Profit and Loss- Key Notes

Profit=SP-CP
Loss=CP-SP
Profit %= ((SP-CP)/CP) *100
Loss %= ((CP-SP)/ CP) *100
Discount= MP-SP
Discount %= ((MP-SP)/ MP) * 100
where SP= Selling Price, CP= Cost Price, MP= Marked Price

Exercise questions

1. A trader makes a profit equal to the selling price of 75 articles when he sold 100 of the articles. What % profit did he make in the transaction?
A) 33.33%
B) 75%
C) 300%
D)150%

2. A merchant buys two articles for Rs.600. He sells one of them at a profit of 22% and the other at a loss of 8% and makes no profit or loss in the end. What is the selling price of the article that he sold at a loss?
A) Rs. 404.80
B) Rs.440
C) Rs. 536.80
D) Rs. 160

3. A trader professes to sell his goods at a loss of 8% but weights 900 grams in place of a kg weight. Find his real loss or gain per cent.
A) 2% loss
B) 2.22% gain
C) 2% gain
D)None of these

4. Rajiv sold an article for Rs.56 which cost him Rs.x. If he had gained x% on his outlay, what was his cost?
A) Rs. 40
B) Rs. 45
C) Rs. 36
D)Rs. 28

5. A trader buys goods at a 19% Amount on the label price. If he wants to make a profit of 20% after allowing a Amount of 10%, by what % should his marked price be greater than the original label price?
A) +8%
B) -3.8%

C) +33.33%
D) None of these

6. If apples are bought at the rate of 30 for Rs.100. How many apples must be sold for Rs.100 so as to gain 20%?
A) 28
B)25
C) 20
D) 22

7. One year payment to the servant is Rs. 200 plus one shirt. The servant leaves after 9 months and receives Rs. 120 and a shirt. Then find the price of the shirt.
A) Rs. 80
B) Rs. 100
C) Rs. 120
D) Cannot be determined

8. Two merchants sell, each an article for Rs.1000. If Merchant A computes his profit on cost price, while Merchant B computes his profit on selling price, they end up making profits of 25% respectively. By how much is the profit made by Merchant B greater than that of Merchant A?
A) Rs.66.67
B) Rs. 50
C) Rs.125
D) Rs.200

9. A merchant marks his goods in such a way that the profit on sale of 50 articles is equal to the selling price of 25 articles. What is his profit margin?
A) 25%
B)50%
C) 100%
D)66.67%

10. A merchant marks his goods up by 75% above his cost price. What is the maximum % Amount that he can offer so that he ends up selling at no profit or loss?
A)75%
B) 46.67%
C) 300%
D)42.85%

Answer Key

1.C; 2.A; 3.B; 4.A; 5.A; 6.B; 7.C; 8.B; 9.C; 10.D

Concepts and Theory

Important formula and Equations

Gain= SP-CP
Loss= CP-SP
Gain Percentage= (Gain*100)/ CP
Loss Percentage= (Loss*100)/ CP
Selling Price=((100+Gain %)/100)*CP or ((100-Loss%)/100)*CP
Cost Price= (100*SP)/(100+Gain%) or (100*SP)/(100-Loss%)

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:

Loss %= (Common loss ans gain %)^2/10 = (x/10)^2

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

Gain%=((Error)/(True value)-(Error))*100%

Key Notes

When an article is sold at a profit of x%. If it would be sold for Rs.n less, there would be a loss of y%, then the cost price of the article CP=(n*100)/(x+y)

A man sells an article at a gain of x%. If it would have been sold for Rs.n more, there would have a profit of y%, then CP= (n*100)/(y-x)

A person brought two articles for Rs.n. On selling one article at x% profit and other at y% profit, he get the same selling price of each, then
CP of first article= Rs. (100+y)n/200+x+y

CP of second article= Rs. (100+x)n/ 200+x+y

When m articles are brought for Rs.n and n articles are sold for Rs.m and m>n, then profit%= ((m^2-n^2)*100)/n^2
If A sells an article to B at a profit of r1 %, B sells it to C at a profit of r2 % and C sells it to D at a profit of r3 %, then, cost price of D= Cost Price of A (1+r1/100)(1+r2/100)(1+r3/100)

If A sells an article to B at a loss of r1 %, B sells it to C at a loss of r2 % and C sells it to D at a loss of r3 %, then, cost price of D= Cost Price of A (1-r1/100)(1-r2/100)(1-r3/100)

A dealer purchases a certain number of articles at x articles for a rupee and the same number at y articles for a rupee. He mixes them together and sells at z articles for a rupee.
Then his gain or loss %=([2xy- 1]/z(x+y))*100; according to positive or negative sign.

If P1 is rate gain w.r.t. selling price S1 and P2 is rate gain w.r.t. selling price S2
Then CP=(100/P1-P2)* difference between selling prices

If P1 is rate gain w.r.t. selling price S1 and P2 is rate loss w.r.t. selling price S2
Then CP= (100/ P1+P2) * difference between selling prices

When a man sells two things at the same price each and in this process his loss on first thing is x% and gain on second thing is x%, then in such a type question, there is always a loss and
Loss= $2*SP/((100/x)^2 -1)$

When a man buys two things on equal price each and in those things one is sold on the profit of x% and another is sold on the loss of x%, then there is no loss or no gain percent.
A sells an article at a profit of r1 % to B and B again sells it to C at a profit of r2 %. If C pays Rs. P to B, then CP of the article for
A= Rs. 100*100*P/(100+r1)(100+r2)

When a shopkeeper on selling an article for Rs.n, gains as much percent as the cost price of it,then CP of the article $= Rs.\left[-50 \pm 10\sqrt{25+r}\right]$

If there is loss in place of profit,
then CP of the article= $Rs.\left[50 \pm 10\sqrt{25-r}\right]$

If two articles are sold at the same price (i.e., the selling prices are equal) and the magnitude of percentage of profit x on one article is the same as the magnitude of percentage of loss x on the second article, then there is an overall loss and the percentage of loss is $x^2/100$.

If a shopkeeper claims to sell the goods at cost price and gives x units less than the actual weight, then the profit percentage made by the shopkeeper is [x / actual weight – x] x 100.

In the above case, the error percentage = [x / actual weight] x 100

If two articles are bought for the same price (i.e., the cost prices are equal) and one is sold at a profit of p1% and the second is sold at a profit of p2%, then the overall percentage of profit is ((p1 + p2)/2) x 100

If the selling price of m articles is equal to cost price of n articles, where m > n, then profit percentage is ((m – n)/m)x 100.
If m < n, then loss percentage = ((n – m)/m) x 100.

Discount

Discount% = Discount / Marked price * 100%

An article sold at selling price(SP1) at a loss of x% is to be sold at selling price(SP2) to gain y%, then SP2 = SP1(100 + y)/ (100-x)

If selling an object for Rs.x a person loses a certain sum and selling for Rs.y he gains the same amount, CP is given by CP = (x+y)/2.

When the price of an article is reduced by p% a man can buy x quantity of the article for Rs.y then reduced price = 1/x (y * p / 100) per unit.
original price = reduced price * 100 / (100 - p).

If the MP (marked price) of an article above CP is M% and after allowing a discount of d%, the gain is g%, Then M% = d+g * 100% / 100 - d, and if there is a loss of l%, then M% = d-l * 100% / 100-d.

A person sells goods at a profit of x%. Had he sold it for Rs. X more, y% would have been gained. Then CP is given by Rs. X *100 / y-x.

A person sells goods at a loss of x%. Had he sold it for Rs. X more, he would have gained y% . Then CP is given by Rs. X * 100/ y+x.

When there are two successive profits of x% and y% the net gain% is given by: Net gain = [x + y + { xy / 100 }]%.

When there are two successive losses of x% and y% the net loss% is given by: Net loss = [- x - y + { xy / 100 }]%.10)

When there is a gain of x% and a loss of y% the net effect is given by: Net effect = [x - y - { xy / 100}]%.

l. If d_1, d_2, d_3….. are percentages of successive discounts on a marked price MP, then the selling price SP = MP $(1 – d_1/100) (1 – d_2/100) (1 – d_3/100)$

2. If d_1, d_2, d_3…. are the percentages of successive discounts offered, then the effective discount is d% = $100[1- (1 – d_1/100) (1 – d_2/100) (1 – d_3/100)…]$

3. If x and y are two successive discount percentages, then it is equivalent to a single discount percentage of $x + y – xy/100$.

Exercise Questions

1. The profit obtained by selling an article for Rs. 56 is the same as the loss obtained by selling it for Rs. 42. What is the cost price of the article?

a. Rs. 40

b. Rs. 50

c. Rs. 49

d. None of these

2. The C.P of 21 articles is equal to S.P of 18 articles. Find the gain or loss percent.

a. 10%

b. $18\ ^{1}/_{3}\%$

c. $16\ ^{2}/_{3}$

d. 20%

3. An article is sold at a certain price. By selling it at 2/3 of that price one loses 10%. Find the gain percent at original price.

a. 15%

b. 35%

c. 25%

d. 50%

4. A man bought a horse and a carriage for Rs. 3000. He sold the horse at a gain of 20% and the carriage at a loss of 10%, thereby gaining 2% on the whole. Find the cost of the horse.

a. 2200

b. 1800

c. 1200

d. 1000

5. The price of a jewel, passing through three hands, rises on the whole by 65%. If the first and second sellers earned 20% and 25% profit respectively, find the percentage profit earned by the third seller.

a. 10%

b. 22%

c. 18%

d. 12%

6. At what percentage above the C.P must an article be marked so as to gain 33% after allowing a customer a discount of 5%?

a. 38%

b. 40%

c. 43%

d. 48%

7. A grocer purchased 80 kg of rice at Rs. 13.50 per kg and mixed it with 120 kg rice at Rs. 16 per kg. At what rate per kg should he sell the mixture to gain 16%?

a. Rs. 19

b. Rs. 20.5

c. Rs. 17.4

d. Rs. 21.6

8. On an article ,the manufacturer gains 10%, the wholesale dealer 15%, and the retailer 25%, If its retail price is 1265, what is the cost of its production?

a. 1000

b. 800

c. 1100

d. 900

9. A dealer professing to sell his goods at cost price, uses 900gm weight for 1 kg. His gain percent is

a. 13%

b $12\ ^{1}/_{3}\%$

c. $11\ ^{1}/_{9}\%$

d.10%

10. A trader has 50 kg of rice, a part of which he sells at 14% profit and rest at 6% loss. On the whole his loss is 4% . What is the quantity sold at 14% profit and that at 6% loss?

a. 5 and 45 kg

b. 10 and 40 kg

c. 15 and 35 kg

d. 20 and 30 kg

11. The cost price of two types of tea are Rs. 180 per kg and Rs. 200 per kg respectively. On mixing them in the ratio 5:3, the mixture is sold at Rs. 210 per kg . In the whole transaction, the gain percent is

a. 10%

b. 11%

c. 12%

d. 13%

12. A trader marks his product 40% above its cost. He sells the product on credit and allows 10% trade discount. In order to ensure prompt payment, he further gives 10% discount on the reduced price. If he makes a profit of Rs. 67 from the transaction, then the cost price of the product is

a. Rs. 300

b. Rs. 400

c. Rs. 325

d. Rs. 500

13. A retailer sold two articles at a profit percentage of 10% each. The cost price of one article is three – fourth that of the other. Find the ratio of the selling price of the dearer article to that of the cheaper one

a 4:3

b.3:4

c.41:31

d.51:41

14. If the S.P of Rs. 24 results in a 20% discount on the list price, What S.P would result in a 30% discount on the list price?

a. Rs. 27

b. Rs..21

c. Rs.20

d. Rs. 9

15. Anil bought a T.V with 20% discount on the labeled price . Had he bought it with 25% discount, he would have saved Rs. 500. At what price did he buy the T.V?

a. Rs. 16000

b. Rs. 12000

c. Rs. 10000

d. Rs. 5000

16. A single discount equivalent to a series of 30%, 20%, and 10% is

a.50%

b. 49.6%

c. 49.4%

d. 51%

17. Ramya sells an article at three- fourth of its list price and makes a loss of 10%. Find the profit percentage if she sells at the list price.

a.20%

b.25%

c.15%

d. None of these

18. The ratio of the selling prices of three articles is 5:6:9 and the ratio of their cost prices is 4:5:8 respectively. What is the ratio of their respective percentages of profit, if the profit on the first and the last articles is the same?

a. 4:5:6

b. 10:8:5

c. 5;6;9

d. Cannot be determined

19. With the money I have , I can buy 50 pens or 150 pencils. I kept 10% aside for taxi fare. With the remaining , I purchased 54 pencils and P pens. What is the value of P?

a. 32

b. 30

c. 27

d. None of these

20. The selling price of 13 apples is the same as the cost price of 26 mangoes . The selling price of 16 mangoes is the same as the cost price of 12 apples. If the profit on selling mangoes is 20%, What is the profit on selling apples?

a. 20%

b.25%

c.40%

d. Cannot be determined

Answer & Explanations

1. Exp. S.P 1- C.P = C.P – S.P 2

   56 - C.P = C.P - 42

   2 C.P = 56 + 42;

   C.P = 98/2 = 49

2. Exp. Let C.P of each article be Re. 1.

   Then C.P of 18 articles = Rs. 18,

   S.P of 18 articles = Rs. 21.

   Gain % = (3/18 * 100) % = $16\,^{2}/_{3}$

3. Exp. Let the original S.P be Rs. X. Then new S.P = Rs. 2/3 X, Loss =10%

   So C.P = Rs. [100/90*2/3 X] = 20 X/27.

   Now C.P = Rs. 20X/27, S.P =Rs. X, Gain = Rs. [X -20X/27] =Rs.7X/27.

Gain % = [7X/27 *27/20X *100]% =35%

4. Exp.Let the C.P of the horse be Rs. X, Then, C.P of the carriage = Rs.(3000- x).

   20% of x - 10% of (3000-x) =2% of 3000 = 60,

   x/5 - (3000-x)/10 = 60, 3x - 3000 = 600, 3x =3600, x = 1200.

   Hence, C.P of the horse = Rs. 1200

5. Exp. Let the original price of the jewel be Rs. P and let the profit earned by the third seller be x%.

   Then, (100 +x)% of 125% of 120% of P = 165% of p

   [(100+x)/100*125/100*120/100* P] = [165/100* P]

   (100 + X) = $\frac{165*100*100}{125*120}$ = 110, X = 10%.

6. Exp. Let C.P = Rs. 100, Then S.P = Rs.133.

   Let the marked price be x

   Then , 95% of x = 133, 95 x/ 100 =133, x = 133*100/95 =140

   Marked price = 40% above C.P

7. Exp. C.P OF 200 kg of mix = Rs.[80*13.50+120*16] =Rs.3000

   S.P =116% of Rs.3000 = Rs. 116/100*3000 = 3480

   Rate of S .P of the mixture = Rs. [3480/200] per kg

   = Rs. 17.40 per kg

8. Exp. 110/100*115/100*125/100*C.P =1265, 11/10*23/20*5/4 C.P =1265

   C.P = 800

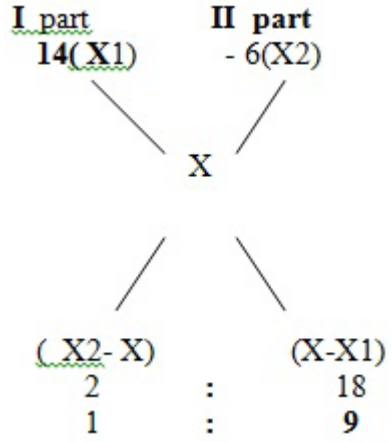
9. Exp. Gain % = $\frac{\text{Error}}{(\text{True value}) - \text{Error}}$ *100 %

= 1000gm -900gm * 100 % = 100/900*100% = 100/9

1000 -100

= 11 1/9 %

10. Exp. Alligation Method



Ratio of quantities sold at 14% profit and 6% loss = 1: 9

Quantity sold at 14% profit = 50/1+9 *1 = 5 kg

Quantity sold at 6% loss = 50/1+9 *9 = 45kg

11. Exp. Let 5kg of first kind of tea be mixed with 3 kg of second kind

C.P of 8 kg of tea = Rs. (180*5 + 200*3) = Rs. 1500

S.P of 8 kg of tea = Rs. (210 * 8) = Rs. 1680

Gain = Rs. (1680 – 1500) = Rs. 180

Gain% = (180/1500*100)% = 12%

12. Exp. M.P = C.P *1.4

Profit = S.P - C.P = C.P (1.4) (0.9) (0.9) – C.P = 67

C.P (1.134 – 1) = 67, C.P = 500

13. Exp. Let C.P of one of the article be X, Then C.P of the other = ¾X,

S.P 1 = 11X/10, S.P2 =3/4*11/10X,

S.P1/S.P2 = 11X/10 *40/33X = 4/3

S.P1: S.P2 = 4 : 3

14. Exp. Let the list price be Rs. X,

80/100*x = 24, x = 24*100/80 = 30

Required S.P = 70% of Rs. 30 = 70*30/100 =21

15. Exp. Let the labelled price be Rs. X,

S.P = 80/100*X =4X/5

New S.P = 75/100*X = 3X/4

4X/5 –3X/4 500, X = 10000

16. Exp. Let the marked price be Rs. 100

Then S.P = 90% of 80% of 70% of 100

= (90/100*80/100*70/100*100) =50.4

Single discount = (100- 50.4)% = 49.6%

17. Exp. Let the list price be x,

S.P =3/4X, S.P = (100 – loss%) /100*C.P = 0.9 C.P

3/4x =0.9C.P, C.P =3X/3.6

If S.P = X, Profit % = (x- 3x/3.6) / (3x/3.6) *100= 60/3 = 20%

18. Exp. Given that the selling prices of three articles,

S.P1 =5X, S.P2 =6X, S.P3 =9X,

And their cost prices are C.P1 =4Y, C.P 2 =5Y, C.P3 =8Y

Given that , S.P1 –C.P1 =S.P2 –C.P2, 5X-4Y =9X-8Y, X =Y,

Their profit percentages are, p1 =(5-4)/4*100 = 25% ,

p2 = (6-5)/5*100 = 20%, p3 = (9-8)/8*100 = $12\ ^{1}/_{2}$ %

Ratio of the percentages is 25:20:$12\ ^{1}/_{2}$ = 10:8:5

19. Exp. Since cost of, 50 pens = 150 pencils, With the cost of 3 pencils I can buy 1 pen. After putting aside 10% for taxi I was left with 90% of the money , with which I can buy 135 pencils (90% of 150) or 45(90% of 50) pens, I bought 54 pencils and P pens, or I could have bought (54 +3P) pencils ,

54 +3P =135, 3P = 135-54 =81, P =27

20. Exp. Given that S.P of 13 apples = C.P of 26 mangoes

S.P of an apple = 2*C.P of the mango

S.P of 16 mangoes = C.P of 12 apples

C.P of the apple = 4/3 *S.P of the mango

	Mango	Apple
C.P	x	4/3*y
S.P	y	2x

Given that y = 1.2x

C.P of apple = 4/3*1.2x =1.6x

Profit on each apple = (S.P – C.P)/C.P*100,

= (2x –1.6x)/1.6*100 = 0.4/1.6 *100 =25%