# PROFIT & LOSS

**Formulae:** If Cost Price of an article is C.P. and Selling Price is S.P. then

i) Profit percent (P) = $\left(\frac{S.P-C.P}{C.P}\right)\times 100$ $\quad \therefore \frac{S.P}{C.P}=\frac{100+P}{100} \Rightarrow S.P=\left(\frac{100+P}{100}\right)C.P$

ii) Similarly loss percent ($l$) = $\left(\frac{C.P-S.P}{C.P}\right)\times 100$ $\quad \therefore \frac{S.P}{C.P}=\left(\frac{100-l}{100}\right) \Rightarrow S.P=\left(\frac{100-l}{100}\right)\times C.P$

iii) If an article is sold for two different prices ($S.P_1$ and $S.P_2$) such that there will be two profit percents ($P_1$ and $P_2$) respectively.

Then $\frac{S.P_1}{S.P_2}=\frac{100+P_1}{100+P_2}$.

**Note:** In case of loss treat that loss as negative profit.

iv) If the Cost price of M articles is equal to the selling price of N articles then the profit percent is given by $P=\left(\frac{M-N}{N}\right)\times 100.$

If (M–N) is negative then treat profit as loss.

v) If an article is sold after allowing a certain discount (d%) on marked price (M.P.) then the selling price (S.P.) is given by

S.P. = (100 – d)% × M.P

vi) If the marked price of an article is a% above the cost price and a discount d% is allowed then the profit percent (p) would be

$p=a-d-\frac{ad}{100} \Rightarrow a=\left(\frac{p+d}{100-d}\right)$ $\quad \times 100 \Rightarrow d=\frac{(a-p)\times 100}{(100+a)}$

vii) If an article is sold after allowing two successive discounts of $d_1$% and $d_2$% then selling price (S.P) is given by S.P =

$\left(\frac{100-d_1}{100}\right)\times\left(\frac{100-d_2}{100}\right)\times M.P$

viii) Two successive discounts of $d_1$ and $d_2$ are equivalent to a single discount of

$d=d_1+d_2-\frac{d_1d_2}{100}$

## PROBLEMS

1. The cost price : selling price of an article is $a : b$. If $b$ is 200% of $a$ then the percentage of profit on cost price is?

1) 75% 2) 125% 3) 100% 4) 200% 5) None of these

**Ans: 3**

**Solution:** Gain percentage = $\frac{S.P - C.P}{C.P} \times 100 = \frac{b-a}{a} \times 100$

b = 200% a $\Rightarrow$ b = 2a

$\Rightarrow \frac{b-a}{a} \times 100 = \frac{2a-a}{a} \times 100 = 1 \times 100 = 100$

2. Rahul purchased a hard disk for ₹ 6,900 and sold it for a loss of 12%. What is the selling price of the hard disk?

1) ₹ 6,084 2) ₹ 6,076 3) ₹ 6,0 62 4) ₹ 6,074 5) None of these

**Ans: 5**

**Solution:** C.P = 6,900 $l$ = 12S.P = ?

$S.P = \left(\frac{100-l}{100}\right) \times C.P$ $S.P = \left(\frac{100-12}{100}\right) \times 6,900$ $= \frac{88}{100} \times 6900 = 6072$

3. Charan purchased a mobile phone and a refrigerator for ₹ 15,400 and ₹ 19,600 respectively. He sold mobile phone for a profit of 15 percent and the refrigerator for a loss of 20 percent. What is his overall loss/profit?

1) Loss of ₹ 1,620 2) Profit of ₹ 1,620

3) Loss of ₹ 1,610 4) No gain no loss 5) None of these

**Ans: 3**

**Solution:** $C.P_m$ = 15400, p = 15,

$C.P_r$ = 19600, $l$ = 20

$S.P_m = \left(\frac{100+15}{100}\right) \times 15400 = \frac{115}{100} \times 15400 = 17710$ $S.P_r = \left(\frac{100-20}{100}\right) \times 19600 = \frac{80}{100} \times 19600 = 15680$

Total C.P. = 15400 + 19600 = 35000

Total S.P. = 17710 + 15680 = 33390

$\because$ C.P > S.P,

loss = 35000 – 33390 = 1610

4. A shopkeeper purchases 12 balloons for ₹ 10 and sells them at 10 balloons for ₹ 12. Thus, he earns a profit of?

1) 35% 2) 36% 3) 44% 4) 45% 5) None of these

**Ans: 3**

**Solution:** Number of balloons purchased and sold be = L.C.M (12, 10) = 60

$$C.P = \frac{60}{12}\times 10 = 50 \qquad S.P = \frac{60}{10}\times 12 = 72 \qquad P = \frac{72-50}{50}\times 100 = \frac{22}{50}\times 100 = 44\%$$

5. By selling 12 oranges for ₹ 60, a man loses 25%. The number of oranges he has to sell for ₹ 100, so as to gain 25% is?

1) 10 2) 11 3) 12 4) 15 5) None of these

**Ans: 3**

**Solution:** $S.P_1 = \frac{60}{12} = 5, \quad P_1 = -25\%, \; S.P_2 = ?, \; P_2 = 25\%$

$$\frac{S.P_1}{S.P_2} = \frac{100+P_1}{100+P_2} \qquad \frac{5}{?} = \frac{100-25}{100+25} \qquad \Rightarrow \frac{5}{?} = \frac{75}{125} \qquad \Rightarrow ? = \frac{5\times 125}{75} = \frac{25}{3}$$

The shopkeeper has to sell each orange at Rs 25/3.

So for Rs 100, he has to sell

$\frac{100\times 3}{25} = 12$ oranges

6. The cost price of 400 lemons is equal to the selling price of 320 lemons. Then the profit percent is

1) 15% 2) 20% 3) 25% 4) 40% 5) None of these

**Ans: 3**

**Solution:** 400 C.P = 320 S.P $\qquad P = \frac{400-320}{320}\times 100 = \frac{80}{320}\times 100 = 25\%$

7. A man sells two tables at the same price. On one he makes a profit of 10% and on the other he suffers a loss of 10%. His loss per cent on the whole transactions is?

1) 0 2) 1 3) 2 4) 5 5) None of these

**Ans: 2**

**Solution:** Profit = 10%, loss = 10%

$\therefore$ Overall loss % = $\frac{x^2}{100} = \frac{10\times 10}{100} = 1$

8. If a shopkeeper marks the price of goods 50% more than their cost price and allows a discount of 40%, what is his gain or loss percent?

1) Gain of 10% 2) Loss of 10% 3) Gain of 20%

4) Loss of 20% 5) None of these

**Ans: 2**

Solution: Let C.P. = 100, M.P. = 150, d = 40%.

$S.P = \frac{60}{100} \times 150 = 6 \times 15 = 90$

$\because$ C.P. = 100, S.P = 90, $l$ =10%

9. Prof. Chakravarthy bought a car and got 15% of its original price as a dealer's discount. He then sold it at 20% profit on his purchase price. What percentage profit did he get on the original price?

1) 2% 2) 12% 3) 5% 4) 17% 5) None of these

**Ans: 1**

Solution: Let the original price be 100.

Then C.P = 85, $S.P = \frac{120}{100} \times 85 = 102$

$\because$ Original price is 100, percentage profit on the original price = 102 – 100 = 2%

10. The marked price of an article is 50% above cost price. When marked price is increased by 20% and selling price is increased by 20%, the profit doubles. If original marked price is ₹ 300, then original selling price is?

1) ₹ 200 2) ₹ 250 3) ₹ 240 4) ₹ 275 5) None of these

**Ans: 2**

Solution: Original M.P. = 300,

$\therefore$ Original C.P = $\frac{300}{150} \times 100 = 200$

Let the original S.P. be $x$.

Then original Profit = $x$ – 200.

If the S.P is increased by 20%,

then new $S.P = \frac{120}{100} \times x = 1.2x.$

Then new Profit = 1.2 $x$ – 200

Given 1.2 $x$ – 200 = 2($x$ – 200)

2$x$ – 1.2 $x$ = 400 – 200

0.8 $x$ = 200

$\therefore x = \frac{200}{0.8} = 250$

11. A shopkeeper placed on display some shirts each with a marked price. He then posted a board "1/4 off on shirts". If the cost of a shirt was 2/3 of the price at which it was actually sold, the ratio of cost and marked price of shirt was?

1) 1:2 2) 1:3 3) 2:3 4) 3:4 5) None of these

**Ans: 1**

Solution: Let the M.P be 400.

$\because$ Discount is 1/4, S.P. will be 3/4 of M.P.

$\therefore S.P = \frac{3}{4} \times 400 = 300$

C.P = $\frac{2}{3}$ of S.P = $\frac{2}{3}$ × 300 = 200

$\therefore$ C.P. : M.P. = 200 : 400 = 1 : 2

12. The marked price of an article is ₹ 500. It is sold at successive discounts of 20% and 10%. The selling price of the article (in rupees) is?

1) 350 2) 375 3) 360 4) 400 5) None of these

**Ans: 3**

Solution: S.P = (100–$d_1$)% (100–$d_2$)% M.P

S.P = (100–20)% (100–10) × 500

$= \frac{80}{100} \times \frac{90}{100} \times 500 = 360$

13. The successive discounts of 10% and 20% are equivalent to a single discount of?

1) 30% 2) 28% 3) 25% 4) 27% 5) None of these

**Ans: 2**

Solution: Single equivalent discount 'd' =

$10 + 20 - \frac{10 \times 20}{100} = 30 - 2 = 28\%$

14. A single discount equivalent to discount series 20%, 20% and 10% is?

1) 50% 2) 48.4% 3) 42.4% 4) 40.4% 5) None

**Ans: 3**

Solution: Single equivalent discount for series 20% and 20% =

$$20+20-\frac{20\times 20}{100}=40-4=36\%$$

Single equivalent discount for series 36% and 10% =

$$36+10-\frac{36\times 10}{100}=46-3.6=42.4\%$$