Profit and Loss

- **Cost Price:** The price at which an article is made is known as its cost price. The cost price is abbreviated as C.P.

- **Selling Price:** The price at which an article is sold is known as its selling price. The selling price is abbreviated as S.P.

- **Profit:** If the selling price (S.P.) of an article is greater than the cost price (C.P.), then the difference between the selling price and cost price is called Profit.

- **Loss:** If the selling price (S.P.) of an article is les than the cost price (C.P.), the difference between the cost price (C.P.) and the selling price (S.P.) is called Loss.

- Gain = S.P. - C.P., if S.P. > C.P.

- Loss = C.. - S.P., if C.P. > S.P.

- Gain % = %%   Loss% = $\dfrac{\text{Loss} \times 100}{CP}$

- S.P. = $\dfrac{100 + \text{Gain}\%}{100} \times$ C.P.

- S.P. = $\dfrac{100 - \text{Gain}\%}{100} \times$ C.P.

- When the selling price and gain percent are given, the C.P. $= \dfrac{100}{100 + \text{Gain}\%} \times$ S.P.

- When the selling price and loss percent are given then C.P. $= \dfrac{100}{100 - \text{Gain}\%} \times$ S.P.

Discount

Discount means reduction in the price. This reduction is always given on the marked price (M.P.) or List price (LP.).

- When discount is offered on an article, then we calculate the selling price (S.P.) as:
S.P. = Marked Price - Discount.

- Discount = Marked price - Selling price

- Discount% = $\dfrac{\text{MP.} \times \text{RATE of discount}}{100}$

- S.P. = M.P. $\times \left(\dfrac{100 - \text{Discount}}{100} \right)\%$

- M.P. = $\dfrac{100 \times \text{S.P.}}{100 - \text{Discount}\%}$

- If the S.P. of two objects are equal and one of them is sold at x% profit and other is at x% loss then there is always a loss of $= \left(\dfrac{\text{Common Loss or Gain}\%}{10} \right)^2$

$\dfrac{x^2}{100}\%$

- Two successive discount of x% and y% allowed on an item are equivalent to a single discount of $\left(x + y - \dfrac{xy}{100} \right)\%$

- **NOTE:** This discount is always less than the sum of individual discount.

Ex.1 If the manufacture gains 10% on an article, the wholesale dealer gain 15% and the retailer 25%, then find the cost of production of a table whose retrial price is Rs. 1265?

Sol. Let the cost of production of the table be Rs. x.
Then, 125% of 115% of 110% of x = 1265

$\Rightarrow \dfrac{125}{100} \times \dfrac{115}{100} \times \dfrac{110}{100} \times x = 1265$

$\Rightarrow \dfrac{253}{160} x = 1265$

$\Rightarrow x = \left(\dfrac{1265 \times 1620}{263} \right) = \text{Rs.800.}$

Ex.2 A man sold two flats for Rs. 675958 each. On one be gains 16% while on the other he loses 16%. How much percentage does he gain or lose in the whole transaction?

Sol. Loss% = %%

Ex.3 A man bought toffees at 3 for a rupee. How many toffees for a rupee must he sell to gain 50%?

Sol. C.P. of 3 toffees = Rs 1:
S.P. of 3 toffees = 150% of Rs. 1

$= \text{Rs. } \dfrac{3}{2}$

For Rs. $\dfrac{3}{2}$ toffees sold = 3

For Rs. 1, toffees sold $= \left(3 \times \dfrac{2}{3} \right) = 2$

Ex.4 The C.P. of 21 articles is equal to S.P. of 18 article. Find the gain or loss percent.

Sol. Let C.P. of each article be Rs. 1.
Then, C.P. of 18 articles = Rs.18,
∴ S.P. of 18 articles = Rs. 21.

∴ Gain% $\left(\dfrac{3}{18} \times 100 \right)\% = 16\dfrac{2}{3}\%$

Ex.5 By selling 33 metres of cloth, one gain the selling of 11 metres. Find the gain percent.

Sol. (S.P. of 33m) - (C.P. of 33 m) = Gain S.P. of 11 m.

∴ S.P. of 22 m = C. P. of 33 m.
Let C.P. of each metre be Rs. 1.
Then, C.P. of 22 m = Rs. 22.
and, S.P. of 22 m = Rs. 33.

∴ Gain% = $\left(\dfrac{11}{22} \times 100\right)\% = 50\%$

Ex.6 A vendor bought bananas at 6 for Rs. 10 and sold them at 4 for Rs. 6. Find his gain or loss percent.

Sol. Suppose, number of bananas bought = L.C.M.(6, 4) = 12

∴ C.P. = Rs. $\left(\dfrac{10}{6} \times 12\right) = Rs.20;$

S.P. = Rs. $\left(\dfrac{6}{4} \times 12\right) = Rs.18;$

∴ Loss% = $\left(\dfrac{2}{20} \times 10\right) = Rs.10\%;$

Ex.7 At what percentage above the C.P. must an article be marked so as to gain 33% after allowing a customer a discount of 5%.

Sol. Let C.P. = Rs. 100. Then S.P. = Rs. 133.
Let market price be Rs. x.
Then 95% of x = 133.

$\Rightarrow \dfrac{95}{100}$ x = 133 $\Rightarrow$ x = $\left(133 \times \dfrac{100}{95}\right)$ = 140.

Hence, percentage above the C.P. of an article be marked as = 140 - 100 = 40%.

Ex.8 A tradesman sold an article at a loss of 20%. If the selling price had been increased by Rs. 100, there would have been a gain of 5%. What was the cost price of the article?

Sol. Let the C.P. be Rs. x.

1st S.P. = 80% of x = $\dfrac{80}{100} \times = \dfrac{4x}{5}$

2nd S.P. = 105% of x = $\dfrac{105}{100} \times = \dfrac{21}{20}$ x

A.T.Q.

$\dfrac{21}{20}x - \dfrac{4}{5}x = 100$

$\Rightarrow x = \dfrac{20}{5} \times 100$

$\Rightarrow x = 400$
Hence, C.P. = Rs. 400.

Ex.9 Find the single discount equivalent to a series discount of 20%, 10% and 5%.

Sol. Let market price be Rs. 100.
Then, net S.P. = 95% of 90% of 80% of Rs. 100.

= Rs. $\left(\dfrac{95}{100} \times \dfrac{90}{100} \times \dfrac{80}{100} \times 100\right) = Rs. 68.40.$

∴ Required discount = (100 - 68.40%) = 31.6%.

Ex.10 A man bought a horse and a carriage for Rs. 3000. He sold the horse at a gain of 20% and the carriage at a loss of 10%, there by gaining 2% on the whole. Find the cost of the horse.

Sol. Let the C.P. of the horse be Rs. x.
Then, C.P. of the carriage = Rs. (3000 - x).

∴ 20% of x - 10% of (3000 - x) = 2% of 3000.

$\Rightarrow \dfrac{x}{5} - \dfrac{(3000-x)}{10} = 60$

$\Rightarrow$ 2x - 3000 + x = 600

$\Rightarrow$ 3x = 3600

$\Rightarrow$ x = 1200. Hence, C.P. of the horse = Rs. 1200

EXERCISE

1. Sam purchased 20 dozens of toys at the rate of Rs. 375 per dozen. He sold each one of them at the rate of Rs. 33. What was his percentage profit?
   (A) 50.6% 　　　　　　(B) 5.6%
   (C) 4.6% 　　　　　　(D) 6.5%

2. A shopkeeper expect a gain of $22\dfrac{1}{2}\%$ on his cot race. If in a week, his sale was of Rs. 392, what was his profit?
   (A) Rs.28 　　　　　　(B) Rs. 72
   (C) Rs. 72 　　　　　　(D) Rs. 88.25

3. In the cost price of 12 pens is equal to the selling price of 8 pens, the gain percent is
   (A) $66\dfrac{2}{3}\%$ 　　　　(B) $33\dfrac{1}{3}\%$
   (C) 50% 　　　　　　(D) 25%

4. In the selling price of 50 articles is equal to the cost price of 40 articles, then the loss or gain percent is:
   (A) 20% loss 　　　　(B) 20% gain
   (C) 25% loss 　　　　(D) 25% gain 44.

5. Find a single discount equivalent to the series of two discounts of 15% and 4%.
   (A) 20% 　　　　　　(B) 21.6%
   (C) 25% 　　　　　　(D) 18.4%

6. A man buys eggs at 2 for Rs. 1 and an equal number at 3 for Rs. 2 and sell the whole at 5 for Rs. 3. His gain of loss percent is:
   (A) $2\dfrac{2}{7}\%$ loss 　　　(B) $3\dfrac{6}{7}\%$ gain
   (C) $3\dfrac{2}{7}\%$ loss 　　　(D) $2\dfrac{6}{7}\%$

7. A main bout some oranges at Rs. 10 per dozen and bought the same number of orange at Rs. 8 per dozen. He sold these oranges at Rs. 11 per dozen and gained Rs. 120. The total number of oranges bought by him was:
   (A) 30 dozens 　　　　(B) 40 dozens
   (C) 50 dozens 　　　　(D) 60 dozens

8. Padam purchase 30 kg of rice at the rate of Rs. 17.5/kg and another 30 kg rice at a certain rate. He mixed the two and sold the entire quantity at the rate of Rs. 18.60/kg and made 20% overall profit. At what price per kg did he purchase the lot of another 30 kg rice?
(A) Rs. 12.50   (B) Rs. 13.50
(C) Rs. 14.50   (D) Rs. 15.50

9. A dishonest dealer professes to shell his goods at cost price. But he uses a false weight and thus gain $6\dfrac{18}{47}\%$. For a kg, he uses a weight of:
(A) 940 gm   (B) 947 gm
(C) 953 gm   (D) 960 gm

10. A man buys an article for 10% less than its value and sell it for 10% more than its value. His gain or loss percent is :
(A) no profit, no loss
(B) 20% profit
(C) less than 20% profit
(D) more than 20% profit

11. The cash difference between the selling prices of an article at a profit of 4% and 6% is Rs. 3. The ratio of the two selling prices is :
(A) 51 : 52   (B) 52 : 53
(C) 51 : 53   (D) 52 : 55

12. By selling an umbrella for Rs. 300, a shopkeeper gains 20%. During a clearance sale, the shopkeeper allows a discount of 10% on the marked price. His gain percent during the sale is :
(A) 7   (B) 7.5
(C) 8   (D) 9

13. At what price should a shopkeeper mark a ratio that costs him Rs. 1200 in order that the may offer a discount of 20% on the marked price and still make a profit of 25%
(A) Rs. 1675   (B) Rs. 1875
(C) Rs. 1900   (D) Rs. 2025

14. Peter bought an item at 20% discount on its original price. H e sold it with 40% increase on the price he bought it. The new sale price is by what percent more than the original price?
(A) 7.5%   (B) 8%
(C) 10%   (D) 12%

15. Varun got 30% concession on the labeled price of an article and sold it for Rs. 8750 with 25% profit on the price he bought. What was the labeled price?
(A) Rs. 10,000   (B) Rs. 12,000
(C) Rs. 16,000   (D) Data inadequate

16. In the selling price of 8 articles is equal to the cost price of 10 articles, then the gain or loss percentage is

[NTSE Stage-I/RAj./2007]

(A) $\dfrac{10-8}{8}\times100$ gain   (B) $\dfrac{10-8}{8}\times100$ loss

(C) $\dfrac{10-8}{10}\times100$ gain   (D) $\dfrac{10-8}{10}\times100$ loss

17. A sold a commodity to B with 10% profit. If B resold the same commodity to A with a loss of 10%, then A will have:

(NTSE Stage-I/Raj./2007)

(A) 1% loss   (B) 11% loss
(C) 1% profit   (D) 11% profit

18. If an article is sold for Rs. p, there is a loss of 15%. If however, the same article is sold for Rs. q, there is a profit of 15% then the ratio (q - p) : (q + p is) :

(NTSE state -II/2008)

(A) 20 : 23   (B) 20 : 3
(C) 3 : 20   (D) 17 : 23

ANSWER – KEY

PROFIT & LOSS

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	B	C	C	A	D	D	D	B	A	D
Que.	11	12	13	14	15	16	17	18		
Ans.	B	C	B	D	A	A	D	C		