

## CHAPTER 09

### Profit, Loss and Discount

On sell of an article when a person received greater amount, then the cost price of an article is known as profit and when received less amount, then the price of an article is known as loss.

The following basic terms are very useful to solve the problems on profit and loss.

- **Cost Price (CP)** The cost price of an article is the price at which the article is bought.
- **Selling Price (SP)** The selling price of an article is the price at which the article is sold.
- **Profit or Gain** If selling price of an article is more than its cost price, there is profit or gain.
- **Loss** If selling price of an article is less than its cost price (CP), there is loss.

$$\text{Profit} = \text{SP} - \text{CP}; \text{Loss} = \text{CP} - \text{SP}$$

- **Discount** is a term used during a business. It is the rebate given to the buyer by the seller to increase the sale. Discount is always given on marked price or printed price of the article.

$$\text{Discount} = \text{Marked/Print Price} - \text{Selling Price}$$

#### Important Tips/Formulae

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

- **Loss percentage** =  $\frac{\text{Loss}}{\text{CP}} \times 100 = \frac{\text{CP} - \text{SP}}{\text{CP}} \times 100$

- **CP** =  $\frac{\text{SP} \times 100}{(100 + P\%)} = \frac{\text{SP} \times 100}{(100 - L\%)}$  ( $P$  = profit,  $L$  = loss)

- **SP** =  $\frac{\text{CP}(100 + P\%)}{100} = \frac{\text{CP}(100 - L\%)}{100}$

- **Discount percentage** =  $\frac{\text{Discount}}{\text{Marked price}} \times 100$

- If two successive Discount of  $x\%$  and  $y\%$  is given on an article. If two successive Discount of  $x\%$  and  $y\%$  is given on an article, then

$$\text{Selling Price} = \text{Marked Price} \times \left(\frac{100-x}{100}\right) \times \left(\frac{100-y}{100}\right)$$

$$\text{Equivalent discount} = \left(x + y - \frac{xy}{100}\right)$$

- If a false weight is used during selling of an article, then

$$\text{Gain per cent} = \frac{\text{Error}}{\text{True value} - \text{Error}} \times 100\%$$

Here, Error = True weight - False weight

- A person sells goods at a profit of  $x\%$ . Had he sold it for ₹  $x$  more,  $y\%$  would have been gained.

$$\text{Then, CP is given by} = ₹ \frac{x}{y-x} \times 100$$

- A person sells goods at a loss of  $x\%$ . Had he sold it for ₹  $X$  more, he would have been gained  $y\%$ .

$$\text{Then, CP is given by} = ₹ \frac{x}{y+x} \times 100$$

- When there is a gain of  $x\%$  and a loss of  $y\%$  the net effect is given by.

$$\text{Net effect} = \left( x - y - \frac{xy}{100} \right) \%$$

- If CP of  $x$  articles is equal to SP of  $y$  articles where  $x > y$ .

$$\text{Then, profit percentage} = \frac{x-y}{y} \times 100$$

- If CP of  $x$  articles is equal to SP of  $y$  articles where  $x < y$ .

$$\text{Then, loss percentage} = \frac{y-x}{y} \times 100$$

### Solved Examples:

1. If selling price of an article is  $\frac{8}{5}$  times its cost price, the profit per cent on it will be?

- (a) 50%
- (b) 60%
- (c) 65%
- (d) 70%

**Sol. (b)**  $SP = \frac{8}{5} CP$

$$\Rightarrow 5SP = 8 \Rightarrow \text{Profit} = 3 \text{ unit}$$

$$\Rightarrow \text{Profit percentage} = \frac{3}{5} \times 100 = 60\%$$

2. A chair is sold for ₹705 at a gain of 6%. Find its cost price.

- (a) ₹ 666
- (b) ₹ 670
- (c) ₹  $665\frac{5}{53}$
- (d) ₹ 680

**Sol. (c)** Let the CP be ₹  $x$ .

$$\text{Then SP} = x + x \times \frac{6}{100} = \frac{53x}{50}$$

But SP = ₹705

$$\Rightarrow \frac{53x}{50} = 705$$

$$\Rightarrow x = \frac{705 \times 50}{53} = 665\frac{5}{53}$$

$$\therefore \text{CP} = ₹665\frac{5}{53}$$

3. If the cost price of 9 pens is equal to the selling price of 11 pens, then what is gain or loss percentage?

- (a) 19%
- (b)  $17\frac{8}{3}\%$
- (c)  $18\frac{2}{11}\%$
- (d)  $19\frac{2}{3}\%$

**Sol. (c)** Let CP of each pen be ₹ 1

then CP of 11 pens = ₹11

SP of 11 pens = CP of 9 pens = ₹9

Then, loss = ₹2

$$\therefore \text{Loss percentage} = \frac{2}{11} \times 100 = \frac{200}{11}\% = 18\frac{2}{11}\%$$

### Alternate Method

CP of 9 pens = SP of 11 pens ( $y$ )

Clearly,  $x < y$

$$\text{Then, loss per cent} = \frac{11-9}{11} \times 100 = \frac{2}{11} \times 100 = 18\frac{2}{11}\%$$

4. The marked price is 20% higher than cost price. A discount of 20% is given on the marked price. By this type of sale, there is

- (a) No loss no gain
- (b) 4% gain
- (c) 4% loss
- (d) 2% loss

**Sol. (c)** Let CP be ₹ 100.

Then, marked price is 20% higher than CP

$$\therefore \text{Marked Price} = 120\% \text{ of CP} = \frac{120 \times 100}{100} = 120$$

Now, 20% discount is given on marked price, then

$$\begin{aligned} \text{SP} &= \frac{(100 - \text{Discount}) \times \text{Marked Price}}{100} \\ &= \frac{(100 - 20) \times 120}{100} = \frac{80 \times 120}{100} = 96 \end{aligned}$$

$$\therefore \text{Loss} = \text{CP} - \text{SP} = 100 - 96 = 4$$

$$\text{Loss percentage} = \frac{\text{Loss}}{\text{CP}} \times 100 = \frac{4}{100} \times 100 = 4\%$$

### Alternate Method

$$\text{Effective change} = \left( \pm a \pm b + \frac{(\pm a \times \pm b)}{100} \right) \%$$

$$a = 20\% \text{ (+ve for increase/profit)}$$

$$b = -20\% \text{ (-ve for decrease/profit)}$$

$$= \left[ 20 - 20 + \frac{(-20 \times 20)}{100} \right] = -4 = 4\% \text{ loss}$$

5. A chair listed at ₹350 is available at successive discounts of 25% and 10%. The selling price of the chair is

- (a) ₹ 240.25
- (b) ₹ 242.25
- (c) ₹ 236.25
- (d) ₹ 230.25

**Sol. (c)** Effective discount of 2 successive discounts  $\left( \pm a \pm b + \frac{(\pm a \times \pm b)}{100} \right)$  - ve for discount

+ ve for increase  $a = -25; b = -10$

$$= \left[ -25 - 10 + \left( \frac{-25 \times -10}{100} \right) \right]$$

$= -35 + 2.5 = -32.5 = 32.5\%$  effective discount

$$SP = \frac{(100 - \text{discount}) \times CP}{100}$$

$$\therefore SP = \frac{(100 - 32.5) \times 350}{100} = \frac{67.5 \times 350}{100} = ₹236.25$$

6. On selling an article for ₹ 264 a man loses 4%. In order to gain 12%. Find the selling price of the article.

- (a) ₹ 300
- (b) ₹ 310
- (c) ₹ 295
- (d) ₹ 308

**Sol. (d)** Let CP be ₹  $x$ .

$$\text{Then, } 96\% \text{ of } x = 264 \Rightarrow \frac{96}{100} \times x = 264$$

$$\therefore x = \left( \frac{264 \times 100}{96} \right) = 275$$

$\therefore$  CP = ₹275, Gain = 12%

$$SP = 112\% \text{ of } ₹275 = 275 \times \frac{112}{100} = 308$$

$\therefore$  SP = ₹308

### Practice Questions

1. If the loss on an article is 5% and its cost price is ₹90, find the selling price.

- (a) ₹ 95.50
- (b) ₹ 85.50
- (c) ₹ 85
- (d) ₹ 95

2. A defective TV costing ₹5000 is being sold at a loss of 50%. If the price is further reduced by 50%, then its selling price is

- (a) ₹ 1225
- (b) ₹ 1250
- (c) ₹ 1025
- (d) ₹ 1200

3. A grocer buys 10 dozen of eggs at ₹18 per dozen from the wholesale market. Out of these, 10 eggs were found broken and had to be thrown away. At what price per egg should he sell them so as to make a profit of 10%, if he spent ₹24 on transportation?
- (a) ₹ 2.00  
(b) ₹ 2.25  
(c) ₹ 2.04  
(d) ₹ 2.50
4. A businessman marks his goods at such price that after allowing a discount of 15%, he makes a profit of 20%. The marked price (in ₹) of an article having cost price ₹170 is
- (a) 236  
(b) 220  
(c) 240  
(d) 204
5. Find the rate of discount when marked price is ₹ 250 and selling price is ₹ 235.
- (a) 6.0%  
(b) 7.0%  
(c) 6.5%  
(d) 5.0%
6. The list price of a watch is ₹160. After two successive discounts, it is sold for ₹ 122.40. If the first discount is 10%, what is the rate of the second discount?
- (a) 13%  
(b) 18%  
(c) 16%  
(d) 15%
7. If the discount sales reduce from  $3\frac{1}{2}\%$  to  $3\frac{1}{3}\%$ , what difference does it make to purchases for ₹ 12102?
- (a) ₹ 20.17  
(b) ₹ 16.35  
(c) ₹ 15.35  
(d) ₹ 17.35

8. Hundred apples were bought for ₹ 300. Out of these four were rotten and the rest were sold at ₹ 50 per dozen. Then, the net profit is
- (a) ₹ 150
  - (b) ₹ 100
  - (c) ₹ 50
  - (d) ₹ 125
9. Rekha purchased a scooter for ₹ 20000 and sold it for ₹22000. The percentage of profit is
- (a) 15
  - (b) 12
  - (c) 10
  - (d) 20
10. The cost price of a refrigerator is ₹28000. The shopkeeper offers a discount of 20% on it and loses 10%. The marked price of the refrigerator is
- (a) ₹ 28000
  - (b) ₹ 31500
  - (c) ₹ 25200
  - (d) ₹ 27000
11. An article listed at ₹ 26580 is sold at a discount of 10%. Due to festival season the shopkeeper allows a further discount of 5%. Find the selling price of the article.
- (a) ₹ 22750.00
  - (b) ₹ 22825.00
  - (c) ₹ 22725.90
  - (d) ₹ 23922.00
12. The cost price of 50 cups is equal to the sale price of 40 cups. The percentage of profit in the transaction is
- (a) 25
  - (b) 30
  - (c) 15
  - (d) 20

13. A shopkeeper purchases 10 pieces of certain items for ₹ 8.00 and sells them at 8 pieces for ₹ 10.00. The profit percentage of the shopkeeper is
- (a) 56.50
  - (b) 56.25
  - (c) 25.50
  - (d) 26.25
14. The marked price is 10% higher than the cost price. A discount of 10% is given on the marked price. In this kind of sale, the seller
- (a) losses 1.5%
  - (b) bears no loss, makes no gain
  - (c) gains 1%
  - (d) losses 1%
15. If an article is sold at a gain of 6% instead of at a loss of 6%, then the seller gets ₹ 6 more. The cost price of the article is
- (a) ₹ 106
  - (b) ₹ 50
  - (c) ₹ 94
  - (d) ₹ 100
16. The selling price of 20 articles is equal to the cost price of 22 articles. The gain percentage is
- (a) 12%
  - (b) 9%
  - (c) 10%
  - (d) 11%
17. A man gains 10% by selling an article for a certain price. If he sells it at double the price, then the profit made is
- (a) 120%
  - (b) 20%
  - (c) 40%
  - (d) 100%

18. The cost price of a book is ₹ 300. The shopkeeper wants to gain 20% after allowing a discount of 10% on the marked price. Then, the marked price of the book must be
- (a) ₹ 360
  - (b) ₹ 336
  - (c) ₹ 400
  - (d) ₹ 396
19. The printed price of a book is ₹ 60, but the seller allows successive discounts of 20% and 30%. The net sale price is subject to a sales tax of 5%. The net sale price is
- (a) ₹ 36.28
  - (b) ₹ 33.60
  - (c) ₹ 36.60
  - (d) ₹ 35.28
20. A dealer sold  $\frac{3}{4}$  of his articles at a gain of 24% and the remaining at the cost price. Percentage of gain in the whole transaction is
- (a) 15
  - (b) 18
  - (c) 24
  - (d) 32
21. The marked price of a watch is ₹1600. The shopkeeper gives successive discounts of 10% and  $x\%$  to the customer. If the customer pays ₹ 1224 for the watch, the value of  $x$  is
- (a) 5
  - (b) 10
  - (c) 15
  - (d) 20
22. If the cost price is 95% of the selling price, what is the profit per cent?
- (a) 4
  - (b) 4.75
  - (c) 5
  - (d) 5.26

23. The difference between a discount of 35% and two successive discounts of 20% on a certain bill was ₹ 22. The amount of the bill was
- (a) ₹ 200
  - (b) ₹ 220
  - (c) ₹ 1100
  - (d) ₹ 2200
24. If I purchased 11 books for ₹100 and sold 10 books for ₹110, the percentage of profit per book sold is
- (a) 10
  - (b) 11.5
  - (c) 17.3
  - (d) 21
25. A cloth merchant sold half of his cloth at 40% profit, half of remaining at 40% loss and the rest was sold at the cost price. In the total transaction, his gain or loss will be
- (a) 20% gain
  - (b) 25% loss
  - (c) 10% gain
  - (d) 15% loss
26. A bookseller sells a book on 10% profit. If he purchases this book on 4% loss and sells ₹ 6 more, then he earns  $18\frac{3}{4}\%$  profit. Find the cost price of the book.
- (a) ₹ 130
  - (b) ₹ 140
  - (c) ₹ 150
  - (d) ₹ 160
27. Ravi purchased two toffees in one rupee of some quantity and sells it five toffees in one rupee. Find the loss per cent.
- (a) 120
  - (b) 90
  - (c) 30
  - (d) 60

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

- (a) ₹ 2000
- (c) ₹ 24000
- (b) ₹ 2200
- (d) Data inadequate

29. If 5 lemons are bought for ₹16, then the selling price of a lemon at 25% profit will be

- (a) ₹ 5
- (b) ₹ 4
- (c) ₹ 6
- (d) ₹ 8

30. Alfred buys an old scooter for ₹4700 and spends ₹ 800 on its repairs. If he sells the scooter for ₹ 5800, his gain per cent is

- (a)  $4\frac{4}{7}$
- (b)  $5\frac{5}{11}$
- (c) 10
- (d) 12

31. A vendor bought toffees at 6 for a rupee. How many for a rupee must he sell to gain 20%?

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

32. It costs ₹1 to photocopy a sheet of paper. However, 2% discount is allowed on all photocopies done after the first 1000 sheets. How much will it cost to photocopy 5000 sheets of paper?

- (a) ₹ 3920
- (b) ₹ 3980
- (c) ₹ 4900
- (d) ₹ 4920

33. When the selling price of an article is ₹ 280, the loss percentage is 20%. What is the loss or gain percentage, if the selling price is increased to ₹ 380?

- (a)  $8\frac{4}{7}\%$ , profit
- (b)  $4\frac{5}{7}\%$ , loss
- (c)  $\frac{50}{3}\%$ , profit
- (d)  $4\frac{9}{11}\%$ , profit

34. A man buys 25 chairs for ₹375 and sells them at a profit equal to the selling price of 5 chairs. What is the selling price of one chair?

- (a) ₹ 18.75
- (b) ₹ 14.50
- (c) ₹ 15.20
- (d) ₹ 17.20

35. If a man reduces the selling price of a fan from ₹400 to ₹380, his loss increases from  $x\%$  to  $(x + 4)\%$ . What is the cost price of the fan?

- (a) ₹ 420
- (b) ₹ 550
- (c) ₹ 500
- (d) ₹ 400

36. If the cost price of 36 books is equal to the selling price of 30 books, then the gain percentage is

- (a) 20%
- (b)  $16\frac{4}{6}\%$
- (c) 16%
- (d)  $8\frac{2}{6}\%$

37. A man buys 6 dozen eggs for ₹10.80 and 12 eggs are found rotten and the rest are sold at 5 eggs per rupee. Find his gain or loss percentage.

- (a)  $11\frac{1}{9}\%$ , gain
- (b)  $11\frac{1}{9}\%$ , loss
- (c)  $9\frac{1}{11}\%$ , gain
- (d)  $9\frac{1}{11}\%$ , loss

38. Sunanda is making a profit of 25% on his selling price, what is her actual profit percentage?
- (a)  $\frac{100}{3}$   
(b) 20  
(c) 25  
(d) 30
39. If a commission of 10% given on the marked price of an article, the gain is 25%. Find the gain per cent, if commission is increased to 20%.
- (a)  $11\frac{1}{9}$   
(b) 12  
(c)  $\frac{100}{3}$   
(d)  $\frac{50}{3}$
40. The cost price of an article is 40% of the selling price. The per cent that the selling price is of cost price is
- (a) 250%  
(b) 240%  
(c) 60%  
(d) 40%
41. A shopkeeper has certain number of eggs of which 5% are found to be broken. He sells 93% of the remainder and still has 266 eggs left. How many eggs did he originally have?
- (a) 3800  
(b) 4000  
(c) 4200  
(d) None of these
42. A dishonest dealer marks his goods 20% above the cost price. He also makes a profit by using a false weight of 900 g in place of 1 kg while buying or selling. Find the percentage profit earned by the shopkeeper.
- (a) 20  
(b) 12  
(c) 42  
(d) 46.6

43. Mukul bought 80 kg of rice for ₹1200 and sold it at a loss of as much money as he received for 20 kg rice. At what price per kg did he sell the rice?

- (a) ₹ 12 per kg
- (b) ₹ 10 per kg
- (c) ₹ 8 per kg
- (d) ₹ 11 per kg

44. A furniture shop allows 20% discount on the marked price of each item what price must be marked on a table costing ₹ 560, so as to make a profit of 25% ?

- (a) ₹ 800
- (b) ₹ 825
- (c) ₹ 700
- (d) ₹ 875

45. A shopkeeper allows a discount of 12.5% on the marked price of a certain article and makes a profit of 20%. If the article costs the shopkeeper ₹ 210, what price must be marked on the article?

- (a) ₹ 280
- (b) ₹ 288
- (c) ₹ 300
- (d) None of these

### ANSWERS

1. (b)	2. (b)	3. (c)	4. (c)	5. (a)	6. (d)	7. (a)	8. (b)	9. (c)	10. (b)
11. (c)	12. (a)	13. (b)	14. (d)	15. (b)	16. (c)	17. (a)	18. (c)	19. (d)	20. (b)
21. (c)	22. (d)	23. (d)	24. (d)	25. (c)	26. (c)	27. (d)	28. (a)	29. (b)	30. (b)
31. (c)	32. (d)	33. (a)	34. (a)	35. (c)	36. (a)	37. (a)	38. (a)	39. (a)	40. (a)
41. (b)	42. (d)	43. (a)	44. (d)	45. (b)					

### Hints & Solutions

1. Required SP =  $(100 - 5)\%$  of 90  
= 95% of 90  
= ₹85.50

2. Selling price of the TV  
 = 50% of 50% of 5000  
 = ₹1250

3. Total cost price of eggs including transportation cost =  $10 \times 18 + 24$   
 =  $180 + 24$   
 = ₹204

To get 10% profit, their SP = 110% of 204 = ₹224.40

But this is the SP of 110 eggs as 10 eggs were broken.

Hence, sale price per egg =  $\frac{224.40}{110} = ₹2.04$

4. Sale price of the article  
 = (100 + 20)% of 170 = ₹204

Now, (100 - 15)% of MP = SP

$\Rightarrow MP = 204 \times \frac{100}{85} = ₹240$

5. Rate of discount

=  $\frac{250 - 235}{250} \times 100\%$   
 =  $\frac{15}{250} \times 100\% = 6\%$

6. Let the rate of the second discount be  $r\%$ .

Then, (100 - 10)% of (100 -  $r$ )% of 160 = 122.40

$\Rightarrow \frac{90}{100} \times \frac{100 - r}{100} \times 160 = 122.40$

$\Rightarrow 100 - r = \frac{122.40 \times 100 \times 100}{90 \times 160}$

= 85

$\Rightarrow r = 15\%$

$$\begin{aligned}
 7. \text{ Difference in discount} &= 3\frac{1}{2}\% - 3\frac{1}{3}\% \\
 &= \frac{7}{2}\% - \frac{10}{3}\% \\
 &= \frac{1}{6}\%
 \end{aligned}$$

$$\therefore \text{Required difference} = \frac{1}{6}\% \text{ of } 12102 = ₹20.17$$

8. Cost price of 96 apples (8 dozen) = ₹300

[∵ 4 apples were rotten.]

Selling price of 96 apples

$$(8 \text{ dozen}) = 8 \times 50 = ₹400$$

$$\therefore \text{Required gain} = 400 - 300 = ₹100$$

9. Profit on selling the scooter

$$= 22000 - 20000$$

$$= ₹2000$$

$$\therefore \text{Required profit percentage} = \frac{2000 \times 100}{20000} = 10\%$$

10. Let the MRP of refrigerator be ₹  $x$ , then

$$(100 - 20)\% \text{ of } x = 90\% \text{ of } 28000$$

$$\Rightarrow 80\% \text{ of } x = 90\% \text{ of } 28000$$

$$\Rightarrow \frac{80}{100} \times x = \frac{90}{100} \times 28000$$

$$\Rightarrow x = \frac{28000 \times 90}{80}$$

$$\therefore x = ₹31500$$

11. Equivalent discount of 10% and 5%

$$= 10 + 5 - \frac{10 \times 5}{100}$$

$$= 15 - 0.5$$

$$= 14.5\%$$

∴ Required selling price

$$\begin{aligned} &= (100 - 14.5)\% \text{ of } 26580 \\ &= \frac{26580 \times 85.5}{100} \\ &= ₹22725.90 \end{aligned}$$

12. Required percentage gain

$$\begin{aligned} &= \frac{x - y}{y} \times 100 \\ &= \frac{50 - 40}{40} \times 100 \\ &= \frac{10}{40} \times 100 = 25\% \end{aligned}$$

13. Cost price of 1 price of article = ₹0.8

Selling price of 1 price of article

$$= \frac{10}{8} = ₹1.25$$

Profit while selling on a price of article =  $1.25 - 0.8 = ₹0.45$

∴ Required gain percentage

$$\begin{aligned} &= \frac{0.45 \times 100}{0.8} \\ &= 56.25\% \end{aligned}$$

14. Here,  $x = 10, y = 10$

∴ Resultant gain or loss

$$\begin{aligned} &= \left( x - y - \frac{xy}{100} \right) \% \\ &= \left( 10 - 10 - \frac{10 \times 10}{100} \right) \% \\ &= -1\% \end{aligned}$$

Thus, seller losses 1%.

15. Let CP of the article be ₹ $x$ , then

$$\begin{aligned}106\% \text{ of } x - 94\% \text{ of } x &= 6 \\ \Rightarrow 12\% \text{ of } x &= 6 \\ \therefore x &= \frac{6 \times 100}{12} \\ &= ₹50\end{aligned}$$

16. Here,  $x = 20$  and  $y = 22$ , then

$$\begin{aligned}\therefore \text{Per cent gain} &= \frac{y - x}{x} \times 100\% \\ &= \frac{22 - 20}{20} \times 100\% \\ &= 10\%\end{aligned}$$

17. Let CP of the article be ₹ $x$ . Then,  $SP = 110\%$  of  $x = ₹1.1x$ . If SP be double i.e.,  $2.2x$ , then Profit per cent =  $\frac{2.2x - x}{x} \times 100\% = 120\%$

18.  $CP = ₹300$

$$\begin{aligned}SP &= 120\% \text{ of } 300 \\ &= ₹360\end{aligned}$$

$$\begin{aligned}\therefore MP &= 360 \times \frac{100}{90} \\ &= ₹400\end{aligned}$$

19. After discounts, the sale price of the book =  $80\%$  of  $70\%$  of  $60 = ₹33.60$

But there is sale tax of  $5\%$ , therefore required  $SP = 105\%$  of  $33.60 = ₹35.28$

20. Let the CP of articles = ₹ $x$

By given condition,

$$SP \text{ of articles} = \frac{3}{4}x \times \frac{124}{100} + \frac{x}{4} = ₹\frac{472}{400}x$$

$\therefore$  Gain percentage

$$\begin{aligned}&= \frac{\frac{472}{400}x - x}{x} \times 100 \\ &= \frac{72}{400} \times 100 = 18\%\end{aligned}$$

21. Marked price = ₹1600

Equivalent discount

$$\begin{aligned} &= \left[ 10 + x - \frac{10 \times x}{100} \right] \\ &= \left[ 10 + \frac{9x}{10} \right] \% \end{aligned}$$

and selling price = ₹1224

∴ Percentage discount

$$\begin{aligned} &= \left[ \frac{1600 - 1224}{1600} \times 100 \right] \% \\ \Rightarrow &\left[ 10 + \frac{9x}{10} \right] \% = \left[ \frac{376}{1600} \times 100 \right] \% \\ \Rightarrow &\frac{9x}{100} = 23.5 - 10 \\ x &= \frac{13.5 \times 10}{9} = 15\% \end{aligned}$$

22. Required profit per cent

$$\begin{aligned} &= \left[ \frac{100 - 95}{95} \times 100 \right] \% \\ &= 5.26\% \end{aligned}$$

23. Let the amount of the bill be ₹  $x$ .

Equivalent discount of two successive discounts of 20%

$$\begin{aligned} &= \left[ 20 + 20 - \frac{20 \times 20}{100} \right] \% \\ &= 36\% \end{aligned}$$

According to question,

$$36\% \text{ of } x - 35\% \text{ of } x = ₹22$$

$$\begin{aligned} \Rightarrow \frac{x \times 36}{100} - \frac{x \times 35}{100} &= 22 \frac{x}{100} = 22 \\ x &= ₹2200 \end{aligned}$$

24. CP of 1 book = ₹  $\frac{100}{11}$

SP of 1 book = ₹  $\frac{110}{10} = ₹11$

Percentage profit

$$= \frac{SP - CP}{CP} \times 100$$

$$= \frac{11 - \frac{100}{11}}{\frac{100}{11}} \times 100$$

$$= 21\%$$

25. Let CP of cloth be ₹ 100, then SP of half of his cloth at 40% profit

$$= 50 \times \frac{140}{100} = ₹70$$

SP of  $\frac{1}{4}$  th of his cloth at 40% loss

$$= 25 \times \frac{60}{100} = ₹15$$

SP of remain  $\frac{1}{4}$  th cloth = ₹25

$$\therefore \text{Total SP} = ₹(70 + 15 + 25) = ₹110$$

$$\therefore \text{Required profit} = \frac{110-100}{100} \times 100 = 10\%$$

26. Suppose, cost of book = ₹100

$$\therefore \text{First selling price of the book} = 100 + 10 = ₹110$$

$$\therefore \text{Reduced cost price of the book} = 100 \times \frac{96}{100} = ₹96$$

$\therefore$  Second selling price of the book

$$\begin{aligned} &= \frac{96 \times \left(100 + \frac{75}{4}\right)}{100} \\ &= 96 \times \frac{475}{4 \times 100} = ₹114 \end{aligned}$$

$$\therefore \text{Difference of selling price} = ₹114 - ₹110 = ₹4$$

$$\therefore \text{When ₹ 4 get more, cost price of the book} = ₹ 100$$

∴ When ₹ 6 get more, cost price of the book =  $\frac{100}{4} \times 6 = ₹150$  ]

27. ∴ Cost price of 2 toffees = ₹1

∴ Cost price of 1 toffee = ₹  $\frac{1}{2}$

Selling price of 5 toffees = ₹1

∴ Selling price of 1 toffee = ₹  $\frac{1}{5}$

$$\begin{aligned}\therefore \text{Loss per cent} &= \frac{\frac{1}{2} - \frac{1}{5}}{1} \times 100 \\ &= \frac{(5 - 2) \times 2}{10 \times 1} \times 100 \\ &= \frac{3 \times 2}{10} \times 100 = 60\%\end{aligned}$$

28. Let cost price of article = ₹ $x$

$$\text{Profit} = 1920 - x$$

$$1280 + x = \text{Loss}$$

$$\therefore \text{Profit} = \text{Loss}$$

$$\therefore 1920 - x = 1280 + x$$

$$3200 = 2x$$

$$x = ₹1600$$

$$\text{Profit on 25\%} = 1600 \times \frac{125}{100} = ₹2000$$

29. Cost price of 5 lemons = ₹16

$$\text{Cost price of 1 lemon} = ₹ \frac{16}{5}$$

$$\text{Selling price of 1 lemon on 25\% profit} = \frac{16}{5} \times \frac{125}{100} = \frac{16}{5} \times \frac{5}{4} = ₹4$$

30. Total cost price of scooter

$$= 4700 + 800$$

$$= ₹5500$$

$$\text{Selling price of scooter} = ₹5800$$

$$\text{Profit} = 5800 - 5500 = ₹300$$

$$\begin{aligned}\text{Profit per cent} &= \frac{\text{Profit} \times 100}{\text{Cost price}} \\ &= \frac{300 \times 100}{5500} = \frac{60}{11} \\ &= 5\frac{5}{11}\%\end{aligned}$$

**31.** Cost price of 1 toffee = ₹ $\frac{1}{6}$

Selling price of 1 toffee on 20%

$$\text{Profit} = \frac{1}{6} \times \frac{120}{100} = \frac{1}{6} \times \frac{6}{5} = \frac{1}{5}$$

Hence, vender selling 5 toffees in a rupee.

**32.** Cost of first 1000 sheet = ₹1000 Remaining sheets

$$\begin{aligned}&= 5000 - 1000 \\ &= 4000\end{aligned}$$

Given, 2% discount on remaining sheets

$$\begin{aligned}&= 4000 \times \frac{98}{100} = 40 \times 98 \\ &= ₹3920\end{aligned}$$

$$\text{Total cost} = 1000 + 3920 = ₹4920$$

**33.** The cost price of an article at a loss of 20% =  $\frac{280 \times 100}{80} = ₹350$

New SP of an article = ₹380

$$\therefore \text{Profit} = 380 - 350 = ₹30$$

Hence, profit per cent

$$\begin{aligned}&= \frac{30}{350} \times 100 \\ &= 8\frac{4}{7}\%\end{aligned}$$

**34.** SP of 25 chairs = CP of 25 chairs + Profit SP of 25 chairs  
 = CP of 25 chairs + SP of 5 chairs ( $\because$  Profit = SP of 5 chairs )  
 $\Rightarrow$  SP of 20 chairs = CP of 25 chairs  
 $\Rightarrow$  SP of 20 chairs = ₹375  
 $\Rightarrow$  SP of one chair = ₹18.75

**35.** Difference of SP = Difference of loss/profit

$$\begin{aligned} \Rightarrow \frac{400 - 380}{20} &= [(x + 4) - (x)]\% \\ &= 4\% \\ \therefore 100\% &= \frac{20}{4} \times 100 \\ &= ₹500 \end{aligned}$$

**36.** If the CP of  $m$  book is equal to SP of  $n$  books, then gain percentage

$$\begin{aligned} &= \frac{m - n}{n} \times 100 \\ &= \frac{36 - 30}{30} \times 100 \\ &= 20\% \end{aligned}$$

**37.** CP of 60 eggs = ₹10.80 (as 12 eggs were found rotten)

$$\text{SP of 60 eggs} = ₹12.00 \text{ gain} = ₹1.20$$

$\therefore$  Gain per cent

$$\begin{aligned} &= \frac{1.2}{10.8} \times 100 = \frac{100}{9} \% \\ &= 11\frac{1}{9} \% \end{aligned}$$

38. Let the selling price = ₹100.

If profit is ₹ 25 on SP, the cost price = ₹75

Actual profit per cent

$$\begin{aligned} &= \frac{\text{Profit}}{\text{CP}} \times 100 \\ &= \frac{25}{75} \times 100 \\ &= \frac{100}{3} \% \end{aligned}$$

39. Gain per cent = (100 + % first profit)

$$\begin{aligned} &\left[ \frac{100 - \%2\text{nd discount}}{100 - \%1\text{st discount}} \right] - 100 \\ &= (100 + 25) \left( \frac{100 - 20}{100 - 10} \right) - 100 \\ &= 125 \times \frac{80}{90} - 100 \\ &= \frac{100}{9} = 11\frac{1}{9} \% \end{aligned}$$

40. The CP will be ₹ 40, if the SP is ₹ 100.

$$\text{Percentage of SP to CP} = \frac{100}{40} \times 100 = 250\%$$

41. Let the shopkeeper has  $x$  eggs.

$$\begin{aligned} \therefore x \times \left( \frac{100 - 5}{100} \right) \left( \frac{100 - 93}{100} \right) &= 266 \\ \Rightarrow x \times \frac{19}{20} \times \frac{7}{100} &= 266 \\ \Rightarrow x &= 4000 \end{aligned}$$

42. The dealer uses a false weight in buying as well as selling. It means that he buys 1100 g and sells 900 g in place of 1 kg. Now, let the CP of 1100 g be ₹ 1000.

Marked price of 1100 g of goods = ₹ 1200 ( 20% up), and this is the SP of 900 g of goods.

$$\text{CP of 900 g} = ₹818.18$$

$$\text{Profit} = ₹381.82 \text{ and profit per cent}$$

$$= \frac{381.82}{818.18} \times 100 = 46.6\%$$

43. SP of 80 kg of rice = CP of 80 kg - loss

$$\text{SP of 80 kg rice} = 1200 - \text{SP of 20 kg of rice}$$

$$\text{SP of 100 kg of rice} = ₹1200$$

$$\therefore \text{SP of 1 kg of rice} = ₹12$$

44. CP of the table = ₹560

$$\text{SP of the table at a profit of 25\%} = ₹700$$

Since SP is arrived after a discount of 20% on marked price

$$\therefore \text{Marked price} = \frac{700}{0.8} = ₹875$$

45. Cost price of the article = ₹210

$$\text{Selling price at a profit of 20\%} = ₹252$$

$$\therefore \text{MP} \times 0.875 = ₹252$$

$$\Rightarrow \text{MP} = ₹ \frac{252}{0.875} = ₹288$$

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