

## Class Test on Lecture Sheet 4

1. In a group of civil, mechanical and electrical engineers, all but 20 are civil engineers, all but 15 are mechanical engineers, and all but 25 are electrical engineers. How many of them are electrical engineers? [IBA MBA December 2017]

A. 5                      B. 10                      C. 15                      D. 20                      E. None of these

সমাধান: Let, total engineers =  $x$

So, Civil engineers =  $x - 20$

Mechanical engineers =  $x - 15$

& Electrical engineers =  $x - 25$

অর্থাৎ,  $x = x - 20 + x - 15 + x - 25$

$\Rightarrow x = 3x - 60$

$\Rightarrow 2x = 60$

$\Rightarrow x = 30$

So, Electrical engineers =  $x - 25 = 30 - 25 = 5$

2. What percentage of numbers from 1 to 70 has either 1 or 9 in the unit's digit? [DBBL (Jr. Officer)-23]

A. 10%                      B. 14%                      C. 20%                      D. 21%                      E. None of these

সমাধান: প্রশ্নমতে, 1 থেকে 70 এর মধ্যে একক স্থানীয় মান 1 অথবা 9 বিশিষ্ট সংখ্যা হলো: 1, 9, 11, 19, 21, 29, 31, 39, 41, 49, 51, 59, 61, 69 অর্থাৎ মোট সংখ্যা পাওয়া যায় 14টি।

$\therefore$  শতকরা =  $\frac{14}{70} \times 100 = 20\%$

3. In the half yearly exam, Kabir scoring 40% marks fails by 10 marks, Hamid scoring 50% marks gets 10 more than the passing marks. What was the total mark in the examination?

A. 80                      B. 140                      C. 200                      D. 100                      E. 160

সমাধান: Let, total marks =  $x$  & passing marks =  $P$

১ম শর্তমতে,  $\frac{40x}{100} = P - 10 \dots \dots \dots (i)$

২য় শর্তমতে,  $\frac{50x}{100} = P + 10 \dots \dots \dots (ii)$

(ii) - (i) করে পাই,  $\frac{10x}{100} = 20$

$\Rightarrow 10x = 2000$

$\Rightarrow x = 200$

4. In a shop, 80% of the articles are sold at a profit of 10%, and the remaining at a loss of 40%. What is the overall profit/loss?

A. 5% loss                      B. 10% loss                      C. 10% profit                      D. 4% profit                      E. No profit, no loss

সমাধান: Let, cost price of 100% of the articles =  $x$

So, cost price of 80% of the articles =  $\frac{80x}{100}$

& Cost price of remaining of the articles =  $\frac{20x}{100}$

Now, selling price of 80% of the articles =  $\frac{80x}{100} \times \frac{110}{100} = \frac{88x}{100}$

& selling price of 20% of the articles =  $\frac{20x}{100} \times \frac{60}{100} = \frac{12x}{100}$

So, total selling price =  $\frac{88x}{100} + \frac{12x}{100} = x$

5. A school has raised 75% of the amount it needed for a new building by receiving an average donation of tk. 60 from the people already solicited. The people already solicited represent 60% of the people the college will ask for donation. If the college is to raise exactly the amount needed for the new building, how much the remaining people donate per person?

A. 25                      B. 30                      C. 40                      D. 50                      E. 20

সমাধান: ধরি, Total amount needed = P

$$\text{Amount raised} = \frac{75P}{100} = \frac{3P}{4}$$

$$\text{So, Amount to be raised} = \frac{P}{4}$$

আবার ধরি, College will ask for donation to = x people

$$\text{People already solicited} = \frac{60x}{100} = \frac{3x}{5}$$

Average donation per people = 60 taka

$$\text{So, total amount raised} = 60 \times \frac{3x}{5} = 36x$$

$$\text{প্রশ্নমতে, } \frac{3P}{4} = 36x$$

$$\Rightarrow P = 48x$$

ধরি, Remaining people donate taka 'y' per person.

$$\text{Then, } \frac{2x}{5} \times y = \frac{P}{4} \left[ x - \frac{3x}{5} = \frac{2x}{5} \right]$$

$$\Rightarrow y = \frac{P}{4} \times \frac{5}{2x} = \frac{5P}{8x} = \frac{5 \times 48x}{8x} = 30$$

6. In a group of students, 80% of the students weight less than 60 kg and a total of 32 students weight less than 50 kg. If 60% of the students weight at least 50 kg, how many of the students weight at least 50 kg but less than 60 kg?

**A. 32**

B. 36

C. 40

D. 42

E. 34

সমাধান: Let, total students = x

As total 32 students weight less than 50 kg, and 60% of the students weight at least 50 kg.

$$\text{So, } x - \frac{60x}{100} = 32$$

$$\Rightarrow \frac{40x}{100} = 32$$

$$\Rightarrow x = \frac{3200}{40} = 80$$

Now, 32 students weight less than 50 kg,

So,  $\geq 50$  kg =  $80 - 32 = 48$  students

and,  $< 60$  kg =  $80 \times 80\% = 64$  students

Now,  $< 50$  kg = 32 students and  $< 60$  kg = 64 students

So,  $50 \leq$  students  $< 60 = 64 - 32 = 32$  students

7. A number m is 8 times another number n. The percentage that n is less than m is- [IBA MBA June 2015]  
A. 90%      B. 87.25%      C. 66.66%      D. 12.50%      **E. None of these**

সমাধান: Here,  $m = 8n$

$$\text{So, n is less than m and the required percentage} = \frac{m-n}{m} \times 100\% = \frac{8n-n}{8n} \times 100\% = \frac{7n}{8n} \times 100\% = 87.5\%$$

8. The work force of company X is 60% female. The company hired 20 additional male workers and as a result the percent of female workers dropped to 55%. How many employees did the company have after hiring the additional male workers?

A. 160

B. 220

**C. 240**

D. 360

E. 420

সমাধান: ধরি, Initially total number of workers = x

$$\text{So, Female workers} = \frac{60x}{100}$$

After hiring 20 male workers, total worker =  $x + 20$

$$\text{প্রশ্নমতে, } \frac{55}{100} (x + 20) = \frac{60x}{100}$$

$$\Rightarrow \frac{60x}{100} - \frac{55x}{100} = 11$$

$$\Rightarrow 5x = 100 \times 11$$

$$\Rightarrow x = 220$$

So, total workers (finally) =  $220 + 20 = 240$

9. In a box, 40% of the pens are red. If half of the red pens are removed, the percentage of red pens in the box will be: [IBA MBA December 2017]

A. 20% B. 22.5% **C. 25%** D. 30% E. None of these

সমাধান: Let, total pen in the box = x

$$\text{Red pens} = \frac{40x}{100}$$

$$\text{After removal, no. of red pens in the box} = \frac{40x}{100} - \frac{20x}{100} = \frac{20x}{100}$$

$$\text{Again, total pen in the box (now)} = x - \frac{20x}{100} = \frac{80x}{100}$$

$$\text{So, the percentage of red pens in the box now} = \frac{20x}{100} \times \frac{100}{80x} \times 100\% = 25\%$$

10. Two numbers individually are less than the third number by 60% and 74% respectively. By what percentage is the second number less than the first? [IBA MBA December 2017]

A. 18 B. 27 C. 30 **D. 35** E. None of these

সমাধান: Let, the third number = x

$$\text{So, 1}^{\text{st}} \text{ number} = \frac{40x}{100} \text{ \& } 2^{\text{nd}} \text{ number} = \frac{26x}{100}$$

$$\text{So, 2}^{\text{nd}} \text{ number is less than 1}^{\text{st}} \text{ number by} = \frac{40x}{100} - \frac{26x}{100} = \frac{14x}{100}$$

$$\text{Required percentage} = \frac{14x}{100} \times \frac{100}{40x} \times 100\% = 35\%$$

### Practice Math

1. The interest charged in loan is 'P' per Tk. 1,000 for the first quarter (3 months), and 'Q' per Tk. 1,000 for each month after the first quarter. How much interest will be charged for the first year on Tk. 10,000? A. 10(P+Q) **B. 10(P+9Q)** C. 4P+9Q D. None of these [BB AD 2022]

$$\text{Solution: ১ম তিন মাসের জন্য সুদ} = \frac{10000 \times P}{1000} = 10P$$

$$\text{১ম Quarter এর পর সুদ} = \frac{9 \times Q \times 10000}{1000} = 90Q$$

$$\therefore \text{মোট সুদ} = 10P + 90Q = 10(P+9Q)$$

2. If the cost price of 20 articles is 5 times of the selling price of 4 articles, then what is the profit or loss percentage?

**A. No profit or loss** B. 25% loss C. 20% profit D. 25% profit

সমাধান: ধরি, Cost price of 20 articles = P

$$\text{So, cost price of 1 article} = \frac{P}{20}$$

$$\text{আবার, Selling price of 4 articles} = \frac{P}{5} \text{ [Cost price} = 5 \text{ times of selling price]}$$

$$\text{So, selling price of 1 article} = \frac{P}{20}$$

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

[তিতাস গ্যাস ট্রান্সমিশন অ্যান্ড ডিস্ট্রিবিউশন কো. লি. (সহকারী ব্যবস্থাপক) 2021]

A. 30 **B. 70** C. 100 D. 250

সমাধান: মনে করি, ক্রয়মূল্য = 100 টাকা

$$\therefore \text{লাভ} = 320 \text{ টাকা}$$

$$\therefore \text{বিক্রয়মূল্য} = 100 + 320 = 420 \text{ টাকা}$$

আবার, ক্রয়মূল্য 25% বৃদ্ধি পেলে,

$$\text{ক্রয়মূল্য} = 125 \text{ টাকা}$$

$$\therefore \text{লাভ} = 420 - 125 = 295 \text{ টাকা}$$

$$\therefore \text{শতকরা লাভ} = \frac{295}{420} \times 100\%$$

$$= 70.22 \text{ টাকা}$$

$$\approx 70\%$$

বিকল্প সমাধান: মনে করি, ক্রয়মূল্য  $x$  টাকা

$$\therefore \text{লাভ} = x \text{ এর } 320\% = \frac{320x}{100} = \frac{16x}{5}$$

$$\text{আবার } 25\% \text{ বৃদ্ধিতে ক্রয়মূল্য} = x + x \text{ এর } 25\% = x + \frac{25x}{100} = \frac{4x+x}{4} = \frac{5x}{4}$$

$$\therefore \text{লাভ} = \frac{21x}{5} - \frac{5x}{4} = \frac{84x-25x}{20} = \frac{59x}{20}$$

$$\therefore \text{শতকরা লাভ} = \frac{\frac{59x}{20}}{\frac{5x}{4}} \times 100\%$$

$$= \frac{59x}{20} \times \frac{4}{5x} \times 100\%$$

$$= 70.23\%$$

$$\approx 70\%$$

4. If 5 bananas are bought for 1 taka and 4 is sold for 1 taka then what is the profit or loss percentage?

[আরডিএ বণ্ডা (সহকারী পরিচালক) ২০২১]

A. Profit 20%

**B. Profit 25%**

C. Loss 20%

D. Loss 25%

সমাধান: 1টি কলার ক্রয়মূল্য =  $\frac{1}{5}$  টাকা

1টি কলার বিক্রয়মূল্য =  $\frac{1}{4}$  টাকা

$$\therefore \text{লাভ} = \frac{1}{4} - \frac{1}{5} = \frac{5-4}{20} = \frac{1}{20}$$

$$\therefore \text{শতকরা লাভ} = \frac{\frac{1}{20}}{\frac{1}{5}} \times 100\% = \frac{1}{20} \times 5 \times 100\% = 25\%$$

5. A tradesman sold an article at a loss of 20%. If the selling price had been increased by 100 taka, there would have been a gain of 5%. What was the cost price of the article?

[দি সিকিউরিটি প্রিন্টিং কর্পোরেশন (সহকারী ব্যবস্থাপক) ২০২১]

A. 375 টাকা

**B. 400 টাকা**

C. 425 টাকা

D. 450 টাকা

সমাধান: ধরি, ক্রয়মূল্য =  $100x$  টাকা

$\therefore$  বিক্রয়মূল্য =  $80x$  টাকা

5% লাভে বিক্রয়মূল্য =  $105x$  টাকা

$$\text{প্রশ্নমতে, } 105x - 80x = 100$$

$$\Rightarrow 25x = 100$$

$$\Rightarrow x = \frac{100}{25}$$

$$\therefore x = 4$$

$$\therefore \text{ক্রয়মূল্য} = 100 \times 4 = 400 \text{ টাকা}$$

6. When an object is sold for Tk. 250 the seller makes 25% profit. What is the cost price of the object?

[BB AD 2008]

**A. 200**

B. 180

C. 220

D. 160

সমাধান: ধরি, Cost price =  $P$

$$\text{প্রশ্নমতে, } P \times \frac{125}{100} = 250$$

$$\Rightarrow P = \frac{250 \times 100}{125} = 200$$

7. A shopkeeper buys two books for tk. 300. He sells the first book at a profit of 20% and the second book at a loss of 10%. What is the selling price of the first book, if, in the whole transaction there is no profit no loss?

A. tk. 110

B. tk. 115

**C. tk. 120**

D. tk. 125

সমাধান: Let, cost price of first book = x

& cost price of second book = 300 - x

Selling price of first book =  $x \times \frac{120}{100}$

& selling price of second book =  $(300 - x) \times \frac{90}{100}$

As there is no profit or loss,

So,  $x \times \frac{120}{100} + (300 - x) \times \frac{90}{100} = 300$

$\Rightarrow 120x + 90(300 - x) = 300 \times 100$

$\Rightarrow 30x = 300 \times 100 - 90 \times 300$

$\Rightarrow x = 100$

So, selling price of the first book =  $100 \times \frac{120}{100} = 120$  taka

8. The profit earned by selling an article for tk. 832 is equal to the loss incurred when the same article is sold for tk. 448. What should be the sale price for making 50% profit?

A. 860

B. 1060

C. 1020

D. 920

E. None of these

সমাধান: ধরি, ক্রয়মূল্য x টাকা

প্রশ্নমতে,  $832 - x = x - 448$

$\Rightarrow 2x = 1280$

$\Rightarrow x = 640$

$\therefore 50\%$  লাভে বিক্রয়মূল্য =  $\frac{640 \times 150}{100} = 960$  টাকা

9. A man sells a book at a profit of 20%. If he had bought it at 20% less and sold it for tk. 18 less, he would have gained 25%. The cost price of the book is-

A. tk. 60

B. tk. 70

C. tk. 80

D. tk. 90

সমাধান: Let, cost price of the book = x

Selling price =  $\frac{x \times 120}{100}$

প্রশ্নমতে,  $\frac{80x}{100} \times \frac{125}{100} = \frac{120x}{100} - 18$

$\Rightarrow \frac{120x}{100} - \frac{400x}{400} = 18$

$\Rightarrow \frac{480x - 400x}{400} = 18$

$\Rightarrow 80x = 18 \times 400$

$\Rightarrow x = 90$

10. Monika purchased a pressure cooker at  $\frac{9}{10}$  of its selling price and sold it at 8% more than its S.P. Find her gain percent.

A. 15%

B. 20%

C. 25%

D. 30%

সমাধান: Monika's cost price =  $\frac{9x}{10}$  [Let, selling price = x] =  $\frac{90x}{100}$

Monika's selling price =  $\frac{x \times 108}{100} = \frac{108x}{100}$

So, Gain =  $\frac{108x}{100} - \frac{90x}{100} = \frac{18x}{100}$

& Gain (percentage) =  $\frac{18x}{100} \times \frac{100}{90x} \times 100\% = 20\%$

11. A sells an article which cost him tk. 400 to B at a profit of 20%. B then sells it to C, making a profit of 10% on the price he paid to A. How much does C pay B?

A. tk. 472

B. tk. 476

C. tk. 528

D. tk. 532

সমাধান: Here, Cost price of B = Selling price of A =  $400 \times \frac{120}{100} = 480$

Again, Cost price of C = Selling price of B =  $480 \times \frac{110}{100} = 528$

12. The price of a TV was first discounted by a certain percent and then by another 20 percent of the discounted price. If these two discounts are equivalent to single discount of 32 percent of the original price, what was the first discount? [IBA MBA June 2016]

A. 10%      B. 12.5%      **C. 15%**      D. 26%      E. None of these

সমাধান: দু'টি পরপর মূল্যহ্রাসের জন্য একটি equivalent বা সমতুল্য মূল্যহ্রাস হবে  $-p - q + \frac{pq}{100}$

অর্থাৎ,  $-32 = -p - 20 + \frac{20p}{100}$  [∵ মূল্যহ্রাসের কারণে '-' চিহ্ন হয়েছে]

$$\Rightarrow -12 = -p + 0.2p = 0.8p \Rightarrow p = \frac{-12}{-0.8} = 15$$

বিকল্প সমাধান: এখানে, ধারাবাহিক পরিবর্তনের ক্ষেত্রে,  $-x - 20 + \frac{20x}{100} = -32$

$$\Rightarrow -x - 20 + \frac{x}{5} = -32$$

$$\Rightarrow \frac{x}{5} - x = -12$$

$$\Rightarrow \frac{-4x}{5} = -12$$

$$\therefore x = 15\%$$

13. A store charges tk. 52 for a video game. This price is 30% greater than the store's cost to buy the game from its supplier. As an incentive to the store's clerks, the manager allows a clerk to purchase the video game for 10% less than the store's cost. How much would a store clerk have to pay for this video game? [IBA BBA 13-14]

A. tk. 15.60      B. tk. 20.80      C. tk. 31.20      D. tk. 32.76      **E. tk. 36.00**

সমাধান: মনে করি, cost price = x টাকা

$$\text{তাহলে, } x \times \frac{130}{100} = 52$$

$$\Rightarrow x = 40 \text{ টাকা}$$

$$10\% \text{ কম মূল্যে, বিক্রয়মূল্য} = 40 \times \frac{90}{100} = 36 \text{ টাকা}$$

14. The interest on a certain deposit at 4.5% p.a. (per annum) is taka 202.50 in one year. How much will the additional interest in one year be on the same deposit at 5% p.a.? [পল্লী সঞ্চয় ব্যাংক (ক্যাশ অফিসার) ২০১৮]

**A. 22.50**      B. 20.25      C. 42.75      D. 25

সমাধান: ধরি, Deposit = x

$$\text{Then, } x \times \frac{4.5}{100} = 202.5$$

$$\Rightarrow x = \frac{202.5 \times 100}{4.5} = 4500$$

At 5% interest rate,

$$\text{Interest} = 4500 \times \frac{5}{100} = 225$$

$$\text{So, additional interest} = 225 - 202.5 = 22.5$$

15. Shalija earns 15 percent on an investment but loses 10 percent on another investment. If the ratio of the two investments is 3:5, then the combined loss percent is?

**A.  $\frac{5}{8}$**       B.  $\frac{8}{5}$       C.  $\frac{4}{5}$       D.  $\frac{5}{4}$

সমাধান: ধরি, Investment one = 3x & Investment two = 5x

As she earns 15% on an investment & loss 10% on another investment.

$$\text{So, net impact/ effect/ change} = 3x \times \frac{15}{100} + \frac{5x \times 90}{100} = \frac{795x}{100}$$

$$\text{Total investment} = 8x$$

$$\text{So, loss} = 8x - \frac{795x}{100} = \frac{5x}{100}$$

$$\text{Then, loss percentage} = \frac{5x}{100} \times \frac{1}{8x} \times 100\% = \frac{5}{8}\%$$

16. A sum of money lent out at simple interest amount to tk. 720 after two years and to tk. 1020 after a further period of 5 years. The sum is: [Janata Bank (EO)-2017]

- A. tk. 600 B. tk. 500 C. tk. 700 D. tk. 710

সমাধান: Let, the principal amount = P

Then, 1<sup>st</sup> condition,  $720 - P = \frac{P \times 2 \times R}{100} \dots \dots \dots (i)$

& 2<sup>nd</sup> condition,  $1020 - P = \frac{P \times 7 \times R}{100} \dots \dots \dots (ii)$

$(ii) - (i) \rightarrow \frac{5PR}{100} = 300$

$\Rightarrow PR = \frac{300 \times 100}{5} = 6000$

From (i),  $720 - P = \frac{6000 \times 2}{100} = 120$

$\Rightarrow P = 720 - 120 = 600$

17. 10000 taka is invested for 2 years in a compound internet rate of 20% bianually. What is the profit interest? [৪৩তম বিসিএস]

- A.  $12^4$  B.  $11^4$  C.  $10^4$  D.  $9^4$

সমাধান: এখানে, আসল, P = 10000, বছর = 2, হার = 20%

যেহেতু অর্ধ বছর  $\therefore t = 2$

$\therefore$  চক্রবৃদ্ধি মূলধন  $C = P \left(1 + \frac{r}{100 \times t}\right)^{nt}$   
 $= 10000 + \left(1 + \frac{20}{100 \times 2}\right)^{2 \times 2}$   
 $= 10000 + \left(1 + \frac{1}{10}\right)^4$   
 $= 10000 \left(\frac{11}{10}\right)^4$   
 $= 10000 \times \frac{11^4}{10^4}$   
 $= 11^4$

18. Your monthly mobile bill 420 taka. It increases 10% after 1 year and again increases 20% after 6 months. What is the bill after 18 months? [৪১তম বিসিএস]

- A. Tk. 460.20 B. Tk. 554.40 C. Tk. 620.60 D. Tk. 730.80

সমাধান: 1 বছর পর বিল =  $420 + 420 \times \frac{10}{100} = 462$

আরো 6 মাস পর বিল =  $\left(462 + 462 \times \frac{20}{100}\right) = 462 + 92.8 = 554.40$  টাকা

বিকল্প সমাধান: পরপর হ্রাস-বৃদ্ধির সূত্রে বসিয়ে,  $10 + 20 + \frac{10 \times 20}{100} = 30 + 2 = 32\%$

অর্থাৎ মোট 32% বৃদ্ধি পায়

$\therefore$  বিল = 420 এর 32% + 420

$= 420 \times \frac{32}{100} + 420$

$= 134.4 + 420$

$= 554.4$  টাকা

19. One bought x number of pen at a rate of 7 tk and 2x number of another pen at rate of 10 tk. He sold them at 96 tk/ dozen and made loss 720 tk. How many pens he bought? [IBA MBA Dec' 2019]

- A. 700 B. 620 C. 720 D. 750 E. None of these

সমাধান: x সংখ্যক pen-এর দাম (7tk rate-এ) = 7x টাকা

2x " " " "(10tk rate-এ) = 20x "

$(x + 2x) = 3x$  সংখ্যক Pen-এর Cost Price = 27x টাকা

96 tk/dozen-এ হিসেবে 3x সংখ্যা pen-এর selling price =  $\frac{96}{12} \times 3x = 24x$

$\therefore$  Loss = 27x - 24x = 3x  $\Rightarrow 3x = 720$

$\therefore$  সে 720টি pen কিনেছিল।

20. Arif sold 100 pens of which 50 are red and 50 are black, at tk. 48 per pen. he made a profit of 20% on the black pens and made a loss of 20% on the red pens. What was the net gain on this sale in tk.?

[IBA MBA June' 17]

- A. 0                      B. -50                      C. -100                      **D. -200**                      E. None of these

সমাধান: For black pens, let cost price = B

$$\text{Then, } B \times \frac{120}{100} = 48$$

$$\Rightarrow B = \frac{48 \times 100}{120} = 40$$

Again, for red pens, let cost price = R

$$\text{Then, } R \times \frac{80}{100} = 48$$

$$\Rightarrow R = \frac{48 \times 100}{80} = 60$$

Total profit =  $(48 - 40) \times 50 = 400$  tk. & Total loss =  $(60 - 48) \times 50 = 600$  tk.

So, net gain = -200 tk.

21. Babu made a profit of 20% by selling a product. If he had purchased that product for 10% less and sold it at a profit of 40%, he would have received tk. 24 more. What was his original selling in taka?

[IBA MBA Dec' 2017]

- A. 400                      **B. 480**                      C. 520                      D. 600                      E. None of these

সমাধান: Let, cost price = x

$$\text{Then, selling price} = \frac{x \times 120}{100}$$

If cost price was 10% less, then, cost price would have been =  $\frac{x \times 90}{100}$

$$\text{So, } \frac{90x}{100} \times \frac{140}{100} = \frac{x \times 120}{100} + 24$$

$$\Rightarrow \frac{126x}{100} - \frac{120x}{100} = 24$$

$$\Rightarrow \frac{6x}{100} = 24$$

$$\Rightarrow x = 400$$

So, original selling price =  $400 \times \frac{120}{100} = 480$

22. If selling price is doubles, the profit tripled, find the profit percent?

- A. 66.5%                      B. 300%                      C. 200%                      **D. 100%**                      E. 120%

সমাধান: Let, cost price = x, selling price = y

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

$$\text{ATQ, } 2y - x = 3(y - x)$$

$$\Rightarrow 2y - x = 3y - 3x$$

$$\Rightarrow y = 2x$$

$$\text{So, profit percent} = \frac{y-x}{x} \times 100\% = \frac{2x-x}{x} \times 100\% = 100\%$$

23. Nadia can buy a pen at the cost of Tk. 1. During a promotional event she would get 40% discount on the cost of 2nd pen when she buys 2 pens together. How many pens she can buy during that promotional even with Tk. 80? [IBA MBA Dec' 2020]

- A. 96                      **B. 100**                      C. 106                      D. 112                      E. None of these

সমাধান: 2টি pen কিনলে 2<sup>nd</sup> pen-এ 40% discount পাওয়া যায়।

$$\text{অর্থাৎ 2টি pen কিনতে খরচ পড়ে} = 1 + 1 \times (1 - 0.4) = 1 + 0.6 = 1.6 \text{ Tk}$$

1.6 Tk এ কেনা যায় 2টি pen

$$\therefore 80 \text{ Tk তে কেনা যাবে} = \frac{2 \times 80}{1.6} = 100 \text{ টি pen.}$$

24. A salesperson bought an item for tk. X and marked it up by 50%. However, he could not sell the item during the first quarter and thus, decided to provide a discount of 20% on the marked up price. As the item remained unsold in the second quarter as well, he started to charge 70% of the discounted value. What is the latest sales price of the item in term of its buying price? [IBA MBA June 2018]

A. 60X                      B. 84X                      C. 96X                      D. 105X                      **E. None of these**

সমাধান: Cost price = x

$$\text{Then, Marked up price} = \frac{x \times 150}{100} = \frac{3x}{2}$$

$$\text{Discounted price (1<sup>st</sup> quarter)} = \frac{3x}{2} \times \frac{80}{100} = \frac{6x}{5}$$

$$\text{Again, Discounted price (2<sup>nd</sup> quarter)} = \frac{6x}{5} \times \frac{70}{100} = \frac{21x}{25} = 0.84x$$

25. A customer came to a shop and asked the shop manager to give a discount of 20% on listed price of pen. Moreover, for 10 pens purchased he wanted two pens free of cost. The manager agreed to the customers demand because he could still make a profit of 20% on cost price. If the cost price of a pen is x, what was the list price of the pen? [IBA BBA 14-15]

A. 1.75x                      **B. 1.8x**                      C. 19x                      D. 2x                      E. None of these

Solution: Cost price of a pen = x

∴ Cost price of 10 pens = 10x

Let, listed price of the pen = L

Then, according to question,

$$\frac{12x \times 120}{100} = 10 \times \frac{80}{100} \times L \quad [\text{Cost price of 10 pens (10x) + two pens (2x) = 12x}]$$

$$\Rightarrow 144x = 80L$$

$$\Rightarrow 8L = 14.4x$$

$$\Rightarrow L = 1.8x$$

26. By selling an article at 80% of its marked price, a merchant makes a loss of 12%. What will be the profit/ loss made by the merchant if he sells the article at 95% of its marked price? [IBA MBA Dec' 15]

A. 5% profit                      B. 1% loss                      C. 5.5% profit                      **D. 4.5% profit**                      E. None of these

সমাধান: Let, cost price = 100

So, selling price = 88

Now, let, marked price = M

$$\text{Then, } M \times \frac{80}{100} = 88$$

$$\Rightarrow M = \frac{88 \times 100}{80} = 110$$

$$\text{Then, selling price at 95% of marked price} = 110 \times \frac{95}{100} = 104.5$$

$$\text{In this case, profit} = 104.5 - 100 = 4.5$$

27. A shopkeeper marks an article at such a price that after allowing a discount of 30% on the tag price (including tax) he marks a profit of 40%. If the tag price of the article including tax is tk. 460, then the cost price of that article is: [IBA BBA 09-10]

A. 232                      B. 260                      **C. 230**                      D. 330                      E. None of these

সমাধান: Tag price = 460

$$\text{Selling price} = 460 \times \frac{70}{100} = 322$$

Let, cost price = x

$$\text{Then, } x \times \frac{140}{100} = 322$$

$$\Rightarrow x = \frac{322 \times 100}{140} = 230$$

28. If an amount kept for a year gives 12.5% interest, then in how many years the cumulative interest generated will be equal to the principal amount? [IBA MBA Dec' 2020]

A. 3 B. 5 C. 6 D. 7 E. None of these

সমাধান: (E) ধরি, Principal amount 100 Tk.

$$\text{Rate of interest} = 12.5\% = \frac{100}{8}\%$$

প্রতি বছর 12.5 or  $\frac{100}{8}$  টাকা interest আসবে।

$$\therefore 8 \text{ বছরে cumulative interest হবে } \frac{100}{8} \times 8 = 100 \text{ টাকা।}$$

প্রশ্নে এটাই চাওয়া হয়েছে। 8 বছরের cumulative interest 100 Tk, principal interest 100 Tk. সমান হবে।

29. An investor made a profit of tk. 420 plus 30% of the amount originally paid for a stock. If the cost of the stock was originally tk. 2800 what percent of the cost was the total profit? [IBA MBA June 2015]

A. 35 B. 50 C. 45 D. 30 E. None of these

সমাধান: Here, cost of the stock = 2800

& 30% of the stock = 840

Let, total cost  $\times$  P% = Total profit

$$\Rightarrow 2800 \times \frac{P}{100} = 840 + 420$$

$$\Rightarrow 2800 \times \frac{P}{100} = 1260$$

$$\Rightarrow P = 45$$

30. Tk 2000 is deposited in a savings account which pays 6% annual interest compounded semi-annually. To the nearest tk, how much is in the account at the end of the year?

A. 2423 B. 2356 C. 2122 D. 2247 E. 2365

সমাধান: We know,  $C = P \left(1 + \frac{R}{100}\right)^N$

Here, Interest is compounded semi-annually.

$$\text{So, } C = P \left(1 + \frac{R}{200}\right)^{2N}$$

$$\Rightarrow C = 2000 \left(1 + \frac{6}{200}\right)^2$$

$$\Rightarrow C = 2000 \left(1 + \frac{3}{100}\right)^2$$

$$\Rightarrow C = 2121.80 \approx 2122$$

### Home Task Math

31. X sells an item to Y at a profit of 28% on his cost and Y sells the same item to Z at a loss of 25% on his cost. If Y thus sold the item to Z a Tk. 2 less than the item to X, then what is the cost of the item to X?

[Bangladesh Bank (Assistant Director) 2022]

A. Tk. 200 B. Tk. 150 C. Tk. 100 D. Tk. 50

Solution: ধরি, X এর ক্রয়মূল্য x

28% লাভে x এর বিক্রয়মূল্য = 128% of x = 1.28x টাকা

আবার, 25% ক্ষতিতে y এর বিক্রয়মূল্য = 75% of 1.28x = 0.75  $\times$  1.28x টাকা

$$\text{প্রশ্নমতে, } 0.75 \times 1.28x = x - 2$$

$$\Rightarrow 0.96x = x - 2$$

$$\Rightarrow x - 0.96x = 2$$

$$\Rightarrow 0.04x = 2$$

$$\therefore x = \frac{2}{0.04} = 50 \text{ টাকা}$$

32. A merchant has 1,000 kg of sugar, part of which he sells at 8% and the remaining at 18% profit. He gains 14% on the whole. Find the quantity of sugar that he sold at 18% profit. [BB AD 2022]

- A. 400 kg                      B. 560 kg                      **C. 600 kg**                      D. 640 kg

Solution: ধরি,  $x$  কেজি চিনি 8% লাভে বিক্রয় করে।

$\therefore$  18% লাভে বিক্রয় করে  $(1000 - x)$  কেজি চাল।

প্রশ্নমতে,  $x$  এর 8% +  $(1000 - x)$  এর 18% = 1000 এর 14%

$$\Rightarrow \frac{8x}{100} + \frac{(1000-x) \times 18}{100} = \frac{1000 \times 14}{100}$$

$$\Rightarrow 8x + 18000 - 18x = 14000 \text{ [উভয় পক্ষকে 100 দ্বারা গুণ করে]}$$

$$\Rightarrow -10x = 14000 - 18000$$

$$\Rightarrow x = \frac{-4000}{-10}$$

$$\therefore x = 400$$

অতএব, 18% লাভে বিক্রয় করেছিল =  $(1000 - 400)$  বা 600 কেজি চাল।

33. By mixing two qualities of pulses in the ratio 2:3 and selling the mixture at the rate of Tk.22 per kilogram, a shopkeeper makes a profit of 10%. If the cost of the smaller quantity be Tk 14 per kg the cost in Tk per kg of the larger quantity is? [তিতাস গ্যাস (সহকারী ব্যবস্থাপক) 2021]

- A. 23                      **B. 24**                      C. 25                      D. 26

সমাধান: 10% লাভে প্রতি কেজির দাম = 22 টাকা

$\therefore$  ক্রয়মূল্য =  $x$  হলে,

$x$  এর 110% = 22

$$\Rightarrow x \times \frac{110}{100} = 22$$

$$\Rightarrow x = \frac{22 \times 100}{110} = 20 \text{ টাকা}$$

$\therefore$  প্রতি 5 কেজির ক্রয়মূল্য =  $20 \times 5 = 100$  টাকা

$\therefore$  প্রতি 5 কেজিতে কম পরিমাণটির 2 কেজি আছে

$\therefore$   $2xy$  এর ক্রয়মূল্য =  $14 \times 2 = 28$  টাকা

$\therefore$  বেশি পরিমাণটির 3 কেজি এর ক্রয়মূল্য =  $100 - 28 = 72$  টাকা

$\therefore$  1 কেজি এর ক্রয়মূল্য =  $\frac{72}{3} = 24$  টাকা

34. If the cost price is 25 of selling price, then what is the profit percent?

[Agrani Bank (SO) 2017]

- A. 75%                      B. 100%                      **C. 300%**                      D. 400%

সমাধান: Let, selling price =  $x$

So, cost price =  $\frac{x}{4}$

$$\therefore \text{Profit} = x - \frac{x}{4} = \frac{3x}{4}$$

$$\therefore \text{Profit percentage} = \frac{3x}{4} \times \frac{4}{x} \times 100\% = 300\%$$

35. Selling 12 lemons in one tk incurs 4 percent loss. To avail 44 percent profit, how many lemons should be sold in one tk.? [বাংলাদেশ গ্যাস ফিল্ড (সহকারী ব্যবস্থাপক) ২০১১]

- A. 8**                      B. 8                      C. 12                      D. 14

সমাধান: যেহেতু 12টি লেবুর বিক্রয়মূল্য 1 টাকা

$\therefore$  1টি লেবুর বিক্রয়মূল্য  $\frac{1}{12}$  টাকা

যেহেতু 4% ক্ষতি হয়,

$$\text{সেহেতু, ক্রয়মূল্য } x \text{ টাকা হলে, } x \times \frac{96}{100} = \frac{1}{12}$$

$$\Rightarrow x = \frac{1 \times 100}{12 \times 96}$$

এখন, 44% লাভে বিক্রয়মূল্য =  $\frac{1 \times 100}{12 \times 96} \times \frac{144}{100} = \frac{1}{8}$  টাকা

∴  $\frac{1}{8}$  টাকায় বিক্রি করতে হবে 1টি লেবু

অর্থাৎ, টাকায় (1) বিক্রি করতে হবে 8টি লেবু।

36. There will be a loss of 10%. If a chair is sold for tk. 540. At what price should the chair be sold to make a profit of 20%? [Bangladesh Bank (Cash Officer) 2011]

A. 600 B. 620 C. 630 **D. 720**

সমাধান: ধরি, ক্রয়মূল্য x টাকা

যেহেতু 540 টাকায় বিক্রি করলে 10% ক্ষতি হয়,

$$\therefore x \times \frac{90}{100} = 540$$

$$\Rightarrow x = \frac{540 \times 100}{90}$$

$$20\% \text{ লাভ করতে হলে বিক্রয়মূল্য} = \frac{540 \times 100}{90} \times \frac{120}{100} = 720 \text{ টাকা}$$

37. A retailer sold toys at a regular selling price of 25% greater than the retailer cost to buy the toys. If the relation reduces the regular selling price by 80%, what is the loss on each toy sold as a percent of the retailer's cost?

A. 25% B. 30% C. 40% **D. 75%**

সমাধান: ধরি, ক্রয়মূল্য x টাকা

$$\therefore \text{বিক্রয়মূল্য} = \frac{x \times 125}{100} = \frac{5x}{4} \text{ টাকা}$$

$$\text{এখন, বিক্রয়মূল্য } 80\% \text{ কমে গেলে, নতুন বিক্রয়মূল্য} = \frac{5x}{4} \times \frac{20}{100} = \frac{x}{4} \text{ টাকা}$$

$$\therefore \text{ক্ষতি} = x - \frac{x}{4} = \frac{3x}{4} \text{ টাকা}$$

$$\therefore \text{শতকরা ক্ষতি} = \frac{3x}{4} \times \frac{1}{x} \times 100\% = 75\%$$

38. A man's investment doubles in every 5 years. If he invested Tk. 5,000 in each of the years 2010, 2015, 2020 then what will be the amount received by him in 2025? [BB AD 2022]

A. Tk. 30,000 **B. Tk. 70,000** C. Tk. 80,000 D. Tk. 1,50,000

Solution:

2010	2015	2020	2025
5000	10000	20000	40000
	5000	10000	20000
	5000		10000
			= 70000/-

39. A sum of money amounts to TK.9800 after 5 years and Tk.12005 after 8 years at the same rate of simple interest. The rate of interest per annum is: [প্রবাসী কল্যাণ ব্যাংক (সিনিয়র অফিসার) ২০২১]

A. 5% B. 8% **C. 12%** D. 15%

সমাধান: 8 বছরের সুদাসল হয় = 12005 টাকা

5 বছরের সুদাসল হয় = 9800 টাকা

∴ 3 বছরের সুদ হয় = 2205 টাকা

$$\therefore 1 \text{ বছরের সুদ হয়} = \frac{2205}{3} \text{ টাকা}$$

$$\therefore 5 \text{ বছরের সুদ হয়} = \frac{2205 \times 5}{3} \text{ টাকা} = 3675 \text{ টাকা}$$

$$\therefore 5 \text{ বছরের আসল} = 9800 - 3675 = 6125 \text{ টাকা}$$

$$\therefore I = \frac{Pnr}{100}$$

$$\Rightarrow r = \frac{I \times 100}{Pn} \quad [I = \text{সুদ}, P = \text{আসল}, n = \text{বছর}, r = \text{হার}]$$

$$\Rightarrow r = \frac{3675 \times 100}{6125 \times 5}$$

$$\Rightarrow r = 12\%$$

40. An amount of money is invested in a savings account for two years. It increases by the Tk. 52.50 in two years. After annual compounding at the rate of 10% per year. What is the amount invested initially?

[BB AD 2022]

A. Tk. 400

B. Tk. 300

C. Tk. 250

D. Tk. 200

Solution: ধরি, আসল x টাকা

$$\therefore \text{চক্রবৃদ্ধি মুনাফার সূত্রানুযায়ী আমরা জানি, } c = p \left(1 + \frac{r}{100}\right)^n$$

$$\text{প্রশ্নমতে, } x + 52.50 = x \left(1 + \frac{10}{100}\right)^2$$

$$\Rightarrow x + 52.50 = x \left(1 + \frac{1}{10}\right)^2$$

$$\Rightarrow x + 52.50 = x \left(\frac{11}{10}\right)^2$$

$$\Rightarrow x + 52.50 = (1.1)^2 x$$

$$\Rightarrow x + 52.50 = 1.21x$$

$$\Rightarrow 1.21x - x = 52.50$$

$$\Rightarrow 0.21x = 52.50$$

$$\Rightarrow x = \frac{52.50}{0.21}$$

$$\Rightarrow x = \frac{525 \times 10}{21}$$

$$\therefore x = 250 \text{ অর্থাৎ আসল 250 টাকা।}$$

41. If a seller buys 3 Myrobolan for 1 taka and 5 Myrobolan for 1 taka and sells 4 Myrobolan for 1 taka, then what percent of profit or loss did he make?

[81তম বিসিএস]

A. 4.25% profit

B. 5.25% loss

C. 6.25% loss

D. 7.25% profit

সমাধান: প্রথম ক্ষেত্রে,

$$1 \text{ টি আমলকীর ক্রয়মূল্য} = \frac{1}{3} \text{ টাকা}$$

দ্বিতীয় ক্ষেত্রে,

$$1 \text{ টি আমলকীর ক্রয়মূল্য} = \frac{1}{5} \text{ টাকা}$$

$$\therefore 2 \text{ টি আমলকীর ক্রয়মূল্য} = \frac{1}{2} + \frac{1}{5} = \frac{5+3}{15} = \frac{8}{15}$$

$$\therefore 1 \text{ টি আমলকীর ক্রয়মূল্য} = \frac{\frac{8}{15}}{2} = \frac{4}{15}$$

$$\text{আবার, } 1 \text{ টি আমলকীর বিক্রয়মূল্য} = \frac{1}{4} \text{ টাকা}$$

$$\therefore \text{ক্ষতি} = \frac{4}{15} - \frac{1}{4} = \frac{16-15}{60} = \frac{1}{60} \text{ টাকা}$$

$$\therefore \text{শতকরা ক্ষতি} = \frac{\frac{1}{60}}{\frac{4}{15}} \times 100\% = \frac{1}{60} \times \frac{15}{4} \times 100 = 6.25\%$$

42. A fruit salad is made by mixing 3 kgs of mango costing tk. 120 per kg and 2 kgs of papaya costing tk. 100 per kg and 2 kgs of grapes costing tk. 140 per kg. At what price (in tk.) per kg should the mixture be sold to make a profit of 25 percent?

A. 125

B. 130

C. 140

D. 150

E. 175

সমাধান: মোট খরচ =  $3 \times 120 + 2 \times 100 + 2 \times 140 = 840$  টাকা

25% লাভে বিক্রয়মূল্য =  $840 \times \frac{125}{100} = 1050$  টাকা

∴ প্রতি কেজির বিক্রয়মূল্য =  $\frac{1050}{3+2+2} = \frac{1050}{7} = 150$  টাকা

43. Albert invested an amount of tk. 8000 in a fixed deposit scheme for 2 years at compound interest rate 5% per annum. How much amount will Albert get on maturity of the fixed deposit? [DBBL (Officer) 2019]  
A. 8600                      B. 8620                      **C. 8820**                      D. 9000

সমাধান: আমরা জানি,  $C = P \left(1 + \frac{r}{100}\right)^n$   
 $= 8000 \left(1 + \frac{5}{100}\right)^2$   
 $= 8000 \left(1 + \frac{1}{20}\right)^2$   
 $= 8000 \left(\frac{21}{20} \times \frac{21}{20}\right)$   
 $= 8820$  টাকা

44. How much interest will tk. 1000 earn in 1 year at an annual interest rate of 20% if interest rate is compounded every 6 months? [BB AD 2010]  
A. 195                      B. 200                      C. 220                      **D. None of these**

সমাধান: এখানে, চক্রবৃদ্ধি সুদ =  $P \left\{ \left(1 + \frac{r}{100}\right)^n - 1 \right\}$   
 $= 1000 \left\{ \left(1 + \frac{20}{2 \times 100}\right)^{\frac{6}{12} \times 2} - 1 \right\}$   
 $= 1000 \left\{ \left(1 + \frac{1}{10}\right)^1 - 1 \right\}$   
 $= 1000 \left(\frac{11}{10} - 1\right)$   
 $= 1000 \times \frac{1}{10}$   
 $= 100$  টাকা

45. By selling 60 oranges at 624 taka, loss is equal to cost price of 8 oranges, the cost price of one orange is: [IBA MBA Dec 2019]  
A. 10                      B. 10.5                      C. 11                      D. 11.5                      **E. None of these**

সমাধান: (E) 60টি Orange এর Selling Price = 624 taka.

ধরি, 1টি Orange-এর Cost Price =  $CP$

Loss =  $60CP - 624 = 8CP$

⇒  $52CP = 624$  ∴  $CP = 12$

46. A man purchased equal number of bananas at two different rates, one at the rate of 8 tk. per dozen and the other at the rate of 10 tk. per dozen. After that, he sold those bananas at an average rate of 11 tk. dozen and thus made a profit of 100 tk. How many dozen of banana did he purchase altogether?  
A. 60                      **B. 50**                      C. 55                      D. 45                      E. None of these

সমাধান: ধরি, 8 টাকা করে  $x$  ডজন এবং 10 টাকা করে  $x$  ডজন কলা কিনেছিলেন।

তাহলে, মোট ক্রয়মূল্য =  $8x + 10x = 18x$  টাকা

এবং বিক্রয়মূল্য =  $2x \times 11 = 22x$  টাকা

প্রশ্নমতে,  $22x - 18x = 100$

⇒  $4x = 100$

∴  $x = 25$

∴  $2x = 50$

47. A man buys an article for 10% less than its value and sells it for 10% more than its value. His gain or loss percent is:

- A. no profit, no loss                      B. 20% profit                      C. less than 20% profit  
**D. more than 20% profit**                      E. None of these

সমাধান: ধরি, তালিকামূল্য  $x$  টাকা

$$\therefore \text{ক্রয়মূল্য} = x \times \frac{90}{100} = \frac{90x}{100} \text{ টাকা}$$

$$\text{এবং বিক্রয়মূল্য} = x \times \frac{110}{100} = \frac{110x}{100} \text{ টাকা}$$

$$\therefore \text{লাভ} = \frac{20x}{100} \text{ টাকা}$$

$$\therefore \text{শতকরা লাভ} = \frac{20x}{100} \times \frac{100}{90x} \times 100\% = \frac{200}{9}\% = 22\frac{2}{9}\%$$

48. Bashir bought an ordinary mobile and a cover for tk. 2000. Malek bought a smart phone and the same cover for tk. 2000 more than Bashir had paid. The price of the cover was one tenth of the combined cost of the two mobiles. What was the cost of the ordinary mobile? [IBA BBA 14-15]

- A. tk. 1000                      B. tk. 1200                      **C. tk. 1500**                      D. tk. 1600                      E. None of these

সমাধান: এখানে, ধরি, Ordinary mobile = M, Smart phone = S এবং Cover = C

$$\therefore M + C = 2000 \dots \dots \dots (i)$$

$$S + C = 2000 + 2000 = 4000 \dots \dots \dots (ii)$$

$$\text{এবং, } C = \frac{1}{10}(M + S)$$

$$\Rightarrow 10C = M + S$$

(i) + (ii) করে পাই,

$$M + S + 2C = 6000$$

$$\Rightarrow 10C + 2C = 6000$$

$$\Rightarrow C = 500$$

$$\therefore (i) \text{ হতে, } M = 2000 - C = 2000 - 500 = 1500 \text{ টাকা}$$

49. The profit on sale of 100 pencils is equal to the selling price of 20 pencils. What is the profit margin in percentage?

- A. 20                      **B. 25**                      C. 33.33                      D. 50                      E. 2.5

সমাধান: S.P of 100 pencils – C.P of 100 pencils = S.P of 20 pencils

$$\Rightarrow \text{S.P of 80 pencils} = \text{C.P of 100 pencils}$$

$$\therefore \text{C.P of 1 pencil} = \text{S.P of } \frac{80}{100} \text{ pencils}$$

$$= \text{S.P of } \frac{4}{5} \text{ pencils}$$

Let, C.P of 1 pencil = P = S.P of  $\frac{4}{5}$  pencils

$$\therefore \text{S.P of 1 pencil} = \frac{5P}{4}$$

$$\therefore \text{Profit} = \frac{5P}{4} - P = \frac{P}{4}$$

$$\therefore \text{Percentage of profit} = \frac{P}{4} \times \frac{1}{P} \times 100\% = 25\%$$

50. At a certain bookstore, the regular price of each book is 20 percent less than its list price. If during a sale the price of each book at the store was 15 percent less than its regular price, then the price of a book during the sale was what percent less than its list price? [IBA MBA Dec' 16]

- A. 30%                      **B. 32%**                      C. 40%                      D. 42%                      E. None of these

সমাধান: ধরি, listed price = 100 টাকা।

$$\therefore \text{regular price} = 100 \times \frac{(100-20)}{100} = 100 \times \frac{80}{100} = 80 \text{ টাকা।}$$

আবার, regular price এর 15% discount এ বিক্রি হলে বিক্রয়মূল্য =  $80 \times \frac{(100-15)}{100} = 80 \times \frac{85}{100} = 68$  টাকা।

∴ বিক্রয়মূল্য, listed price থেকে কম =  $(100 - 68) = 32$  টাকা।

Alternater Solution: Regular price =  $\frac{L.P \times 80}{100} = \frac{80L.P}{100}$

During sale, price (store) =  $\frac{80L.P}{100} \times \frac{85}{100} = \frac{17L.P}{25}$

∴ Discount (less) =  $L.P - \frac{17L.P}{25} = \frac{8L.P}{25}$

∴ Discount (less) – Percentage =  $\frac{8L.P}{25} \times \frac{1}{L.P} \times 100\% = 32\%$

51. A man sold his watch at a loss of 5%. had he sold it for tk. 56.25 more he would have gained 10%. What was the cost of the watch?

A. 260

B. 275

C. 280

**D. 375**

E. None of these

সমাধান: ধরি, ঘড়িটির ক্রয়মূল্য P টাকা,

তাহলে, 5% ক্ষতিতে বিক্রয়মূল্য =  $\frac{P \times 95}{100} = \frac{95P}{100}$

প্রশ্নমতে,  $\frac{95P}{100} + 56.25 = \frac{110P}{100}$

$\Rightarrow \frac{15P}{100} = 56.25$

$\Rightarrow P = \frac{100 \times 56.25}{15} = 375$  টাকা

52. Two chairs have been sold, each for tk. 3600. On one 20% profit has been earned and on the other 20% loss has been incurred, what is the total profit or loss?

A. profit of tk. 100

B. loss of tk. 120

**C. loss of tk. 300**

D. profit of tk. 300

E. None of these

সমাধান: মনে করি, প্রথম চেয়ারের ক্রয়মূল্য  $x_1$  টাকা

প্রশ্নমতে,  $\frac{x_1 \times 120}{100} = 3600$

$\Rightarrow x_1 = \frac{3600 \times 100}{120} = 3000$

আবার, দ্বিতীয় চেয়ারের ক্রয়মূল্য  $x_2$  টাকা

প্রশ্নমতে,  $x_2 \times \frac{80}{100} = 3600$

$\Rightarrow x_2 = \frac{3600 \times 100}{80} = 4500$

∴ মোট ক্রয়মূল্য =  $3000 + 4500 = 7500$  টাকা

এক মোট বিক্রয়মূল্য =  $3600 + 3600 = 7200$  টাকা

∴ ক্ষতি =  $7500 - 7200 = 300$  টাকা

53. The sales price of an item including the sales tax is tk. 616. The tax rate is 10%; If the shopkeeper made a profit of 12%, what was cost price of the item in tk.?

**A. 500**

B. 515

C. 550

D. 575

E. None of these

সমাধান: মনে করি, C.P (ক্রয়মূল্য) = x টাকা

∴ S.P (বিক্রয়মূল্য) =  $\frac{x \times 112}{100} = \frac{112x}{100}$

প্রশ্নমতে,  $\frac{112x}{100} \times \frac{110}{100} = 616$

$\Rightarrow x = \frac{616 \times 100 \times 100}{112 \times 110} = 500$  টাকা

54. A man sold an article for tk. 56 cost him tk. x. If he had gained x% his outlay, what was his cost?

A. tk. 45

B. tk. 35

**C. tk. 40**

D. tk. 50

E. tk. 28

সমাধান: মনে করি, ক্রয়মূল্য = x টাকা

$$\text{প্রশ্নমতে, } x + \frac{x \times x}{100} = 56$$

$$\Rightarrow \frac{100x + x^2}{100} = 56$$

$$\Rightarrow x^2 + 100x - 5600 = 0$$

$$\Rightarrow x^2 + 140x - 40x - 5600 = 0$$

$$\Rightarrow (x + 140)(x - 40) = 0$$

$$\therefore x = 40$$

55. The price of the jewel, passing through three hands, rises on the whole by 65%. If the 1<sup>st</sup> and the 2<sup>nd</sup> sellers earn 20% and 25% profit respectively, find the percentage profit earned by the third seller.

A. 12%

B. 30%

C. 40%

D. 15%

E. 10%

সমাধান: মনে করি, প্রথম বিক্রেতার ক্রয়মূল্য = x টাকা

$$\therefore \text{দ্বিতীয় বিক্রেতার ক্রয়মূল্য} = \frac{x \times 120}{100} \text{ টাকা এবং তৃতীয় বিক্রেতার ক্রয়মূল্য} = \frac{x \times 120}{100} \times \frac{125}{100} = \frac{3x}{2} \text{ টাকা}$$

যেহেতু, মূল্য 65% বৃদ্ধি পায়; সেহেতু, তৃতীয় বিক্রেতার লাভ 'P' হলে,

$$\frac{3x}{2} \times P = \frac{x \times 165}{100}$$

$$\Rightarrow P = \frac{2 \times x \times 165}{3 \times 100 \times x} = \frac{11}{10} = \frac{110}{100}$$

সুতরাং, তৃতীয় বিক্রেতার লাভ = 10%

56. A dress on sale in a shop is marked at tk. Z. During the discount sale its price is reduced by 15%. Staffs are allowed a further 10% reduction on the discounted price. If a staff member buys the dress what will she have to pay in terms of Z?

A. 0.75Z

B. 0.76Z

C. 0.765Z

D. 0.77Z

E. None of these

সমাধান: Discount sale এর জন্য, বিক্রয়মূল্য =  $Z \times \frac{85}{100} = \frac{85Z}{100}$  টাকা

এখন, Discount price এর ওপর 10% ছাড় দেয়ায়,

$$\text{বিক্রয়মূল্য} = \frac{85Z}{100} \times \frac{90}{100} = \frac{153Z}{200} = 0.765Z$$

57. A retailer sells perfumes at a 10% discount. If a perfume cost him \$75 and he wants to make a profit of no less than twenty percent on the cost (after the discount) what is the minimum tag price he needs to put on a perfume?

A. 90

B. 100

C. 120

D. 140

E. 150

সমাধান: মনে করি, Tag price = \$x

$$\text{যেহেতু, cost price } \$75, \text{ সেহেতু, Minimum sell price} = \frac{75 \times 120}{100} = \$90$$

$$\text{প্রশ্নমতে, } x \times \frac{90}{100} = 90$$

$$\Rightarrow x = \$100$$

58. A shopkeeper sold an article for tk. 450 at a discount of 10% on the labeled price. He would have earned a profit of 25%, had there been no discount. What was the profit earned in percentage, at the discounted price? [IBA June 2015]

A. 10

B. 12

C. 12.5

D. 20

E. None of these

সমাধান: ধরি, label price = x টাকা।

$$\text{প্রশ্নমতে, } \frac{90x}{100} = 450 \Rightarrow x = \frac{450 \times 100}{90} = 500 \text{ টাকা।}$$

$$\text{এখন, 25\% লাভে, Cost price} \times \frac{125}{100} = 500$$

$$\Rightarrow \text{Cost price} = 400 \text{ টাকা}$$

$$\therefore \text{Profit} = 450 - 400 = 50 \text{ টাকা}$$

$$\therefore \text{Profit (Percentage)} = \frac{50}{400} \times 100\% = 12.5\%$$

59. Syntax cement gives commission of 15% on the printed price of each sack of cement if sells to its dealers and gives a profit of 19%. If the commission is decreased to 10%, the new profit percentage will be? [IBA MBA June 2018]

- A. 21%      B. 25%      **C. 26%**      D. 35%      E. None of these

সমাধান: ধরি, printed price = 100 tk

15% commission এ selling price = 85 tk

cost price x হলে, x এর  $\frac{119}{100} = 85$  tk       $\therefore x = \frac{85 \times 100}{119}$  tk

commission 10% হলে, selling price হবে 90 tk

এখন profit p% হলে,

cost price এর  $\frac{p}{100}$  profit এ selling price 90

সুতরাং,  $\frac{85 \times 100}{119} \times \frac{p}{100} = 90 \therefore p = \frac{90 \times 119}{85} = 126$

$\therefore$  Net profit (126 – 100) = 26%

60. The sum of principle interest of a certain amount of money would be tk. 460 after 3 years from now and tk. 500 after 5 year from. What is the total interest rate?

- A. 3%      **B. 5%**      C. 10%      D. 12%      E. 15%

সমাধান: ধরি, Principal/ আসল = P টাকা

তাহলে, 3 বছর পরে সুদ = (460 – P) টাকা

এবং 5 বছর পরে সুদ = (500 – P) টাকা

প্রথম শর্তমতে,  $460 - P = \frac{P \times 3 \times R}{100} \dots \dots \dots (i) [\because I = \frac{PnR}{100}]$

এবং দ্বিতীয় শর্তমতে,

$500 - P = \frac{P \times 5 \times R}{100} \dots \dots \dots (ii)$

(ii) – (i) করে,  $\frac{2PR}{100} = 40$

$\Rightarrow PR = 2000 \dots \dots \dots (iii)$

এখন, (i) হতে,  $460 - P = \frac{2000 \times 3}{100} = 600$  [PR = 2000]

$\therefore$  (iii) হতে পাই,  $R = \frac{2000}{400} = 5\%$

**Written Math**

1. Babu purchased 6 identical maple wood furniture and 7 identical birch wood furniture for his office. The regular price of each maple wood furniture was thrice the regular price of each birch wood furniture. However, Babu obtained a 20% discount off the regular price of each maple wood furniture. If the regular price of each birch wood furniture was Tk. 500, what was the total price of all 13 furniture?

[DBBL (Trainee Officer) 2023]

সমাধান: দেওয়া আছে, maple wood এর ফার্নিচার কিনেছে = 6টি এবং birch wood এর ফার্নিচার কিনেছে = 7টি

$\therefore$  birch wood ফার্নিচারের মূল্য =  $500 \times 7 = 3500$  টাকা

এবং maple wood ফার্নিচারের মূল্য =  $1500 \times 6 = 9000$  টাকা

[ $\because$  maple wood ফার্নিচারের মূল্য birch wood ফার্নিচারের 3 গুণ]

প্রশ্নে বলা আছে, বাবু maple wood ফার্নিচারের উপর 20% discount পায়।

$\therefore$  discount এর পরে maple wood ফার্নিচারের মূল্য =  $9000 - 20\% = 9000 \times \frac{80}{100} = 7200$  টাকা

সুতরাং, সকল ফার্নিচারের মোট মূল্য =  $7200 + 3500 = 10700$  টাকা

**Answer: Tk. 10700**

2. Ana runs a merchandiser store. She wants to buy 500 note book for her store. She will have 300 note book for Tk. 2500. Next 200 note book are for tk. 4 per notebook. If total cost for notebook is Tk. 3300 and 12% discount is given then total cost for notebooks is- [IFIC (TSO) 2019]

সমাধান: Since a 12% discount is given, the final cost after the discount is Tk. 3300 – 12% of Tk. 3300.

To calculate the discount, we multiply Tk. 3300 by 0.12 to get Tk. 396.

Therefore, the final cost after the discount is Tk. 3300 – Tk. 396 = Tk. 2904.

**Answer: 2904 taka**

3. A man buys 20 pens and 12 books for tk. 400. He sells pens at a profit of 40% and books at a gain of 25%. If his overall profit was Tk. 112, the cost price of the book is (in Tk. )-

[BSCIC (Extension Officer) 2019]

সমাধান: Let, the CP of 12 books = x

So, the CP of 20 pens = 400 – x

$$\text{ATQ, } \frac{(400-x) \times 40}{100} + \frac{x \times 25}{100} = 112$$

$$\Rightarrow \frac{(400-x) \times 2}{5} + \frac{x}{4} = 112$$

$$\Rightarrow \frac{3200 - 8x + 5x}{20} = 112$$

$$\Rightarrow 3200 - 3x = 112 \times 20$$

$$\Rightarrow -3x = 2240 - 3200$$

$$\Rightarrow x = \frac{-960}{-3} = 320$$

$$\therefore \text{CP of a book} = \frac{320}{12} = 26.66 \text{ taka.}$$

**Answer: 26.66 tk.**

4. The cost, in taka, of manufacturing X microwaves is Tk. (6000+300x). The amount received when selling these X microwaves is Tk. 700x. What is the least number of microwaves that must be manufactured and sold so that the net profit is Tk. 2400? [MTB (MTO) 2019]

সমাধান: Here, the cost price of X microwaves is Tk. (6000+300x) and the selling price is 700x.

$$\therefore \text{Profit} = \text{SP} - \text{CP} = 700x - (6000 + 300x) = 400x - 6000$$

$$\text{ATQ, } 400x - 6000 = 2400$$

$$\Rightarrow x = \frac{2400+6000}{400}$$

$$\Rightarrow x = \frac{8400}{400} = 21$$

**Answer: 21**

5. Kalam bought two varieties of rice, costing Tk. 50/kg and Tk 60/kg each, and mixed them in same ratio. Then he sold the mixture at Tk. 70/kg making a profit of 20%,. What was the ratio of the mixture?

[BREB (AD) 2019]

সমাধান: Let, Kalam bought x kg at 50/kg rate and y kg at 60/kg rate.

So, the cost price = 50x + 60y and sell price = 70(x + y)

Now, the profit was 20%

If cost price is 100 selling is 120 tk.

If cost price (50x + 60y) selling is  $\frac{120(50x+60y)}{100}$  tk.

$$\therefore \frac{120(50x+60y)}{100} = 70(x + y)$$

$$\Rightarrow 60x + 72y = 70x + 70y$$

$$\Rightarrow 2y = 10x$$

$$\Rightarrow 5x = y$$

$$\Rightarrow \frac{x}{y} = \frac{1}{5}$$

$$\therefore x:y = 1:5$$

**Answer: 1:5**

6. Last year's Jaman bought two lamps. This year he sold them for BDT 2000 each. On one lamp he made 25% profit and on other lamp he has loss 25% loss. What was his net loss or profit? [BREB (AD) 2019]

Solution: Price of painting with 25% profit =  $\frac{2000}{1.25} = \text{Tk. } 1600$

Price of painting with loss 25% =  $\frac{2000}{0.75} = \text{Tk. } 2666.66$

Total invested amount = Tk. 4266.66

Total SP = Tk. 4000

So, net gain or loss = SP – CP = 4000 – 4266.66 = Tk. 266.66 loss

**Answer: Tk. 266.66 loss**

7. A retailer buys pens in packs of 24 for tk. 336/pack and then resells them in packs of 5 for tk. 80/pack. If the retailer sold all the pens it purchased and made a profit of tk. 960, how many packs of pens did the retailer purchased? [Biman Bangladesh Airlines (Ground Service Assistant) 2018]

Solution: Cost price per pen =  $\frac{336}{24} = 14$  taka

Selling price per pen =  $\frac{80}{5} = 16$  taka

Profit per pen = 16 – 14 = 2 taka

Total profit = 960 taka

Total pens =  $\frac{960}{2} = 480$  taka

∴ The retailer purchased =  $\frac{480}{24} = 20$  packs

**Answer: 20 packs**

8. Mr. X a sales person earns 5% commission on all sales between tk. 20000 and 40000, 8% on all sales exceeding tk. 40000 in a month. he does not earn any commission if sales in month amount to less than tk. 20000. His monthly salary is tk. 60000, he has to pay tax 20% on his basic salary but no tax in commission in April, 2001, the total net income (salary + commission) of the sales person was tk. 65000. How much were the sales in April?

সমাধান: Tax on salary = 60000 × 20% = 12000

Net salary = 60000 – 12000 = 48000

So, commission found in April = 65000 – 48000 = 17000

Let, the sales in April = x

According to the question,

$40000 \times 5\% + (x - 40000) \times 8\% = 17000 \Rightarrow 2000 + 0.08x - 3200 = 17000$

$\Rightarrow 0.08x - 1200 = 17000 \Rightarrow 0.08x = 18200 \Rightarrow x = 227500$

So, the sales in April = tk. 227500

**Answer: Tk. 227500**

9. A Video magazine distributor made 3500 copies of the May issue of the magazine at a cost of tk. 400000. He gave 500 cassettes free to same key video libraries. He also allowed a 25% discount on the market price of the cassette. In this manner, he was able to sell all of a cassettes was tk. 160, what is his gain or loss for the May issue of the video magazine?

সমাধান: Market price of a cassetter was tk. 160.

So, at 25% discount selling price = 1600 – 160 × 25% = 120

Now selling price of 3500 cassette = (500 × 0 + 120 × 3000) = 360000

Cost loss = (400000 – 360000) = 40000

**Answer: 40000**

10. Mr. Karim borrowed tk. 500 at 5% interest per year. After some time, he borrowed tk. 400 at  $3\frac{1}{2}\%$  interest per year for the second time. Six months after the second time borrowing, he repaid both the borrowed money along with interest and the amount repaid was tk. 994.50. How many years after the first time borrowing Mr. Karim repaid the borrowed money? [23<sup>rd</sup> BCS, Bank Asia (MTO) 2017]

Solution: Total amount =  $(400 + 500) = \text{tk. } 900$

Total interest =  $(994.5 - 900) = \text{tk. } 94.5$

at 3.5% interest rate, tk. 400 for 6 months or  $\frac{1}{2}$  years total interest =  $400 \times 3.5\% \times \frac{1}{2}$   
 $= \frac{400 \times 3.5}{100 \times 2} = \text{tk. } 7$

Remaining interest =  $(94.5 - 7) = \text{tk. } 87.5$

at 5% interest of tk. 500 for 1 year =  $500 \times \frac{5}{100} = \text{tk. } 25$

tk. 25 interest for = 1 year

$\therefore$  1 interest for =  $\frac{1}{25}$  year

$\therefore$  87.5 interest for =  $\frac{87.5}{25} = 3.5$  years

So, after 3.5 years then he repaid the amount

**Answer: 3.5 years**