

Mark Up, Discount and Profit questions confuse a lot of people. But, actually, most of them are absolute sitters — very easy to solve — a free ride! How? We will just see. Let me begin with the previous post's question.

Question: If a retailer marks up an article by 40% and then offers a discount of 10%, what is his percentage profit?

Let us say the retailer buys the article for \$100 (\$100 is his cost price of the item). He marks it up by 40% i.e. increases his cost price by 40% ($100 * 140/100$) and puts a tag of \$140 on the article. Now, the article remains unsold and he puts it on sale — 10% off everything. So the article marked at \$140, gets \$14 off and sells at \$126 (because $140 * 9/10 = 126$). This \$126 is the selling price of the article. To re-cap, we obtained this selling price in the following way:

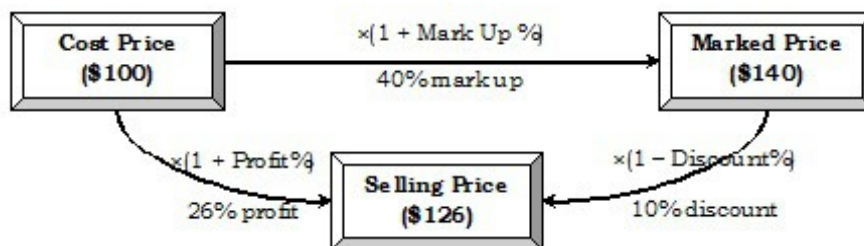
$$\text{Cost Price} * (1 + \text{Mark Up}\%) * (1 - \text{Discount}\%) = 100 * (1 + 40/100) * (1 - 10/100) = 126 = \text{Selling Price}$$

The profit made on the item is \$26 (obtained by subtracting 100, the retailer's cost price, from 126, the retailer's selling price).

He got a profit % of $(26/100) * 100 = 26\%$ (Profit/Cost Price x 100)

$$\text{Or we can say that } \text{Cost Price} * (1 + \text{Profit}\%) = 100 * (1 + 26/100) = 126 = \text{Selling Price}$$

The italicized parts above show the two ways in which you can reach the selling price: using mark-up and discount or using profit. The same thing is depicted in the diagram below:



$$\text{Therefore, } \text{Cost Price} * (1 + \text{Mark Up}\%) * (1 - \text{Discount}\%) = \text{Cost Price} * (1 + \text{Profit}\%)$$

Or

$$(1 + \text{Mark Up}\%) * (1 - \text{Discount}\%) = (1 + \text{Profit}\%)$$

Look at the numbers here: Mark Up: 40%, Discount: 10%, Profit: 26% (Not 30% that we might expect because $40\% - 10\% = 30\%$)

Why? Because the discount offered was on \$140, not on \$100. So a bigger amount of \$14 was reduced from the price. Hence the profit decreased. This leads us to an extremely important question in percentages – What is the base? 100 was increased by 40% but the new number 140 was decreased by 10%. So in the two cases, the bases were different. Hence, you cannot simply subtract 10 from 40 and hope to get the Profit %. Also, mind you, almost certainly, 30% will be

one of the answer choices, albeit incorrect. (The GMAT doesn't forego even the smallest opportunity of tricking you into making a mistake!)

Let's see this concept in action on a tricky third party question:

A dealer offers a cash discount of 20%. Further, a customer bargains and receives 20 articles for the price of 15 articles. The dealer still makes a profit of 20%. How much percent above the cost price were his articles marked?

- a) 100%
- b) 80%
- c) 75%
- d) $66\frac{2}{3}\%$
- e) 50%

This question involves two discounts:

1. the straight 20% off

2. discount offered by selling 20 articles for the price of 15 – a discount of cost price of 5 articles on 20 articles i.e. a discount of $\frac{5}{20} = 25\%$

Using the formula given above:

$$(1 + m/100)(1 - 20/100)(1 - 25/100) = (1 + 20/100)$$

$$m = 100$$

Therefore, the mark up was 100%.

Answer (A)

Note: The two discounts are successive percentage discounts.

Another application of successive percentage changes is the concept of compounding. But more on that, in the next post.