PROFIT & LOSS

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1)Introduction

Cost price (CP)- The price at which an item has been bought.

Selling price (SP)- The price at which an item has been sold.

Profit (P) or loss (L)- The difference between CP and SP.

Profit % = (SP~CP)/CP x 100

$$\% \text{ profit} = \frac{\text{S.P.} - \text{C.P.}}{\text{C.P.}} \times 100\%$$

$$\% \text{ loss} = \frac{\text{C.P.} - \text{S.P.}}{\text{C.P.}} \times 100\%$$

From these we can write direct expressions for S.P. and C.P.

$$\text{S.P.} = \left(\frac{100 + \% \text{ Profit}}{100} \right) \times \text{C.P. in case of profit}$$

$$\text{and } \text{S.P.} = \left(\frac{100 - \% \text{ Loss}}{100} \right) \times \text{C.P. in case of loss.}$$

These can be rewritten as

$$\text{C.P.} = \left(\frac{100}{100 + \% \text{ Profit}} \right) \times \text{S.P. in case of profit}$$

$$\text{and } \text{C.P.} = \left(\frac{100}{100 - \% \text{ Loss}} \right) \times \text{S.P. in case of loss.}$$

2) Problems without applying formula

2.i) SP IN TERMS OF CP

If the **profit is 10%**,
SP = CP + 10%CP
     = 110% CP
∴ **SP = 110% CP**   or   **SP = 1.10 CP**

If the **profit is 20%**,
SP = 120% CP   or   **SP = 1.20 CP**

If the **loss is 25%**,
SP = 75% CP   or   **SP = 0.75 CP**

Example: A dealer loses 20% if an article is sold at the price of 16000. At what price he/she has to sell to gain 20%?

In the first case the **loss is 20%**
∴ **SP = 80% CP**
In the second case the **gain has to be 20%**
SP = 120% CP

Substituting the given values
80% CP = 16000
120% CP = 80% + 40%
　　　= 16000 + 8000
　　　= **24000**
∴ He/she has to sell the article at Rs 24000 to gain 20%.

Example 1. A dealer loses 40% if the plot is sold at the price of 32000. At what price he/she has to sell to gain 50%?

2.ii) Difference in percentage

Example: A man sold an article at 10% profit. Had it been sold for Rs. 50 more, he would have gained 15%. Find the cost price of the article.

Here the difference in percentage is 5%
The difference in price is Rs 50

5% = Rs 50
CP = 100%

  5% = Rs 50
100% = Rs 1000

Example 2. A man sells a book at 7% loss. Had he sold it for Rs.72 more he could have gained 5%. What is the cost price of the article?

a) 500   b) 600   c) 622   c) 700

3) Problems with formula

3.i) Type 1: Number of items is same and the price is different

Example: What is the profit/loss % if an item is bought at Rs 5 and sold at Rs 6?

In this case the CP and SP is given.
Profit % = (SP-CP)/CP x 100
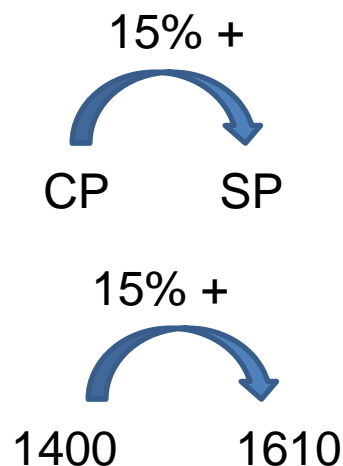   = (6-5)/5 x 100
   = 1/5 x 100
   = 20%

Example 3. What is the profit/loss % if a pen is bought at Rs 8 and sold at Rs 6?

*If the selling price is unknown

Example: A man buys an article for Rs. 1400 and sells it at a profit of 15%. What is the selling price of the article?

CP = 1400
Profit = 15%

15% +

CP   SP
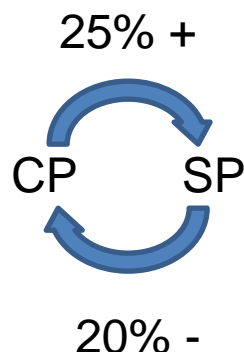
15% +

1400   1610

10% = 140
5%   = 70

15% = 210

Example 4. A man buys a cycle for Rs. 2400 and sells it at a loss of 20%. What is the selling price of the cycle?
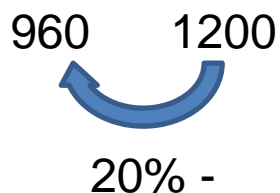
*If the cost price is unknown

Example: By selling an article of Rs. 1200 a man makes profit of 25%. What is the C.P?

SP = 1200
Profit = 25%

25% +

CP   SP

20% -

25% + = 1/4 +
Increase = 1/4
Decrease = 1/5
         = 20% -

960   1200

20% -

10% = 120
20% = 240

Example 5. By selling a shirt of Rs. 3300 a man makes loss of 25%. What is the C.P?

3.ii) Type 2: Number of items is different and the price is same

Example: What is the profit/loss % if 5 items are bought for Re 1 and 4 items are sold at Re 1?

In this case the price is same but the number items bought and sold is different.

Number of items bought **B = 5**

Number of items sold **S = 4**

Profit % = (B− S)/ S x 100

= (5-4)/4 x 100

= 1/4 x 100

=**25%**

Example 6. If the cost price of 20 candies is equal to the selling price of 16 candies, then what is the profit/loss percentage?

A. 16.66%
B. 20%
C. 25%
D. 33.33%

*If the items sold is unknown

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

Number of items bought **B = 6**
Number of items sold   **S = ?**
                                        Profit = 20%
Profit % = (B– S)/ S x 100
20% = (6-S)/S x 100

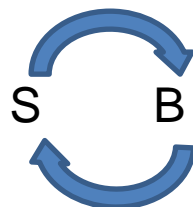Go by options to find the value of S
Ans : 5

Shortcut:

B = 6
Profit = 20%

20% +

S   B

16.66% -

Increase = 20 % + = 1/5
Decrease   = 1/6
                    = 16.66%

5   6

16.66% -

16.66% of 6 = 1/6 of 6
                    = 1

Example 7. A vendor bought toffees at 8 for a rupee. How many for a rupee must he sell to gain 33.33%?

*If the items bought is unknown

Example: A vendor sold 4 toffees for a rupee to gain 50%. What should be the number of toffees bought for the same price?

Number of items bought **B = ?**
Number of items sold   **S = 4**
                                    Profit = 50%
Profit % = (B− S)/ S x 100
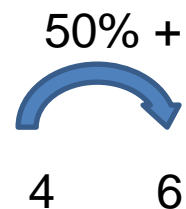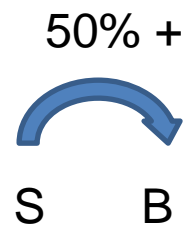50% = (B-4)/4 x 100

Go by options to find the value of S
Ans : 6

Shortcut:

S = 4
Profit = 50%

50% +

S   B

50% +

50% of 4 = 2

4   6

Example 8. A vendor sold 12 toffees for a rupee to gain 15%. What should be the number of toffees bought for the same price?

If both price and the quantity are different, then convert the values to **same price and solve by using the 1ˢᵗ method** or convert the values to **same number of items and solve by using the 2ⁿᵈ method.**

Example 9. Some articles were bought at 6 articles for Rs. 5 and sold at 5 articles for Rs. 6. Find the gain percentage.

A. 30%
B. 33 1/3%
C. 35%
D. 44%

4) Application of successive increase/ decrease (a + b + ab/100)

Mark up   +ve a or b value
Discount   -ve a or b value

Following are the few cases in which this formula in applied

i) **Mark up and discount**

Profit/loss % = M – D – MD/100

ii) **Discount and discount**

Loss % = – D1 – D2 + D1D2/100

*If the marked price/ discount is given and profit is unknown

Example: I bought a car at Rs 1lakh and marked up the cost by 25% and sold it at a discount of 4%. What is my profit or loss?

Profit % = a + b + ab/100
Here **a = 25** , **b = -4**

Profit % = 25 – 4 + (25)(-4)/100
             = 25 – 4 – 100/100
             = 25 – 4 – 1
             = 20 %

Example 10. A trader gives 20% additional discount on the discounted price, after giving an initial discount of 25% on the labelled price of an item. The final sale price of the item is Rs.840.. Find the labelled price.

A. Rs 1260
B. Rs 1400
C. Rs 1680
D. None of these

*If the profit is given and marked price/ discount is unknown

Example: A tradesman marks his goods at such a price that after allowing a discount of 15% he makes a profit of 2%. Find the marked price of an article if the original price is Rs. 750.

Profit = a + b + ab/100
Here **profit = 2% , b = -15%**

2 = a – 15 – 15a/100
17 = a – 15a/100
17 = 85a/100
a = 100 * 85/17
a = 20 %

Marked price = 750 + 20% of 750
                   = 750 + 150
                   = Rs 900

5) Solved examples

Q 1. A man sells two houses at the rate of Rs.1000 each. On one he gains 5% and on the other, he loses 5%. What is his gain or loss percent in the whole transaction?

a) 0.25% loss   b) 25% loss   c) 25% gain   d) no gain or loss

Solution:

SP1 = 1000   SP2 = 1000

SP1 = 1.05 CP1   SP2 = 0.95 CP2
1000 = 1.05 CP1   1000 = 0.95 CP2
CP1 = 1000/1.05   CP2 = 1000/0.95

Total CP = CP1 + CP2 = 1000/1.05 + 1000/0.95 **= 2005**
Total SP = SP1 + SP2 = 1000 + 1000 **= 2000**

Loss = 5/2005 x 100
          = 0.25%

Shortcut:

If there is a% gain and b% loss in selling two articles at the same price the overall profit/ loss will be

Profit/ loss = a + b + ab/100
In this question b = -a
Profit/ loss = a – a - a^2/100
            = -a^2/100

In this question a = 5%
Profit/ loss = – 5^2/100
            = - 0.25%
            = **0.25% loss**

Q 2. A dishonest dealer professes to sell his goods at C.P. but he uses a weight 950gm for a Kg. Find loss or gain%.

A. 4 %
B. 5 %
C. 5.26 %
D. 50%

Solution :

Number of items bought **B = 1000 g**
Number of items sold   **S = 950 g**

Profit % = (B– S)/ S x 100
           = (50)/950 x 100
          = 5.26%

50/1000 x 100 = 5%
50/950 x 100 > 5%
Option c is > 5%

Q 3. At style cloth emporium the shopkeeper measures 20% less for every meter of cloth also he marks-up goods by 20%. What is the profit percentage?

a) 50%
b) 80%
c) 75%
d) None of these

Solution:

Let 100 meter = Rs 100

Here meter is reduced by 20% and price is increased by 20

$$80 \text{ meter} = \textbf{Rs 120} = \textbf{SP}$$

Original price of 80 meter = **Rs 80** = **CP**

Profit = 40/80 x 100

= **50%**

Q 4. Sam purchased 20 dozens of toys at the rate of Rs. 300 per dozen. He sold each one of them at the rate of Rs. 33. What was his percentage profit?

A. 3% B. 26% C. 30% D. 32%

Solution:

CP of a dozen toy = Rs 300

SP of I toy = Rs 33
SP of a dozen toy = Rs 33 * 12 **= Rs 396**

Profit = 96/300 * 100
         = 32%

Q 5. Two third of a consignment was sold at a profit of 6% and rest at a loss of 3%. If there was an overall profit of Rs. 450. Find the value of consignment.

A. 9000
B. 27000
C. 5000
D. 15000

Solution:

Let x be the value of the consignment
6% of 2/3 x - 3% of 1/3 x = 450
12% of 1/3 x - 3% of 1/3 x = 450
9% of 1/3 x = 450
3% of x = 450
1% of x = 150
100% of x = **15000**

Q 6. I buy 2 machines X and Y. X costs Rs. 500 more than Y. I sell X at a profit of 16% and Y at a profit of 7%. My total gain is Rs. 1000. What is the cost of the machine X?

a) Rs. 4000
b) Rs. 5500
c) Rs. 4500
d) Rs. 5000

Solution:

Profit = 16% of (y+500) + 7% of y = 1000
16% of y + 16% of 500 + 7% of y = 1000
23% of y + 16% of 500 = 1000
23% of y + 80 = 1000
23% of y = 920
 y = 4000
x = **4500**

6) Practice problems

Q 1. If the cost price is 25% of selling price. Then what is the profit percent?

a) 300%
b) 200%
c) 250%
d) 150%

Q 2. If the selling price doubles, the profit triples. What is the profit percentage?

A. 25%
B. 50%
C. 100%
D. 200%

Q 3. Dealer sells goods at 10% loss on C.P. but uses 20% less weight. Find the loss or gain %.

A. 12.5%
B. 20%
C. 22%
D. None

Q 4. Anjuli, Bhoomika and Chawla went to market to purchase the rings whose costs were same. But each ring was available with two successive discounts. Anjuli availed two successive discounts of 5% and 20%. Bhoomika availed two successive discounts 10% and 15% while Chawla availed two successive discounts of 12% and 13%. Who gets the maximum discount?

a) Anjuli
b) Bhoomika
c) Chawla
d) All of these

Q 5. A shopkeeper sold 12 cameras at a profit of 20% and 8 cameras at a profit of 10%. If he had sold all the 20 cameras at a profit of 15%, then his profit would have been reduced by Rs.36. What is the cost price of each camera?

a) 100
b) 150
c) 180
d) 220

Q 6. A tradesman allows a discount of 15% on the written price. How much above the cost price must he mark his goods to gain 70%?

a) 100% of CP
b) 200% of CP
c) 85% of CP
d) 185% of CP

Q 7. A bicycle is sold at 10% profit. Had it been sold for Rs. 10 less, the profit would have been 5% only. What is the cost price of the bicycle?

a) Rs 190
b) Rs 200
c) Rs 210
d) Rs 2000

Q 8. A shopkeeper is giving 6 kg of rice at the price of 5 kg. What should be the mark up on the cost price to make a profit of 20%?

a) 20%
b) 33%
c) 44%
d) 66%

THANKS
FOR
LISTENING