20. PROFIT - LOSS & DISCOUNT

When SP > CP, there is a profit.
$\therefore$ Profit = SP – CP

When CP > SP, there is a loss.
Loss = CP – SP

When CP = SP, there is neither profit nor loss

In all the three cases discussed above, CP remains constant where as SP varies. Hence the profit percent or loss percent is calculated on the cost price.

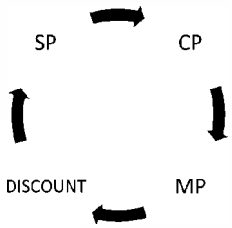
Profit percent = $\frac{\text{Profit}}{\text{CP}} \times 100$

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

SP = $\frac{\text{CP}(100+\text{p}\%)}{100}$, Where p % is profit percent.

SP = $\frac{\text{CP}(100-l\%)}{100}$, Where l% is loss percent.

Increasing the cost price by consider a trader expenses and profit is called marked price. The reduction in the marked price (MP) is called discount and the price obtained after reducing the Marked price is called selling price.



Discount can be offered in two ways;

1) In terms of cash back 2) In terms of articles

Eg: 1) An article is marked 20% above the cost price and offered a discount of 10%. This is called discount in terms of cash back.

Eg: 2) Buy 2 and Get 3, this is called discount in terms of articles. Here a shop keeper is giving 3 articles at the price of 2 articles. So, he is offering (1/3)*100 = 33.33% discount.

Overheads:

The expenditure incurred towards transportation, repairs etc are known as overheads.

A problem on profit or loss could be solved by formula method or by percentage method. But percentage method is more convenient. Take CP = 100 and proceeding further is percentage method.

Example:

When a chair is sold at Rs.480, there is a loss of 20%. At what price should it be sold to gain 10%?
By using the percentage method, let the CP be Rs.100. When there is a loss of 20%, SP = 80% of CP. When there is a profit 10%, SP = 110% of CP. Given that 80% of CP = Rs.480,

then 110% of CP = $\frac{110}{80} \times 480$ = Rs. 660

Type 1:
The cost prices of two articles are equal and there is a loss of x % on one article and a gain of x % on the other. What is the overall profit or loss percent?

Solution:
Profit on the second article is equal to loss on the first article. Therefore, on the whole, there is neither profit nor loss.

Type 2:
As given in the above example, $CP^1 = CP_2$. The profit percentages on the two articles is 20% and 30% respectively. What is the overall profit percentage?
Solution:
Let $CP_1 = CP_2$ = Rs.100.
Total CP = Rs.200
Overall profit = 20 + 30 = Rs. 50

Overall profit percent = $\frac{50}{200} \times 100 = 25\%$

Alternatively, overall profit percentage

= $\frac{20+30}{2} = 25\ \%$

Type 3:
$CP_1 = CP_2$ and there is a profit of 30% on one article and a loss of 20% on the other. What is the overall profit or loss percent?
Solution:
Since the cost prices are equal and the profit percent on one article is greater than the loss percent on the other, there will be profit on the whole.

Let $CP_1 = CP_2$ = Rs.100, total CP = Rs.200
Overall profit = 30 – 20 = Rs.10

Overall profit percentage = $\frac{10}{200} \times 100 = 5\%$

Alternatively, overall profit percentage

= $\frac{30-20}{2} = 5\%$

Type 4:
The selling prices of two articles are equal. The profit percent on one article is equal to the loss percent on the other article which is x%. What is overall profit or loss

percent in terms of x?

Solution:
Whenever SP1 = SP2, there will be always a loss.

$$\text{Loss percentage} = \left(\frac{x^2}{100}\right)\%$$

Type 5:
The cost price of 10 articles is equal to the selling price of 8 articles. What is the profit or loss percentage?

Solution:
Let the CP of 10 articles = SP of 8 articles = Rs.80
CP of 1 article = Rs.8
SP of 1 article = Rs.10

$$\text{Profit percent} = \frac{SP - CP}{CP} \times 100$$

$$= \frac{10 - 8}{8} \times 100 = 25\%$$

Type 6:
Atul sold an article to John at 20% profit and John sold it to Pavan at a loss of 15%. If Pavan bought the article for Rs.10,200, what was Atul's cost price?

Solution: Let the CP of Atul be Rs.x
Given that,

$$x \times \frac{120}{100} \times \frac{85}{100} = \text{Rs.}10,200$$

$$\Rightarrow x = \text{Rs.}10,000.$$

Type 7:
A milk man sells adulterated milk, which contains 25% of water. If he claims to sell at cost price, what is his profit or loss percent?

Solution:
Let the milk man sell 100x litres of adulterated milk. There are 25x litres of water in it.
Let the CP of 75 x litres of pure milk be Rs. 75y.
$\therefore$ S.P. of 100x litre of milk = Rs.100y.

$$\text{Profit percent} = \frac{25y}{75y} \times 100 = 33\frac{1}{3}\%$$

A trader first increases his price above the cost price and then allows a discount on it. Discount is always allowed on the marked price (MP). MP is the tag price.

Selling price = Marked price - Discount

$$\text{Discount percent} = \frac{\text{Discount}}{MP} \times 100$$

$$SP = \frac{MP(100 - d\%)}{100}$$

When CP and SP are referred, the value of CP should be taken as 100. When SP and MP are referred, the value of MP should be taken as 100. When CP, SP and M.P. are refered, the value of CP should be taken as 100.

Type 8:
A Radio is sold at Rs.450, after allowing a discount of 10%.
What is the marked price of the Radio?
Solution:
Let the MP be Rs.100
Then SP = Rs. 90
If SP = Rs.450,

$$\text{Then MP} = \frac{450 \times 100}{90} = \text{Rs.}500$$

Type 9:
An article is marked 25% above the cost price and a discount of 20% is offered on it. What is the profit percent earned?
Solution:
Let the CP be Rs.100
MP = Rs.125

$$\text{Discount} = \frac{20}{100} \times 125 = \text{Rs.}25$$

SP = MP – Discount
= Rs.125 - Rs.25 = Rs.100
As SP = CP, There is no profit, no loss.

Type 10:
Even after allowing a discount of 20%, a trader gains 20%. By what percent is the marked price more than the cost price?
Solution:
Let the CP be Rs.100
SP = Rs.120
If MP is Rs.100 then SP is Rs.80
If SP is 120, then

$$\text{MP} = \frac{120 \times 100}{80} = 150$$

$\therefore$ MP is 50% above the CP.

Type 11:
A dishonest trader professes to sell his clothes at cost price, but uses a measurement of 80 cm for a metre. Find his gain percent.

Solution:
For every 80 cm, dealer gains 20 cm.

$$\therefore \text{ Profit percentage} = \frac{20}{80} \times 100 = 25\%$$

Type 12:
Anand went to a T.V. showroom and purchased a T.V. by expecting a discount of 30%. But, trader allows successive

discounts 20% and 10%. Is the single discount is more profitable than two successive discounts?

Solution:
Let the cost of T.V be Rs.100

(i) If the discount is 30%, then

$$SP = 100 \times \frac{70}{100} = Rs.\ 70$$

(ii) If the discount is in the form of successive discounts 20% and 10%, then

$$SP = 100 \times \frac{80}{100} \times \frac{90}{100} = Rs.72$$

$\therefore$ Discount of 30% is more profitable than the given two successive discounts.

Successive discounts 20% and 10% is equal to a single discount of 28%.

Practice Exercise

1. The selling price of a soap is decreased by 20%. It now sells for Rs.20. What was the original selling price of the soap?
(1) 16 (2) 24 (3) 25 (4) 26

2. A shopkeeper sells a calculator at Rs.150 for 20% profit. At what price should he sell it to gain 40% (in Rs.)?
(1) 300 (2) 180 (3) 175 (4) 200

3. The cost price of a TV set is 60% of its selling price. Find the profit percentage.
(1) 66.66% (2) 40% (3) 33.33% (4) 25%

4. The cost price of two shirts is same. One shirt is sold for 20% profit and the other is sold for 30% profit. Find the overall profit percentage.
(1) 50% (2) 25% (3) 15% (4)20%

5. Ganguly bought a cycle for Rs.600 and sold it for Rs. 900. Find the percentage of profit he made.
(1) 25% (2) 50% (3) 33 (4) 20%

6. A shop keeper marks his goods 20% above the cost price and offers a discount of 10%, find his profit/loss percent.
(1) 10% profit (2) 10% loss
(3) 8% profit (4) 8% loss
(5) 12% profit

7. A shop keeper marks his goods 25% above the cost price and offers a discount of 12%, find his profit/ loss percent.
(1) 10% profit (2) 10% loss
(3) 8% profit (4) 8% loss
(5) 13% profit

8. A trader marks his goods 40% above the cost price but gets only 5% profit on selling the article. Find the discount percent offered.
(1) 35% (2) 25% (3) 20% (4) 15%

9. If selling price of 8 articles is equal to cost price of 10 articles, find the profit percentage.
(1) 25% (2) 20% (3) 33.33% (4) 16.66%

10. If selling price of 10 articles is equal to cost price of 8 articles, find the loss percentage.
(1) 25% (2) 20% (3) 33.33% (4) 16.66%

11. If selling price of 9 articles is equal to cost price of 10 articles, find the profit/loss percentage.
(1) 11.11% profit (2) 11.11% loss
(3) 10% loss (4) 10% profit

12. Akanksha sells two articles at same price and gets a profit of 30% on one article and a loss of 30% on the other article. What is her overall profit/loss percentage?
(1) 9% profit (2) 9% loss (3) 3% profit
(4) 3% loss (5) No profit, no loss

13. Akanksha by selling two articles at same price gets a profit of 50% on one article and a loss of 25% on the other article. What is her overall profit/loss percentage?
(1) 4% profit (2) 10% profit (3) 6% profit
(4) 12.5% loss (5) 0%

14. Akanksha sells two articles at same price and gets a profit of 10% on one article and a loss of 10% on the other article. What is her overall profit/loss percentage?
(1) 1% loss (2) 6% loss (3) 6% profit
(4) 10% loss (5) 0%

15. Akanksha buys two articles at same price and on selling them she gets a profit of 30% on one article and a loss of 30% on the other article. What is her overall profit/loss percentage?
(1) 9% profit (2) 9% loss (3) 3% profit
(4) 3% loss (5) No profit, no loss

16. Akanksha buys two articles at same price and on selling them she gets a profit of 30% on one article and a loss of 20% on the other article. What is her overall profit/loss percentage?
(1) 10% profit (2) 5% profit
(3) 6% profit (4) 4% profit
(5) 4 % loss

17. Akanksha buys two articles at same price. She sells one at a profit of 20% and the other at a loss of 30%. What is her overall profit/loss percentage?
(1) 10% profit (2) 10% loss

(3) 5% profit (4) 5% loss (5) 16% loss

18. Mr. Singh purchased 40,000 apples at Rs.7 each. He found that 30% of those were spoilt and hence were found unfit to be sold. At what price should he sell each of the remaining apples so as to get an overall profit of 25%?
(1) Rs.8.75 (2) Rs.10
(3) Rs.11.25(4) Rs.12.50

19. A man sold a book at a loss of 10%. Had he sold it for Rs.104 more, he would have earned a profit of 10%. Find the cost price of the book.
(1) Rs.400 (2) Rs.520 (3) Rs.640 (4) Rs.840

20. The cost price of a table is Rs.330. It is sold for a profit of Rs.30 after giving a 10% discount. Find its marked price.
(1) 396 (2) 390 (3) 400 (4) 420

21. Sanjana sells two articles at the same selling price one at a profit of 20% and the other at a profit of 30%. Findher overall profit percent.
(1) 50% (2) 25% (3) 56% (4) 65%

22. If after giving a discount of 12%, a profit of 10% was made on an article, then by what percentage was the price marked up?
(1) 20% (2) 25% (3) 32.5% (4) 35%

23. If the cost price of 5 pens is equal to the selling price of 3 pens, then find the profit percentage.
(1) 33.33% (2) 50% (3) 66.66% (4) 25%

24. A dishonest cloth merchant sells cloth at its cost price but still gets a profit of 33.33%. How many cm of cloth he gives for every one meter?
(1) 80 (2) 90 (3) 70 (4) 75

25. A dishonest shopkeeper sells sugar at its cost price but gives 800 gm for 1 kg. Find his profit percentage?
(1) 20% (2) 25% (3) 10% (4) 15%

26. Ram calculates profit percentage on the selling price instead of cost price and gets it as 25%. Find the actual profit percentage?
(1) 33.33% (2) 20% (3) 66.66% (4) 40%

27. Akarsh bought an article at 40% discount; Bindu bought the same article at two successive discounts of 30% and 14%. Who benefited?
(1) Akarsh (2) Bindu (3) Cannot be found

28. Find a single discount percent equal to Successive discounts of 10%, 20% and 10%.
(1) 40 (2) 64.8 (3) 35.2 (4) 60

29. Arti bought an article at Rs.120. She sold it Sonali at a profit of 25%. Sonali sold the article toNamita at a loss of 20%. Namita sold it to Uma at a profit of 10%. For how much Uma has to sell the article to get Rs. 12 profit (In Rs.)?
(1) 144 (2) 155 (3) 144 (4) 160

30. Tanuja buys a T.V, marks it 20% above cost and later offers a discount of 10%. If the profit made by Tanuja is Rs.2480, find the cost price of the T.V. (in rupees)
(1) 33480 (2) 31000 (3) 36000 (4) 37200

31. A trader buys a car for Rs.1,25,000. He spends Rs.25,000 on the purchase of accessories. The rate of depreciation of the car is 20% every year. After two years, he sells it for Rs.1,02,000. What is his profit or loss percentage?
(1) 6.25% profit (2) 18.4% loss
(3) 7.5% loss (4) 10% profit

32. A shirt was marked 35% above the cost. If a profit of 8% is made by selling the shirt, what is the discount percent offered on the shirt?
(1) 25% (2) 30% (3) 20% (4) 32%

33. Gagan narang bought an article at certain price and he marked at 25% above the cost price. Later he offered a discount of 20% to a customer. Find his profit or loss percent on selling the article.
(1) 5% profit (2) 2 % loss
(3) 2.5% profit (4) 5% loss
(5) No profit, no loss

34. An item was sold at a price after giving two successive discounts of 30% and 50%. If the selling price of the item was Rs.448, then what was the marked price of the item?
(1) Rs.840 (2) Rs.1280 (3) Rs.1140 (4) Rs.1640

35. A man purchased 120 kg of sugar and was forced to sell it at a loss equal to the selling price of 30 kg of sugar. If he purchased each kilogram of sugar for Rs.15, then at what price did he sell each kilogram of sugar?
(1) Rs.12 (2) Rs.15 (3) Rs.20
(4) Cannot say

Profit-Loss & Discount													
1	3	6	3	11	1	16	2	21	3	26	1	31	1
2	3	7	1	12	2	17	4	22	2	27	1	32	3
3	1	8	2	13	5	18	4	23	3	28	3	33	5
4	2	9	1	14	1	19	2	24	4	29	1	34	2
5	2	10	2	15	5	20	3	25	2	30	2	35	1