Profit and Loss
Exercise 11A

IMPORTANT FACTS

Cost Price:

The price, at which an article is purchased, is called its **cost price**, abbreviated as **C.P.**

Selling Price:

The price, at which an article is sold, is called its **selling prices**, abbreviated as **S.P.**

Profit or Gain:

If S.P. is greater than C.P., the seller is said to have a **profit** or **gain**.

Loss:

If S.P. is less than C.P., the seller is said to have incurred a **loss**.

IMPORTANT FORMULAE

1. Gain = (S.P.) - (C.P.)
2. Loss = (C.P.) - (S.P.)
3. Loss or gain is always reckoned on C.P.
4. Gain Percentage: (Gain %)

$$\text{Gain \%} = \left(\frac{\text{Gain} \times 100}{\text{C.P.}}\right)$$

5. Loss Percentage: (Loss %)

$$\text{Loss \%} = \left(\frac{\text{Loss} \times 100}{\text{C.P.}}\right)$$

6. Selling Price: (S.P.)

$$\text{SP} = \left[\frac{(100 + \text{Gain \%})}{100} \times \text{C.P}\right]$$

7. Selling Price: (S.P.)

$$\text{SP} = \left[\frac{(100 - \text{Loss \%})}{100} \times \text{C.P.}\right]$$

8. Cost Price: (C.P.)

$$\text{C.P.} = \left[\frac{100}{(100 + \text{Gain \%})} \times \text{S.P.}\right]$$

9. Cost Price: (C.P.)

$$\text{C.P.} = \left[\frac{100}{(100 - \text{Loss \%})} \times \text{S.P.}\right]$$

10. If an article is sold at a gain of say 35%, then S.P. = 135% of C.P.
11. If an article is sold at a loss of say, 35% then S.P. = 65% of C.P.
12. When a person sells two similar items, one at a gain of say x%, and the other at a loss of x%, then the seller always incurs a loss given by:

$$\text{Loss \%} = \left(\frac{\text{Common Loss and Gain \%}}{10}\right)^2 = \left(\frac{x}{10}\right)^2.$$

13. If a trader professes to sell his goods at cost price, but uses false weights, then

$$\text{Gain \%} = \left[\frac{\text{Error}}{(\text{True Value}) - (\text{Error})} \times 100\right]\%.$$

Q1

Answer :

(i) CP = Rs. 950

Gain = 6%

$$\text{SP} = \left\{ \frac{(100 + \text{Gain \%})}{100} \times \text{CP} \right\}$$
$$= \left\{ \frac{(100 + 6)}{100} \times 950 \right\}$$
$$= \frac{106}{100} \times 950$$
$$= \frac{100700}{100}$$
$$= \text{Rs. } 1007$$

(ii) CP = Rs. 9600

Gain = $16\frac{2}{3}\% = \frac{50}{3}\%$

$$\text{SP} = \left\{ \frac{(100 + \text{Gain \%})}{100} \times \text{CP} \right\}$$
$$= \left\{ \frac{\left(100 + \frac{50}{3}\right)}{100} \times 9600 \right\}$$
$$= \frac{350}{300} \times 9600$$
$$= \frac{3360}{3}$$
$$= \text{Rs. } 11200$$

(iii) CP = Rs. 1540

Loss = 4%

$$\text{SP} = \left\{ \frac{(100 - \text{Loss \%})}{100} \times \text{CP} \right\}$$
$$= \left\{ \frac{(100 - 4)}{100} \times 1540 \right\}$$
$$= \frac{96}{100} \times 1540$$
$$= \frac{147840}{100}$$
$$= \text{Rs. } 1478.40$$

(iv) CP = Rs. 8640

Loss = $12\frac{1}{2}\% = \frac{25}{2}\%$

$$\text{SP} = \left\{ \frac{(100 - \text{Loss \%})}{100} \times \text{CP} \right\}$$
$$= \left\{ \frac{\left(100 - \frac{25}{2}\right)}{100} \times 8640 \right\}$$
$$= \frac{175}{200} \times 8640$$
$$= \frac{1512000}{200}$$
$$= \text{Rs. } 7560$$

Q2

Answer :

(i) CP = Rs. 2400
SP = Rs. 2592
Gain = SP - CP = Rs. (2592 - 2400) = Rs. 192

$$\text{Gain\%} = \left(\frac{\text{Gain}}{\text{CP}} \times 100\right) = \left(\frac{192}{2400} \times 100\right) = 8$$

(ii) CP = Rs. 1650
SP = Rs. 1452
Loss = CP - SP = (1650 - 1452) = Rs. 198

$$\text{Loss\%} = \left(\frac{\text{Loss}}{\text{CP}} \times 100\right) = \left(\frac{198}{1650} \times 100\right) = 12$$

(iii) CP = Rs. 12000 and SP = Rs. 12800
Gain = SP - CP = (12800 - 12000) = Rs. 800

$$\text{Gain\%} = \left(\frac{\text{Gain}}{\text{CP}} \times 100\right) = \left(\frac{800}{12000} \times 100\right) = 6.66$$

(iv) CP = Rs. 1800
SP = Rs. 1611
Loss = CP - SP = (1800 - 1611) = Rs. 189

$$\text{Loss\%} = \left(\frac{\text{Loss}}{\text{CP}} \times 100\right) = \left(\frac{189}{1800} \times 100\right) = 10.5$$

Q3
Answer :

(i) SP = Rs. 924
Gain = 10%

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

$$= \left\{\frac{100}{(100 + 10)} \times 924\right\}$$

$$= \frac{92400}{110}$$

$$= \text{Rs. } 840$$

(ii) SP = Rs. 1755
Gain = $12\frac{1}{2}\% = \frac{25}{2}\%$

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

$$= \left\{\frac{100}{\left(100 + \frac{25}{2}\right)} \times 1755\right\}$$

$$= \left\{\frac{200}{225} \times 1755\right\}$$

$$= \frac{351000}{225}$$

$$= \text{Rs. } 1560$$

(iii) SP = Rs. 8510
Loss = 8%

$$\text{CP} = \left\{\frac{100}{(100 - \text{Loss }\%)} \times \text{SP}\right\}$$
$$= \left\{\frac{100}{(100 - 8)} \times 8510\right\}$$
$$= \frac{851000}{92}$$
$$= \textbf{Rs. } 9250$$

(iv) SP = Rs. 5600
Loss = $6\frac{2}{3}\% = \frac{20}{3}\%$

$$\text{CP} = \left\{\frac{100}{(100 - \text{Loss }\%)} \times \text{SP}\right\}$$
$$= \left\{\frac{100}{\left(100 - \frac{20}{3}\right)} \times 5600\right\}$$
$$= \left\{\frac{300}{280} \times 5600\right\}$$
$$= \frac{168000}{28}$$
$$= \textbf{Rs. } 6000$$

Q4

Answer :

Cost price of an almirah = Rs. 13600
Transportation cost = Rs. 400
Total cost price = Rs. (13600 + 400) = Rs. 14000
Selling price = Rs. 16800
Now, SP > CP

$\textbf{Gain} = \text{SP} - \text{CP} = (16800 - 14000) = \text{Rs. } 2800$

$$\text{Gain}\% = \left(\frac{\text{Gain}}{\text{CP}} \times 100\right)\%$$
$$= \left(\frac{2800}{14000} \times 100\right)\%$$
$$= \frac{2800}{140}\%$$
$$= 20\%$$

Q5

Answer :

Cost price of the house = Rs. 765000
Cost of repairing the house = Rs. 115000
Total Cost price = (765000 + 115000) = Rs. 880000
Ravi sold it at a gain of 5%.

$$\text{SP} = \left\{\frac{(100 + \text{ gain }\%)}{100} \times \text{CP}\right\}$$
$$= \left\{\frac{(100 + 5)}{100} \times 880000\right\}$$
$$= \frac{105}{100} \times 880000$$
$$= \textbf{Rs. } 924000$$

He gets Rs. 924000.

Q6

Answer :

CP of 12 lemons (dozen) = Rs. 25
CP of one lemon = Rs. $\frac{25}{12}$

CP of five lemons = 5 × $\frac{25}{12}$ = $\frac{125}{12}$ = **Rs. 10.42**

SP of five lemons = Rs. 12 (given)

Gain = SP - CP = (12 - 10.42) = Rs 1.58

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

$$= \left(\frac{1.58}{10.42} \times 100\right)\%$$

= 15.2%

Q7

Answer :

Let the cost price of the pen be Re 1.
Cost price of 12 pens = Rs 12
SP of 12 pens = CP of 15 pens = Rs 15
Gain = SP - CP = Rs (15 - 12) = Rs 3

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

$$= \left(\frac{3}{12} \times 100\right)\%$$
$$= 25\%$$

Gain% = 25%

Q8

Answer :

Let the cost price of one spoon be Re 1.
CP of 16 spoons = Rs 16
SP of 16 spoons = CP of 15 spoons = Rs 15
Loss = CP - SP = (16 - 15) = Re 1

$$\text{Loss}\% = \left(\frac{\text{Loss}}{\text{CP}} \times 100\right)\%$$
$$= \left(\frac{1}{16} \times 100\right)\%$$
$$= 6.25\%$$

Loss% = 6.25%

Q9

Answer :

Cost price of a video = Rs. 12000

SP of a video at a gain of 10% = $\left\{\frac{(100+\text{Gain \%})}{100} \times \text{CP}\right\}$

$= \left\{\frac{(100+10)}{100} \times 12000\right\}$

$= \left\{\frac{110}{100} \times 12000\right\}$

$= \text{Rs.}\,13200$

So, Rahul purchased at a cost price of Rs. 13200.

Rahul sells it at a loss of 5%.

SP of a video at loss of 5% = $\left\{\frac{(100-\text{Loss \%})}{100} \times \text{CP}\right\}$

$= \left\{\frac{(100-5)}{100} \times 13200\right\}$

$= \frac{95}{100} \times 13200$

$= \text{Rs. } 12540$

∴ Rakesh pays = Rs. 12540

Q10

Answer :

SP of the sofa set = Rs. 21600

Gain% = 8

$\text{CP of the sofa set} = \left\{\frac{100}{(100+\text{Gain\%})} \times \text{SP}\right\}$

$= \left\{\frac{100}{(100+8)} \times 21600\right\}$

$= \frac{2160000}{108}$

$= \text{Rs. } 20000$

He purchased it at the cost of Rs. 20000.

Q11

Answer :

SP of the watch = Rs 11400

Loss% = 5

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

$= \left\{\frac{100}{(100-5)} \times 11400\right\}$

$= \frac{11400}{95}$

$= \text{Rs. } 12000$

He purchased it at the cost of Rs. 12000.

Q12

Answer :

SP of the calculator = Rs. 1325
Gain % = 6

$$\text{CP of the calculator} = \left\{\frac{100}{(100 + \text{Gain \%})} \times \text{SP}\right\}$$

$$= \left\{\frac{100}{(100 + 6)} \times 1325\right\}$$
$$= \frac{132500}{106}$$
$$= \text{Rs. } 1250$$

$$\text{SP of the calculator} = \left\{\frac{(100 + \text{Gain \%})}{100} \times \text{CP}\right\}$$
$$= \left\{\frac{(100 + 12)}{100} \times 1250\right\}$$
$$= \frac{140000}{100}$$
$$= \text{Rs. } 1400$$

Q13

Answer :

SP of a computer = Rs. 24480
Loss% = 4

$$\text{CP of the computer} = \left\{\frac{100}{(100 - \text{Loss \%})} \times \text{SP}\right\}$$
$$= \left\{\frac{100}{(100 - 4)} \times 24480\right\}$$
$$= \frac{2448000}{96}$$
$$= \text{Rs. } 25500$$

In order to gain 4%:

$$\text{SP of the computer} = \left\{\frac{(100 + \text{Gain \%})}{100} \times \text{CP}\right\}$$
$$= \left\{\frac{(100 + 4)}{100} \times 25500\right\}$$
$$= \left\{\frac{104}{100} \times 25500\right\}$$
$$= \frac{2652000}{100}$$
$$= \text{Rs. } 26520$$

Q14

Answer :

Let the CP of the tricycle be Rs. *x*

SP at 15% gain = $\left\{\frac{(100+G\text{ ain }\%)}{100} \times \text{CP}\right\}$

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

$= \frac{115}{100}x$

$= \text{Rs. } \frac{23}{20}x$

SP at 20% gain = $x \times \frac{120}{100} = \text{Rs. } \frac{6}{5}x$

$\frac{6}{5}x - \frac{23}{20}x = 108$

$\Rightarrow \frac{24x-23x}{20} = 108$

$\Rightarrow \frac{x}{20} = 108$

$\Rightarrow x = 2160$

Hence, the cost price of the tricycle is Rs. 2160

Q15

Answer :

Let CP of a television be Rs *x*.

SP at 8% loss = $\frac{(100-8)}{100} \times x = \text{Rs. } \frac{92}{100}x$

100

SP at 6% gain = $\left(\frac{100+6}{100} \times x = \text{Rs. } \frac{106}{100}x\right.$

$\frac{106}{100}x - \frac{92}{100}x = 3360$

$\Rightarrow \frac{14}{100}x = 3360$

$\Rightarrow x = \frac{336000}{14} = 24000$

∴ CP = Rs. 24000

Sandeep bought it at the cost of Rs. 24000.

Q16

Answer :

SP of each cycle = Rs. 2376

He gains 10% in one cycle.

CP = $\left\{\frac{100}{(100+G\text{ ain }\%)} \times \text{SP}\right\}$

$= \left\{\frac{100}{(100+10)} \times 2376\right\}$

$= \frac{100}{110} \times 2376$

$= \text{Rs. } 2160$

He looses 10% in the second cycle.

CP = $\frac{100}{(100-L\text{oss }\%)} \times \text{SP}$

$= \frac{100}{(100-10)} \times 2376$

$= \frac{100}{90} \times 2376$

$= \frac{23760}{9}$

$= \text{Rs. } 2640$

Total CP = $\text{Rs. } (2160 + 2640) = \text{Rs. } 4800$

Total SP = $\text{Rs. } (2376 + 2376) = \text{Rs. } 4752$

Loss = CP - SP = $\text{Rs. } (4800 - 4752) = \text{Rs. } 48$

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

$= \left(\frac{48}{4800} \times 100\right)\%$

$= 1\%$

Q17

Answer :

Let the CP of the exhaust fan be Rs. *x*.

Gain = $\text{Rs. } \frac{x}{6}$

SP = $Rs\left(x + \frac{x}{6}\right)$

SP = Rs. 7350

$\therefore \quad x + \frac{x}{6} = 7350$

$\Rightarrow \quad \frac{7}{6}x = 7350$

$\Rightarrow \quad x = \frac{7350 \times 6}{7} = \frac{44100}{7} = 6300$

CP of the fan = Rs. 6300

Q18

Answer :

Mohit sold a watch to Karim at Rs. *x*.

Mohit sold it at a gain of 10%.

SP of the watch = $110\% \, of \, x$

$= \left(x + \frac{110}{100}\right) = \text{Rs. } \frac{11}{20}x$

Karim sold it to Rahim at a gain of 4%.

SP of the watch = $104\% \, of \, \frac{11}{10}x = \left(\frac{104}{100} \times \frac{11}{10}x\right) = \text{Rs. } \left(\frac{26}{25} \times \frac{11}{10}x\right)$

But, Rahim pays Rs. 14300.

$\therefore \frac{26}{25} \times \frac{11}{10}x = 14300$

$\Rightarrow x = \frac{14300 \times 25 \times 10}{26 \times 11} = \frac{3575000}{286} = 12500$

Mohit purchased it at Rs. 25000.

Q19

Answer :

Let the production cost of a washing machine be Rs. *x*.

Profit of the manufacturer = 10%

SP of the manufacturer = $110\% \, of \, x$

$= \left(x + \frac{110}{100}\right) = \frac{110}{100}x = \text{Rs. } \frac{11}{10}$

Profit of the wholesale dealer = 15%

SP of the wholesale dealer = $115\% \, of \, Rs \, \frac{11}{10}x$

$= Rs\left(\frac{11}{10}x \times \frac{115}{100}\right) = Rs\left(\frac{11}{10}x \times \frac{23}{20}\right)$

Profit of the retailer = 25%

SP of the retailer = $125\% \, of \, Rs\left(\frac{11}{10}x \times \frac{23}{20}\right)$

$= \text{Rs. } \left(\frac{11}{10}x \times \frac{23}{20} \times \frac{125}{100}\right) = \text{Rs. } \left(\frac{11}{10}x \times \frac{23}{20} \times \frac{5}{4}\right)$

Given:
Retail price = Rs. 37950

$\therefore \left(\frac{11}{10}x \times \frac{23}{20} \times \frac{5}{4}\right) = 37950$

$\Rightarrow x = \frac{37950 \times 10 \times 20 \times 4}{11 \times 23 \times 5}$

=> $x = \frac{30360000}{1265} = 24000$

∴ Production cost of a washing machine = Rs. 24000

Q20

Answer :

Mr. Mehta purchased a video at the cost of Rs. 20000.
Mr. Mehta purchased a television at the cost of Rs. 30000.
Total cost = Rs. (20000 + 30000) = Rs. 50000

He lost 5% on the video.

$\text{SP} = \frac{(100 - \text{Loss \%})}{100} \times \text{CP}$
$= \frac{100-5}{100} \times 20000$
$= \frac{95}{100} \times 20000$
$= \text{Rs. } 19000$

He gained 8% on the television.

$\text{SP} = \frac{(100 + \text{Gain \%})}{100} \times \text{CP}$
$= \frac{100+8}{100} \times 30000$
$= \frac{108}{100} \times 30000$
$= \text{Rs. } 32400$

Total SP = $\text{Rs. } (190000 + 32400) = \text{Rs. } 51400$

Total CP = Rs. 50000
Total Gain = SP - CP = $\text{Rs. } (51400 - 50000) = \text{Rs. } 1400$
$\text{Gain\%} = \left(\frac{\text{Gain}}{\text{CP}} \times 100\right)\%$
$= \left(\frac{1400}{50000} \times 100\right)\%$
$= 2.8\%$

Q21

Answer :

Let the CP of 1 orange be Rs. x.
∴ CP of 36 oranges = Rs. $36x$
Let SP of orange be Rs. y.
∴ SP of 36 oranges = Rs. $36y$

Loss = SP of 4 oranges = $4y$ (given)

We know:
Loss = CP - SP

$\Rightarrow 4y = 36x - 36y$
$\Rightarrow 4y + 36y = 36x$
$\Rightarrow 40y = 36x$
$\Rightarrow 10y = 9x$
$\Rightarrow y = \frac{9}{10}x$

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

$$= \left(\frac{4y}{36x} \times 100\right)\%$$

$$= \left(\frac{4 \times 9x}{36x \times 10} \times 100\right)\%$$

$$= 10\%$$

Loss% = 10%

Q22

Answer :

Let the CP of one pencil be Rs. x.
Therefore, the CP of 96 pencils will be Rs. $96x$.
Let SP of one pencil be Rs. y.
∴ SP of 96 pencils = Rs. $96y$
Gain= SP of one dozen pencil = Rs.$12y$ (given)

Gain = SP - CP

⇒12y=96y-96x⇒96x=96y-12y⇒96x=84y⇒x=84y96

Gain% = GainCP×100 %=12y96x×100%=12y×9696×84y×100%=14.28%