bring in by selling products or services and how much profit you will make from these sales.

In good times, you use it to ensure that there will be enough money coming in to exceed the costs of providing the goods and services so you can make a solid profit. In tough times, your P&L can play an essential role in showing you what kind of a plan you need to return to breakeven, so that you'll be able to survive until better times come.

In this chapter, the use of "Rule of Fraction" is dominant; we should understand this rule because it is going to be used in almost all the questions.

The Rule of Fraction

It states, *"If our required value is greater than the supplied value, we should multiply the supplied value with a fraction which is more than one. And if our required value is less than the supplied value, we should multiply the supplied value with a fraction which is less than one."*

- If there is a gain of x%, the calculating figures would be 100 and $(100+x)$.
- If there is a loss of y%, the calculating figures would be 100 and $(100-y)$.
- If the required value is more than the supplied value, our multiplying fractions should be $\frac{100+x}{100}$ or $\frac{100}{100-y}$ (both are less than 1).
-

If the required value is less than supplied value, our multiplying fractions should be $\frac{100}{100+x}$ or $\frac{100-y}{100}$ (both are less than 1).

Profit and Loss: A financial statement that summarizes the revenues, costs and expenses incurred during a specific period of time – usually a fiscal quarter or year. These records provide information that shows the ability of a company to generate profit by increasing revenue and reducing costs. The P&L statement is also known as a "statement of profit and loss", an "income statement" or an "income and expense statement". The profit or loss is reckoned as so much percent on the cost.

- **Cost Price:** The price, at which an article is purchased, is called its cost price, abbreviated as C.P.
- **Selling Price:** The price, at which an article is sold, is called its selling prices, abbreviated as S.P.
- **Profit or Gain:** If S.P. is greater than C.P., the seller is said to have a profit or gain.

Important Formulae

- Gain / Profit = Selling Price (SP) – Cost Price (CP)
- Loss = (C.P.) – (S.P.)
  Loss or gain is always reckoned on C.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.)
  $$\text{S.P.} = \left[\frac{100 - \textit{Loss}\ \%}{100}\times \text{C.P.}\right]$$
- Cost Price: (C.P.)
  $$\text{C.P.} = \left[\frac{100}{(100 - \text{Gain}\ \%)}\times \text{S.P.}\right]$$
- Cost Price: (C.P.)
  $$\text{C.P.} = \left[\frac{100}{(100 - \textit{Loss}\ \%)}\times \text{S.P.}\right]$$
- If an article is sold at a gain of say 35%, then S.P. = 135% of C.P.
- If an article is sold at a loss of say, 35% then S.P. = 65% of C.P.
- 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

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

Example 1. A vendor bought toffees at 6 for a rupee. How many for a rupee must he sell to gain 20%?

Solution: C.P. of 6 toffees = Re. 1

S.P. of 6 toffees = 120% of Re. 1 = Rs. $\frac{6}{5}$

For Rs. $\frac{6}{5}$, toffees sold = 6.

For Re. 1, toffees sold $= \left(6 \times \frac{5}{6}\right) = 5.$

Example 2. On an order of 5 dozen boxes of a consumer product, a retailer receives an extra dozen free. This is equivalent to allowing him a discount of?

Solution: Clearly, the retailer gets 1 dozen out of 6 dozens free.

$\therefore$ Equivalent discount $= \left(\frac{6}{6} \times 100\right)\% = 16\frac{2}{3}\%$

Example 3. A dishonest dealer sells goods at $6\frac{1}{4}\%$ loss on cost price but uses 14 gm instead of 16 gm. What is his percentage profit or loss?

Solution. Suppose the cost price is x per kg.

Then, he sells the goods for $\square x\left(\frac{100 - \frac{25}{4}}{100}\right) = \text{Rs.}\frac{15x}{16}$ per kg

Now, suppose he bought y kg of goods.

Then, his total investment $= xy$

and his total return $= \frac{15x}{16} \times y\left(\frac{16}{14}\right) = \text{Rs.}\frac{15}{14}xy$

$\therefore$ His % profit $= \frac{\frac{15}{14}xy - xy}{xy} \times 100 = \frac{50}{7} = 7\frac{1}{7}\%$

Direct Formula: If the shopkeeper sells his goods at x% loss on cost price butuses y gm instead of z gm, then his % profit or loss is $[100 - x]\frac{z}{y} - 100$ as the sign is +ve or –ve.

In the above case,

$$\%\text{profit or loss} = \left[100 - 6\frac{1}{4}\right]\left[\frac{16}{14}\right] - 100$$

$$= \frac{375}{4} \times \frac{16}{14} - 100$$

$$= \frac{1500 - 1400}{14} = \frac{100}{4}$$

$$= \frac{50}{7} = 7\frac{1}{7}\%$$

Example 4. A dishonest dealer sells the goods at $6\frac{1}{4}\%$ loss on cost price but uses $12\frac{1}{2}\%$ less weight. What is his percentage profit or loss?

Solution: In this case, we use the direct formula as: Profit or loss percentage

$$= \frac{100 - 6\frac{1}{4}}{100 - 12\frac{1}{2}} \times 100 - 100$$

$$= \frac{100 - \frac{25}{4}}{100 - \frac{25}{2}} \times 100 - 100$$

$$= \frac{\frac{375}{4}}{\frac{175}{2}} \times 100 - 100 = \frac{15}{14} \times 100 - 100 = \frac{100}{14} = 7\frac{1}{7}\%$$

Since, sign is +ve, there is profit of $7\frac{1}{7}\%$

Multiple Choice Questions

1. A shopkeeper purchased 70 kg of potatoes for Rs. 420 and sold the whole at the rate of Rs. 6.50 per kg. What will be his gain percent?

a. $4\frac{1}{4}\%$ **b.** $6\frac{1}{4}\%$ **c.** $8\frac{1}{3}\%$ **d.** 20%

2. 100 oranges are bought at the rate of Rs. 350 and sold at the rate of Rs. 48 per dozen. The percentage of profit or loss is:

a. $14\frac{2}{7}\%$ gain **b.** 15% gain

c. $14\frac{2}{7}\%$ loss **d.** 15% loss

3. A sells an article which costs him Rs. 500 to B at a profit of 20%. B then sells it to C, making a profit of 10% on the price he paid to A. How much does C pay B?

a. Rs 472 **b.** Rs 476

c. Rs 528 **d.** None of these

4. By selling an article for Rs. 100, a man gains Rs. 30. Then, his gain% is:

a. 15% **b.** $42\frac{6}{7}\%$ **c.** $17\frac{11}{17}\%$ **d.** $17\frac{1}{4}\%$

5. A fruit seller sells mangoes at the rate of Rs. 8 per kg and thereby loses 25%. At what price per kg, he should have sold them to make a profit of 25%?

a. Rs. 11.81 **b.** Rs. 12 **c.** Rs. 12.25 **d.** Rs. 13.33

6. A property dealer sells a house for Rs. 9, 00,000 and in the bargain makes 12.5%. Had he sold it for Rs. 6, 00,000, then what percentage of loss or gain have made?

a. 25% loss **b.** 10% loss

c. $12\frac{1}{2}\%$ gain **d.** $16\frac{2}{3}\%$ gain

7. If selling price of an article is $\frac{5}{4}$ of its cost price, the profit in that?

a. $16\frac{2}{3}\%$ **b.** $20\frac{1}{2}\%$ **c.** 25% **d.** 30%

8. The ratio between the sale price and the cost price of an article is 7: 5. What ratio between the profit and the cost price of that article?

a. 2 : 7 **b.** 5 : 2

c. 7 : 2 **d.** None of these

9. The profit earned by selling an article for Rs. 900 is double the loss incurred when the same article is sold for Rs. 450. At what price should the article be sold to make 25% profit?

a. Rs. 600 **b.** Rs. 750

c. Rs. 800 **d.** Data inadequate

10. The cost price of 20 articles is the same as the selling price of *x* articles. If the profit is 25%, then the value of *x* is:

a. 15 **b.** 16 **c.** 18 **d.** 25

11. A loss of 5% was suffered by selling a plot for Rs. 4,085. The cost price of the plot was:

a. Rs. 4350 **b.** Rs.4259.25

c. Rs. 4200 **d.** Rs. 4300

12. A man purchased a watch for Rs. 400 and sold it at a gain of 20% of the selling price. The selling price of the watch is:

a. Rs. 300 **b.** Rs. 320

c. Rs. 440 **d.** Rs. 500

13. If 5% more is gained by selling an article for Rs. 350 than by selling it for Rs. 340, the cost of the article is:

a. Rs. 50 **b.** Rs. 160

c. Rs. 200 **d.** Rs. 225

14. If the cost price of 15 tables be equal to the selling price of 20 tables, the loss percent is:

a. 25% **b.** 37.5% **c.** 35% **d.** 20%

15. By selling 100 bananas, a fruit seller gains the selling price of 20 bananas. His gain percent is:

a. 10% **b.** 15% **c.** 20% **d.** 25%

16. Profit after selling a commodity for Rs. 425 is same as loss after selling it for Rs. 355. The cost of the commodity is:

a. Rs. 385 **b.** Rs. 390 **c.** Rs. 395 **d.** Rs. 400

17. The cost price of an article, which on being sold at a gain of 12% yields Rs. 6 more than when it is sold at a loss of 12%, is:

a. Rs. 30 **b.** Rs. 25 **c.** Rs. 20 **d.** Rs. 24

18. The cost of 2 almirahs and a radio is Rs. 7000, while 2 radios and one almirah together cost Rs. 4250. The cost of an almirah is:

a. Rs. 3000 **b.** Rs. 3160

c. Rs. 3240 **d.** None of these

19. A shopkeeper mixes two varieties of tea, one costing Rs. 25 per kg; and another at Rs. 45 per kg. in the ratio 3 : 2. If he sells the mixed variety at Rs. 41.60 per kg, his gain or loss percent is:

a. 4% gain **b.** 4% loss

c. $6\frac{2}{3}\%$ gain **d.** $6\frac{2}{3}\%$ loss

20. A dishonest dealer professes to sell his goods at cost price but he uses a false weight and thus gains $6\frac{18}{47}\%$. For a kg, he uses a weight of:

a. 953 gm **b.** 940 gm

c. 960 gm **d.** 947 gm

ANSWERS

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
c	a	d	b	d	a	c	d	b	d
11.	**12.**	**13.**	**14.**	**15.**	**16.**	**17.**	**18.**	**19.**	**20.**
d	d	c	a	c	b	b	b	c	b

SOLUTIONS

1. **(c)** C. P. of 1 kg = Rs. $\left(\frac{420}{70}\right)$ = Rs. 6

S. P. of 1 kg = Rs. 6.50

$\therefore$ Gain $\% = \left(\frac{0.50}{6}\times 100\right)\% = \frac{25}{3}\% = 8\frac{1}{3}\%$

2. **(a)** C.P. of 1 orange = Rs. $\left(\frac{350}{100}\right) = 3.50$

S.P. of 1 orange = Rs. $\left(\frac{48}{12}\right)$ = Rs. 4

$\therefore$ Gain $\% = \left(\frac{0.50}{3.50}\times 100\right)\% = \frac{100}{7}\% 14\frac{2}{7}\%$

3. **(d)** C.P. for B = 120 % of Rs. 500

$= \text{Rs.}\left(\frac{120}{100}\times 500\right) = \text{Rs. } 600$

C.P. for C = 110 % of Rs. 600

$= \text{Rs.}\left(\frac{110}{100}\times 600\right) = \text{Rs. } 660$

4. **(b)** S.P. = Rs. 100, gain = Rs. 30

C.P. = Rs. (100 – 30) = Rs. 70

$\therefore \quad \text{Gain} = \left(\frac{30}{70}\times 100\right)\% = \frac{3000}{70}\% = 42\frac{6}{7}\%$

5. **(d)** $75 : 8 = 125 : x$ or $x = \left(\frac{8\times 125}{75}\right) = 13.33$

Hence S.P. per kg = Rs. 13.33

6. **(a)** C.P. = Rs. $\left(\frac{100}{112.5}\times 900000\right) = \text{Rs. } 800000$

$\therefore \quad \text{Required loss } \% = \left(\frac{200000}{800000}\times 100\right) = 25\%$

7. **(c)** Let C.P. = Rs. X

Then, S.P. = Rs. $\frac{5x}{4}$

Gain = Rs. $\left(\frac{5x}{4} - x\right) = \text{Rs. } \frac{1}{4}x$

$\therefore \quad \text{Gain } \% = \left(\frac{x}{4}\times\frac{1}{x}\times 100\right)\% = 25\%$

8. **(d)** Let C.P. = Rs. $5x$and S.P. = Rs. $7x$

Then, Gain = Rs. $2x$

Required ratio = $2x : 5x = 2 : 5$

9. **(b)** Required S.P. = 125 % of Rs. 600

$= Rs.\left(\frac{125}{100}\times 600\right) = Rs.750$

10. **(d)** Let C.P. of each article be Rs. 1

Then, C.P. of 16 articles = Rs. 16,

S.P. of 16 articles = Rs. 20

Gain % $= \left(\frac{4}{16}\times 100\right)\% = 25\%$

11. **(d)** C. P. $10 = \frac{5}{100}x \Rightarrow x = Rs.200$

12. **(d)** Let S.P. = Rs. x

Then, gain = Rs. $\left(\frac{20}{100}\times x\right) = \text{Rs. } \frac{x}{5}$

C.P. $= \text{Rs.}\left(x - \frac{x}{5}\right) = \text{Rs.}400$

$\Rightarrow \quad \frac{4}{5}x = 400 \Rightarrow x = Rs.500.$

13. **(c)** Let C.P. Rs. x

Then, if S.P. = Rs. 350, gain = Rs. $(350 - x)$.

if S.P. = Rs. 340, gain = Rs. $(340 - x)$

$\therefore \quad (350 - x) - (340 - x) = \frac{5}{100}x$

$\Rightarrow \quad 10 = \frac{5}{100}x \Rightarrow x = Rs.200$

14. **(a)** Let C.P. of each table be Rs. 1.

C.P of 20 tables = Rs. 20.

S.P. of 20 tables = Rs. 15.

Loss % $\left(\frac{5}{20}\times 100\right)\% = 25\%.$

15. **(c)** Gain = (S.P. of 100 bananas) – (C.P. of 100 bananas)

Or S.P. of 20 bananas

= (S.P. of 100 bananas) – (C.P. of 100 bananas)

Or S.P. of 80 bananas = C.P. of 100 bananas.

Now, let C.P. of each banana be Re. 1. Then,

C.P. of 80 bananas = Rs. 80.

S.P. of 80 bananas = Rs. 100.

Gain % $= \left(\frac{20}{80}\times 100\right)\% = 25\%.$

16. **(b)** Let C.P. = Rs. x. Then,

$425 - x = x - 355 \Rightarrow 2x = 780 \Rightarrow x = 390.$

17. **(b)** Let the C.P. be Rs. x

Then, S.P. when gain is

$12\% = \left(\frac{12x}{100} + x\right) = \frac{112x}{100}$

$\therefore \quad \frac{112x}{100} - \frac{88x}{100} = 6.$

18. **(b)** Let the cost of each almirah be Rs. x and that of each radio be Rs. y.

Then, $2x + y = 7000$ and $x + 2y = 4520.$

Solving these equations, we get x = Rs. 3160.

19. **(c)** C.P. of 5 kg mix.

$= Rs.(35\times 3 + 45\times 2) = Rs.195$

S.P. of 5 kg mix. $= Rs.(41.60\times 5) = Rs.280.$

Gain % $= \left(\frac{13}{195}\times 100\right)\% = 6\frac{2}{3}\%.$

20. **(b)** Suppose he uses a weight of x gm For 1 kg.

Then, $\frac{x}{1000 - x}\times 100 = \frac{300}{47}$ or $\frac{\text{x}}{\text{1000-x}} = \frac{3}{47}.$

Or $47x = 3000 - 3x$ or $50x = 3000$ or $x = 60.$

So, he uses a weight of (1000 – 60) = 940 gm for 1 kg.

□□□