Profit, Loss and Discount

Cost Price (CP)

Cost price is the price at which an article is purchased. Loss or gain is reckoned on the cost price.

Selling Price (SP)

Selling price is the price at which an article is sold.

Profit = SP – CP

Loss = CP – SP

Commission

Commission is an incentive given by the parent or manufacturing company to the retailer based on the sales of product.

Formulae

1. Profit percentage

$$= \frac{\text{Profit}}{\text{CP}} \times 100 = \left(\frac{\text{SP}}{\text{CP}} - 1\right) \times 100$$

2. Loss percentage

$$= \frac{\text{Loss}}{\text{CP}} \times 100 = \left(1 - \frac{\text{SP}}{\text{CP}}\right) \times 100$$

3. $\text{SP} = \frac{(100 + \text{Profit percentage}) \times \text{CP}}{100}$

or $\frac{(100 - \text{Loss percenatge}) \times \text{CP}}{100}$

4. $\text{CP} = \frac{100 \times \text{SP}}{(100 + \text{Profit percentage})}$

or $\frac{100 \times \text{SP}}{(100 - \text{Loss percentage})}$

5. If marked price be MP and discount percentage be 'd', then

$\text{SP} = \frac{\text{MP}(100-\text{d})}{100}$; $\text{MP} = \frac{100 \times \text{SP}}{(100 - \text{d})}$.

6. M.P. $\xrightarrow{-\text{ Discount}}$ S.P. $\xleftarrow{\text{Profit }+}$ C.P.

7. If 2 items are sold, each at ₹X, one at a gain of P% and the other at a loss of P%, then overall

loss percentage = $\frac{\text{P}^2}{100}$ %

8. Successive Discounts: If two discounts of a% and b% are given successively, then the net discount given in percentage is = $a + b + \frac{ab}{100}$.

We have learnt this in the percentage chapter.

Solved Examples

1. A boy buys eggs at 10 for ₹1.80 and sells them at 11 for ₹2. What is his gain or loss percentage?

Solution :

To avoid fractions, let the number of eggs purchased be LCM (10, 11) = 110

CP of 110 eggs = $\frac{110 \times 1.80}{10}$ = ₹19.80

SP of 110 eggs = $\frac{110 \times 2.00}{11}$ = ₹20.

Profit percentage = $\frac{0.20 \times 100}{19.80}$ = 1.01%

2. A woman buys certain number of apples at 15 per rupee and the same number at 20 per rupee. She mixes and sells them at 35 for ₹2. What is her gain or loss percentage?

Solution :

Suppose the woman buys (LCM of 15, 20 and 35) 420 apples.

Cost at the rate of 15 per rupee = ₹28.

Cost at the rate of 20 per rupee = ₹21.

Total cost for 840 apples = ₹49.

SP for 840 apples = $\frac{840 \times 2}{35}$ = ₹48;

Loss percentage = $\frac{1 \times 100}{49}$ = 2.04%

3. A man bought 80 kg rice for ₹88 and sold it at a loss of as much money as he received for 20 kg. At what price did he sell it?

Solution :

CP of 80 kg – SP of 80 kg = SP of 20 kg
SP of 100 kg = CP of 80 kg = ₹88
SP of 1 kg = 88 paise;
He sold it at 88 paise per kilogram.

Types of question	Example	Approach to question
1. If a dealer sells a goods at cost price but uses a false weight, find his profit percentage.	A dishonest dealer professes to sell his goods at cost price, but he uses a weight of 960 gm for 1 kg. Find his profit %.	Profit % = $\frac{x}{y}\times 100$ where x is the error and y is True value – x. $\therefore \frac{40}{1000-40}\times 100 = 4.16\%$
2. If A sells to B at a profit of x%, B sells to C at a profit of y% and C pays ₹P for it, find the cost for A.	A sells a cycle to B at a profit of 10%, B sells to C at a profit of 20%. If C pays ₹264 for it, what did A pay for it?	$C.P_C = \frac{100+x}{100}\times\frac{100+y}{100}\times P$ where x and y are the profit % for A and B, and P is the cost for A. $\therefore \frac{110}{100}\times\frac{120}{100}\times P = 264$ P = ₹200
3. If cost price of A articles is equal to the selling price of B articles, find the profit %.	The C.P. of 10 articles is equal to the S.P. of 9 articles. Find the profit %.	Profit % = $\frac{A-B}{B}\times 100$ where A is the number of articles bought and B is the number of articles sold. $\therefore \frac{10-9}{9}\times 100 = 11.11\%$
4. The cost price of two articles is the same. If one is sold at a X% profit and the other at a loss of X%, find his profit or loss %.	Amit buys 2 cows for ₹200 each. He sells one at a profit of 10% and the other at a loss of 10%. Find his profit or loss %.	For the same cost price and equal profit and loss %, there is no profit and no loss. $\therefore$ Profit or loss = 0%
5. The selling price of two articles is the same. If one is sold at X% profit and the other at a loss of X%, find his profit or loss %.	Amit sells 2 cows for ₹200 each. On one he gets a profit of 10%, while loses 10% on the other. What is his overall profit or loss %?	Loss % = $\frac{X^2}{100}\%$ $= \frac{10^2}{100}\% = 1\%$
6. Find the single rate of discount equal to two successive discounts of x % and y%.	What single rate of discount is equal to two successive discounts of 10% and 15%?	Using successive percentage change: $-10-15+\frac{10\times 15}{100}$ $-25+1.5=-23.5\%$ Hence, discount = 23.5%
7. If x% discount on an article is given on cash payment, find he % that should be marked bove the cost price so as to make a profit of y%.	A dealer allows a discount of 7% for cash payment. How much % above the cost price should he mark his goods to make a profit of 10%?	M.P = $\frac{100+y}{100-x}\times 100$, where x% is the discount and y% is the profit. $\therefore$ 110/93 ×100 = 118.28 Hence, 118.28 – 100 = 18.28%

4. Goods are purchased for ₹450 and one-third is sold at a loss of 10%. At what profit per cent should the remainder be sold so as to gain 20% on the whole transaction?

Solution :

Total cost price of goods = ₹450

SP of total goods $= 450 \times \frac{120}{100} = ₹540$

SP of one-third goods = $\frac{90}{100} \times \frac{450}{3} = ₹135$

SP of the remaining goods = 540 – 135 = ₹405

CP of the remaining (two-thirds) goods = ₹300

Hence, profit percentage = $\frac{105}{300} \times 100 = 35\%$

Alternative method:

Applying weighted average, one-third of quantity there is a loss of 10% (or a profit of –10%) and balance two-thirds gives a profit of x%.

Hence, overall profit is given by $\frac{1}{3}(-10\%)$ of CP + $\frac{2}{3}(x\%)$ of CP = 20% of CP.

Thus, x = 35%.

5. A reduction of 10% in the price of sugar enables a man to buy 25 kg more for ₹225. What is the original price of sugar (per kilogram)?

Solution :

Let the original price be x.

Original quantity = $\frac{225}{x}$

New price = 0.9x

New quantity = $\frac{225}{0.9x}$

$\Rightarrow \frac{225}{0.9x} - \frac{225}{x} = 25$

$\Rightarrow$ x = ₹1/kg

Alternative method:

CP of 25 kg = $\frac{10}{100} \times 225 = ₹22.5$;

Reduced CP of 1 kg = $\frac{22.5}{25} = ₹0.90$

Original price of sugar (per kilogram) = $\frac{0.90}{90} \times 100 = ₹1$

6. A man sold an article at a profit of 25%. If he had bought it at 20% less and sold it for ₹10.50 less, he would have gained 30%. Find the CP of the article.

Solution :

Let CP = ₹x; SP = 1.25x

New CP = 0.8x; new SP = 1.25x – 10.50

But new SP = 130% of new CP = 1.3 × 0.8x

Therefore, 1.3 × 0.8x = 1.25x – 10.50

$\Rightarrow$ x = ₹50.

7. A vendor bought bananas at 6 for ₹5 and sold at 4 for ₹3. Find his gain or loss percentage.

Solution :

Let number of bananas be 24. (A multiple of 4 and 6)

Cost price = $\frac{24}{6} \times 5 = ₹20$

Selling price = $\frac{24}{4} \times 3 = ₹18$;

$\therefore$ Loss percentage = $\frac{2}{20} \times 100$ = 10%

8. If a commission of 10% is given on the marked price of an article, the gain is 25%. Find the gain percentage, if the commission is increased to 20%.

Solution :

Let marked price = ₹100

Commission = ₹10

SP after 10% commission = 90

CP = $\frac{90}{125} \times 100 = ₹72$

New commission = ₹20

New SP = ₹80, Gain = 80 – 72 = 8

Gain percentage = $\frac{8 \times 100}{72} = 11.1\%$

9. Peanuts are sold at 60 per rupee. If the vendor decides to hike SP by 20%, how many peanuts can be bought per rupee?

Solution :

SP of one peanut = ₹$\frac{1}{60}$.

New SP = $\frac{1.2}{60} = ₹\frac{1}{50}$

Therefore, 50 peanuts can be bought per rupee.

10. Sumit buys 9 books for ₹100 but sells 8 for ₹100. What is the net profit percentage?

Solution :

SP of 8 books = ₹100

$\therefore$ SP of one book = $\frac{100}{8}$ = ₹12.50

$\therefore$ SP of 9 books = 12.50 × 9 = ₹112.50

$\therefore$ Profit percentage = 12.5%

Alternative method:

CP of 9 books = SP of 8 books

CP of 8 books + CP of 1 book = SP of 8 books

CP of 1 books = SP of 8 books – CP of 8 books

Profit = CP of 1 book

Profit percentage = $\frac{\text{CP of 1 book}}{\text{CP of 8 books}} \times 100 = 12.5\%$.

11. If by selling an article for ₹100, a man gains ₹15, then what is his gain percentage?

Solution :

SP = ₹100, gain = ₹15. So, CP = SP – Gain

$\therefore$ Gain percentage = $\left(\frac{15}{85} \times 100\right)\% = 17\frac{11}{17}\%$

12. A grain dealer gains to the extent of 10% while buying as well as selling by using false weights. What is his total gain?

Solution :

Rule: Gain percentage

$= \frac{(100 + \text{Common gain percentage})^2}{100} - 100$

Gain percentage

$= \left[\frac{(100+10)^2}{100} - 100\right]\% = \left(\frac{12100 - 10000}{100}\right)\%$

= 21%

Alternate Method:

This question can also be done by using the approach

$a + b + \frac{ab}{100} \Rightarrow 10 + 10 + \frac{10 \times 10}{100} = 21\%$

13. A person bought 20 L milk at the rate of ₹8 per litre. He got it churned after spending ₹10 and got 5 kg cream and 20 L toned milk. If he sold the cream at ₹30 per kilogram and toned milk at ₹4 per litre, what was his profit in the transaction?

Solution :

Investment = ₹(20 × 8 + 10) = ₹170;

Receipt = ₹(30 × 5 + 20 × 4) = ₹230

$\therefore$ Gain percentage = $\left(\frac{60}{170} \times 100\right)$

= 35.29% $\approx$ 35.3%

14. A person earns 15% on an investment but loses 10% on another investment. If the ratio of the two investments is 3 : 5, what is the gain or loss on the two investments taken together?

Solution :

Let the investments be 3x and 5x.Then, the total investment = 8x.

Total receipt = (115% of 3x + 90% of 5x)

= (3.45x + 4.5x) = 7.95x

So loss = 8x – 7.95x = 0.05x

$\therefore$ Loss percentage = $\left(\frac{0.05x}{8x} \times 100\right)\%$

= 0.625%

15. Vivek purchased 120 tables at a price of ₹110 per table. He sold 30 tables at a profit of ₹12 per table and 75 tables at a profit of ₹14 per table. The remaining tables were sold at a loss of ₹7 per table. What is the average profit per table?

Solution :

Total CP = ₹(120 × 110) = ₹13,200

Total SP = (30 × 110 + 30 × 12) + (75 × 110 + 75 × 14) + (15 × 110 – 15 × 7) = ₹14,505

$\therefore$ Average profit = ₹ $\left(\frac{14505 - 13200}{120}\right)$

$= ₹\frac{1305}{120} = ₹10.875$

Exercise

1. If books bought at prices ranging from ₹200 to ₹350 are sold at prices ranging from ₹300 to ₹425, what can be the greatest possible profit?
   (a) ₹400
   (b) ₹600
   (c) Cannot be determined
   (d) None of these
2. The cost price of 20 articles is same as the selling price of 15 articles. The profit percentage is
   (a) 25% (b) 30%
   (c) 33.33% (d) 50%
3. If the selling price of an article is $\frac{4}{3}$ times of its cost price, the profit percentage is
   (a) $33\frac{1}{3}\%$ (b) $25\frac{1}{4}\%$
   (c) $20\frac{1}{2}\%$ (d) $20\frac{1}{3}\%$
4. If the cost price of 12 books is same as the selling price of 16 books, the loss percentage is
   (a) 15% (b) 20%
   (c) 25% (d) 30%
5. A man loses the selling price of 4 apples on selling 36 apples. His loss percentage is
   (a) 12.5% (b) 11.11%
   (c) 10% (d) None of these
6. By selling a table, Aditya earned a profit equal to one-fourth of the price for which he bought it. If he sold it for ₹375, what was the cost price?
   (a) ₹281.75 (b) ₹300
   (c) ₹312.50 (d) ₹350
7. A man bought a number of bananas at 3 for a rupee and an equal number at 2 for a rupee. At what price per dozen should he sell them to make a profit of 20%?
   (a) ₹4 (b) ₹5
   (c) ₹6 (d) ₹7
8. A man bought oranges at ₹5 a dozen and an equal number at ₹2 a dozen. He sold them at ₹5.50 a dozen and made a profit of ₹50. How many oranges (in dozens) did he buy?
   (a) 25 (b) 40
   (c) 50 (d) 60
9. A producer of tea blends two varieties costing ₹18 per kilogram and another ₹20 per kilogram in the ratio 5 : 3. If he sells the blended variety at ₹21 per kilogram, what is his gain percentage?
   (a) 10% (b) 12%
   (c) 19% (d) 22%
10. Ram purchased 35 kg rice at ₹9.50 per kilogram and 30 kg at ₹10.50 per kilogram, and mixed them. At what price (per kilogram) should he sell the mixture to gain 35%?
    (a) ₹12 (b) ₹12.50
    (c) ₹13 (d) ₹13.50
11. Oil costs ₹100 per liter. After adulterating it with another oil that costs ₹50 per liter, Ram sells the mixture at ₹96 per liter making a profit of 20%. In what ratio does he mix the two?
    (a) 1 : 2 (b) 3 : 2
    (c) 3 : 1 (d) None of these
12. Two varieties of rice are mixed in the ratio 2 : 3 and sold at ₹22 per kilogram, resulting in a profit of 10%. If the cost of the first variety rice be ₹14 per kilogram, the cost per kilogram of the second variety rice will be
    (a) ₹23 (b) ₹24
    (c) ₹25 (d) None of these
13. A dealer who professes to sell his goods at cost price uses a 900 g weight for a kilogram. His gain percentage is
    (a) 9% (b) 10%
    (c) 11% (d) 11.11%
14. A dealer professes to sell his goods at cost price, but he uses a false weight and gains $6\frac{18}{47}\%$. What is the weight used per kilogram of goods sold by him?
    (a) 953 g (b) 940 g
    (c) 960 g (d) 947 g
15. By selling toffees at 20 for a rupee, a man loses 4%. To gain 20% for a rupee he must sell
    (a) 16 toffees (b) 20 toffees
    (c) 24 toffees (d) 25 toffees
16. A man gains 10% by selling an article for a certain price. If he sells it at double the price, the profit is
    (a) 20% (b) 120%
    (c) 100% (d) 140%

17. 'A' bought a cycle and spent ₹110 on its repairs. He then sold it to 'B' at a profit of 20%. 'B' sold it to 'C' at a loss of 10%. 'C' sold it at a profit of 10% for ₹1,188. How much did 'A' buy it for?
    (a) ₹850 (b) ₹890
    (c) ₹930 (d) ₹950
18. If the manufacturer gains 10%, the wholesaler gains 15%, and the retailer gains 25%, what is the cost of production of the goods if the retail price is ₹1,265?
    (a) ₹632.50 (b) ₹800
    (c) ₹814 (d) ₹834.34
19. A man sells 2 cows for ₹4,000 each, neither gaining nor losing in the deal. If he sold one cow at a gain of 25%, then the other cow is sold at a loss of
    (a) 16.66% (b) 18.22%
    (c) 25% (d) None of these
20. Two horses were sold for ₹12,000 each, one at a loss of 20% and the other at a gain of 20%. The entire transaction resulted in
    (a) no loss, no gain (b) loss of ₹1,000
    (c) gain of ₹1,000 (d) gain of ₹2,000
21. A vendor has 24 kg apples. He sells part of these at 20% gain and the balance at 5% loss. If on the whole he earns a profit of 10%, the part of apples sold at a loss is
    (a) 6 kg (b) 4.6 kg
    (c) 9.6 kg (d) 11.4 kg
22. The cost price of an article is 40% of the selling price. The percentage that selling price is of the cost price is
    (a) 250% (b) 240%
    (c) 60% (d) 40%
23. By selling an article, there is a loss of 2.5%. By selling it at ₹6 more, there is a gain of 5%. The cost price of the article is
    (a) ₹78 (b) ₹80
    (c) ₹82 (d) ₹84
24. A man sold an article for a gain of 5%. If he had bought it for 5% less and sold it for ₹1 less, he would have made a profit of 10%. The cost price of the article is
    (a) ₹100 (b) ₹150
    (c) ₹200 (d) ₹500
25. Profit after selling goods for ₹425 is the same as the loss after selling it at ₹355. What is its cost price?
    (a) ₹385 (b) ₹390
    (c) ₹395 (d) ₹400
26. The profit earned by selling a table for ₹900 is double the loss incurred when it is sold for ₹450. At what price should it be sold to make 25% profit?
    (a) ₹600 (b) ₹750
    (c) ₹800 (d) Data inadequate
27. Successive discounts of 30%, 20% and 10% is equivalent to a single discount of
    (a) 50% (b) 49.6%
    (c) 39.4% (d) 51%
28. The difference between the discount of 40% on ₹500 and two successive discounts of 36% and 4% on the same price is
    (a) nil (b) ₹2
    (c) ₹7.20 (d) ₹1.93
29. At what percentage above the cost price must an article be marked so as to gain 33% after allowing a discount of 5%?
    (a) 38% (b) 40%
    (c) 43% (d) 48%
30. A trader allows two successive discounts of 20% and 10%. If he sells the article for ₹108, then the marked price of the article is
    (a) ₹150 (b) ₹148
    (c) ₹142 (d) ₹140
31. A merchant intends to offer a discount of 10% but would like to maintain the current prices. By what percentage should he increase the list price?
    (a) 10% (b) 9.09%
    (c) 11.11% (d) 12.5%
32. A hotel offers 10% discount on food purchased during happy hours and 5% overall discount on all purchases exceeding ₹150. What is the net percentage discount offered to a customer who purchased food worth ₹190 during the happy hours?
    (a) 14.75% (b) 15%
    (c) 14% (d) 14.5%

33. A trader quotes ₹45 for an article whose cost price is ₹30. The customer pays him a fifty-rupee note. The trader does not have the change to return ₹5 to the customer. He thus goes to a neighbouring shop to get change for ₹50. The customer collects his balance of ₹5. The next day the neighbouring shop owner realizes that the fifty-rupee note was fake and demanded ₹50 back from the trader. What is the total loss to the trader?
    (a) ₹80 (b) ₹85
    (c) ₹35 (d) ₹30
34. A merchant sells rice and makes a profit of 6%. His cost price increases by 10% and thus he increases his selling price also by 10%. What profit percentage does he earn now?
    (a) 6% (b) 6.6%
    (c) 10% (d) None of these
35. A trader buys 78 kg of wheat for ₹492. He sells 40% of this at a loss of 20%. What should be the percentage mark up on the remaining so as to gain an overall 25%?
    (a) 40% (b) 55%
    (c) 28% (d) 45%
36. Sneha buys X eggs to resell them at a profit of 10% but loses 10% of the eggs. By how much should she mark up the selling price in order to retain 10% profit?
    (a) 30% (b) 40%
    (c) 33.33% (d) 22.22%
37. A merchant gives a discount of 10% on tea, but uses a weight of 900 gm per kilogram. Find his net profit/loss percentage.
    (a) 3.33% (b) 2.05%
    (c) 4.67% (d) No profit no loss
38. By selling 25 L of milk at ₹50 per litre, a merchant earns a profit equivalent to the cost price of 5 L. Find the profit percentage.
    (a) 15% (b) 25%
    (c) 20% (d) 18%
39. A man bought 100 kg of rice for ₹1,100 and sold it at a loss of as much money as he received for 20 kg of rice. At what price approximately did he sell the rice?
    (a) ₹9.17 (b) ₹10.50
    (c) ₹10.14 (d) ₹9.50

Answer Key

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

Explanations

1. c Nothing is mentioned about the number of books.

2. c CP of 20 articles = SP of 15 articles.
SP of 15 = CP of 15 + CP of 5.
We know, SP = CP + Profit
$\therefore$ Percentage profit = $\frac{5}{15}\times 100 = 33.33\%$.

3. a Let CP = x.
Then, SP = $\frac{4x}{3}$.
Gain = $\left(\frac{4x}{3} - x\right) = \frac{x}{3}$.
$\therefore$ Gain percentage = $\left(\frac{x}{3}\times\frac{1}{x}\times 100\right) = 33\frac{1}{3}\%$.

4. c SP of 16 books = CP of 12 books.
SP of 16 = CP of 16 – CP of 4.
$\therefore$ Percentage Loss = $\frac{4}{16}\times 100 = 25\%$.

5. c Loss = SP of 4 apples on selling 36 apples.
$\therefore$ SP of 40 = CP of 36 = CP of 40 – CP of 4
$\therefore$ Loss percentage = $\frac{4}{40}\times 100 = 10\%$.

6. b Profit = $\frac{1}{4}$ of CP, SP = ₹375.
Profit = SP – CP
$\frac{1}{4}CP = 375 - CP \Rightarrow 375 = \left(1+\frac{1}{4}\right)CP$
$CP = 375\times\frac{4}{5} = ₹300$

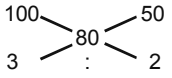
7. c CP of one banana of first quality = ₹$\frac{1}{3}$.
CP of one banana of second quality = ₹$\frac{1}{2}$.
Average CP = $\frac{\frac{1}{3}+\frac{1}{2}}{2} = ₹\frac{5}{12}$.
SP = ? P = 20%
SP = CP $\frac{(100 + \text{Gain percentage})}{100}$.
SP = $\frac{5}{12}\times\frac{120}{100}$ = ₹$\frac{1}{2}$ per banana.
Price per dozen = $\frac{1}{2}\times 12 = ₹6$.

8. a CP of one dozen oranges of first quality = ₹5.
CP of one dozen oranges of second quality = ₹2.
Average CP = $\frac{5+2}{2}$ = ₹3.50 per dozen.
SP = ₹5.50
Profit per dozen = ₹2.
Total profit = ₹50.
$\therefore$ Number of dozens = $\frac{50}{2}$ = 25.

9. b CP of first = ₹18 per kilogram.
CP of second = ₹20 per kilogram.
Suppose he mixes 5 kg of first and 3 kg of second (for 8 kg rice).
Total CP = 18 × 5 + 20 × 3 = 90 + 60 = ₹150.
Total SP = 21 × 8 = ₹168.
$\text{Profit} = \frac{18}{150}\times 100 = 18\times\frac{2}{3} = 12\%$.

10. d Total CP = 35 × 9.5 + 30 × 10.5
= 332.5 + 315 = ₹647.5 (For 65 kg rice)
SP = CP $\frac{(100 + \text{Gain percentage})}{100}$
SP = $\frac{647.5}{65}\times\frac{135}{100} \approx ₹13.50$

11. b Let the ratio be x : 1 of ₹100 per liter and ₹50 per liter oil.
Total CP = ₹(100x + 50).
Total SP = ₹96(x + 1)
$96(x+1) = (100x+50)\times\frac{120}{100}$
96 × 5(x + 1) = 6 × 50(2x + 1)
8(x + 1) = 5(2x + 1)
$\Rightarrow$ 8x + 8 = 10x + 5
$\Rightarrow$ 2x = 3
$\Rightarrow x = \frac{3}{2}$
$\therefore$ Ratio is 3 : 2.
Short cut:
CP of the mixture = $\frac{96}{1.2}$ = 80.
Using alligation,



12. b Let the quantity of rice be 2x and 3x kilograms.
Profit = 10%, SP = ₹22.
CP of 2x kg = ₹14 per kilogram.
Let CP of 3x kg = ₹y per kilogram.
Total CP = ₹(28x + 3xy)
Total SP = ₹22 × 5x = 110x.

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

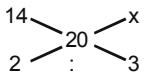
$$110x = (28x + 3xy) \times \frac{110}{100}$$

$$\Rightarrow 100 = 28 + 3y;\ y = \frac{72}{3} = ₹24$$

Short cut:

CP of the mixture = 20.

Using alligation,



$$\Rightarrow \frac{x - 20}{20 - 1} = \frac{2}{3}$$

$$\Rightarrow x = 24$$

13. d Gain percentage = $\frac{100}{900} \times 100 = 11.11\%$.

14. b If he uses a weight of x grams, then profit percentage $= \frac{1000 - x}{x} \times 100$, which is equal to $6\frac{18}{47}\%$.

Therefore, x = 940 g.

15. a Number of toffees = $\frac{1}{\left(\frac{1}{20}\right)\left(\frac{1.2}{0.96}\right)} = 16$.

Short cut:

To make a gain, number of toffees must be less than 20. (from options)

16. b Let CP = 100. Therefore, SP = 110.

If SP = 220, Profit percentage = 120%.

17. b Let CP for A = ₹x.

Total CP after repairs = ₹(x + 110)

B's CP = (x + 110) × 1.2

C's CP = (x + 110) × 1.2 × 0.9

C's SP = (x + 110) × 1.2 × 0.9 × 1.1 = ₹1,188

$$\therefore x + 110 = \frac{1188 \times 1000}{12 \times 9 \times 11}$$

$$\Rightarrow x + 110 = 1000 \Rightarrow x = ₹890$$

18. b Let the cost of production be ₹a.

a × 1.1 × 1.15 × 1.25 = ₹1,265

$$\Rightarrow a = \frac{1265}{1.1 \times 1.15 \times 1.25} = \frac{1265 \times 100000}{11 \times 115 \times 125}$$

$$\Rightarrow a = \frac{100000}{125} = ₹800$$

19. a $SP_1 = SP_2 = ₹4,000$.

$Gain_1 = 25\%$, $loss_2 = ?$

$CP_1 = 4000 \times \frac{100}{125} = ₹3,200$

$\therefore CP_2 = ₹4000 + ₹800 = ₹4,800$

($\because$ Total SP = Total CP)

Therefore, loss percentage = $\frac{800}{4800} \times 100 = 16.66\%$.

20. b When SP of two articles is same, one is sold at a loss of x% and other at a gain of x%, then there is always an overall loss, by $\frac{x^2}{100}\%$ and which is

$= \frac{20 \times 20}{100} = 4\%$

$\therefore$ Total CP $= \frac{12000 \times 2}{0.96} = 25000$

$\therefore$ Loss = ₹(25000 – 24000) = ₹1000

21. c Let CP per kilogram be ₹1.

So total CP of 24 kg = ₹24.

Let he sell x kilograms apples at 20% gain and (24 – x) kg at 5% loss.

$SP_1 = \frac{120x}{100} = 1.2x$ … (i)

$SP_2 = 0.95(24 - x) = 22.8 - 0.95x$ … (ii)

Overall profit = 10% on ₹24 = ₹2.4

But, Total SP – Total CP = ₹2.4

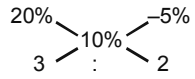
[1.2x + 22.8 – 0.95x] – 24 = 2.4

Solving for x, x = ₹14.4

$\therefore$ Amount sold at loss is 24 – x = 9.6 kg.

Short cut:

Using alligation,



Therefore, $\frac{2}{5} \times 24 = 9.6$ kg.

22. a CP = 40% of SP = 0.4 SP.

$SP = \left(\frac{10}{4} \times 100\%\right)$ of CP = 250% CP.

23. b Profit and loss are calculated on the cost price.

$\therefore$ Difference in percentages = 5 – (– 2.5) = 7.5%

7.5% of C.P. = ₹6

$\therefore$ CP = $\frac{6 \times 100}{7.5}$ = ₹80

24. c Let CP = 100. SP = 105. New CP = 95. Profit = 10%.

Therefore, New SP = 104.5. Therefore, he is now selling at ₹0.5 less. He would sell at ₹1 less if CP = ₹200.

25. b $CP = \frac{355 + 425}{2} = ₹390$

26. b Let CP = ₹x.

Profit = SP – CP = (900 – x)

Loss = CP – SP = (x – 450)

$\therefore$ 900 – x = 2 (x – 450)

900 – x = 2x – 900 $\Rightarrow$ 1800 = 3x $\Rightarrow$ x = ₹600 = CP.

Now to make a profit of 25%,

SP = 600 × $\frac{125}{100}$ = ₹750

27. b 30%, 20%, 10%

(1 and 2) : – 30 – 20 + $\frac{600}{100}$ = – 44%

(1 and 2) and 3 : – 44 – 10 + $\frac{440}{100}$ = – 49.6%

The –ve sign here indicates discount percentage.

Short cut:

0.7 x 0.8 x 0.9 = 0.504 = 50.4%.

Therefore, 100 – 50.4 = 49.6%.

28. c 36% and 4% successive discounts equal to

–36 – 4 + $\frac{144}{100}$ = –38.56%

Difference = 40 – 38.56 = 1.44%.

$\therefore$ 1.44% of 500 = ₹7.20

29. b MP = CP $\frac{(100 + \text{Profit percentage})}{(100 - \text{Discount percenatge})}$

MP = CP × $\frac{133}{95}$ = 1.4 CP

$\therefore$ MP is 40% above the CP.

30. a Net discount = –20 – 10 + $\frac{200}{100}$ = 28%

SP = MP $\frac{(100 - \text{Discount percentage})}{100}$

108 = MP × $\frac{72}{100}$, MP = ₹150.

31. c Let MP = ₹100 = SP (Initially)

After a discount of 10%, SP would be ₹90.

But the shopkeeper wants to maintain the current price, i.e. SP = ₹100.

When SP = ₹90, MP = ₹100.

$\therefore$ When SP = ₹100, MP = ₹100 × $\frac{100}{90}$

= ₹111.11 or 11.11% increase.

32. d The customer would get two successive discounts of 10% and 5%

$\therefore$ Net discount = a + b + $\frac{ab}{100}$

= – 10 – 5 + $\frac{50}{100}$ = –14.5%

33. c Total loss to the shopkeeper = (CP of article + Balance) = (30 + 5) = ₹35

34. a If CP and SP increases by the same percentage, the profit remains same.

35. b In this case weight given is of no use. We have to calculate in percentage terms only.

Let total quantity of wheat = 100x

And percentage mark up = p%

$\Rightarrow 40x \times \frac{80}{100} + 60x\left(\frac{100+p}{100}\right) = 100x \times \frac{125}{100}$

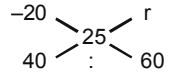
$\Rightarrow$ 320 + 600 + 6p = 1250 $\Rightarrow$ 6p = 330

$\Rightarrow$ p = 55%

Short cut:

Let r% be the percentage mark-up (or profit percentage).

Then using alligation,



$\Rightarrow$ r = 55%

36. d Let CP_1 per egg initially = ₹1 per egg

(Assuming she had 100 eggs.)

Due to loss of 10% eggs, CP of remaining 90 eggs increases.

CP_2 = $\frac{100}{90}$ = ₹1.11 per egg

To retain 10% profit,

SP_2 = 1.11 x 1.1 = 1.221 or a mark-up of 22.1%.

37. d If CP of tea is ₹1 per kilogram, then he is receiving ₹1,000 for something which is worth ₹900. But he gives a discount of 10% on ₹1000, i.e. sells at ₹900. Hence, no loss no profit.

38. c Let CP per litre milk be ₹x.

For 25 L, CP = ₹25x, SP = ₹1,250.

Profit = ₹5x = SP – CP

$\Rightarrow$ 5x = 1250 – 25x $\Rightarrow$ x = ₹41.66 per litre.

Profit percentage = $\frac{50 - 41.66}{41.66} \times 100$ = 20%.

39. a Let SP of 1 kg rice = ₹x.

SP of 100 kg rice = ₹100x.

CP of 100 kg rice = ₹1,100.

$\therefore$ Loss = ₹20x = CP – SP = 1100 – 100x

$\Rightarrow x = \frac{1100}{120} \approx$ ₹9.17