# Shortcuts, Tips & Techniques - Quantitative Aptitude

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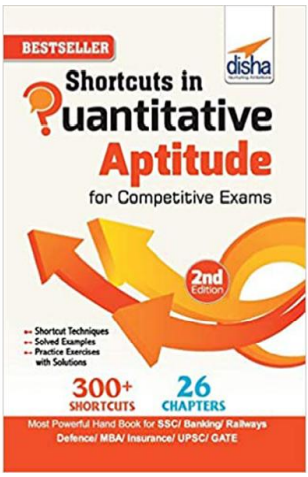


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11 Chapter

# Profit, Loss and Discount

## Shortcut Approach - 1

**If an item is bought at the rate of X items for a rupee, then the number of items sold for a rupee in order to gain $x$% is $\left[X\left(\frac{100}{100+x}\right)\right]$.**

**1.** A man bought toffees at the rate of 15 for a rupee and sold them at the rate of 12 for a rupee. His gain percent is

(a) 20% (b) 25%

(c) 33.33% (d) None of these

**Sol. (b)** Item rate sold price $= X\left[\frac{100}{100+x}\right]$

$$12 = 15\left[\frac{100}{100+x}\right]$$

$$12[100+x] = 1500$$

$$[100+x] = \frac{1500}{12}$$

$$x = \frac{1500-1200}{12}$$

$$x = \frac{300}{12} = 25\%$$

**2.** A fruit seller buys lemons at 2 for a rupee and sells them at 5 for three rupees. What is his gain percent?

(a) 10% (b) 15% (c) 20% (d) 25%

**Sol. (c)** Item rate sold price $= x\left[\frac{100}{100+x}\right]$

$$\frac{5}{3} = 2\left[\frac{100}{100+x}\right]$$

$$(100+x)=\left[\frac{200}{5/3}\right]$$

$$x=\frac{600-500}{5}=\frac{100}{5}=20\%$$

## Shortcut Approach - 2

**If a man purchases 'a' items for ₹ 'b' and sells 'c' items for ₹ 'd', then the gain or loss [depending upon the respective (+ve) or (–ve) sign in the final result] made by him is $\left[\frac{ad-bc}{bc}\times 100\right]\%$**

**3.** A person purchased 11 articles for ₹ 10 and at 10 articles for ₹11. Find the gain percentage.

(a) 22% (b) 20%

(c) 1% (d) 21%

**Sol. (d)** Profit or loss

$$=\left[\frac{ad-bc}{bc}\times 100\%\right]=\left[\frac{11\times 11-10\times 10}{10\times 10}\times 100\right]\Rightarrow \quad 21\%$$

## Shortcut Approach - 3

**When there are two successive profits of x% and y %, then the resultant profit per cent is given by $\left(x+y+\frac{xy}{100}\right)$.**

**4.** A sells a cycle to B at 20% profit. Then B sells it to C at 25% profit. If C pays ₹ 225, then what is the cost price of cycle for A?

(a) ₹100 (b) ₹125 (c) ₹150 (d) ₹175

**Sol. (c)** Resultant profit

$$=\left[x+y+\frac{x.y}{100}\right]=\left[20+25+\frac{20\times 25}{100}\right]$$

$$=50\%$$

$$\therefore \quad C.P.=\left(\frac{100}{100+P}\right)\times S\cdot P=\left(\frac{100}{100+50}\right)\times 225=\frac{100}{150}\times 225$$

$$C.P.=₹150$$

## Shortcut Approach - 4

**If a dishonest trader professes to sell his items at CP but uses false measurement, then**

$$\textbf{\% gain} = \frac{\textbf{True measurement} - \textbf{False measurement}}{\textbf{False measurement}} \times 100$$

**5.** A retailer profess to sell his goods at cost price. If using a false weight, he still gains 25%, find the weight he uses in place of 1 kg.

(a) 200 g (b) 600 g (c) 700 g (d) 800 g

**Sol. (d)** $\text{Profit \%} = \left[\frac{\text{True weight} - \text{False weight}}{\text{False weight}}\right] \times 100$

$$25 = \left[\frac{1000 - \text{False weight}}{\text{False weight}}\right] \times 100$$

$25 \text{ false weight} = 100000 - 100 \text{ false weight}$

$125 \text{ false weight} = 100000$

$\text{false weight} = 800 \text{ gram.}$

## Shortcut Approach - 5

**If a shopkeeper sells his goods at x% profit and uses a measurement which is y% less, then**

**Total percentage profit**

$$= \frac{\textbf{\% profit} + \textbf{\% less in wt}}{\textbf{100} - \textbf{\% less in wt}} \times 100$$

**6.** A trader sells wheat at 20% profit and uses weight 20% less than the actual measure. His gain percent is

(a) 50% (b) 25%

(c) 10% (d) 15%

**Sol. (a)** Total percentage profit

$$= \left[\frac{\text{Profit\%} - \text{loss in wt\%}}{100 - \text{loss in wt\%}}\right] \times 100$$

$$= \left(\frac{20+20}{100-20}\right) \times 100 = \frac{40}{80} \times 100 = 50\%(\text{Profit})$$

## Shortcut Approach - 6

**If the shopkeeper sells his goods at x% loss on cost price but uses y gm instead of z gm, then his % profit or loss is $\left[100 - x\right]\frac{z}{y} - 100$ (according as the sign is +ve or –ve.)**

**7.** A merchant professes to sell goods at the loss of 5% but uses weight of 900 grams in place of one kilogram, what is his profit percent?

(a) 5% (b) $5\frac{5}{19}\%$

(c) 6% (d) 10%

**Sol. (b)** $\text{Profit}\% = \left[100 - x\right]\frac{z}{y} - 100$

$$= \left[\left[100 - 5\right]\frac{1000}{900} - 100\right] = 95 \times \frac{10}{9} - 100$$

$$\Rightarrow \quad \frac{950 - 900}{9} = \frac{50}{9} = 5\frac{5}{9}\%$$

## Shortcut Approach - 7

**A dishonest dealer sells the goods at x% loss on cost price but uses y% less weight, then his percentage profit or loss is $\left[\frac{y - x}{100 - y} \times 100\right]$ (according as the sign is +ve or –ve.)**

**8.** A dishonest dealer sells his goods at 10% loss on cost price and uses 30% less weight. What is his profit or loss percent?

(a) $28\frac{4}{7}\%$ loss (b) $28\frac{4}{7}\%$ profit

(c) $26\frac{4}{7}\%$ profit (d) $26\frac{4}{7}\%$ loss

**Sol. (b)** $\left(\text{Profit or loss} = \frac{y - x}{100 - y} \times 100\right)$

$$= \left(\frac{30 - 10}{100 - 30}\right) \times 100 = \frac{2000}{70} = 28\frac{4}{7}\% \left(\text{profit}\right)$$

## Shortcut Approach - 8

**If a seller uses 'X' gm in place of one kg (1000 gm) to sell his goods and gains a profit of x% on cost price, then his actual gain or loss percentage is $\left[(100+x)\left[\frac{1000}{X}\right]-100\right]$ (according as the sign is +ve or –ve.)**

**9.** A merchant professes to sell goods at 20% profit but uses weight of 800 grams in place of a kilogram. What is his actual profit percent?
(a) 20% (b) 25% (c) 50% (d) 33.3%

**Sol. (c)** Profit or loss $=(100+x)\left[\frac{1000}{X}\right]-100$

$=(100+20)\left[\frac{1000}{800}\right]-100 \quad =\frac{120\times 5-400}{4}=\frac{200}{4}$

$=50\%$ (Profit)

## Shortcut Approach - 9

**A man purchases a certain number of articles at x a rupee and the same number at y a rupee. He mixes them together and sells them at z a rupee. then his gain or loss % $=\left[\frac{2xy}{z(x+y)}-1\right]\times 100$ (according as the sign is *+ve* or *–ve* .)**

**10.** A man purchases a certain number of oranges at 4 a rupee and the same number of oranges at 5 a rupee. He mixes them together and sells them at 4 a rupee. What is his gain or loss percent?

(a) $10\frac{1}{9}\%$ loss (b) $10\frac{1}{9}\%$ gain

(c) $11\frac{1}{9}\%$ gain (d) $11\frac{1}{9}\%$ loss

**Sol. (c)** Profit or loss $=\left[\frac{2xy}{z(x+y)}-1\right]\times 100$

$=\left[\frac{2\times 4\times 5}{4(4+5)}-1\right]\times 100$

$=\left[\frac{40-36}{36}\right]\times 100=\frac{4}{36}\times 100=\frac{100}{9}=11\frac{1}{9}\%$ (Profit)

## Shortcut Approach - 10

**If a tradesman marks his goods at x% above his cost price and allows purchasers a discount of y% for cash, then there is $\left(x - y - \frac{xy}{100}\right)\%$ profit or loss according to +ve or –ve sign respectively.**

**Note : When x = y, then formula becomes $-\frac{x^2}{100}$**

**– ve sign indicates that there will be always loss.**

**11.** What is the percentage discount (approximately) that a merchant can offer on his marked price so that he ends up selling at no profit or loss, if he initially marked his goods up by 40%?

(a) 33.5 % (b) 28.5%

(c) 60% (d) No discount

**Sol. (b)** Let the discount % = $y$ %

$$\text{Profit or loss} = \left(x - y - \frac{xy}{100}\right)$$

$$0 = \left(40 - y - \frac{40y}{100}\right)$$

$$y + \frac{40y}{100} = 40$$

$$y = \frac{4000}{140} = 28.5\%$$

## Shortcut Approach - 11

**If a man buys two items A and B for ₹ P, and sells one item A so as to loss $x$% and the other item B so as to gain $y$%, and on the whole he neither gains nor loses, then**

**(i) the cost of the item A is $\left(\frac{Py}{x+y}\right)$ and**

**(ii) the cost of the item B is $\left(\frac{Px}{x+y}\right)$.**

**12.** A man purchased two cows for ₹500. He sells the first at 12% loss and the second at 8% gain. In this bargain he neither gains nor loses. Find the selling price of each cow.

(a) ₹176, ₹324 (b) ₹324, ₹350

(c) ₹150, ₹300 (d) ₹184, ₹276

**Sol. (a)** The cost of first cow is $= \left(\frac{Py}{x+y}\right)$

$$= \left(\frac{500\times 8}{8+12}\right) = \frac{4000}{20} = 200$$

The cost of second cow is $= \left(\frac{Px}{x+y}\right)$

$$= \left(\frac{500\times 12}{12+8}\right) = \frac{6000}{20} = 300$$

So, selling price of first cow

$$\text{S.P.} = \frac{200(100-12)}{100} = ₹176$$

Selling price of second cow $= \frac{300\times(100+8)}{100} = ₹324$

## Shortcut Approach - 12

**By selling a certain item at the rate of 'X' items a rupee, a man loses x%. If he wants to gain y%, then the number of items should be sold for a rupee is** $\left[\left(\frac{100-x}{100+y}\right)X\right]$

**13.** By selling 9 articles for a rupee, a man incurred a loss of 4%. To make a gain of 44%, the number of articles to be sold for a rupee is

(a) 5 (b) 3 (c) 4 (d) 6

**Sol. (d)** Number of items

$$= \left[\left(\frac{100-x}{100+y}\right)X\right] = \left[\frac{100-4}{100+44}\right]\times 9 = 6$$

## Shortcut Approach - 13

**When each of the two commodities is sold at the same price ₹ A, and a profit of P % is made on the first and a loss of L % is made on the second, then the percentage gain or loss is $\frac{100(P-L)-2PL}{(100+P)+(100-L)}$ according to the +ve or –ve sign.**

**14.** A dealer sold two T.V. sets for ₹7400 each.
On one he gained 10% and on the other he lost 10%. The dealers loss or gain in the transaction is
(a) no profit, no loss (b) 1% gain
(c) 0.1% loss (d) 1% loss

**Sol. (d)** $\%\ \text{Profit} = \frac{100(\text{P}-\text{L})-2\text{PL}}{(100+\text{P})+(100-\text{L})}$

$$= \frac{100(10-10)-2\times10\times10}{(100+10)+(100-10)} = \frac{-200}{200} = -1$$

So, negative sign shows the 1% loss in the transaction.

## Shortcut Approach - 14

**If a dealer sells an item for ₹ A, making a profit of x%, and he sells another item at a loss of y%, and on the whole he makes neither profit nor loss, then the cost of the second table is ₹ $\left[A\left(\frac{100}{100+x}\right)\frac{x}{y}\right]$.**

**15.** 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) ₹600 (b) ₹800
(c) ₹700 (d) ₹900

**Sol. (b)** The cost of second table $= \text{A}\left[\frac{100}{100+\text{x}}\right]\frac{\text{x}}{\text{y}}$

$$= 400\left[\frac{100}{100+25}\right]\frac{25}{10} = ₹\ 800$$

## Shortcut Approach - 15

**If a person buys an article with *x* per cent discount on the marked price and sells the article with *y* per cent profit on the marked price, then his profit per cent on the price he buys the article is given by**

$\left(\frac{x+y}{100-x}\right)\times 100$ **per cent.**

**16.** Sweta bought an article with 20% discount on the labelled price. She sold the article with 8% profit on the labelled price. What was her percent profit of the price she bought?

(a) 35% (b) 25% (c) 20% (d) 15%

**Sol. (a)** $\text{Profit} = \left[\frac{x+y}{100-x}\right]\times 100$

$$= \left[\frac{20+8}{100-20}\right]\times 100 = \frac{2800}{80} = 35\%$$

## Shortcut Approach - 16

**A certain company declares *x* per cent discount for wholesale buyers. If a person buys articles from the company for ₹ A after getting discount. He fixed up the selling price of the article in such a way that he earned a profit y% on original company price. Then the total selling price is given by** ₹ $A\left(\frac{100+y}{100-x}\right)$.

**17.** Surdeep bought a machinery for ₹800 after getting a discount of 20% from the company. He fixed up the selling price of garments in such a way that he earned a profit of 10% on the original company price. Find the selling price of machinery for Surdeep?

(a) ₹900 (b) ₹1000

(c) ₹1100 (d) ₹1200

**Sol. (c)** $\text{Total selling price} = A\left[\frac{100+y}{100-x}\right]$

$$= 800\left[\frac{100+10}{100-20}\right] = \frac{800\times 110}{80} = ₹\,1100$$

## Shortcut Approach - 17

**A businessman marks an article at ₹ $A$ and allows $x$ % discount (on the marked price). He gains $y$ %. If the cost price of the article is ₹ $B$, then the selling price of the article can be calculated from the equation given below**

$$\textbf{Selling price} = \frac{A(100-x)}{100} = \frac{B(100+y)}{100}$$

$$\textbf{i.e.}\ \frac{\text{M.P}(100-\text{Dis}\%)}{100} = \frac{\text{CP}(100+\text{Profit}\%)}{100}$$

**Note : Remember discount is given on marked price, and gain is calculated on the cost price.**

**18.** Raman expects 20% profit by selling a fan. If the allows 40% discount on marked price then his cost price is what percent of marked price?

(a) 40% (b) 60%

(c) 50% (d) 100%

**Sol. (c)** $\text{Selling price} = \frac{A(100-x)}{100} = \frac{B(100+y)}{100}$

$$\frac{A(100-40)}{100} = \frac{B(100+20)}{100}$$

$$A\,60 = B\,120$$

So, $\frac{B}{A} = \frac{60}{120} = \frac{1}{2}$

$$\frac{B}{A}\times 100\% = \frac{1}{2}\times 100 = 50\%$$

Hence, cost price is 50% of marked price.

## Shortcut Approach - 18

**A person sells articles at ₹ A each after giving x% discount on marked price. Had he not given the discount, he would have earned a profit of y% on the cost price. Then the cost price of each article is given by ₹**

$$\left[\frac{100^2\ A}{(100-x)(100+y)}\right].$$

**19.** A person sells a T.V at 9600 after giving a discount of 20%. If he sells the T.V at marked price then his profit is 50%. What is the cost price of T.V?

(a) ₹10000 (b) ₹12000 (c) ₹8000 (d) ₹9000

**Sol. (c)** Cost price of T.V. $= \left[\frac{(100)^2 A}{(100-x)(100+y)}\right]$

$$= \left[\frac{(100)^2 \times 9600}{(100-20)(100+50)}\right]$$

$$= \frac{96000000}{12000} = ₹\ 8000$$

## Shortcut Approach - 19

**A shopkeeper sold an article for ₹ A after giving x% discount on the labelled price and made y% profit on the cost price. Had he not given the discount, the percentage profit would have been $\left[\frac{x+y}{100-x} \times 100\right]$ per cent.**

**20.** A person allows 30% discount on his goods and still gains 40%. If he sells a fan on marked price then what is percentage of profit?

(a) 100% (b) 50% (c) 60% (d) 70%

**Sol. (a)** Profit $= \left[\frac{x+y}{100-x} \times 100\right]\%$

$$= \left[\left(\frac{30+40}{100-30}\right) \times 100\right]\%$$

$$= \left[\frac{70}{70} \times 100\right]\% = 100\%$$

# Exercise

**1.** Two motor cars were sold for ₹ 9,900 each, gaining 10% on one and losing 10% on the other. The gain or loss per cent in the whole transaction is :
(a) Neither loss no gain
(b) $\frac{1}{99}$ % gain
(c) $\frac{100}{99}$ % profit
(d) 1% loss

**2.** A dishonest dealer sells his goods at the cost price but still earns a profit of 25% by underweighing. What weight does he use for a kg?
(a) 750 g (b) 800 g
(c) 825 g (d) 850 g

**3.** Three successive discounts of 10%, 12% and 15% amount to a single discount of:
(a) 36.28 % (b) 34.68%
(c) 37% (d) 32.68%

**4.** A man sold two steel chairs for ₹ 500 each. On one he gains 20% and on other, he loses 12%. How much does he gain or lose in the whole transaction?
(a) 1.5% gain
(b) 2% gain
(c) 1.5% loss
(d) 2% loss

**5.** $\frac{2}{3}$ of a consignment was sold at 6 % profit and the rest at a loss of 3 %. If there was an overall profit of ₹ 540, find the value of the consignment.
(a) ₹ 15,000 (b) ₹ 18000
(c) ₹ 35000 (d) ₹ 45000

**6.** A person sells 36 oranges per rupee and suffers a loss of 4%. Find how many oranges per rupee to be sold to have a gain of 8%?
(a) 30 (b) 31
(c) 32 (d) 33

**7.** Two electronic musical instruments were purchased for ₹ 8000. The first was sold at a profit of 40% and the second at loss of 40%. If the sale price was the same in both the cases, what was the cost price of two electronic musical instruments?
(a) ₹ 2000, ₹ 5000
(b) ₹ 2200, ₹ 5500
(c) ₹ 2400, ₹ 5000
(d) ₹ 2400, ₹ 5600

**8.** Arun bought toffees at 6 for a rupee. How many for a rupee he should sell to gain 20%?
(a) 3 (b) 4
(c) 5
(d) can't be determined

**9.** A firm of readymade garments makes both men's and women's shirts. Its average profit is 6% of the sales. Its profit in men's shirts average 8% of the sales and women's shirts comprise 60% of the output. The average profit per sale rupee in women shirts is
(a) 0.0466 (b) 0.0666
(c) 0.0166
(d) None of these

**10.** For a certain article, if discount is 25%, the profit is 25%. If the discount is 10%, then the profit is

(a) 10% (b) 20%

(c) 35% (d) 50%

**11.** By selling 66 metres of cloth a person gains the cost price of 22 metres. Find the gain per cent.

(a) 22% (b) $22\frac{1}{2}\%$

(c) 33% (d) $33\frac{1}{3}\%$

**12.** A fruit seller declares that he sells fruits at the cost price. However, he uses a weight of 450 g instead of 500 g. His percentage profit is :

(a) 10% (b) $11\frac{1}{9}\%$

(c) 12% (d) $12\frac{2}{9}\%$

## Hints & Solution

**1.** **(d)** If any two transactions of SP is the same and also gain % and loss % are same then there is always a loss

$\therefore$ loss % $=$

$$\left(\frac{\text{Common gain or loss\%}}{10}\right)^2$$

$$=\left(\frac{10}{10}\right)^2=1\%$$

**2.** **(b)** Use Short Approach - 4

**3.** **(d)** Applying successive discounts of 10%, 12% and 15% on 100, we get

$100\times0.9\times0.88\times0.85$

$=67.32$

$\Rightarrow$ Single discount

$=100-67.32=32.68\%$

**4.** **(a)** Use Short Approach -13

**5.** **(b)** Value of consignment

$$=\frac{540\times100}{\frac{2}{3}\times6+\frac{1}{3}(-3)}$$

$$=\frac{540\times100}{4-1}=₹\,18{,}000$$

**6.** **(c)** Use Short Approach - 12

**7.** **(d)** Here, $SP_1=SP_2$

$\Rightarrow 140\,CP_1=60CP_2$

$$\Rightarrow \frac{CP_1}{CP_2}=\frac{6}{14}=\frac{3}{7}$$

$$\therefore\ CP_1=\frac{3}{(3+7)}\times8000$$

$=₹\,2400$

and $CP_2=8000-2400=$ ₹ 5600

**8.** **(c)** Use Short Approach - 12

**9.** **(a)** Women's shirt comprise 60% of the output.

$\therefore$ Men's shirts comprise $(100-60)=40\%$ of the out put.

$\therefore$ Average profit from men's shirt

$=8\%$ of 40

$=3.2$

Overall average profit
= 6 out of 100

$\therefore$ Average profit from women's shirts = 2.8 out of 60 i.e. 0.0466 out of each shirt.

**10. (d)** For same article,

$$\frac{100-d_1}{100-d_2}=\frac{100+g_1}{100+g_2}$$

$$\Rightarrow \frac{100-25}{100-10}=\frac{100+25}{100+g_2}$$

$$\Rightarrow \frac{75}{90}=\frac{125}{100+g_2}$$

$$\Rightarrow 100+g_2=\frac{90\times125}{75}$$

$$=150$$

$$\Rightarrow g_2=50\%$$

**11. (d)** Let C.P. of one metre of cloth = ₹ 1
then C.P. of 66 metres of cloth = ₹ 66
Gain = C.P. of 22 metres = ₹ 22
% gain

$$=\frac{22}{66}\times100=33\frac{1}{3}\%$$

**Shortcut method :**
If on selling 'x' articles, a man gains equal to the C.P. of 'y' articles, then % gain

$$=\frac{y}{x}\times100$$

$$\therefore \%\ \text{gain}=\frac{22}{66}\times100$$

$$=33\frac{1}{3}\%$$

**12. (b)** Use Short Approach - 8