Profit and Loss, Discount
by Total Gadha - Thursday, 5 April 2007, 03:03 AM

Profit and loss calculations are extensions of percentage only with a few twists thrown in because of play of words. In standard MBA exams, approaching these problems in a straight and simplified manner can save you from puzzlement.

I will start this chapter by giving two problems on profit and loss:

Problem 1: you have decided to make a donkey out of me. You buy a widget for $100 and sell it to me for $200. You buy it back from me for $300 and then sell it back to me for $400. Have you made any profit in this process? If yes, how much.

Answer: If you said â€œno profit no lossâ€ or â€œ$100â€ youâ€™re in for a surprise. Letâ€™s see how much you earned in the process and how much spent.

Your earnings = $200 + $400 = $600.

Your spending = $100 + $300 = $400.

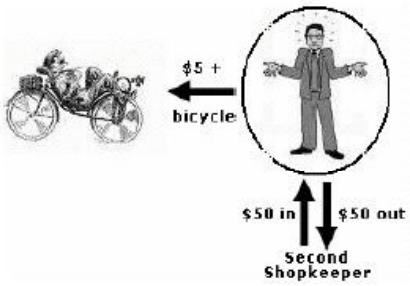
Therefore, the amount earned by you = $600 – $400 = $200.

Hereâ€™s the first rule of profit and loss.

RULE 1: Total Profit/Loss = Total Amount Gained – Total Amount Spent

Problem 2: Here is an old puzzle: There are two shopkeepers having shops side by side. The first shopkeeper sells bicycles. He sells a bicycle worth $30 for $45. One day a customer comes and buys a bicycle. He gives a $50 note to the shopkeeper. The shopkeeper doesnâ€™t have change so he goes to the second shopkeeper, gets the change for $50, and gives $5 and the bicycle to the customer. The customer goes away. The next day the second shopkeeper comes and tells the first shopkeeper that the $50 note is counterfeit and takes his $50 back. Now, how much does the first shopkeeper lose?

Answer: The answer to this tricky problem can be found easily if you consider the first shopkeeper as a system. From the second shopkeeper he took $50 and gave back $50 so there was no profit no loss. To the customer he gave $5 + $30 bicycle. Therefore, his total loss is $35, as shown below:



Now, hereâ€™s the second rule of profit and loss, and it is EXACTLY similar to the first rule:

RULE 2: Total Profit/Loss = Total Amount Gained – Total Amount Spent

Why am I stressing on this rule? Because if you need to pass through the maze of words which present a profit and loss problem, you will have to perform the simple arithmetic of calculating the total amount gained and total amount spent.

Now here are some terms associated with profit and loss:

Cost Price (CP) - The price at which a person buys a product is known as the cost price (CP) of the product.

Selling Price (SP) - The price at which a person sells a product is known as the selling price (SP) of the product.

Profit = SP – CP (SP > CP)

Loss = CP – SP (CP > SP)

Profit Percentage $= \frac{\text{Profit}}{\text{CP}} \times 100$. Therefore, $\text{SP} = \text{CP}(1 + \frac{\text{Profit Percentage}}{100})$

Loss Percentage $= \frac{\text{Loss}}{\text{CP}} \times 100$. Therefore, $\text{SP} = \text{CP}(1 - \frac{\text{Loss Percentage}}{100})$

NOTE: the profit percentage and the loss percentage are always calculated on CP, unless stated otherwise.

Examples:

1. A shopkeeper buys oranges at the rate of 4 for Rs20 and sells them at the rate of 5 for Rs30. What is his profit percentage?

Answer: To find the profit percentage we will have to first make numbers of oranges bought and sold equal. Therefore, we take LCM of 4 and 5, i.e. 20. The shopkeeper buys 20 oranges for Rs100 and sells 20 oranges for Rs120.

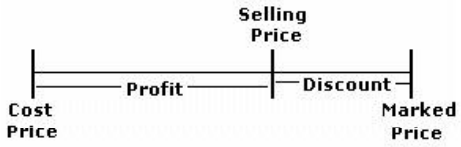
Therefore his profit percentage $= \frac{\text{profit}}{\text{CP}} \times 100 = \frac{20}{100} \times 100 = 20\%$.

2. A fruit seller bought two equal lots of oranges, one at the rate of 5 for a rupee and the other at the rate of 4 for a rupee. He sold all the oranges at the rate of 9 for Rs2. What is his profit/loss percentage?

   Answer: As the fruit seller is buying equal lots, we will have to make numbers of oranges of both the lots equal. Also, since he is selling all the oranges, we will have to make the numbers of oranges bought and sold equal. Therefore, we take LCM of 5, 4, and 9, i.e. 180. The fruit seller is buying two lots of oranges, each lot having 180 oranges.
   In the 1st lot, the fruit seller buys 5 oranges for a rupee. Therefore, he will buy 180 oranges for Rs36.
   In the 2nd lot, the fruit seller buys 4 oranges for a rupee. Therefore, he will buy 180 oranges for Rs45.
   Total amount spent = 45 + 36 = Rs81.
   The fruit seller sells 9 oranges for Rs2. Therefore, he will sell 360 oranges for Rs80.
   Therefore, he incurs a loss of 1 rupee.

   Loss percentage $= \frac{\text{Loss}}{\text{CP}} \times 100 = \frac{1}{81} \times 100 = 1.23\%$

Thereâ€™s one more term you should get familiar with in profit and loss. Suppose a shopkeeper buys a product for Rs100 and he wants to earn a profit of 20% on this product. Therefore, he would like to sell the product at Rs120. But a customer wants a discount on the price. If the customer gives a discount on selling price of Rs120, his profit will decrease. Therefore, the shopkeeper prices the product at a price which is higher than Rs120. Now when the shopkeeper gives discount, the price again falls to Rs120 and the shopkeeper maintains his profit percentage. The hiked price, above the selling price, on which discount is given is known as the **Marked Price**. See the figure below:



As you can see from the figure above, Selling Price = Cost Price + Profit = Marked Price – Discount

Or Selling Price = Cost Price$(1 + \frac{\text{Profit Percentage}}{100})$ = Marked Price$(1 - \frac{\text{Discount Percentage}}{100})$

NOTE: Remember that discount and discount percentage are always given on the **Marked Price**.

Example:

1. A merchant hikes the cost price of a product by 20% to make the selling price, and then further hikes the selling price by 20% to make the marked price. By what percentage is the marked price more than the cost price?

   Answer: Let the cost price be Rs100. Therefore, selling price is Rs120. Now 20% of 120 is 24, therefore marked price is = 120 + 24 = Rs144.
   Therefore, the marked price is 44% greater than the selling price.

2. By giving a discount of 20%, a shopkeeper earns a profit of 20%. By what percentage is the marked price greater than the cost price?

   Answer: Let the cost price be Rs100. Therefore, the selling price is Rs120 as the shopkeeper is earning 20% profit. Now we need to find marked price on which giving a 20% discount will result in Rs120. From the lesson on percentage, we know that the factor for 20% reduction is 0.8.
   Therefore, Marked price × 0.8 = Rs120 → Marked price = Rs150.
   Therefore, marked price is 50% more than the cost price.

3. What is the percentage discount on "buy three, get one free" offer?

   Answer: Answer let the cost price of one product be Rs100. If we had to buy all the four products we would be paying Rs400. But we had to pay only Rs300 (price of three products). Therefore, we got a discount of Rs100 on Rs400.

   Therefore percentage discount $= \frac{100}{400} \times 100 = 25\%$.

Before we continue with more problems, here is the most important rule to solve profit and loss problems:

RULE 3: To calculate profit or loss on a transaction, sell the complete goods that have been bought, and then calculate the difference between amount received and amount spent.

Example:

1. Chikloo buys 10 pens and sells 8 of them at the cost price of 10 pens. What is his profit percentage?

   Answer: To calculate profit percentage, sell all the pens purchased by Chikloo. Now, let the cost price of each pen be 1 rupee. Therefore, Chikloo purchased 10 pens for Rs10. He sells 8 of them for Rs10.
   Chikloo sells 8 pens for Rs10.

   → He will sell 10 pens for Rs $\frac{10}{8} \times 10 = \text{Rs}12.5$. Therefore, Chikloo spent Rs10 and got back Rs12.5. Therefore, his profit is 25%.

2. A dishonest shopkeeper sells goods at a price 6.25% less than the cost price but uses 12.5% less weight. What is his profit percentage?

   Answer: Let the shopkeeper buy 100 g of goods and let the cost price of 1 g be 1 rupee. Therefore, the shopkeeper spends Rs100. Now we will sell **ALL** of this 100 g and see the amount he receives. The shopkeeper sells 12.5% less goods as original weight. That means he sells 87.5 g as 100 g. Also, since he charges 6.25% less, he charges Rs93.75 for this 'supposedly' 100 g.
   The shopkeeper sells 87.5 gram for Rs93.75

→ he will sell the complete 100 g for Rs$\frac{93.75}{87.5}\times 100$ = Rs107.14 .

The shopkeeper spent Rs100 and got back Rs107.14. Therefore, his profit percentage is 7.14%

Solved Examples:

1. A shopkeeper sells one-third of his goods at a profit of 10%, another one-third at a profit of 20%, and the rest at a loss of 6%. What is his overall profit percentage?

   Answer: Let the shopkeeper buy 300 g for Rs300. Now he sells 100 g for Rs110, another 100 g for Rs120, and the rest 100 g for Rs94. Therefore, the total amount he receives is
   = Rs110 + Rs120 + Rs94 = 324. Therefore, the shopkeeper spends Rs300 and gets back Rs324.
   Therefore, his profit percentage $=\frac{24}{300}\times 100 = 8\%$

2. I buy 15 pens and sell 12 of them at the cost price of 18 pens. What is my profit percentage?

   Answer: Again we will have to sell the pens that have been bought and then calculate the profit. Assume each pen was for 1 rupee. So I bought them for Rs15.
   Now, I sell 12 pen for Rs18.
   → I will sell all 15 pens for $\frac{18}{12}\times 15$ = Rs22.5 . Therefore, I spent Rs15 and got back Rs22.5 for a profit of Rs7.5 or 50%.

3. A retailer buys products from a shopkeeper at discount of 40% on the list price (marked price) and sells them to the customer at a discount of 25% on the list price. What is his profit percentage?

   Answer: Let the list price be Rs100. Therefore, the retailer is buying the products at Rs60 and selling it to the customer at Rs75, earning a profit of Rs15. Therefore, his profit percentage is
   $\frac{15}{60}\times 100 = 25\%$.

4. A woman goes to market with Rs500 to buy oranges. The prices of the oranges have decreased by 10% so he could buy 2 kg more with the amount she had. What was the original price of the oranges?

   Answer: If the price of the oranges decreases by 10%, the woman would save 10% of the money that is Rs50 to buy the same amount as before. Now in Rs50 she can buy 2 kg more, therefore the current price of 1 kg of oranges is Rs25. Now this current price is after 10% reduction.
   Therefore, the original price $=\frac{25}{0.9}$ = Rs27.77 .

5. A retailer cheats both while buying and selling goods. While buying goods from the shopkeeper, he uses a weighing machine that shows 1 000 g when the actual quantity is 1 100 g. While selling, he uses a machine that shows 1 100 g when the actual quantity is 1 000 g. If he sells goods at the cost price only, determine his profit percentage in this whole transaction.

   Answer: As always, we will sell the complete goods that the retailer buys. Let the price of 1 g be 1 rupee. While buying good, he gets 1 100 g through his machine showing only 1 000 g. Therefore, he pays Rs1 000 and gets 1 100 g. Now while selling, he sells 1 000 g as 1 100 g.

   He sells 1 000 g as 1 100 g

   → He will sell the whole 1 100 g he got as $\frac{1100}{1000}\times 1100\text{ g} = 1210\text{ g}$. Therefore, he will get Rs1 210 after selling the complete goods. He spent Rs 1000 and got back Rs1 210. Therefore, his profit percentage is 21%