# Chapter-13

# Profit, Loss, Discount and Value added Tax

## Exercise 13.1

Q.1 A student buys a pen for Rs. 90 and sells it for Rs. 100. Find his gain and gain percent.

Sol: C.P for pen = Rs. 90

S.P. for pen = Rs 100

$\because$ SP > CP

Profit = SP − CP

= 100 − 90

= Rs 10

$$\text{Profit \%} = \frac{\text{Profit}}{CP} \times 100 = \frac{10}{90} \times 100 = \frac{100}{9} = 11\frac{1}{9}\%$$

Q.2 Rekha bought a saree for Rs. 1240 and sold it for Rs. 1147. Find her loss and loss percent.

Sol: CP of Saree = Rs. 1240

SP of Saree = Rs 1147

$\because$ SP < CP

Then loss = CP − SP

= 1240 − 1147

= Rs 93

$$\text{loss \%} = \frac{\text{loss}}{CP} \times 100 = \frac{93}{1240} \times 100 = \frac{930}{124}$$

$$= 7.5\%$$

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Q.3 A boy buys 9 apples for Rs 9.60 and sells them at 11 for Rs. 12. Find his gain or loss percent.

Sol: CP of 9 apples = Rs 9.60

$\therefore$ CP of 1 apple = Rs $\frac{9.60}{9}$ = $\frac{96}{90}$ = Rs $\frac{48}{45}$

= Rs $\frac{16}{15}$

SP of 11 apples = Rs 12

$\therefore$ SP of 1 apple = Rs $\frac{12}{11}$

$\therefore$ Gain = $\frac{12}{11} - \frac{16}{15}$ = $\frac{180 - 176}{165}$ = Rs $\frac{4}{165}$

Gain % = $\frac{\text{Gain}}{CP} \times 100$

$= \frac{\left(\frac{4}{165}\right)}{\frac{16}{15}} \times 100$ = $\frac{4 \times 15}{165 \times 16} \times 100$

$= \frac{25}{11} = 2\frac{3}{11}$ %

Q.4 The cost price of 10 articles is equal to the selling price of 9 articles. Find the profit %.

Sol: We are given that

C.P of 10 articles = SP of 9 articles

$\Rightarrow$ let SP of 1 article = Rs x

then SP of 10 articles = 10x

also CP of 10 articles = 9x

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Profit = SP − CP
= 10x − 9x = Rs x

Profit % = $\frac{\text{Profit}}{CP} \times 100 = \frac{x}{9x} \times 100 = \frac{100}{9}$

$= 11\frac{1}{9}\%$

Q5 A retailer buys a radio set for Rs 225. His overhead expenses are Rs 15. If he sells the radio for Rs 300. determine his profit percent.

Sol: CP of radio set = Rs 225
overhead expanses = Rs 15

∴ overall CP = Rs 225 + Rs. 15
= Rs 240

we are given, SP = Rs 300

Profit = Rs 300 − Rs 240
= Rs 60

∴ P% = $\frac{P}{CP} \times 100 = \frac{60}{240} \times 100 = 25\%$

Q.6 A retailer buys a cooler for Rs 1200 and overhead expanses on it are Rs. 40. If he sells the cooler for Rs 1550. determine his profit percent.

Sol: Price at which cooler purchased = Rs 1200
Overhead expanses = Rs 40

∴ overall CP = Rs 1200 + Rs 40
= Rs 1240

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SP of cooler = Rs 1550

Then Profit = SP − CP = 1550 − 1240

= Rs 310

Profit % = $\frac{\text{Profit}}{CP} \times 100$

= $\frac{310}{1240} \times 100$

= 25%.

Q.7 A dealer buys a wrist watch for Rs 225 and spends Rs 15 on its repairs. If he sells the same for Rs 300. Find his profit %.

Sol: CP of wrist watch = Rs 225

Amount spend on repair = Rs 15

∴ Total C.P = Rs 225 + Rs 15

= Rs 240

SP = Rs 300

∴ Profit = SP − CP

= 300 − 240 = Rs 60.

Therefore Profit % = $\frac{P}{CP} \times 100$

= $\frac{60}{240} \times 100$ = 25%.

Q8 Ramesh bought two boxes for Rs 1300. He sold one box at a profit of 20% and the other box at a loss of 12%. If the selling price of both boxes is the same, find the cost price of each box.

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Sol: CP of ~~each~~ boxes = Rs 1300

let CP of one box = Rs x

CP of other box = Rs (1300 − x)

S.P of one box = x + 20 % of x

$= x + \frac{20x}{100} = x + \frac{x}{5} = \frac{6x}{5}$

SP of second box = $(1300-x) - \frac{12}{100} \times (1300-x)$

$= Rs \ \frac{(28600-22x)}{25}$

∴ SP of one box = SP of second box

$\frac{6x}{5} = \frac{28600-22x}{25}$

$\Rightarrow 150x = 28600 \times 5 - 110x$

$\Rightarrow 260x = 28600 \times 5$

$x = \frac{28600 \times 5}{260} = Rs\ 550$

∴ CP of one box = Rs 550

CP of Second box = 1300 − 550 = Rs 750

**Q.9** If the selling price of 10 Pens is equal to Cost price of 14 Pens. Find the gain percent.

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Sol: ∵ S.P of 10 pens = C.P of 14 pens.

Let SP of 1 pen = Rs x

∴ SP of 14 pens = 14x

also CP of 14 pens = SP of 10 pens.

= 10x

Profit = SP − CP = 14x − 10x = 4x

$\text{gain \%} = \frac{\text{gain}}{\text{CP}} \times 100$

$= \frac{4x}{10x} \times 100 = 40\%$

Q.10 If the cost price of 18 chairs be equal to the selling price of 16 chairs. Find his gain or loss %.

Sol: CP of 18 chairs = SP of 16 chairs.

Let SP of 1 chair = Rs x

∴ SP of 18 chairs = 18x

also CP of 18 chairs = 16x

∴ gain = SP − CP = 18x − 16x = 2x

$\text{gain \%} = \frac{\text{gain}}{\text{CP}} \times 100 = \frac{2x}{16x} \times 100$

$= \frac{100}{8} = \frac{25}{2}$

$= 12\frac{1}{2}\%$

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Q.11 If the selling price of 18 oranges is equal to cost price of 16 oranges. Find the loss percent.

Sol: ∵ SP of 18 oranges = CP of 16 oranges.

Let SP of 1 orange = x

SP of 16 oranges = 16x

also CP of 18 oranges = 18x

∴ loss = 18x − 16x = 2x

$$\text{loss \%} = \frac{\text{loss}}{\text{CP}} \times 100 = \frac{2x}{18x} \times 100$$

$$= \frac{100}{9} = 11\frac{1}{9}\ \%$$

Q.12 Rakesh sold his motorcycle to Vineet at a loss of 28%. Vineet spent Rs 1680 on its repairs and sold the motor cycle to Rahul for Rs 35910, thereby making a profit of 12.5%, Find the cost price of the Motorcycle to Rakesh?

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~~SP = 18/25 (x + 1680)~~

~~∴ CP~~

Solution: Let CP of Motorcycle for Ranjith = Rs x

Loss = 28%.

$$SP = \frac{72}{100}x = \frac{18x}{25}$$

∴ CP for Vineet = $\frac{18x}{25}$

Repair cost = Rs 1680

∴ Total CP of Motorcycle = $\left(\frac{18x}{25} + 1680\right)$

SP price for Vineet = Rs 35910

$$\text{Profit} = 35910 - \frac{(18x + 42000)}{25}$$

$$= \text{Rs}\left(\frac{855750 - 18x}{25}\right)$$

Profit % = 12.5% (given)

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$$\therefore \quad \text{Gain \%} = \frac{\text{Gain}}{CP} \times 100$$

$$= \frac{\left\{\frac{855750 - 18x}{25}\right\}}{\left\{\frac{18x + 42000}{25}\right\}} \times 100 = 12.5$$

$$\Rightarrow \quad \frac{855750 - 18x}{18x + 42000} = \frac{1}{8}$$

$$\Rightarrow \quad 6846000 - 144x = 18x + 42000$$

$$\Rightarrow \quad 6846000 - 42000 = 18x + 144x$$

$$\Rightarrow \quad 162x = 6804000$$

$$x = \frac{6804000}{162}$$

$$x = 42000$$

Q.13 By selling a book for Rs 258, a bookseller gains 20%. For how much should he sell it to gain 30%.

Sol: $\therefore$ SP of book = Rs 258

gain = 20%.

$$\therefore \quad CP = \frac{100}{100 + \text{gain\%}} \times SP$$

$$= \frac{100}{100+20} \times 258 = \frac{100}{120} \times 258$$

$$= \text{Rs } 215$$

$\therefore$ cost price of book = Rs 215

desired gain = 30%.

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$\therefore$ sp of book

$$= \frac{100 + \text{gain \%}}{100} \times CP$$

$$= \frac{100+30}{100} \times 215 = \frac{130}{100} \times 215$$

$$= Rs \quad 279.5$$

$\therefore$ sp of book = Rs 2795

Q14 A defective briefcase costing Rs 800 is being sold at a loss of 8%. If the price is further reduced by 5%, find its selling price.

Sol: Give CP of briefcase = Rs 800.

loss % = 8%

$$SP = \frac{100-8}{100} \times 800 = \frac{92}{100} \times 800$$

$$= Rs 736.$$

Again price is reduced = 5% of 736

$$= \frac{5}{100} \times 736$$

$$= \frac{3680}{100} = Rs\ 36.8$$

Now selling price

$$= Rs\ 736 - 36.8$$

$$= Rs\ 699.2$$

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Q.15 By selling 90 ball pens for Rs 160 a person loses 20%. How many ball pens should be sold for Rs 96 so as to have profit of 20%.

Solution: SP of 90 ball pens = Rs 160

$\therefore$ SP of 1 ball pen = Rs $\frac{160}{90}$ = Rs $\frac{16}{9}$

$\therefore$ loss % = 20%

Let us consider the CP of 1 pen = Rs x

$\therefore$ $x - x \times \frac{20}{100} = \frac{16}{9}$

$\Rightarrow$ $\frac{4x}{5} = \frac{16}{9}$ $\Rightarrow$ $x = \frac{16}{9} \times \frac{5}{4}$ = Rs $\frac{20}{9}$

Now Profit = 20%.

SP = $\frac{120}{100} \times \frac{20}{9}$ = $\frac{240}{9} = \frac{24}{9}$

$\therefore$ No of pens = $96 \div \frac{24}{9}$ = $96 \times \frac{9}{24}$

= 36 Pens

Q.16 A man sells an article at a profit of 25%. If he had bought it at 20% less and sold it for Rs 36.75 less, he would have gained 30%. Find the cost price of the article.

Sol:

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Solution: Given details

SP of book = Rs 258

gain % = 20

let C.P = Rs x

$\therefore x + \frac{20x}{100} = 258$

$\Rightarrow x + \frac{x}{5} = 258$ $\Rightarrow \frac{6x}{5} = 258$

$\Rightarrow x = \frac{258 \times 5}{6} = Rs\ 215$

Now the cost price = Rs 215

gain = 30%.

$SP = \frac{100+30}{100} \times 215 = \frac{130}{100} \times 215$

$= 13 \times 21.5$

$= Rs\ 279.50$

Q14 Solution: let the CP = Rs x

Profit % = 25%

$SP = \frac{100+25}{100} \times x = \frac{125}{100} x$

$= \frac{5}{4} x$

If cost price is 20% less, then cost price

$= x - \frac{20}{100} x = x - \frac{x}{5} = \frac{4x}{5}$

$S.P = \frac{5x}{4} - 36.75$

Profit % = 30%.

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He would have gained 30% selling price

$\therefore$ Gain = SP − CP

~~30%~~ $\Rightarrow \frac{5x}{4} - 36.75 - \frac{4x}{5}$

$\Rightarrow \frac{30}{100}$ = Now Gain % = $\frac{\text{Gain}}{CP} \times 100$

$\Rightarrow 30\% = \left\{\left(5x/4 - 36.75\right\} - \left(4x/5\right]\right) \Big/ \left(\frac{4x}{5}\right) \times 100$

$\Rightarrow \frac{30}{100} = \frac{\left(\frac{9x}{20} - 36.75\right)}{\left(\frac{4x}{5}\right)} \times 100$

$\Rightarrow$ By calculating

$x = 175$

$\therefore$ Cost price of article = Rs 175.

Q.17 A dishonest shopkeeper professes to sell pulses at his cost price but uses a false weight of 950 gm. for each kg. Find his gain %.

Sol: Let us consider the cost price of 1000 gm

pulses = Rs x

also, SP of 950 g pulses = Rs x

SP of 1000 gm pulses = $\frac{x}{950} \times 1000$

So Gain = SP − CP

$= \frac{1000x}{950} - x = \frac{1000x - 950x}{950} = \frac{50x}{950}$

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$$\text{Gain \%} = \frac{\text{Gain}}{CP} \times 100$$

$$= \frac{\left(\frac{50x}{950}\right)}{x} \times 100 = \frac{5}{95} \times 100 = \frac{100}{19}$$

$$= 5\frac{5}{19}\ \%$$

**Q.18** A dealer bought two tables for Rs 3120. He sold one of them at loss of 15% and other at a gain of 36%. Then he found that each table was sold for the same price. Find the cost price of each table.

**Sol:** CP of two tables = Rs 3120

Let cost price of first table = Rs $x$

Then cost price of second = $(3120 - x)$ Rupees.

~~gain~~ loss at first table = 15%.

$$SP = \frac{100 - 15}{100} \times x = \frac{85}{100} x = \frac{17}{20} x$$

gain on second table = 36%.

$$SP = \frac{100 + 36}{100} \times (3120 - x)$$

$$= \frac{136}{100} (3120 - x) = \frac{34}{25} (3120 - x)$$

$\therefore$ SP of first table = SP of second table

$$\Rightarrow \frac{17}{20} x = \frac{34}{25} (3120 - x)$$

$$\Rightarrow 425x = 680 (3120 - x)$$

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By calculating, we get

$x = 1200$

∴ cost price of first table = Rs 1200

C.P of second table = Rs 3120 − Rs 1200

= Rs 1920

Q.19 Mariam bought two fans for Rs 3605. She sold one at a profit of 15% and the other at a loss of 9%. If Mariam obtained the same amount for each fan, find the cost price of each fan.

Sol: CP of two fans = Rs 3605

Let CP of first fan = Rs $x$

Then CP of second fan = Rs $(3605 - x)$

Profit at first fan = 15%.

then $SP = \frac{100+15}{100} \times x = \frac{115}{100} x$

$= \frac{23}{20} x$

loss at second fan = 9%.

$SP = \frac{100-9}{100}(3605-x) = \frac{91}{100}(3605-x)$

∴ SP of both fans are equal.

$\frac{23}{20} x = \frac{91}{100}(3605-x)$

$\Rightarrow \frac{23}{20} \times 100x = 91(3605-x)$

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$\Rightarrow 115x = 328055 - 91x$

$\Rightarrow 115x + 91x = 328055$

$= 206x = 328055$

$\Rightarrow x = \frac{328055}{206} = Rs\ 1592.50$

$\therefore$ cost price of one fan = Rs 1592.5

Second fan = 3605 − 1592.5

= Rs 2012.5

Q.20 : Some toffees are bought at the rate of 11 for Rs 10 and the same number at the rate of 9 for Rs 10. If the whole lot is sold at one rupee per toffee, find the gain or loss percent on the whole transaction.

Sol: Let total no. of toffees = $x$

CP of 11 toffees = Rs 10

CP of 1 toffee = Rs $\frac{10}{11}$

CP of 9 toffees = Rs 10

$\therefore$ CP of 1 toffee = Rs $\frac{10}{9}$

CP of two toffees = Rs $\left(\frac{10}{11} + \frac{10}{9}\right)$

$= \frac{90 + 110}{99} = \frac{200}{99}$

$\therefore$ CP of one toffee = Rs $\frac{\left(\frac{200}{99}\right)}{2}$ = Rs $\frac{200}{198}$

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$\therefore$ SP of 1 toffee = Rs 1

$$\text{loss} = CP - SP$$

$$= \frac{200}{198} - 1 = \frac{200-198}{198} = \frac{2}{198} = \frac{1}{99}$$

$$\text{loss \%} = \frac{\text{loss}}{CP} \times 100$$

$$= \frac{\left(\frac{1}{99}\right)}{\left(\frac{200}{198}\right)} \times 100 = \frac{1 \times 198}{99 \times 200} \times 100$$

$$= 1\%$$

$\therefore$ It is 1% loss on the whole transaction.

Q.21. A tricycle is sold at a gain of 16%. Had it been sold for Rs 100 more, the gain would have been 20%. Find the C.P of the article.

Sol: Let CP of tricycle = Rs $x$

SP of tricycle = Rs $x + \frac{16x}{100}$

$$= \frac{100x + 16x}{100} = \frac{116x}{100}$$

$$= 29x$$

$$\overline{25}$$

If SP is Rs 100 more.

$$\text{New SP} = \frac{29x}{25} + 100$$

Gain = 20%

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$$\therefore \quad \text{Gain\%} = \frac{\text{Gain}}{CP} \times 100$$

$$\Rightarrow 20\% = \frac{\left(\frac{29x}{25} + 100\right) - x}{x} \times 100$$

$$= \frac{20x}{100} = \frac{29x + 2500 - 25x}{25}$$

$$\Rightarrow \frac{x}{5} = \frac{29x + 2500 - 25x}{21}$$

$$\Rightarrow x = 2500$$

$\therefore$ Cost price of tricycle = Rs 2500.

Q.22 Shabana bought 16 dozen ball pens and sold them at a loss equal to S.P of 8 ball pens. Find.

(i) her loss percent

(ii) SP of 1 dozen ball pens, if she purchased these 16 dozen ball pens for Rs. 576.

Sol: no. of ball pens bought = 16 dozen = $16 \times 12$

= 192 pens.

Let Cost price of each pen = Rs $x$

CP of 8 pens = Rs $x$

SP of 192 pens = $192x$

Given, loss of 192 pens = SP of 8 ball pens.

$$\text{loss} = 8 \times SP$$

$$\Rightarrow 192x = (192 + 8)\, SP$$

$$\Rightarrow SP = \frac{192x}{200}$$

$$\text{loss} = CP - SP$$

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$$\Rightarrow x - \frac{192x}{200}$$

(i) $\text{loss}\% = \frac{\text{loss}}{CP} \times 100$

$$= \frac{\left(x - \frac{192x}{200}\right)}{x} \times 100$$

$$= \frac{200x - 192x}{200x} \times 100$$

$$= \frac{8}{2} = 4\%$$

(ii) Given, CP of 16 dozen pens = Rs 576

$\therefore 192x = 576$

$$x = \frac{576}{192}$$

We know that SP of 1 pen $= \frac{192x}{200}$

SP of dozen pens $= 12 \times \frac{192x}{200}$

$$= 12 \times \frac{192}{200} \times \frac{576}{192}$$

$$= 12 \times \frac{576}{200}$$

$$= 34.56$$

$\therefore$ Loss = 4%, SP of 1 dozen pens = Rs 34.56

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Q.23 The difference between two selling prices of a shirt at profits of 4% and 5% is Rs. 6. Find (i) CP of the shirt

(ii) The two selling prices of the shirt

Sol: (i) Let CP of shirt = Rs x

Profit = 4%

$SP = \frac{100+4}{100} \times x = \frac{104}{100} x$

=

(ii) Let the CP of shirt = Rs x

Profit = 5%

$SP = \frac{100+5}{100} \times x = \frac{105}{100} x$

Given that

$$\frac{105x}{100} - \frac{104x}{100} = 6$$

$$\Rightarrow \frac{x}{100} = 6$$

$$\Rightarrow x = 600$$

$\therefore$ CP of the shirt = Rs 600.

SP of one shirt $= \frac{104}{100} x = \frac{104}{100} \times 600 =$ Rs 624

SP of other shirt $= \frac{105}{100} x = \frac{105}{100} \times 600 =$ Rs 630

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Q.24 Tosheba bought 100 hens for Rs. 8000 and sold 20 of these at a gain of 5%. At what gain percent she must sell the remaining hens so as to gain 20% on the whole?

Sol: Given, Total hens = 100

Remaining hens = 100 − 20 = 80 hens

CP of 100 hens = Rs 8000

∴ CP of 1 hen = Rs $\frac{8000}{100}$ = Rs 80

hence C.P of 80 hens = 80 × 80

= Rs 1600

gain = 5%

∴ SP of 20 hens = $\frac{100+5}{100}$ × 1600

= $\frac{105}{100}$ × 1600 = 105 × 16

= Rs 1680

gain on whole = 20% of 8000

= $\frac{20}{100}$ × 8000 = Rs 1600

∴ SP of 80 hens = 8000 + 1600 − 1680

= Rs 7920

∴ Gain on 80 hens = SP of 80 hens − CP of 80 hens

= 7920 − 6400

= Rs 1520

Gain% = $\frac{\text{Gain}}{\text{CP}}$ × 100 = $\frac{1520}{6400}$ × 100

= 23.75%

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