Introduction

Basics terms to be used in this chapter

(a) Cost price (CP): It is the price at which an article is bought.

(b) Selling price (SP): It is the price for which an article is sold.

(c) Profit or gain: When selling price is more than the cost price.

⇨ Profit or gain = $SP - CP$

(d) Loss: when cost price is more than the selling price.

⇨ Loss = $CP - SP$

Formulae to be used in this chapter:

1	Gain	$SP - CP$
2	Loss	$CP - SP$
3	Gain%	$\left(\frac{Gain}{CP} \times 100\right)\%$
4	Loss%	$\left(\frac{Loss}{CP} \times 100\right)\%$
5	SP when gain% is given	$\frac{(100 + Gain\%)}{100} \times CP$
6	CP when gain% is given	$\frac{100}{(100 + Gain\%)} \times SP$
7	SP when Loss% is given	$\frac{(100 - Loss\%)}{100} \times CP$
8	CP when loss% is given	$\frac{100}{(100 - Loss\%)} \times SP$

Examples:

Example 1 – Mohit bought a CD for Rs 750 and sold it for Rs 875. Find his gain per cent.

Solution - Cost price of a CD (CP) = $Rs\ 750$

Selling price (SP) = $Rs\ 875$

Gain% =?

Gain = $SP - CP = 875 - 750 = 125$

Gain% = $\left(\frac{Gain}{CP} \times 100\right)\%$

= $\left(\frac{125}{750} \times 100\right)\% = \frac{50}{3}\% = 16\frac{2}{3}\%$

Example 2 – Rahul purchased a table for Rs 1260 and due to some scratches on its top he had to sell it for Rs 1197. Find his loss per cent.

Solution - Given that CP of table = $Rs1260$

SP of table = $Rs\ 1197$

Loss% =?

Loss = $CP - SP = 1260 - 1197 = Rs\ 63$

Loss% = $\left(\frac{Loss}{CP} \times 100\right)\%$

= $\left(\frac{63}{1260} \times 100\right)\% = \frac{6300}{1260}\% = 5\%$

Example 3 – Mohan Lal purchased an old scooter for Rs 12000 and spent Rs 2850 on its overhauling. Then, he sold it to his friend Sohanbir for Rs 13860. How much per cent did he gain or lose?

Solution - CP of an old scooter = $Rs\ 12000$

Spent on overhauling (overheads) = $Rs2850$

Thus, total CP = $Rs\ 12000 + 2850 = Rs14850$

SP of scooter = $Rs\ 13860$

Since, CP > SP

Thus, there is a loss so we will find loss%

Loss = $CP - SP = 14850 - 13860 = 990$

Loss% = $\left(\frac{Loss}{CP} \times 100\right)\%$

= $\left(\frac{990}{14850} \times 100\right)\% = \frac{99000}{14850}\% = \frac{20}{3}\% = 6\frac{2}{3}\%$

Example 4 – Raghu bought an almirah for Rs 6250 and spent Rs 375 on its repairs. Then, he sold it for Rs 6890. Find his gain or loss per cent.

Solution - CP of the almirah = Rs 6250

Spent on repairs = Rs 375

Total CP = $6250 + 375 = Rs6625$

SP of the almirah = $Rs6890$

Since, SP > CP

Thus, there is a gain so we will find gain%

Gain = $SP - CP = 6890 - 6625 = Rs265$

Gain% = $\left(\frac{Gain}{CP} \times 100\right)\%$

= $\left(\frac{265}{6625} \times 100\right)\% = \frac{26500}{6625}\% = 4\%$

Example 5 – A vendor bought oranges at 20 for Rs 125 and sold them at Rs 90 per dozen. Find his gain or loss per cent.

Solution - We will first find the number of oranges bought.

Number of oranges = LCM of (20, 12) which is 60

Now, CP of 20 oranges = $Rs125$

CP of 1 orange = $Rs\ \frac{125}{20}$

CP of 60 oranges = $Rs\ \frac{125 \times 60}{20} = Rs\ 375$

SP of 12 oranges = $Rs\ 90$

SP of 1 orange = $Rs\frac{90}{12}$

SP of 60 oranges = $Rs\ \frac{90\times60}{12} = Rs\ 450$

Since, SP > CP

Thus, there is a gain so we will find gain%

Gain = $SP - CP = 450 - 375 = Rs75$

Gain% = $\left(\frac{Gain}{CP} \times 100\right)\%$

= $\left(\frac{75}{375} \times 100\right)\% = \frac{7500}{375}\% = 20\%$

Example 6 – If the cost price of 10 greeting cards is equal to the selling price of 8 greeting cards, find the gain or loss per cent.

Solution - Let the CP of each card be Rs x

Then, CP of 8 cards = Rs8x

It is given that SP of 8 cards = CP of 10 cards = Rs 10x

Thus, CP = Rs8x and SP = Rs 10x

Now, as SP > CP, there is a gain

So, Gain = $SP - CP = Rs(10x - 8x) = Rs\ 2x$

Then, Gain% = $\left(\frac{2x}{8x} \times 100\right)\% = 25\%$

Example 7 – By selling 33m of cloth, a draper loses an amount equal to the selling price of 3 m of cloth. Find his gain or loss per cent.

Solution - It is given that Loss = SP of 3m cloth

Now, Loss = (CP of 33m cloth – SP of 33 m cloth)

=> (SP of 3m cloth) = (CP of 33m cloth – SP of 33 m cloth)

=> (SP of 3m cloth+ SP of 33 m cloth) = (CP of 33m cloth)

=> (SP of 36m cloth) = (CP of 33m cloth)

Now, let CP of 1 m cloth be Rsx

Then, CP of 36m cloth = Rs36x

And, SP of 36m cloth = CP of 33m cloth = Rs 33x

Therefore, we have CP = Rs 36x and SP = Rs 33x

As CP > SP, there is a loss

Loss = $CP - SP = 36x - 33x = 3x$

Loss% = $\left(\frac{Loss}{CP} \times 100\right)\%$

= $\left(\frac{3x}{36x} \times 100\right)\% = \frac{25}{3}\% = 8\frac{1}{3}\%$

Example 8 – Rohit buys a geyser for Rs 3680 and sells it at a gain of $7\frac{1}{2}\%$. For how much does he sell it?

Solution - CP of the geyser is given to be Rs 3680

Given that gain% = $7\frac{1}{2}\% = \frac{15}{2}\%$

We know that when CP and Gain% is given,

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

=> $SP = \frac{\left(100+\frac{15}{2}\right)}{100} \times 3680$

= $\left(\frac{200+15}{2}\right) \times \frac{1}{100} \times 3680$

= $\frac{215}{200} \times 3680 = 92 \times 43 = 3956$

Thus, SP = Rs3956

Example 9 – Rashmi buys a calculator for Rs 1080 and sells it at a loss of $6\frac{2}{3}\%$. For how much does she sell it?

Solution - CP of a calculator = Rs1080

Loss% = $6\frac{2}{3}\% = \frac{20}{3}\%$

We know that when CP and Loss% is given,

$$SP = \frac{(100 - Loss\%)}{100} \times CP$$

$= \frac{\left(100-\frac{20}{3}\right)}{100} \times 1080$

$= \left(\frac{300-20}{3}\right) \times \frac{1}{100} \times 1080$

$= \frac{280}{300} \times 1080 = 28 \times 36 = 1008$

Thus, SP = $Rs1008$

Example 10 – On selling a fan for Rs 810, Sunil gains 8%. For how much did he purchase it?

Solution - Given that SP of the fan = $Rs810$

Gain% = 8%

CP of fan =?

We know that when SP and Gain% is given,

$$CP = \frac{100}{(100 + Gain\%)} \times SP$$

$= \frac{100}{(100+8)} \times 810$

$= \frac{100}{108} \times 810 = 25 \times 30 = 750$

Thus, CP of the fan = Rs 750

Example 11 – On selling a table for Rs 1974, Ramesh loses 6%. For how much did he purchase it?

Solution - SP of a table = $Rs1974$

Loss% = 6%

We know that when SP and Gain% is given,

$$CP = \frac{100}{(100 - Loss\%)} \times SP$$

$= \frac{100}{(100-6)} \times 1974$

$= \frac{100}{94} \times 1974 = 100 \times 21 = 2100$

Thus, CP of the fan = Rs 2100

Example 12 – On selling a bat for Rs 742, a man gains 6%. For how much should he sell it to gain 8%?

Solution - SP of a bat = Rs742

Gain% = 6%

First, we will find the CP of a bat.

We know that when SP and Gain% is given,

$$CP = \frac{100}{(100 + Gain\%)} \times SP$$

$= \frac{100}{(100+6)} \times 742$

$= \frac{100}{106} \times 742 = 7 \times 100 = 700$

Thus, CP of a bat = Rs700

Now, Gain% = 8%

We know that when CP and gain% is known,

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$= \frac{(100+8)}{100} \times 700$

$= \frac{108}{100} \times 700 = 756$

Therefore, SP of bat to obtain gain of 8% is Rs756

Example 13 – By selling a T-shirt for Rs 648, a shopkeeper loses 4%. For how much should he sell it to gain 4%?

Solution - SP of a T-shirt = Rs648

Loss% = 4%

First, we will find CP of a T-shirt

We know that when SP and Loss% is known,

$$CP = \frac{100}{(100 - Loss\%)} \times SP$$

$= \frac{100}{(100-4)} \times 648$

$= \frac{100}{96} \times 648 = 675$

Thus, CP of a T-shirt = $Rs675$

Now, Gain% = 4%

We know that when CP and gain% is known,

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$= \frac{(100+4)}{100} \times 675$

$= \frac{104}{100} \times 675 = 702$

Therefore, SP of T-shirt to obtain gain of 4% is $Rs702$

Example 14 – Harish sold a bicycle at 8% gain. Had it been sold for Rs 375 more, the gain would have been 14%. Find the cost price of the bicycle.

Solution - Let the CP of a bicycle be $Rs\ x$

We will find SP of a bicycle both at 8% gain and 14% gain

SP of bicycle at 8% gain = $\frac{(100+Gain\%)}{100} \times CP$

$= \frac{(100+8)}{100} \times x = \frac{108x}{100} = \frac{27x}{25}$

SP of bicycle at 14% gain = $\frac{(100+Gain\%)}{100} \times CP$

$= \frac{(100+14)}{100} \times x = \frac{114x}{100} = \frac{57x}{50}$

Now, according to given question,

$$\frac{57x}{50} - \frac{27x}{25} = 375$$

$= \frac{57x-54x}{50} = 375$

$= \frac{3x}{50} = 375$

$= x = \frac{375\times50}{3} = 125 \times 50 = 6250$

Thus, CP of the bicycle = $Rs6250$

Example 15 – Manish sold a watch at 5% loss. Had he sold it for Rs 312 more, he would have gained 8%.Find the selling price of the watch?

Solution - Let the SP of a watch be Rs x

Loss% = 5%

Then, CP of a watch = $\frac{100}{(100-Loss\%)} \times SP$

$= \frac{100}{(100-5)} \times x = \frac{100x}{95}$

Now, Gain% = 8%

Therefore, SP of watch = $\frac{(100+Gain\%)}{100} \times CP$

$= \frac{(100+8)}{100} \times \frac{100x}{95} = \frac{108x}{95}$

According to given question,

$$\frac{108x}{95} - x = 312$$

$= \frac{108x-95x}{95} = 312$

$= \frac{13x}{95} = 312$

$= x = \frac{312\times95}{13} = 24 \times 95 = 2280$

Thus, SP of the watch is $Rs2280$

Example 16 – Gurpreet sells two watches for Rs 2970 each, gaining 10% on one and losing 10% on the other. Find her gain or loss per cent in the whole transaction.

Solution - SP of first watch = Rs 2970

Gain% = 10%

Thus, CP of first watch = $\frac{100}{(100+Gain\%)} \times SP$

= $\frac{100}{(100+10)} \times 2970$

= $\frac{100}{110} \times 2970 = 100 \times 27 = 2700$

Now, SP of second watch = Rs2970

And, Loss% = 10%

CP of second watch = $\frac{100}{(100-10)} \times 2970$

= $\frac{100}{90} \times 2970 = 33 \times 100 = 3300$

Now, total SP of both watches = $2970 + 2970 = Rs\ 5940$

And, total CP of both watches = $2700 + 3300 = Rs\ 6000$

Since, CP > SP, there is a loss

Thus, loss = $CP - SP = 6000 - 5940 = 60$

Loss% = $\left(\frac{Loss}{CP} \times 100\right)\%$

= $\left(\frac{60}{6000} \times 100\right)\% = 1\%$

Example 17 – Manohar purchased two handbags for Rs 1500 each. He sold these bags, gaining 8% on one and losing 4% on the other. Find his gain or loss per cent in the whole transaction.

Solution - CP of first handbag = Rs 1500

Gain% = 8%

Then, SP of first handbag = $\frac{(100+Gain\%)}{100} \times CP$

= $\frac{(100+8)}{100} \times 1500 = \frac{108}{100} \times 1500 = 108 \times 15 = 1620$

CP of second handbag = $Rs1500$

Loss% = 4%

SP of second bag = $\frac{(100-Loss\%)}{100} \times CP$

= $\frac{(100-4)}{100} \times 1500 = \frac{96}{100} \times 1500 = 96 \times 15 = 1440$

Total SP of both handbags = $1620 + 1440 = 3060$

Total CP of both handbags = $1500 + 1500 = 3000$

Since, SP > CP, there is a gain

Gain = $SP - CP = 3060 - 3000 = 60$

Gain% = $(\frac{gain}{CP} \times 100)\% = (\frac{60}{3000} \times 100)\% = 2\%$

Example 18 - A reduction of 20% in the price of sugar enables Mrs. Shah to buy an extra 3 kg of it for Rs 360. Find (a) the original rate, and (b) the reduced rate per kg.

Solution - Let original rate of sugar be Rs x per kg

Then, reduced rate of sugar will be $x\left(1 - \frac{20}{100}\right)$

= $x\left(\frac{80}{100}\right) = \frac{4x}{5}$

Now, at original rate, quantity of sugar = $\frac{360}{x}$ kg

At new rate, quantity of sugar = $\frac{360}{\frac{4x}{5}}$

= $360 \times \frac{5}{4x} = \frac{450}{x}$

According to given question,

$\frac{450}{x} - \frac{360}{x} = 3$

$\frac{90}{x} = 3$

=> $x = \frac{90}{3} = 30$

Thus, original rate of sugar is Rs 30

And, reduced rate = $\frac{4(30)}{5} = Rs\ 24$

Exercise 10A

Question 1 – Find the gain or loss per cent when:

(a) CP = Rs 620 and SP = Rs 713

Solution - Given that CP = $Rs620$ and SP = $Rs713$

Since, SP > CP, there is a gain

Gain = $SP - CP$

= $713 - 620 = Rs\ 93$

Gain% = $\left(\frac{Gain}{CP} \times 100\right)\%$

= $\left(\frac{93}{620} \times 100\right)\% = 15\%$

(b) CP = Rs 675 and SP = Rs 630

Solution - Given that CP = $Rs675$ and SP = $Rs630$

Since CP > SP, there is a loss

Loss = $CP - SP$

= $675 - 630 = Rs\ 45$

Loss% = $\left(\frac{Loss}{CP} \times 100\right)\%$

= $\left(\frac{45}{675} \times 100\right)\% = \frac{20}{3}\% = 6\frac{2}{3}\%$

(c) CP = Rs 345 and SP = Rs 372.60

Solution - Given that CP = $Rs345$ and SP = $Rs372.60$

Since, SP > CP, there is a gain

Gain = $SP - CP$

= $372.60 - 345 = Rs\ 27.6$

Gain% = $\left(\frac{Gain}{CP} \times 100\right)\%$

$= \left(\frac{27.6}{345} \times 100\right)\% = 8\%$

(d) CP = Rs 80 and SP = Rs 76.80

Solution - Given that CP = $Rs80$ and SP = $Rs76.80$

Since, CP > SP, there is a loss

Loss = $CP - SP$

$= 80 - 76.80 = Rs\ 3.2$

Loss% = $\left(\frac{Loss}{CP} \times 100\right)\%$

$= \left(\frac{3.2}{80} \times 100\right)\% = 4\%$

Question 2 – Find the selling price when:

(a) CP = 1650 and gain = 4%

Solution - CP = Rs 1650 and gain = 4%

We know that when CP and gain% is given,

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 4)}{100} \times 1650$$

$$SP = \frac{104}{100} \times 1650$$

$$SP = 52 \times 33 = Rs\ 1716$$

(b) CP = 915 and gain = $6\frac{2}{3}\%$

Solution - CP = Rs 915 and gain = $6\frac{2}{3}\% = \frac{20}{3}\%$

We know that when CP and gain% is given,

$$SP = \frac{(100 + \frac{20}{3})}{100} \times 915$$

$$SP = \frac{\frac{(300+20)}{3}}{100} \times 915$$

$$SP = \frac{320}{300} \times 915$$

$$SP = 16 \times 61 = Rs\ 976$$

(c) CP = Rs 875 and loss = 12%

Solution - CP = Rs 875 and loss = 12%

We know that when CP and gain% is given,

$$SP = \frac{(100 - Loss\%)}{100} \times CP$$

$$SP = \frac{(100-12)}{100} \times 875$$

$$SP = \frac{88}{100} \times 875 = Rs\ 770$$

(d) CP = Rs 645 and loss = $13\frac{1}{3}\%$

Solution - CP = Rs 645 and Loss = $13\frac{1}{3}\% = \frac{40}{3}\%$

We know that when CP and Loss% is given,

$$SP = \frac{(100 - \frac{40}{3})}{100} \times 645$$

$$SP = \frac{\frac{(300-40)}{3}}{100} \times 645$$

$$SP = \frac{260}{300} \times 645$$

$$SP = 13 \times 43 = Rs\ 559$$

Question 3 – Find the cost price when:

(a) SP = Rs 1596 and gain = 12%

Solution - SP = Rs 1596 and gain = 12%

We know that when SP and gain% is given,

$$CP = \frac{100}{(100 + Gain\%)} \times SP$$

$$CP = \frac{100}{(100 + 12)} \times 1596$$

$$CP = \frac{100}{112} \times 1596 = Rs\ 1425$$

(b) SP = Rs 2431 and loss = $6\frac{1}{2}\%$

Solution - SP = $Rs\ 2431$ and loss = $6\frac{1}{2}\% = \frac{13}{2}\%$

We know that when SP and loss% is given,

$$CP = \frac{100}{(100 - Loss\%)} \times SP$$

$$CP = \frac{100}{\left(100 - \frac{13}{2}\right)} \times 2431$$

$$CP = \frac{100}{\frac{200 - 13}{2}} \times 2431$$

$$CP = \frac{200}{187} \times 2431 = Rs\ 2600$$

(c) SP = Rs 657.60 and loss = 4%

Solution - SP = $Rs\ 657.60$ and loss = 4%

We know that when SP and loss% is given,

$$CP = \frac{100}{(100 - Loss\%)} \times SP$$

$$CP = \frac{100}{(100 - 4)} \times 657.60$$

$$CP = \frac{100}{96} \times 657.60 = Rs\ 685$$

(d) SP = Rs 34.40 and gain = $7\frac{1}{2}\%$

Solution - SP = Rs 34.40 and Gain = $7\frac{1}{2}\% = \frac{15}{2}\%$

We know that when SP and gain% is given,

$$CP = \frac{100}{(100 + Gain\%)} \times SP$$

$$CP = \frac{100}{\left(100 + \frac{15}{2}\right)} \times 34.40$$

$$CP = \frac{100}{\left(\frac{200 + 15}{2}\right)} \times 34.40$$

$$CP = \frac{200}{215} \times 34.40 = Rs\ 32$$

Question 4 – Manjit bought an iron safe for Rs 12160 and paid Rs 340 for its transportation. Then, he sold it for Rs 12875. Find his gain per cent.

Solution - CP of an iron safe = Rs 12160

Paid on transportation = Rs340

Total CP of iron safe = $Rs\ (12160 + 340) = Rs\ 12500$

SP of iron safe = Rs12875

Since SP > CP, there is a gain

Gain = $SP - CP = 12875 - 12500 = Rs\ 375$

Gain% = $\left(\frac{Gain}{CP} \times 100\right)\%$

= $\frac{375}{12500} \times 100 = 3\%$

Question 5 – Robin purchased an old car for Rs 73500. He spent Rs 10300 on repairs and paid Rs 2600 for its insurance. Then he sold it to a mechanic for Rs 84240. What was his percentage gain or loss?

Solution - CP of an old car = Rs 73500

Spent on repairs = Rs10300

Spent on insurance = $Rs2600$

Total CP = $Rs\ (73500 + 10300 + 2600) = Rs\ 86400$

SP of car = $Rs\ 84240$

Since CP > SP, there is a loss.

Loss = $CP - SP = 86400 - 84240 = Rs\ 2160$

Loss% = $\left(\frac{Loss}{CP} \times 100\right)\% = \left(\frac{2160}{86400} \times 100\right)\% = \frac{5}{2}\% = 2\frac{1}{2}\%$

Question 6 – Hari bought 20 kg of rice at Rs 36 per kg and 25 kg of rice at Rs 32 per kg. He mixed the two varieties and sold the mixture at Rs 38 per kg. Find his gain per cent in the whole transaction.

Solution - CP of 1 Kg of rice (variety1) = $Rs\ 36$

CP of 20 Kg of Rice = $Rs(36 \times 20) = Rs\ 720$

CP of 1 Kg of Rice (variety2) = $Rs\ 32$

CP of 25 Kg of Rice = $Rs(32 \times 25) = Rs\ 800$

Total CP of both varieties = $Rs\ (720 + 800) = Rs\ 1520$

Total Quantity of rice = $(20 + 25) = 45$

SP of 1 Kg of Mixture of both varieties = $Rs\ 38$

SP of 45 Kg of mixture = $Rs\ (45 \times 38) = Rs\ 1710$

Sine $SP > CP$, there is a gain

Gain = $SP - CP = Rs\ (1710 - 1520) = Rs\ 190$

Gain% = $\left(\frac{Gain}{CP} \times 100\right)\%$

= $\left(\frac{190}{1520} \times 100\right)\% = \frac{25}{2}\% = 12\frac{1}{2}\%$

Question 7 – Coffee costing Rs 250 per kg was mixed with chicory costing Rs 75 per kg in the ratio 5:2 for a certain blend. If the mixture was sold at Rs 230 per kg,find the gain or loss per cent.

Solution - Let 5 kg of coffee be mixed with 2 kg of coffee.

Then, total CP of coffee = $5(250) + 2(75) = 1250 + 150 = Rs\ 1400$

Total Quantity of coffee = $5 + 2 = 7$ kg

SP of 1 Kg of coffee = $Rs230$

SP of 7 Kg of coffee = $(230 \times 7) = Rs\ 1610$

Since SP > CP, there is a gain

Thus, gain = $SP - CP$

= $1610 - 1400 = Rs\ 210$

Gain% = $\left(\frac{Gain}{CP} \times 100\right)\%$

= $(\frac{210}{1400} \times 100)\% = 15\%$

Question 8 – If the selling price of 16 water bottles is equal to the cost price of 17 water bottles, find the gain per cent earned by the dealer.

Solution - Given that SP of 16 water bottles = CP of 17 water bottles

Let CP of 1 water bottle be Rs x

Then, SP of 16 water bottles = CP of 17 water bottles = Rs17x

CP of 16 water bottles = Rs16x

Since SP > CP, there is a gain

Gain = $17x - 16x = x$

Gain% = $\left(\frac{Gain}{CP} \times 100\right)\%$

= $\left(\frac{x}{16x} \times 100\right)\% = \frac{25}{4}\% = 6\frac{1}{4}\%$

Question 9 – The cost price of 12 candles is equal to the selling price of 15 candles. Find the loss per cent.

Solution - Given that CP of 12 candles = SP of 15 candles

Let CP of 1 candle be Rs x

SP of 15 candles = CP of 12 candles = Rs 12x

CP of 15 candles = Rs 15x

Since, CP > SP, there is a loss

Loss = $CP - SP$

= $15x - 12x = 3x$

Loss% = $\left(\frac{loss}{CP} \times 100\right)\%$

= $\frac{3x}{15x} \times 100 = 20\%$

Question 10 – By selling 130 cassettes, a man gains an amount equal to the selling price of 5 cassettes. Find the gain per cent.

Solution - Let the SP of 1 cassette be Rs x

It is given that Gain = SP of 5 cassettes = Rs 5x

SP of 130 cassettes = Rs 130x

Since, Gain = $SP - CP$

=> 5x = 130x – CP

=> CP = 130x – 5x

=> CP = Rs 125x

Gain% = $\left(\frac{Gain}{CP} \times 100\right)\%$

= $\left(\frac{5x}{125x} \times 100\right)\% = 4\%$

Question 11 – By selling 45 lemons, a vendor loses a sum equal to the selling price of 3 lemons. Find his loss per cent.

Solution - Let SP of 1 lemon be Rs x

It is given that Loss = SP of 3 lemons = Rs 3x

SP of 45 cassettes = Rs 45x

Since Loss = $CP - SP$

=> 3x = 45x – CP

=> CP = 45x – 3x

=> CP = Rs 42x

Loss% = $\left(\frac{Loss}{CP} \times 100\right)\%$

= $\left(\frac{3x}{42x} \times 100\right)\% = \frac{25}{4}\% = 6\frac{1}{4}\%$

Question 12 – Oranges are bought at 6 for Rs 20 and sold at 4 for Rs 18. Find the gain or loss per cent.

Solution - CP of 6 oranges = Rs 20

CP of 1 orange = $Rs\frac{20}{6} = Rs\frac{10}{3}$

SP of 4 oranges = Rs 18

SP of 1 orange = $Rs\frac{18}{4} = Rs\frac{9}{2}$

Since SP > CP, there is a gain

Gain = $SP - CP = \frac{9}{2} - \frac{10}{3}$

= $\frac{27-20}{6} = Rs\frac{7}{6}$

Gain% = $\left(\frac{Gain}{CP} \times 100\right)\%$ = $\left(\frac{\frac{7}{6}}{\frac{10}{3}} \times 100\right)\% = 35\%$

Question 13 – A vendor purchased bananas at Rs 40 per dozen and sold them at 10 for Rs 36. Fins his gain or loss per cent

Solution - CP of 12 bananas = Rs 40

CP of 1 banana = $Rs\frac{40}{12} = Rs\frac{10}{3}$

SP of 10 bananas = Rs 36

SP of 1 banana = $Rs\frac{36}{10} = Rs\frac{18}{5}$

Since SP > CP, there is a gain

Gain = $SP - CP = \frac{18}{5} - \frac{10}{3}$

$= Rs\frac{54-50}{15} = Rs\frac{4}{15}$

Gain% = $\left(\frac{Gain}{CP} \times 100\right)\% = \left(\frac{\frac{4}{15}}{\frac{10}{3}} \times 100\right)\% = 8\%$

Question 14 – A man bought apples at 10 for Rs 75 and sold them at Rs 75 per dozen. Find his loss per cent.

Solution - CP of 10 apples = Rs 75

CP of 1 apple = $Rs\frac{75}{10} = Rs\frac{15}{2}$

SP of 12 apples = Rs 75

SP of 1 apple = $Rs\frac{75}{12} = Rs\frac{25}{4}$

Since CP > SP, there is a loss

Loss = $CP - SP = \frac{15}{2} - \frac{25}{4}$

$= Rs\ \frac{30-25}{4} = Rs\frac{5}{4}$

Loss% = $\left(\frac{Loss}{CP} \times 100\right)\% = \left(\frac{\frac{5}{4}}{\frac{15}{2}} \times 100\right)\% = \frac{50}{3}\% = 16\frac{2}{3}\%$

Question 15 – A man purchased some eggs at 3 for Rs 16 and sold them at 5 for Rs 36. Thus, he gained Rs 168 in all. How many eggs did he purchase?

Solution - Let the number of eggs bought be x

CP of 3 eggs = Rs 16

CP of 1 egg = $Rs\frac{16}{3}$

CP of x eggs = $Rs\frac{16x}{3}$

SP of 5 eggs = Rs 36

SP of 1 egg = $Rs\frac{36}{5}$

SP of x eggs = $Rs\frac{36x}{5}$

Since SP > CP, there is a gain

Gain = $SP - CP = \frac{36x}{5} - \frac{16x}{3}$

= $Rs\ \frac{108x-80x}{15} = \frac{28x}{15}$

Gain is given to be Rs 168

=> $\frac{28x}{15} = 168$

=> $x = \frac{168\times15}{28} = 6 \times 15 = 90$

Question 16 – A dealer sold a camera for Rs 1080 gaining $\frac{1}{8}$ of its cost price. Find (a) the cost price of the camera, and (b) the gain per cent earned by the dealer.

Solution - Let the CP of camera be Rs x

SP of camera = Rs 1080

Gain = $\frac{1}{8}x$

=> SP – CP = $\frac{1}{8}x$

=> $1080 - x = \frac{1}{8}x$

=> $x + \frac{x}{8} = 1080$

=> $\frac{8x+x}{8} = 1080$

=> $\frac{9x}{8} = 1080$

=> $x = \frac{1080\times8}{9} = Rs960$

Gain = $\frac{960}{8} = Rs120$

Also, gain % = $\left(\frac{Gain}{CP} \times 100\right)\% = \left(\frac{120}{960} \times 100\right)\% = \frac{25}{2}\% = 12\frac{1}{2}\%$

Question 17 – Meenakshi sells a pen for Rs 54 and loses $\frac{1}{10}$ of her outlay. Find (a) the cost price of the pen, and (b) the loss per cent.

Solution - Let the CP of pen be Rs x

SP of pen = Rs 54

Loss = $\frac{1}{10}x$

=> CP – SP = $\frac{1}{10}x$

=> $x - 54 = \frac{1}{10}x$

=> $x - \frac{x}{10} = 54$

=> $\frac{10x-x}{10} = 54$

=> $\frac{9x}{10} = 54$

=> $x = \frac{54\times10}{9} = Rs60$

Loss = $\frac{60}{10} = Rs6$

Also, loss % = $\left(\frac{Loss}{CP} \times 100\right)\% = \left(\frac{6}{60} \times 100\right)\% = 10\%$

Question 18 – A dealer gets Rs 940 more if instead of selling a table at a loss of 10%, it is sold at a gain of 10%. Find the cost price of the table.

Solution - Let the CP of table be Rs x

SP of table at 10% Loss:

$$SP = \frac{(100-Loss\%)}{100} \times CP$$

$$SP = \frac{(100-10)}{100} \times x$$

$$SP = \frac{90}{100} \times x = Rs\frac{9x}{10}$$

SP of table at 10% gain:

$$SP = \frac{(100+Gain\%)}{100} \times CP$$

$$SP = \frac{(100+10)}{100} \times x$$

$$SP = \frac{110}{100} \times x = Rs\frac{11x}{10}$$

Given that $\frac{11x}{10} - \frac{9x}{10} = 940$

=> $\frac{2x}{10} = 940$

=> $x = 940 \times 5 = Rs\ 4700$

Thus, CP of table is Rs 4700

Question 19 – A dealer gets Rs 56 less if instead of selling a chair at a gain of 15%, it is sold at a gain of 8%. Find the cost price of the chair.

Solution - Let the CP of chair be Rs x

SP of chair at 15%gain:

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 15)}{100} \times x$$

$$SP = \frac{115}{100} \times x = Rs\frac{23x}{20}$$

SP of chair at 8% gain:

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 8)}{100} \times x$$

$$SP = \frac{108}{100} \times x = Rs\frac{27x}{25}$$

Given that $\frac{23x}{20} - \frac{27x}{25} = 56$

= $\frac{115x - 108x}{100} = \frac{7x}{100} = 56$

=> $x = Rs\ 800$

Thus, CP of chair is Rs 800

Question 20 – A cycle was sold at a gain of 10%. Had it been sold for Rs 260 more, the gain would have been 14%. Find the cost price of the cycle.

Solution - Let the CP of cycle be Rs x

SP of cycle at 10% gain:

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 10)}{100} \times x$$

$$SP = \frac{110}{100} \times x = Rs\frac{11x}{10}$$

SP of cycle at 14% gain:

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 14)}{100} \times x$$

$$SP = \frac{114}{100} \times x = Rs\frac{57x}{50}$$

Given that $\frac{57x}{50} - \frac{11x}{10} = 260$

=> $\frac{57x - 55x}{50} = 260$

=> $\frac{2x}{50} = 260$

=> $x = 260 \times 25 = Rs\ 6500$

Thus, CP of cycle is Rs 6500

Question 21 – Sonu buys 40 kg of wheat at Rs 12.50 per kg and 30 kg of wheat at Rs 14 per kg. At what rate per kg should he sell the mixture to gain 5% on the whole?

Solution - CP of 1 kg of wheat (variety 1) = $Rs12.50$

CP of 40 kg of wheat = $12.50 \times 40 = Rs\ 500$

CP of 1 kg of wheat (variety 2) = $Rs\ 14$

CP of 30 kg of wheat = $14 \times 30 = Rs\ 420$

Total CP of mixture = $500 + 420 = Rs\ 920$

Total quantity = $40 + 30 = 70kg$

Gain% = 5%

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 5)}{100} \times 920$$

$$SP = \frac{105}{100} \times 920 = Rs21 \times 46 = Rs966$$

SP of 70 kg of wheat = Rs 966

SP of 1 kg of wheat = $\frac{966}{70} = Rs$ 13.80

Question 22 – Wasim bought two cricket bats for Rs 840 and Rs 360 respectively. He sells the first bat at a gain of 15% and the second one at a loss of 5%. Find his gain or loss per cent in the whole transaction.

Solution - CP of first cricket bat = Rs 840

Gain = 15%

SP of First cricket bat:

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 15)}{100} \times 840$$

$$SP = \frac{115}{100} \times 840 = Rs966$$

CP of second cricket bat = Rs 360

Loss = 5%

SP of second cricket bat:

$$SP = \frac{(100 - Loss\%)}{100} \times CP$$

$$SP = \frac{(100 - 5)}{100} \times 360$$

$$SP = \frac{95}{100} \times 360 = Rs342$$

Total CP = $840 + 360 = Rs\ 1200$

Total SP = $966 + 342 = Rs\ 1308$

Since SP > CP, there is a gain

Gain = $SP - CP = 1308 - 1200 = Rs\ 108$

Gain% = $(\frac{Gain}{CP} \times 100)\%$

= $\frac{108}{1200} \times 100 = 9\%$

Question 23 – Hema bought two pairs of jeans for Rs 1450 each. She sold one of them at a gain of 8% and the other at a loss of 4%. Find her gain or loss per cent in the whole transaction.

Solution - CP of one jeans = Rs 1450

Gain = 8%

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 8)}{100} \times 1450$$

$$SP = \frac{108}{100} \times 1450 = Rs1566$$

CP of second jeans = Rs 1450

Loss = 4%

$$SP = \frac{(100 - Loss\%)}{100} \times CP$$

$$SP = \frac{(100 - 4)}{100} \times 1450$$

$$SP = \frac{96}{100} \times 1450 = Rs1392$$

Total CP = $1450 + 1450 = Rs\ 2900$

Total SP = $1566 + 1392 = Rs2958$

Since SP > CP, there is a gain

Gain = $SP - CP = 2958 - 2900 = Rs\ 58$

Gain % = $(\frac{Gain}{CP} \times 100)\%$

= $\left(\frac{58}{2900} \times 100\right)\% = 2\%$

Question 24 – A grocer purchased 200 kg of rice at Rs 25 per kg. He sold 80 kg of it at a gain of 10% and 40 kg at a loss of 4%. At what rate per kg should he sell the remainder to gain 8% on his total investment?

Solution - CP of 1 kg of Rice = $Rs\ 25$

CP of 200 kg of Rice = $25(200) = Rs\ 5000$

CP of 80 kg of wheat = $25(80) = Rs2000$

SP of 80 kg wheat at 10% gain:

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 10)}{100} \times 2000$$

$$SP = \frac{110}{100} \times 2000 = Rs2200$$

CP of 40 kg wheat = $25(40) = Rs1000$

SP of 40 kg wheat at 4% loss:

$$SP = \frac{(100 - Loss\%)}{100} \times CP$$

$$SP = \frac{(100 - 4)}{100} \times 1000$$

$$SP = \frac{96}{100} \times 1000 = Rs960$$

Remaining quantity = $200 - (80 + 40) = 80$

SP of 200 kg wheat at 8% gain:

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$SP = \frac{(100+8)}{100} \times 5000$

$SP = \frac{108}{100} \times 5000 = Rs5400$

Now, SP of 80 kg wheat = $5400 - (2200 + 960) = Rs2240$

SP of 1 kg wheat = $\frac{2240}{80} = Rs\ 28$

Question 25 – If the selling price of a TV set is equal to $\frac{6}{5}$ of its cost price, find the gain per cent.

Solution - Let CP be Rs x

It is given that SP of T.V = $\frac{6}{5}\ x$

Gain = $SP - CP$

= $\frac{6x}{5} - x = \frac{x}{5}$

Gain% = $\left(\frac{gain}{CP} \times 100\right)\%$

= $\frac{\frac{x}{5}}{x} \times 100 = 20\%$

Question 26 – If the selling price of a flower vase is $\frac{5}{6}$ of its cost price, find the loss per cent.

Solution - Let the CP be Rs x

It is given that SP of flower vase = $\frac{5}{6}x$

Loss = $CP - SP$

= $x - \frac{5x}{6} = \frac{x}{6}$

=> Loss% = $\left(\frac{Loss}{CP} \times 100\right)\%$

= $\frac{\frac{x}{6}}{x} \times 100 = \frac{50}{3}\% = 16\frac{2}{3}\%$

Question 27 - By selling a bouquet for Rs 322, a florist gains 15%.At what price should he sell it to gain 25%?

Solution - SP of a bouquet = Rs 322

Gain = 15%

$$CP = \frac{100}{(100 + Gain\%)} \times SP$$

$$CP = \frac{100}{(100 + 15)} \times 322$$

$$CP = \frac{100}{115} \times 322 = Rs280$$

Now, Gain = 25%

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 25)}{100} \times 280$$

$$SP = \frac{125}{100} \times 280 = Rs350$$

Question 28 – By selling an umbrella for Rs 336, a shopkeeper loses 4%. At what price must he sell it to gain 4%?

Solution - SP of an umbrella = Rs 336

Loss = 4%

$$CP = \frac{100}{(100 - Loss\%)} \times SP$$

$$CP = \frac{100}{(100 - 4)} \times 336$$

$$CP = \frac{100}{96} \times 336 = Rs350$$

Now, gain= 4%

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 4)}{100} \times 350$$

$$SP = \frac{104}{100} \times 350 = Rs364$$

Question 29 – A radio is sold for Rs 3120 at a loss of 4%. What will be the gain or loss per cent if it is sold for Rs 3445?

Solution - SP of a radio = Rs 3120

Loss = 4%

$$CP = \frac{100}{(100 - Loss\%)} \times SP$$

$$CP = \frac{100}{(100 - 4)} \times 3120$$

$$CP = \frac{100}{96} \times 3120 = Rs3250$$

Now, if SP of radio = Rs 3445

Since, SP > CP, there is gain

Gain = $SP - CP$

= $3445 - 3250 = Rs$ 195

Gain% = $\left(\frac{gain}{CP} \times 100\right)\%$

= $\frac{195}{3250} \times 100 = 6\%$

Question 30 – Luxmi sold two sarees for Rs 1980 each. On one, she lost 10%, while on the other she gained 10%. Find her gain or loss per cent in the whole transaction.

Solution - SP of one saree = Rs 1980

Loss = 10%

$$CP = \frac{100}{(100 - Loss\%)} \times SP$$

$$CP = \frac{100}{(100-10)} \times 1980$$

$$CP = \frac{100}{90} \times 1980 = Rs2200$$

SP of second saree = Rs 1980

Gain = 10%

$$CP = \frac{100}{(100+Gain\%)} \times SP$$

$$CP = \frac{100}{(100+10)} \times 1980$$

$$CP = \frac{100}{110} \times 1980 = Rs1800$$

Total SP = $1980 + 1980 = Rs3960$

Total CP = $2200 + 1800 = Rs\ 4000$

Since, CP > SP, there is a loss

Loss = $CP - SP$

= $4000 - 3960 = Rs40$

Loss% = $\left(\frac{Loss}{CP} \times 100\right)\%$

= $\frac{40}{4000} \times 100 = 1\%$

Question 31 – A shopkeeper sold two fans for Rs 1140 each. On one he gains 14%, while on the other he loses 5%. Calculate his gain or loss per cent in the whole transaction.

Solution - SP of one fan = Rs 1140

Gain = 14%

$$CP = \frac{100}{(100+Gain\%)} \times SP$$

$$CP = \frac{100}{(100 + 14)} \times 1140$$

$$CP = \frac{100}{114} \times 1140 = Rs1000$$

SP of second fan = Rs 1140

Loss = 5%

$$CP = \frac{100}{(100 - Loss\%)} \times SP$$

$$CP = \frac{100}{(100 - 5)} \times 1140$$

$$CP = \frac{100}{95} \times 1140 = Rs1200$$

Total SP = $1140 + 1140 = Rs\ 2280$

Total CP = $1000 + 1200 = Rs\ 2200$

Since, SP > CP, there is a gain

Gain = $2280 - 2200 = Rs\ 80$

Gain % = $\left(\frac{gain}{CP} \times 100\right)\%$

= $(\frac{80}{2200} \times 100)\%$

= 3.64%

Question 32 – Vinod sold a watch to arun at a gain of 12% and arun had to sell it to manoj at a loss of 5%. If manoj paid Rs 3990 for it, how much did vinod pay for the watch?

Solution - Let CP of watch for vinod be Rs x

Gain = 12%

SP of watch for vinod:

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 12)}{100} \times x$$

$$SP = \frac{112}{100} \times x = \frac{Rs112x}{100}$$

Now, SP of watch for vinod will be CP of watch for Arun

CP of watch for arun = $\frac{Rs112x}{100}$

Loss = 5%

$$SP = \frac{(100 - Loss\%)}{100} \times CP$$

$$SP = \frac{(100 - 5)}{100} \times \frac{112x}{100}$$

$SP = \frac{95}{100} \times \frac{112x}{100} = \frac{Rs95}{100}(\frac{112}{100}x)$

Now, SP of watch for arun will be CP of watch for manoj

CP of watch for manoj = $\frac{95}{100} \times \frac{112x}{100}$

=> $\frac{95}{100} \times \frac{112x}{100} = 3990$

=> $x = \frac{3990 \times 100 \times 100}{112 \times 95}$

=> $x = Rs\ 3750$

Question 33 – Ahmed buys a plot of land for Rs 480000. He sells $\frac{2}{5}$ of it at a loss of 6%. At what gain per cent should he sell the remaining part of the plot to gain 10% on the whole?

Solution - CP of a plot of land = Rs 480000

CP of $\frac{2}{5}th$ of land = $\frac{2}{5} \times 480000 = Rs192000$

Loss = 6%

SP of $\frac{2}{5}th$ of land:

$$SP = \frac{(100 - Loss\%)}{100} \times CP$$

$$SP = \frac{(100 - 6)}{100} \times 192000$$

$$SP = \frac{94}{100} \times 192000 = Rs\ 180480$$

Remaining portion = $1 - \frac{2}{5} = \frac{3}{5}$

CP of $\frac{3}{5}th$ of land = 480000-192000 = $Rs288000$

Total gain% = 10%

$\left(\frac{gain}{CP} \times 100\right)\% = 10\%$

Gain = $\frac{10 \times 480000}{100} = Rs\ 48000$

Now, total SP = CP + gain

=> Total SP = 480000 + 48000 = Rs528000

SP of $\frac{3}{5}th$ of land = $528000 - 180480 = Rs\ 347520$

Gain on $\frac{3}{5}th$ of land = SP of $\frac{3}{5}th$ of land - CP of $\frac{3}{5}th$ of land

= $347520 - 288000 = Rs\ 59520$

Gain% = $\left(\frac{gain}{CP} \times 100\right)\%$

= $\frac{59520}{288000} \times 100 = \frac{62}{3}\% = 20\frac{2}{3}\%$

Question 34 – A grocer bought sugar worth of Rs 4500. He sold one-third of it at a gain of 10%. At what gain per cent must the remaining sugar be sold to have a gain of 12% on the whole?

Solution - CP of sugar = $Rs\ 4500$

CP of $\frac{1}{3}rd$ of sugar = $\frac{1}{3} \times 4500 = Rs1500$

Gain = 10%

SP of $\frac{1}{3}rd$ of land:

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 10)}{100} \times 1500$$

$$SP = \frac{110}{100} \times 1500 = Rs\ 1650$$

Remaining portion = $1 - \frac{1}{3} = \frac{2}{3}$

CP of $\frac{2}{3}rd$ of sugar = 4500-1500 = $Rs3000$

Total gain% = 12%

$\left(\frac{gain}{CP} \times 100\right)\% = 12\%$

Gain = $\frac{12 \times 4500}{100} = Rs\ 540$

Now, total SP = CP + gain

=> Total SP = 4500 + 540 = Rs5040

SP of $\frac{2}{3}rd$ of sugar = $5040 - 1650 = Rs\ 3390$

Gain on $\frac{2}{3}rd$ of sugar = SP of $\frac{2}{3}rd$ of land - CP of $\frac{2}{3}rd$ of sugar

= $3390 - 3000 = Rs\ 390$

Gain% = $\left(\frac{gain}{CP} \times 100\right)\%$

= $\frac{390}{3000} \times 100 = 13\%$

Useful terms

1) Market Price – It is the price which appears on a product in the form of label

2) Discount – It is the rebate on the market price.

Discount is always reckoned on the market price.

SP = MP – Discount

3) Successive discount – Suppose a discount of 20% is given on a good. Then, on the reduced price, a discount of 10% is given. We say that successive discounts are given

Examples

Example 1 – The marked price of a ceiling fan is Rs 1250 and the shopkeeper allows a discount of 6% on it. Find the selling price of the fan.

Solution - MP of a ceiling fan = $Rs\ 1250$

Discount = 6%

SP =?

Discount = $\frac{6}{100} \times 1250 = Rs\ 75$

Now, SP = MP - Discount

=> SP = $1250 - 75 = Rs\ 1175$

Example 2 – A trader marks his goods at 40% above the cost price and allows a discount of 25%. What is his gain per cent?

Solution - Let the CP of goods be $Rs\ 100$

Then, MP will be $100\left(1 + \frac{40}{100}\right) = Rs140$

Discount = 25%

=> Discount = $\frac{25}{100} \times 140 = Rs\ 35$

SP = MP – Discount

=> SP = 140 – 35 = $Rs\ 105$

Gain = SP – CP

$= 105 - 100 = 5$

Gain%= $\left(\frac{gain}{CP} \times 100\right)\%$

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

Example 3 – A dealer purchased a washing machine for Rs 7660. He allows a discount of 12% on its marked price and still gains 10%. Find the marked price of the machine.

Solution - CP of a washing machine = Rs 7660

Gain% = 10%

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 10)}{100} \times 7660$$

$$SP = \frac{110}{100} \times 7660 = Rs8426$$

Let MP be Rs x

Then, discount = 12% of x = $\frac{12x}{100} = \frac{3x}{25}$

Now, SP = MP – discount

=> 8426 = $x - \frac{3x}{25}$

=> 8426 = $\frac{22x}{25}$

=> $x = \frac{25 \times 8426}{22} = Rs\ 9575$

Thus, MP of machine is Rs 9575

Example 4 – How much per cent above the cost price should a shopkeeper marks his goods so that after allowing a discount of 25% on the marked price, he gains 20%?

Solution - Let the CP be Rs 100

Gain = 20%

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 20)}{100} \times 100$$

$$SP = \frac{120}{100} \times 100 = Rs120$$

Let the MP be Rs x

Then, discount = 25% of x = $\frac{25x}{100} = \frac{x}{4}$

Now, SP = MP – discount

=> 120 = $x - \frac{x}{4}$

=> 120 = $\frac{3x}{4}$

=> $x = \frac{120 \times 4}{3} = Rs\ 160$

Thus, MP of goods is $Rs\ 160$

Thus, MP is 60% above the cost price

Example 5 – Find the single discount equivalent to two successive discounts of 20% and 10%.

Solution - Let the MP of an article be $Rs\ 100$

First discount = 20%

= $\frac{20}{100} \times 100 = Rs\ 20$

Reduced price = 100 – 20 = $Rs\ 80$

Discount = 10%

= $\frac{10}{100} \times 80 = Rs\ 8$

Price after second discount = $80 - 8 = Rs72$

SP = MP – Discount

=> $72 = 100 - Discount$

=> Discount = 100 – 72 = 28%

Exercise 10B

Question 1 – The marked price of a water cooler is Rs 4650. The shopkeeper offers an off-season discount of 18% on it. Find its selling price.

Solution - MP of water cooler = $Rs4650$

Discount = 18%

= $\frac{18}{100} \times 4650 = Rs\ 837$

SP = MP – Discount

= 4650 – 837 = Rs 3813

Question 2 – The price of a sweater was slashed from Rs 960 to Rs 816 by a shopkeeper in the winter season. Find the rate of discount given by him.

Solution - Market Price of sweater = Rs 960

Selling price = Rs 816

Discount = $960 - 816 = Rs144$

Discount Rate = $\left(\frac{144}{960} \times 100\right)\% = 15\%$

Question 3 – Find the rate of discount being given on a shirt whose selling price is Rs 1092 after deducting a discount of Rs 208 on its marked price.

Solution - SP of a shirt = Rs 1092

Discount =$Rs208$

SP = MP – Discount

=> 1092 = MP – 208

=> MP = 1092 + 208

=> MP = Rs 1300

Discount Rate = $\left(\frac{208}{1300} \times 100\right)\% = 16\%$

Question 4 – After allowing a discount of 8% on a toy, it is sold for Rs 216.20. Find the marked price of the toy.

Solution - Discount = 8%

SP of toy = Rs 216.20

MP of toy =?

Let MP be Rs x

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

SP = MP – Discount

=> 216.20 = $x - \frac{2x}{25}$

=> 216.2 = $\frac{23x}{25}$

=> $x = \frac{216.2 \times 25}{23} = Rs\ 235$

Question 5 – A tea set was bought for Rs 528 after getting a discount of 12% on its marked price. Find the marked price of the tea set.

Solution - SP of tea set = Rs 528

Discount = 12%

Let the MP of tea set be Rs x

Discount = $\frac{12x}{100} = \frac{3x}{25}$

SP = MP – Discount

=> 528 = $x - \frac{3x}{25}$

=> 528 = $\frac{22x}{25}$

=> $x = \frac{528 \times 25}{22} = Rs\ 600$

Question 6 – A dealer marks his goods at 35% above the cost price and allows a discount of 20% on the marked price. Find his gain or loss per cent.

Solution - Let the CP be $Rs100$

Then, MP will be $100\left(1 + \frac{35}{100}\right) = Rs135$

Discount = 20%

$= \frac{20}{100} \times 135 = Rs27$

SP = MP – Discount

= 135 – 27 = 108

Since, SP > CP, there is a gain

Gain = $108 - 100 = 8\%$

Gain% = $\left(\frac{gain}{CP} \times 100\right)\% = \frac{8}{100} \times 100 = 8\%$

Question 7 – A cellphone was marked at 40% above the cost price and a discount of 30% was given on its marked price. Find the gain or loss per cent made by the shopkeeper.

Solution - Let the CP be $Rs100$

Then, MP will be $100\left(1 + \frac{40}{100}\right) = Rs140$

Discount = 30%

$= \frac{30}{100} \times 140 = Rs42$

SP = MP – Discount

= 140 – 42 = 98

Since, CP > SP, there is a loss

Gain = $100 - 98 = 2$

Loss% = $\left(\frac{loss}{CP} \times 100\right)\% = \frac{2}{100} \times 100 = 2\%$

Question 8 – A dealer purchased a fan for Rs 1080. After allowing a discount of 25% on its marked price, he gains 25%. Find the marked price of the fan.

Solution - CP of a fan = Rs 1080

Gain = 25%

$$\text{SP of fan} = \frac{(100 + \text{Gain}\%)}{100} \times \text{CP}$$

$$\text{SP} = \frac{(100 + 25)}{100} \times 1080$$

$$\text{SP} = \frac{125}{100} \times 1080 = \text{Rs}1350$$

Discount = 25%

Let the MP of fan be $Rs\ x$

Discount = $\frac{25x}{100} = \frac{x}{4}$

SP = MP - Discount

=> $1350 = x - \frac{x}{4}$

=> $\frac{3x}{4} = 1350$

=> $x = \frac{1350 \times 4}{3} = Rs1800$

Thus, MP of fan is Rs 1800

Question 9 – A dealer bought a refrigerator for Rs 11515. After allowing a discount of 16% on its market price, he gains 20%. Find the marked price of the fan.

Solution - CP of a refrigerator = Rs 11515

Gain = 20%

$$\text{SP of refrigerator} = \frac{(100 + \text{Gain}\%)}{100} \times \text{CP}$$

$$\text{SP} = \frac{(100 + 20)}{100} \times 11515$$

$$\text{SP} = \frac{120}{100} \times 11515 = \text{Rs}13818$$

Discount = 16%

Let the MP of refrigerator be Rs x

Then, discount = $\frac{16x}{100} = \frac{4x}{25}$

SP = MP - Discount

=> $13818 = x - \frac{4x}{25}$

=> $\frac{21x}{25} = 13818$

$\Rightarrow x = \frac{13818 \times 25}{21} = Rs16450$

Thus, MP of fan is Rs 16450

Question 10 – A jeweler allows a discount of 16% to his customers and still gains 20%. Find the marked price of a ring which costs the jeweler Rs 1190.

Solution - CP = Rs 1190

Gain = 20%

$$\text{SP} = \frac{(100 + \text{Gain\%})}{100} \times \text{CP}$$

$$\text{SP} = \frac{(100 + 20)}{100} \times 1190$$

$$\text{SP} = \frac{120}{100} \times 1190 = \text{Rs}1428$$

Discount = 16%

Let the MP of refrigerator be Rs x

Then, discount = $\frac{16x}{100} = \frac{4x}{25}$

SP = MP - Discount

$\Rightarrow 1428 = x - \frac{4x}{25}$

$\Rightarrow \frac{21x}{25} = 1428$

$\Rightarrow x = \frac{1428 \times 25}{21} = Rs1700$

Thus, MP of fan is Rs 1700

Question 11 – After allowing a discount of 10% on the marked price, a trader still makes a gain of 17%. By what per cent is the marked price above the cost price?

Solution - Let the CP be Rs 100

Gain = 17%

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 17)}{100} \times 100$$

$$SP = \frac{117}{100} \times 100 = Rs117$$

Let the MP be Rs x

Then, discount = 10% of x = $\frac{10x}{100} = \frac{x}{10}$

Now, SP = MP – discount

=> 117 = $x - \frac{x}{10}$

=> 117 = $\frac{9x}{10}$

=> $x = \frac{117 \times 10}{9} = Rs\ 130$

Thus, MP of goods is $Rs\ 130$

Thus, MP is 30% above the cost price

Question 12 – How much per cent above the cost price should a shopkeeper mark his goods so that after allowing a discount of 10% on the marked price, he gains 8%?

Solution - Let the CP be Rs 100

Gain = 8%

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 8)}{100} \times 100$$

$$SP = \frac{108}{100} \times 100 = Rs108$$

Let the MP be Rs x

Then, discount = 10% of x = $\frac{10x}{100} = \frac{x}{10}$

Now, SP = MP – discount

=> 108 = $x - \frac{x}{10}$

=> 108 = $\frac{9x}{10}$

=> $x = \frac{108 \times 10}{9} = Rs\ 160$

Thus, MP of goods is $Rs\ 120$

Thus, MP is 20% above the cost price

Question 13 – The marked price of a TV is Rs 18500. A dealer allows two successive discounts of 20% and 5%. For how much is the TV available?

Solution - MP of a T.V = $Rs\ 18500$

First discount = 20%

= $\frac{20}{100} \times 18500 = Rs\ 3700$

Reduced price = 18500 – 3700 = $Rs\ 14800$

Discount = 5%

= $\frac{5}{100} \times 14800 = Rs\ 740$

Price after second discount = $14800 - 740 = Rs 14060$

Thus, TV is available for Rs 14060

Question 14 – Find the single discount which is equivalent to two successive discounts of 20% and 5%.

Solution - Let the MP of an article be $Rs\ 100$

First discount = 20%

= $\frac{20}{100} \times 100 = Rs\ 20$

Reduced price = 100 – 20 = $Rs\ 80$

Discount = 5%

= $\frac{5}{100} \times 80 = Rs\ 4$

Price after second discount = $80 - 4 = Rs 76$

SP = MP – Discount

=> $76 = 100 - Discount$

=> Discount = 100 – 76 = 24%

Sales Tax: It is charged by the shopkeeper from the customer on selling price of an item and is added to the value of the bill.

Value added tax (VAT): It is the indirect tax imposed at the time of consumption of goods and services.

Examples:

Example 1 – The cost of a TV set at a showroom was Rs 36500. The sales tax charged was 8%. Find the bill amount.

Solution - It is given that cost of TV set = Rs 36500

Sales Tax = 8%

= $\frac{8}{100} \times 36500 = Rs\ 2920$

Thus, Bill amount = $36500 + 2920 = Rs\ 39420$

Example 2 – Raman bought an air cooler for Rs 5400 including VAT at 8%. Find the original price of the air cooler.

Solution - Let the original price of the air cooler be Rs x

Given that VAT = 8% of x

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

Price of air cooler including VAT =Rs 5400

=> $x + \frac{2x}{25} = 5400$

=> $\frac{27x}{25} = 5400$

=> $x = \frac{5400 \times 25}{27} = Rs\ 5000$

Thus, original price of cooler is Rs 5000

Example 3 – A color TV is available for Rs 26880 inclusive of VAT. If the original cost of the TV is Rs 24000, find the rate of VAT.

Solution - Given Original cost of TV = Rs 24000

Let rate of VAT be x%

Price of TV including VAT = Rs 26880

=> $24000 + \left(\frac{x}{100} \times 24000\right) = 26880$

=> $240x = 26880 - 24000 = 2880$

=> $x = \frac{2880}{240} = 12$

Thus, rate of VAT = 12%

Exercise 10C

Question 1 – The list price of a refrigerator is Rs 14650. If 6% is charged as sales tax, find the cost of the refrigerator.

Solution - Given List price of refrigerator = Rs 14650

Sales tax = 6%

= $\frac{6}{100} \times 14650$ =Rs 879

Thus, bill amount = $14650 + 879 = Rs$ 15529

Question 2 – Reena bought the following articles from a general store:

Calculate the total amount to be paid by Reena.

(a) 1 tie costing Rs 250 with ST @ 6%

Solution - Cost of 1 tie = Rs 250

Sales tax = 6%

= $\frac{6}{100} \times 250 = Rs15$

Bill amount = $250 + 15 = Rs265$

(b) Medicines costing Rs625 with ST @ 4%

Solution - Cost of medicines = Rs 625

Sales tax = 4%

= $\frac{4}{100} \times 625 = 25$

Bill amount = $625 + 25 = Rs\ 650$

(c) Cosmetics costing Rs 430 with ST @ 10%

Solution - Cost of cosmetics = $Rs\ 430$

Sales tax = 10%

= $\frac{10}{100} \times 430 = 43$

Bill amount = $430 + 43 = Rs\ 473$

(d) Clothes costing Rs 1175 with ST @ 8%

Cost of clothes = $Rs 1175$

Sales tax = 8%

= $\frac{8}{100} \times 1175 = 94$

Bill amount = $1175 + 94 = Rs\ 1269$

Thus, total amount to be paid = Sum of bill amount of all 4 items

= $265 + 650 + 473 + 1269 = Rs\ 2657$

Question 3 – Tanvy bought a watch for Rs 1980 including VAT at 10%. Find the original price of the watch.

Solution - Let the original price of watch be Rs x

Given that VAT = 10% of x

= $\frac{10x}{100} = \frac{x}{10}$

Price of watch including VAT = Rs 1980

=> $x + \frac{x}{10} = 1980$

=> $\frac{11x}{10} = 1980$

=> $x = \frac{1980 \times 10}{11} = Rs\ 1800$

Thus, original price of watch is Rs 1800

Question 4 – Mohit bought a shirt for Rs 1337.50 including VAT at 7%. Find the original price of the shirt.

Solution - Let the original price of shirt be Rs x

Given that VAT = 7% of x

$= \frac{7x}{100}$

Price of shirt including VAT =Rs 1337.5

$\Rightarrow x + \frac{7x}{100} = 1337.5$

$\Rightarrow \frac{107x}{100} = 1337.5$

$\Rightarrow x = \frac{1337.5 \times 100}{107} = Rs\ 1250$

Thus, original price of shirt is Rs 1250

Question 5 – Karuna bought 10 g of gold for Rs 15756 including VAT at 1%. What is the rate of gold per 10 g?

Solution - Let the original price of 10g of gold be Rs x

Given that VAT = 1% of x

$= \frac{1x}{100} = \frac{x}{100}$

Price of 10g of gold including VAT =Rs 15756

$\Rightarrow x + \frac{x}{100} = 15756$

$\Rightarrow \frac{101x}{100} = 15756$

$\Rightarrow x = \frac{15756 \times 100}{101} = Rs\ 15600$

Thus, original price of 10g gold is Rs 15600

Question 6 – Mohini purchased a computer for Rs 37960 including VAT at 4%. What is the original price of the computer?

Solution - Let the original price of computer be Rs x

Given that VAT = 4% of x

$= \frac{4x}{100} = \frac{x}{25}$

Price of computer including VAT =Rs 37960

=> $x + \frac{x}{25} = 37960$

=> $\frac{26x}{25} = 37960$

=> $x = \frac{37960 \times 25}{26} = Rs\ 36500$

Thus, original price of computer is Rs 36500

Question 7 – Sajal purchased some car parts for Rs 20776 including VAT at 12%. What is the original cost of these spare parts?

Solution - Let the original price of car parts be Rs x

Given that VAT = 12% of x

$= \frac{12x}{100} = \frac{3x}{25}$

Price of car parts including VAT =Rs 20776

=> $x + \frac{3x}{25} = 20776$

=> $\frac{28x}{25} = 20776$

=> $x = \frac{20776 \times 25}{28} = Rs\ 18550$

Thus, original price of car parts is Rs 18550

Question 8 – The sale price of a TV set including VAT is Rs 27000. If the VAT is charged at 8% of the list price, what is the list price of the TV set?

Solution - Let the list price of TV be Rs x

Given that VAT = 8% of x

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

Price of TV including VAT =Rs 27000

=> $x + \frac{2x}{25} = 27000$

$\Rightarrow \frac{27x}{25} = 27000$

$\Rightarrow x = \frac{27000 \times 25}{27} = Rs\ 25000$

Thus, List price of TV is Rs 25000

Question 9 – Rohit purchased a pair of shoes for Rs 882 inclusive of VAT. If the original cost be Rs 840, find the rate of VAT.

Solution - Given Original cost of a pair of shoes = Rs 840

Let rate of VAT be x%

Price of shoe pair including VAT = Rs 882

$\Rightarrow 840 + \left(\frac{x}{100} \times 840\right) = 882$

$\Rightarrow 8.4x = 882 - 840 = 42$

$\Rightarrow x = \frac{42}{8.4} = 5$

Thus, rate of VAT = 5%

Question 10 – Malti bought a VCR for Rs 19980 including VAT. If the original price of VCR be Rs 18500, find the rate of VAT.

Given Original cost of VCR = Rs 18500

Let rate of VAT be x%

Price of VCR including VAT = Rs19980

$\Rightarrow 18500 + \left(\frac{x}{100} \times 18500\right) = 19980$

$\Rightarrow 185x = 19980 - 18500 = 1480$

$\Rightarrow x = \frac{1480}{185} = 8$

Thus, rate of VAT = 8%

Question 11 – The value of a car including VAT is Rs 382500. If the basic price of the car be Rs 340000, find the rate of VAT on cars.

Solution - Given Original cost of car = Rs 340000

Let rate of VAT be x%

Price of car including VAT = $Rs382500$

=>$340000 + \left(\frac{x}{100} \times 340000\right) = 382500$

=> $3400x = 382500 - 340000 = 42500$

=> $x = \frac{42500}{3400} = 12.5$

Thus, rate of VAT = 12.5%

Exercise 10D

Question 1 – Rajan buys a toy for Rs 75 and sells it for Rs 100. His gain per cent is?

Solution - CP of a toy = Rs 75

SP of toy = Rs 100

Gain = $SP - CP$

= $100 - 75 = Rs25$

Gain% = $\left(\frac{Gain}{CP} \times 100\right)\%$

= $\frac{25}{75} \times 100 = \frac{100}{3}\% = 33\frac{1}{3}\%$

Question 2 – A bat is bought for Rs 120 and sold for Rs 105. The loss per cent is?

Solution - CP of bat = Rs 120

SP of bat = Rs 105

Loss = CP – SP

= 120 – 105 = Rs 15

Loss% = $\left(\frac{Loss}{CP} \times 100\right)\%$

= $\frac{15}{120} \times 100 = \frac{25}{2}\% = 12\frac{1}{2}\%$

Question 3 – A bookseller sells a book for Rs 100, gaining Rs 20. His gain per cent is?

Solution - SP of book = Rs 100

Gain = Rs 20

CP of book = (SP – gain)

CP = 100 – 20 = Rs 80

Thus, gain% = $\left(\frac{Gain}{CP} \times 100\right)\%$

= $\left(\frac{20}{80} \times 100\right)\% = 25\%$

Question 4 – On selling an article for Rs 48, a shopkeeper loses 20%. In order to gain 20%, what would be the selling price?

Solution - SP of an article = Rs 48

Loss = 20%

$$CP = \frac{100}{(100 - Loss\%)} \times SP$$

CP = $\frac{100}{(100-20)} \times 48$

= $\frac{100}{80} \times 48 = Rs\ 60$

Now, gain = 20%

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 20)}{100} \times 60$$

$$SP = \frac{120}{100} \times 60 = Rs\ 72$$

Question 5 – On selling an article at a certain price a man gains 10%. On selling the same article at double the price, gain per cent is?

Solution - Let SP of an article be Rs x

Given that gain = 10%

$$CP = \frac{100}{(100 + Gain\%)} \times SP$$

CP = $\frac{100}{(100+10)} \times x$

= $\frac{100}{110} \times x = Rs\frac{10x}{11}$

If SP becomes double, then SP = 2x

Thus, gain = SP – CP

= $2x - \frac{10x}{11} = \frac{12x}{11}$

Gain% = $(\frac{gain}{CP} \times 100)\%$

= $\frac{\frac{12x}{11}}{\frac{10x}{11}} \times 100 = 120\%$

Question 6 – Bananas are bought at 3 for Rs 2 and sold at 2 for Rs 3. The gain per cent is?

Solution - CP of 3 bananas = Rs 2

CP of 1 banana = $Rs\frac{2}{3}$

SP of 2 banana = Rs 3

SP of 1 banana = $Rs\frac{3}{2}$

Gain = SP – CP

= $\frac{3}{2} - \frac{2}{3} = \frac{9-4}{6} = Rs\frac{5}{6}$

Gain% = $(\frac{gain}{CP} \times 100)\% = \frac{\frac{5}{6}}{\frac{2}{3}} \times 100 = 125\%$

Question 7 – If the selling price of 10 pens is the same as the cost price of 12 pens then gain per cent is?

Solution - It is given that SP of 10 pens = CP of 12 pens

Let CP of 1 pen be Rs x

Then, SP of 10 pens = Rs 12x

And, CP of 10 pens = Rs 10x

Gain = SP – CP

= 12x – 10 x = 2x

Gain% = $\left(\frac{gain}{CP} \times 100\right)\% = \frac{2x}{10x} \times 100 = 20\%$

Question 8 – On selling 100 pencils a man gains the selling price of 20 pencils. His gain per cent is?

Solution - Given that Gain = SP of 20 pencils

Let the SP of 1 pencil be Rs x

Then, Gain = 20x

SP of 100 pencils = Rs 100x

Gain = 20x

SP – CP = 20x

=> 100x – CP = 20x

=> CP = 100x – 20x = 80x

Gain% = $\left(\frac{gain}{CP} \times 100\right)\% = \frac{20x}{80x} \times 100 = 25\%$

Question 9 – Ravi buys some toffees at 5 for a rupee and sells them at 2 for a rupee. His gain per cent is?

Solution - Let Ravi buys x toffees

CP of 5 toffees = Rs 1

CP of 1 toffee =Rs $\frac{1}{5}$

CP of x toffees = $Rs\frac{x}{5}$

SP of 2 toffees = Rs 1

SP of 1 toffee = $Rs\frac{1}{2}$

SP of x toffees = $Rs\frac{x}{2}$

Gain = SP – CP

$= \frac{x}{2} - \frac{x}{5} = \frac{5x-2x}{10} = \frac{3x}{10}$

Gain% = $\left(\frac{gain}{CP} \times 100\right)\% = \frac{\frac{3x}{10}}{\frac{x}{5}} \times 100 = 150\%$

Question 10 – Oranges are bought at 5 for Rs 10 and sold at 6 for Rs 15. His gain per cent is?

Solution - CP of 5 oranges = Rs 10

CP of 1 orange = $\frac{10}{5} = Rs2$

SP of 6 oranges = Rs 15

SP of 1 orange = $\frac{15}{6} = Rs\frac{5}{2}$

Gain = SP – CP = $\frac{5}{2} - 2 = \frac{1}{2}$

Gain % = $\left(\frac{gain}{CP} \times 100\right)\% = \frac{\frac{1}{2}}{2} \times 100 = 25\%$

Question 11 – By selling a radio for Rs 950, a man loses 5%. What per cent shall he gain by selling it for Rs 1040?

Solution - SP of radio = Rs 950

Loss = 5%

$$CP = \frac{100}{(100 - Loss\%)} \times SP$$

CP = $\frac{100}{(100-5)} \times 950$

$= \frac{100}{95} \times 950 = Rs1000$

Now, SP = Rs 1040

Gain = SP – CP

$= 1040 - 1000 = Rs\ 40$

Gain % = $\left(\frac{gain}{CP} \times 100\right)\% = \frac{40}{1000} \times 100 = 4\%$

Question 12 – The selling price of an article is $\frac{6}{5}$ of the cost price. The gain per cent is?

Solution - Let the CP of an article be Rs x

SP of an article = $\frac{6x}{5}$

Gain = SP – CP

= $\frac{6x}{5} - x = \frac{6x-5x}{5} = \frac{x}{5}$

Gain% = $\left(\frac{gain}{CP} \times 100\right)\% = \frac{\frac{x}{5}}{x} \times 100 = 20\%$

Question 13 – On selling a chair for Rs 720, a man loses 25%. To gain 25% it must be sold for?

Solution - SP of chair = Rs 720

Loss = 25%

$$CP = \frac{100}{(100 - Loss\%)} \times SP$$

CP = $\frac{100}{(100-25)} \times 720$

= $\frac{100}{75} \times 720 = Rs960$

Now, gain = 25%

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 25)}{100} \times 960$$

$$SP = \frac{125}{100} \times 960 = Rs\ 1200$$

Question 14 – The ratio of cost price and selling price of an article is 20:21. What is the gain per cent on it?

Solution - Let the CP of an article be Rs 20x

And, SP of an article be Rs 21x

Then, Gain = SP – CP

= 21x -20x = x

Gain% = $\left(\frac{gain}{CP} \times 100\right)\% = \frac{x}{20x} \times 100 = 5\%$

Question 15 – A man sold two chairs for Rs 500 each. On one he gains 20% and on the other he loses 12%. His net gain or loss per cent is?

Solution - SP of first chair = Rs 500

Gain% = 20%

Thus, CP of first chair = $\frac{100}{(100+Gain\%)} \times SP$

= $\frac{100}{(100+20)} \times 500$

= $\frac{100}{120} \times 500 = \frac{1250}{3}$

Now, SP of second chair = Rs500

And, Loss% = 12%

CP of second chair = $\frac{100}{(100-12)} \times 500$

= $\frac{100}{88} \times 500 = \frac{6250}{11}$

Now, total SP of both chairs = $500 + 500 = Rs\ 1000$

And, total CP of both chairs = $\frac{1250}{3} + \frac{6250}{11} = \frac{13750+18750}{33} = \frac{32500}{33}$

Since SP > CP, there is a gain

Thus gain = $SP - CP = 1000 - \frac{32500}{33} = \frac{33000-32500}{33} = \frac{500}{33}$

Gain% = $\left(\frac{Gain}{CP} \times 100\right)\%$

= $\left(\frac{\frac{500}{33}}{\frac{32500}{33}} \times 100\right)\% = 1.5\%$

Question 16 – The profit earned on selling an article for Rs 625 is the same as loss on selling it for Rs 435. The cost price of the article is?

Solution - Let the CP of an article be Rs x

It is given that,

Gain earned on selling article for Rs625 = Loss on selling article for Rs 435

=> 625 – x = x – 435

=> 625 + 435 = 2x

=> 1060 = 2x

=> x = Rs 530

Thus, CP of article is Rs 530

Question 17 – A man buys an article for Rs 150 and makes overhead expenses which are 10% of the cost price. At what price must he sell it to gain 20%?

Solution - CP of an article = Rs 150

Overhead expenses = 10% of 150

$= \frac{10}{100} \times 150 = 15$

Total CP = 150+15 = Rs 165

Gain = 20%

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

$$SP = \frac{(100 + 20)}{100} \times 165$$

$$SP = \frac{120}{100} \times 165 = Rs\ 198$$

Question 18 – If an article is sold at a gain of 5% instead of being sold at a loss of 5%, a man gets Rs 5 more. What is the cost price of the article?

Solution - Let the CP of an article be Rs x

SP of table at 5% Loss:

$$SP = \frac{(100 - Loss\%)}{100} \times CP$$

$$SP = \frac{(100 - 5)}{100} \times x$$

$$SP = \frac{95}{100} \times x = Rs \frac{19x}{20}$$

SP of table at 5% gain:

$$SP = \frac{(100 + Gain\%)}{100} \times CP$$

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

$$SP = \frac{105}{100} \times x = Rs\frac{21x}{20}$$

Given that $\frac{21x}{20} - \frac{19x}{20} = 5$

=> $\frac{2x}{20} = 5$

=> $x = 10 \times 5 = Rs\ 50$

Thus, CP of table is Rs 50

Question 19 – A dealer lists his articles at 20% above cost price and allows a discount of 10%. His gain per cent is?

Solution - Let the CP of article be Rs 100

Then, list price = $100\left(1 + \frac{20}{100}\right) = Rs\ 120$

Discount = 10%

= $\frac{10}{100} \times 120 = Rs12$

SP = MP – Discount

= $120 - 12 = Rs108$

Gain =SP – CP = 108-100 = Rs 8

Gain% = $\left(\frac{Gain}{CP} \times 100\right)\%$

= $\left(\frac{8}{100} \times 100\right)\% = 8\%$

Question 20 – The marked price of an article is 10% more than the cost price and a discount of 10% is given on the marked price. The seller has?

Solution - Let the CP of an article be Rs 100

MP = 100 + 10%of 100

$= 100 + \frac{10}{100} \times 100 = 100 + 10 = 110$

Discount = 10%

$= \frac{10}{100} \times 110 = 11$

SP = MP – discount

$= 110 - 11 = Rs99$

Thus, loss = CP –SP

= 100 – 99 = 1

Loss% = $\left(\frac{Loss}{CP} \times 100\right)\% = \frac{1}{100} \times 100 = 1\%$

Question 21 – The price of watch including 10% VAT is Rs 825. What is its basic price?

Solution - Let the original price of watch be Rs x

VAT = 10%

= 10% of x = $\frac{10x}{100} = \frac{x}{10}$

Price including 10% VAT = Rs 825

=> $x + \frac{x}{10} = 825$

=> $\frac{11x}{10} = 825$

=> $x = \frac{825 \times 10}{11} = Rs\ 750$

Thus, original price of watch is Rs 750