PROFIT & LOSS

Content

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 /Gain = SP- CP

Loss (L)= CP- SP

Profit % = (Profit/CP) x 100

Loss% = (Loss/CP) x 100

2. Problems without applying formula

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**

S P = (100+gain %) / 100 × C P

S P = (100 - loss %) / 100 × 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%.

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

Option B

- 12% 72
- 1 % 72/12 =6
- 100 % 6*100 = 600

3. Types of Problems

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?

A) Loss 20 % b) loss 25 % c) gain 25 % d) none

- Loss =cp-sp=8-6=2
- Loss % = Loss / cp * 100
- 2/8 * 100=25%

*If the selling price is unknown

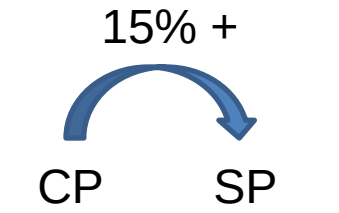
Example: A man buys an article for Rs. 1400 and sells it at a profit of 15%. What is the selling price of the article?

SP=115/100 * CP

OR

CP = 1400

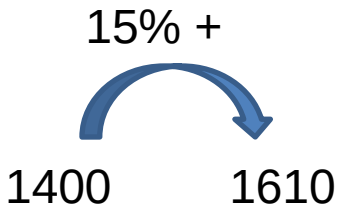
Profit = 15%



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?

SP=80/100 * 2400=80*24=1920

OR

100% 2400

10% 240

80 % 240*8=1920

*If the cost price is unknown

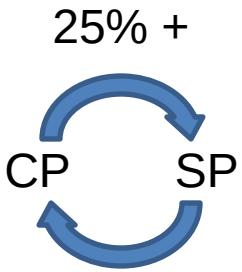
Example: By selling an article of Rs. 1200 a man makes profit of 25%. What is the C.P?

SP=125/100 * CP

OR

SP = 1200

Profit = 25%



25% + = 1/4 +

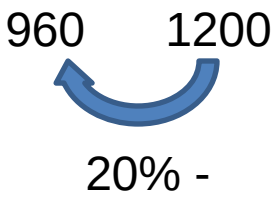
Increase = 1/4

Decrease = 1/5

= 20% -

10% = 120

20% = 240



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%**

OR
Make the number of articles Same
Cp of 5 items= Re 1 ----1
SP of 4 items= Re 1 ----2
Multiply eq 1 by 4 and second eq by 5
Cp of 20 items= Re 4
SP of 20 items= Re 5 So P%=1/4 * 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%

Option C

- CP of 20 = SP of 16 (given)
- Let CP of 20 = Re1 ----eq 1
- So SP of 16 = Re1 -------eq 2
- Now make the number of articles same
- Multiply eq 1 by 16 and eq 2 by 20
- Let CP of 20*16 = Re16 ----eq 1
- So SP of 16*20 = Re20 -------eq 2
- So P%= p/cp * 100 = 4/16 * 100 = 25%

- **Example :** If the cost price of 50 oranges is equal to the selling price of 40 oranges, then the profit percent is
- (a) 5
- (b) 10
- (c) 20
- (d) 25

*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%?

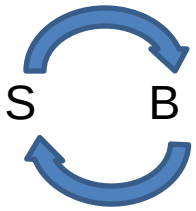
Number of items bought **B = 6**
Number of items sold **S = ?**
Profit = 20%
Profit % = (B– S)/ S x 100
20% = (6-S)/S x 100

Go by options to find the value of S
Ans : 5
OR
Let CP of 6 toffees = 100 paise
SP of 6 toffees should be = 120 paise so as to gain 20 %
So sp of 1 toffee = 120 /6 =20 paise
So for a rupee he can sell 5 Ans

Shortcut:

B = 6
Profit = 20%

20% +



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%?

a) 5 b) 6 c) 7 c) 8

- % increase = 33.33% = 1/3
- So % decrease = 1/ (3+1)=1/4
- So ¼ * 8= 2
- So ans is 8-2=6

*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 B
Ans : 6
OR
Let CP of 4 toffees = 100
SP of 4 toffees = 150
So for 150 how many toffees he can purchase =6

Shortcut:

S = 4
Profit = 50%

50% +

S B

50% +

4 6

50% of 4 = 2 so
Ans 4+2=6

OR
Increase = 50 % = 1/2
Decrease = 1/3
So x- 1/3 * x=4

Example 8. A vendor sold 12 toffees for a rupee to gain 25%. What should be the number of toffees bought for the same price?

- Number of items bought **B = ?**
- Number of items sold **S = 12**
- **Profit = 25%**
- Profit % = (B– S)/ S x 100
- 25% = (B-12)/12 x 100

- Go by options to find the value of S
- **Ans : 15**
- **OR**
- **Let CP of 12 toffees = 100**
- **SP of 12 toffees = 125**
- **So for 125 how many toffees he can purchase =125/(100/12)=15**

Shortcut:

S = 12
Profit = 25%

50% +

S B

50% +

4 6

25% of 12 = 3 so
Ans 12+3=15

OR
Increase = 25 % = 1/4
Decrease = 1/5
So x- 1/5 * x=12

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

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

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

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 – M*D/100

ii) **Discount and discount**

Loss % = – D1 – D2 + D1*D2/100

*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 %

*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 * 17/85
a = 20 %

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

5. 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

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

Example : 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%

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%**

Very Important Result

✓ If C1 = C2 and P% = L% then

No Profit No Loss

✓ If S1 = S2 and P% = L% = x then

This is case of Loss always and

Loss % = $\frac{x^2}{100}$ %

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 meter = **Rs 120 = 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 x = 920
x = **4000**