PROFIT AND LOSS

Terms used in profit and loss problems:

1. Cost price= (CP)
2. Selling price =(SP)
3. If SP-CP>0 ,then seller is said to have a profit or gain.
4. If SP-CP<0 , then seller is said to have a Loss.
5. Loss or gain always depend upon Cost price(CP).

IMPORTANT FORMULA:

(i) Gain = SP-CP

(ii) Loss= CP-SP

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

(iv)Loss percentage = ($\frac{loss}{CP} \times 100$)%

(v) CP =($\frac{100}{100+gain\%} \times SP$) or $CP = (\frac{100}{100-loss\%} \times SP)$

(vi) SP =($\frac{100+gain\%}{100} \times CP$) or $SP = (\frac{100-loss\%}{100} \times CP)$

(vii) If an article is sold at a gain of say 20%, then S.P. = 120% of C.P.

(viii) If an article is sold at a loss of say, 20% then S.P. = 80% of C.P.

(ix) When a person sells an item to two customers, one at a gain of x%, and the other at a loss of x%, then the seller always incurs a loss given by: $\left(\frac{x}{10}\right)^2$

SOLVED PROBLEMS ON PROFIT AND LOSS

1. Arun buys an old scooter for Rs. 4700 and spends Rs. 800 on its repairs. If he sells the scooter for Rs. 5800, find his gain percent.

Solution: Given

Total cost price=(4700+800)=Rs.5500

Selling price (SP)=5800

We know that,

Gain=SP-CP =5800-5500

=Rs. 300

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

$=(\frac{300}{5500}\times 100)\%$

$=\frac{60}{11}\%$

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2. A man buys a cycle for Rs. 1400 and sells it at a loss of 15%. What is the selling price of the cycle?

Solution :

Given,

CP=Rs.1400

Loss% =15

SP = ?

We know that

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

$=\frac{100-15}{100}\times 1400$

$=\frac{85}{100}\times 1400$

=Rs.1190

Therefore selling price of the cycle is Rs.1190

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3. In a certain store, the profit is 320% of the cost. If the cost increases by 25% but the selling price remains constant, what percentage of the selling price is the profit?

Solution:

Let CP =Rs. 100

Given, profit=320%

$\therefore SP=(320+100)=420$

Again, CP increased by 25%

$\therefore$New CP$=125$

Profit =SP-CP=420-125=Rs. 295 (SP remain constant)

Now we have to find profit percentage with respect to selling price(SP)

Required percentage$=(\frac{295}{420}\times 100)\%$

$=\frac{1475}{21}\%$

$=70.2\%$

$\therefore$Required Percentage $=70.2\%$

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4. The cost price of 20 articles is the same as the selling price of *x* articles. If the profit is 25%, then find the value of *x*.

Solution:

Given,

CP of x article = SP of 20 article

$\Rightarrow$ SP. x =CP$\times$20

$\Rightarrow x = \frac{CP}{SP} \times 20$ --------(i)

Again ,

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

$\Rightarrow 25 = (\frac{SP}{CP} - 1) \times 100$

$\Rightarrow \frac{25}{100} + 1 = \frac{SP}{CP}$

$\Rightarrow \frac{125}{100} = \frac{SP}{CP}$

$\therefore \frac{CP}{SP} = \frac{100}{125}$

From (i) we get $x = \frac{100}{125} \times 20$

$= \frac{2000}{125}$

$= 16$

$\therefore x = 16$

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5. Sam purchased 20 dozens of toys at the rate of Rs. 375 per dozen. He sold each one of them at the rate of Rs. 33. What was his percentage profit?

Solution :

Given,

CP 0f 12 toy = 375

CP of 1 toy $= \frac{375}{12}$ **=31.25**

SP of 1 toy=Rs.33

Gain = SP-CP

=33-31.24

= 1.75

$\therefore \text{gain\%} = (\frac{gain}{CP} \times 100) = \frac{1.75}{31.25} \times 100 = 5.6\%$

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6. If selling price is doubled, the profit triples. Find the profit percent.

Solution:

Let

CP= x , SP= y

Profit = $y - x$---------(i)

When SP= $2y$, New Profit =3 $(y - x$

But, profit =SP-CP

$\Rightarrow 3(y - x) = 2y - x$ **(new selling price and new profit)**

$\Rightarrow y = 2x$ ---------*(ii)*

$\therefore$ (i) $\Rightarrow$ **Profit=** $y - x$

$= 2x - x$ **(putting the value of y)**

$= x$

Now, Profit percent=$(\frac{profit}{CP} \times 100)\%$

$= (\frac{x}{x} \times 100)\%$

$= 100\%$

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7. The percentage profit earned by selling an article for Rs. 1920 is equal to the percentage loss incurred by selling the same article for Rs. 1280. At what price should the article be sold to make 25% profit?

Solution:

Let

CP $= x$

Here , when SP=1920 , the seller gains

When SP=1280 , the seller incurred loss

$\therefore$ Profit percent $= \frac{profit}{CP} \times 100$

$= \frac{1920-x}{x} \times 100$ (profit=SP-CP)

Loss percentage $= \frac{loss}{CP} \times 100$

$= \frac{x-1280}{CP} \times 100$

According to question, $(\frac{1920-x}{x} \times 100) = (\frac{x-1280}{x} \times 100)$

$\Rightarrow 1920 - x = x - 1280$

$\Rightarrow 2x = 3200$

$\Rightarrow x = 1600$

$\therefore$ CP $=$ Rs. 1600

But, we have ,

If the profit is 25% , than SP=125% of CP

$= \frac{125}{100} \times 1600$

$= 2000$

Therefore to get 25% profit the article should be sell at Rs. 2000.

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8. On selling 17 balls at Rs. 720, there is a loss equal to the cost price of 5 balls. Find the cost price of a ball ?

Solution:

Let CP of 1 ball= x

$\therefore$ Cp of 17 ball $= 17x$

Cp of 5 balls $= 5x$

Given SP of 17 balls $=$ Rs.720

Now , CP-SP $=$ Loss

$\Rightarrow 17x - 720 = 5x$

$\Rightarrow 12x = 720$

$\Rightarrow x = \frac{720}{12} = 60$

Price of one ball=Rs.60

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9. A shopkeeper expects a gain of 22.5% on his cost price. If in a week, his sale was of Rs. 392, what was his profit?

Solution:

Given,

gain% =22.5, SP=392, CP= ? Profit =?

We know that,

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

$$\Rightarrow CP = \frac{100}{100+22.5} \times 392$$

$$= \frac{100}{122.5} \times 392$$

$$= \frac{1000}{1225} \times 392$$

$$= \frac{2240}{7}$$

$$= 320$$

$\therefore$ Profit = SP-CP

=392-320

= Rs. 72

10. When a plot is sold for Rs. 18,700, the owner loses 15%. At what price must that plot be sold in order to gain 15%?

Solution :

Given,

SP=Rs.18700

Loss%=15

CP=?

We have to find SP for gain of 15%

We know that,

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

$$= \frac{100}{85} \times 18700$$

=22000

Now for gain of 15%

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

$$= \left(\frac{115}{100} \times 22000\right)$$

=25300

Therefore plot must be sell at Rs. 25300.

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