PROFIT AND LOSS

Cost Price: The price (amount) paid to purchase a product or the cost incurred in manufacturing a product is known as the cost price (CP) of that product.
Selling Price: The price at which a product is sold is called the selling price (SP) of the product.
List Price: List price or the tag price is the price that is printed on the tag of the article. For all practical purposes, we assume it to be same as the marked-price.
Margin: The profit percentage on selling price is known as MARGIN.

Profit
If the Selling Price exceeds the Cost Price, then there is Profit.
Profit or gain = SP – CP
Profit % = Profit / (CP) × 100
S P = (100+gain %) / 100 × C P
C P = 100 / (100+gain %) × S P

Loss
If the overall Cost Price exceeds the selling price of the buyer then he is said to have incurred loss.
Loss = C P – S P
Loss % = Loss / (CP) × 100
S P = (100 - loss %) / 100 × CP
C P = 100 / (100 - loss %) × SP

Mark-up Price
Generally the SP is less than the marked price (MP) the difference MP – SP is known as discount, D.
Discount = M P – S P
Discount %, D% = (Discount) / (MP) ×100

$$\textbf{Mark up percentage} = \frac{\text{MP} - \text{CP}}{\text{CP}} \times 100$$

Successive Discount
Sometimes more than one discount is offered by the shopkeeper on a single item or article. When two or more discounts are applicable successively to the list price of an article, they form the discount series.
When there are two successive Profit of x % and y % then the resultant profit percent is given by

$$[x + y + \frac{xy}{100}]$$

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 came + then there will be overall profit, if it came – then there will be overall loss.

False Weight Problems
Shown or indicate weight is always equivalent to selling price, and actual/true weight is equivalent to cost price.

If a trader professes to sell his goods at cost price, but uses false weights, then

$$Gain\% = \left(\frac{Error}{True\ value - Error}\right) \times 100 \%$$

If a cost price of m articles is equal to the selling Price of n articles, then Profit percentage

$$\frac{m-n}{n} \times 100\%$$

Solved Examples

Example 1: Marked price of a dining table is Rs 1350. It is sold at Rs. 1188 after allowing certain discount. Find the rate of discount.

Solution: MP of the dining table = Rs. 1350
SP of the dining table = Rs. 1188
Discount allowed = Rs. (1350 - 1188) = Rs. 162
Discount percent =162/1350×100=12
This the rate of discount is 12%

Example 2: If two articles are sold at same selling price one at 30% profit another at 30% loss then what is his overall percentage profit or loss?

Solution: Overall loss = - $x^2/100$ %
= - 900/100 = -9% loss

Example 3: A shopkeeper takes 20%, extra quantity while purchasing the milk, and gives 25% less than the indicated weight while selling the milk. Find the profit percentage of he sells at the cost price only.

Solution: Suppose the price of milk = 1 Rs per ml shopkeeper takes 120 ml, and pays only Rs. 100
While selling he gives only 75 ml and shows 100 ml.
Total selling price of 120 ml
100/75×120 = 160, hence percentage profit = 60%

Example 4: A sells an item at a profit of 20% to B and B sells it to C at a profit of 10%. Find the resultant profit percent?

Solution: When there are two successive profit of x% and y% , net profit percentage
= {x+y+(xy/100)}
= 20+ 10 + {(20 x 10)/100} = 32%

Example 5: The cost price of 25 articles is equal to selling price of 20 ar-ticles. The gain percent is?

Solution: Profit percentage = (x-y/y) * 100%
%Gain = {(25-20)/20} x100 = 5/20 x 100 = 25%

Example 6: A man sold an article at a loss of 20%. If he has sold that article for Rs. 12 more he would have gained 10%. Find the cost price of that article

Solution: Let the CP be x
SP at 20% loss = Rs 0.8x

0.8x + 12 = 1.1x
=>0.3x = 12
=> x = Rs 40

Example 7: In a transaction, the profit percentage is 80% of the cost. If the cost further increases by 20% but the selling price remain the same, how much is the decrease in profit percentage?

Solution: Let us assume CP = Rs. 100.
Then Profit = Rs. 80 and selling price = Rs. 180.
The cost increases by 20% → New CP = Rs. 120, SP = Rs. 180.
Profit % = 60/120 * 100 = 50%.
Therefore, Profit decreases by 30%.

Example 8: A man bought some toys at the rate of 10 for Rs. 40 and sold them at 8 for Rs. 35. Find his gain or loss percent.

Solution: Cost price of 10 toys = Rs. 40 → CP of 1 toy = Rs. 4.
Selling price of 8 toys = Rs. 35 → SP of 1 toy = Rs. 35/8
Therefore, Gain = 35/8 – 4 = 3/8.
Gain percent = (3/8)/4 * 100 = 9.375%

Example 9: A shopkeeper allows a discount of 10% on the marked price and still gains 17% on the whole. Find at what percent above the cost price he marked his goods.

Solution: Let the cost price be 100. Then SP = 117.
Let the marked price be x.
So, 90% of x = 117 → x = 130.
Therefore, he marked his goods 30% above the cost price.

Example 10: A shopkeeper offers a discount of 20% on the selling price. On a special sale day, he offers an extra 25% off coupon after the first discount. If the article was sold for Rs. 3600, find
I. The marked price of the article and
II. The cost price if the shopkeeper still makes a profit of 80% on the whole after all discounts are applied.

Solution: Let the marked price of the article be x.
First a 20% discount was offered, on which another 25% discount was offered.
So, 75% of 80% of x = 3600
75/100 * 80/100 * x = 3600 → x = 6000.
So the article was marked at Rs. 6000.
Cost price of the article = [100 / (100+80)]*3600 = Rs. 2000.

LEVEL – I

1. Alfred buys an old scooter for Rs. 4700 and spends Rs. 800 on its repairs. If he sells the scooter for Rs. 5800, his gain percent is?
A. 4 4/7% B. 5 5/11% C. 10% D. 12%

2. 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

3. If selling price is doubled, the profit triples. Find the profit percent?
A. 200/3 B. 105/3 C. 100 D. 120

4. Find the cost price of an article which is sold at a loss of 25 % for Rs. 480.

A. 640 B. 620 C. 740 D. 820

5. A vendor bought toffees at 6 for a rupee. How many for a rupee must he sell to gain 20%?
A. 3 B. 4 C. 5 D. 6

6. The percentage profit earned by selling an article for Rs. 1920 is equal to the percentage loss incurred by selling the same article for Rs. 1280. At what price should the article be sold to make 25% profit?
A. Rs. 2000 B. Rs. 2200 C. Rs. 2400 D. Data inadequate

7. A shopkeeper expects a gain of 22.5% on his cost price. If in a week, his sale was of Rs. 392, what was his profit?
A. Rs. 18.20 B. Rs. 70 C. Rs. 72 D. Rs. 88.25

8. A man buys a cycle for Rs. 1400 and sells it at a loss of 15%. What is the selling price of the cycle?
A. Rs. 1090 B. Rs. 1160 C. Rs. 1190 D. Rs. 1202

9. 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. 3.5 B. 4.5 C. 5.6 D. 6.5

10. Some articles were bought at 6 articles for Rs. 5 and sold at 5 articles for Rs. 6. Gain percent is:
A. 30% B. 33 1/3 % C. 35% D. 44%

11. A shopkeeper sells one transistor for Rs. 840 at a gain of 20% and another for Rs. 960 at a loss of 4%. His total gain or loss percent is?
A. 5 15/17% gain B. 20/3 C. 5 15/23 loss D. None of these

12. The labelled price of a product is Rs. 750. If it is sold at 20% discount and the dealer earns 25% profit, find its cost price.

A. Rs. 540 B. Rs. 480 C. Rs. 440 D. Rs. 520

13. When a plot is sold for Rs. 18,700, the owner loses 15%. At what price must that plot be sold in order to gain 15%?
A. Rs. 21,000 B. Rs. 22,500 C. Rs. 25,300 D. Rs. 25,800

14. The marked price of a radio is 30% more than its cost price. If a discount of 10% is given on the marked price, find the gain percent.

A. 20% B. 17% C. 19% D. 21%

15. On selling 17 balls at Rs. 720, there is a loss equal to the cost price of 5 balls. The cost price of a ball is?
A. Rs. 45 B. Rs. 50 C. Rs. 55 D. Rs. 60

16. By selling 45 lemons for Rs 40, a man loses 20%. How many should he sell for Rs 24 to gain 20% in the transaction?
A. 16 B. 18 C. 20 D. 22

17. A shopkeeper cheats to the extent of 10% while buying and selling, by using false weights. His total gain is.
A. 20% B. 21% C. 22% D. 23%

18. If the cost price of 12 pens is equal to the selling price of 8 pens, the gain percent is?
A. 12% B. 30% C. 50% D. 60%

19. The cost price of 24 articles is the same as the selling price of x articles. If the profit is 20%, then the value of x is?
A. 15 B. 20 C. 18 D. 25

20. If books bought at prices ranging from Rs. 200 to Rs. 350 are sold at prices ranging from Rs. 300 to Rs. 425, what is the greatest possible profit that might be made in selling eight books?
A. 600 B. 1200 C. 1800 D. none of these

LEVEL – II

1. How much percent more than the cost price should a shopkeeper mark his goods so that after allowing a discount of 25% on the marked price, he gains 20%?
A. 60% B. 55% C. 70% D. 50%

2. A dishonest dealer professes to sell his goods at the cost price but uses a false weight of 850 g instead of 1 kg. His gain percent is?
A. 71 11/17% B. 11 11/17% C. 17 12/17% D. 17 11/17%

3. In a certain store, the profit is 320% of the cost. If the cost increases by 25% but the selling price remains constant, approximately what percentage of the selling price is the profit?
A. 30% B. 70% C. 100% D. 250%

4. The percentage profit earned by selling an item for Rs. 832 is equal to the percentage loss incurred by selling the same item for Rs. 448. At what price should the item be sold to make 50% profit?
A. Rs.920 B. Rs. 960 C. Rs. 1060 D. Rs. 1200

5. 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 2/7% gain B. 15% gain C. 14 2/7 % loss D. 15 % loss

6. A trader mixes 26 kg of rice at Rs. 20 per kg with 30 kg of rice of other variety at Rs. 36 per kg and sells the mixture at Rs. 30 per kg. What is his profit percentage?
A. 6% B. 5% C. 4% D. 7%

7. A trader gives 12% additional discount on the discounted price, after giving an initial discount of 20% on the labelled price of an item. The final sale price of the item is Rs.704. Find out the labelled price?
A. 1000 B. 2000 C. 1200 D. 920

8. A milkman buys some milk contained in 10 vessels of equal size. If he sells his milk at Rs 5 a litre, he loses Rs 200; while selling it at Rs6 a litre, he would gain Rs150 on the whole. Find the number of litres contained in each vessel.
A. 30 B. 35 C. 40 D. 45

9. A watch passes through three hands and each gain 25%. If the third sells it for Rs250, what did the first pay for it?
A. 128 B. 130 C. 145 D. 150

10. If by selling an article for Rs 60, a person loses 1/7 of outlay (cost), what would he have gained or lost per cent by selling it for Rs77?
A. 5% B. 10% C. 11% D. 15%

11. I sold a book at a profit of 7%. Had I sold it for Rs 7.50 more, 22% would have been gained. Find the cost price?
A. 25 B. 30 C. 50 D. 55
12. A reduction of 40 per cent in the price of bananas would enable a man to obtain 64 more for Rs40. What is the reduced price per dozen?
A. 3 B. 6 C. 5 D. 4

13. A man purchased an article at 3/4 th of the list price and sold at half more than the list price. What was his gain per cent?
A. 25% B. 50% C. 75% D. 100%

14. I lose 9 per cent selling pencils at the rate of 15 a rupee. How many for a rupee must I sell them to gain 5 per cent?
A. 10 B. 13 C. 15 D. 18

15. Goods are sold so that when 4 per cent is taken off the list price, a profit of 20% is made. How much per cent is the list price more than the cost price?
A. 25% B. 50% C. 75% D. 100%

16. A man sells an article at 5% profit. If he had bought it at 5% less and sold it for Re 1 less, he would have gained 10%. Find the cost price.
A. 100 B. 150 C. 200 D. 250

17. A profit of 20% is made on goods when a discount of 10% is given on the marked price. What profit per cent will be made when a discount of 20% is given on the marked price?
A. 6 2/3% B. 7 2/3% C. 3 1/4% D. 7 4/5%

18. A dealer sells a table for 400, making a profit of 25%. He sells another table at a loss of 10%, and on the whole he makes neither profit nor loss. What did the second table cost him?
A. 700 B. 800 C. 900 D. 950

19. Each of the two horses is sold for Rs720. The first one is sold at 25% profit and the other one at 25% loss. What is the % loss or gain in this deal?
A. 7.25% B. 6.25% C. 8.5% D. 9.25%

20. Each of the two cars is sold at the same price. A profit of 10% is made on the first and a loss of 7% is made on the second. What is the combined loss or gain?
A. 150/203 % B. 160/203 % C. 180/203% D. 170/203 %