Class Test on Lecture Sheet 5

1. Asif sells an article at a profit of 25%. If he had bought it 20% loss and sold in for tk. 10.50 less, he would have gained 30%. Find the cost of the article.

A. 40 B. 50 C. 30 D. 60 E. 45

সমাধান: Let, the cost of the article = x

Then, selling price = $\frac{x\times125}{100}$

If he had bought it at 20% loss,

Then, cost price = $\frac{80x}{100}$

প্রশ্নমতে, $\frac{80x}{100}\times\frac{130}{100}=\frac{x\times125}{100}-10.50$

$\Rightarrow \frac{104x}{100}=\frac{125x}{100}-10.50$

$\Rightarrow \frac{21x}{100}=10.50$

$\Rightarrow x=\frac{10.5\times100}{21}=50$

2. Rakib was planning on depositing a certain amount of money each month into a bank. He then decided not to make any contribution during May and June. To make the same annual contribution that he had originally planned, by what percent should be increase his monthly deposits?

A. 16.66% B. 20% C. 25.33% D. 30% E. 33.33%

সমাধান: Let, total planned annual contribution = $x\times12=12x$

Where, each month contribution = x

As during May & June, there won't be any contributio n,

So, total possible contribution = $x\times10=10x$

Now, Let, Monthly deposit should be increased by D%

Then, $10x+10x\times D\%=12x$

$\Rightarrow 10x+\frac{Dx}{10}=12x$

$\Rightarrow 2x=\frac{Dx}{10}$

$\Rightarrow D=20$

3. The selling price of an article is tk. 39. If its cost price is numerically equal to its profit percent, then its cost price is-

A. 13 B. 17 C. 30 D. 35 E. 34

সমাধান: ধরি, cost price = x

তাহলে, $x+x\times x\%=39$

$\Rightarrow x+\frac{x^2}{100}=39$

$\Rightarrow x^2+100x-3900=0$

$\Rightarrow x^2+130x-30x-3900=0$

$\Rightarrow x(x+130)-30(x+130)=0$

$\Rightarrow (x+130)(x-30)=0$

$\therefore x=30$

4. What will be the difference between simple and compound interest at 10% on a sum of tk. 1000 after 4 years?

A. 31.90 B. 32.10 C. 44.90 D. 64.10 E. None of these

সমাধান: Simple Interest , I = Pnr = $\frac{1000\times10\times4}{100}=400$

Compound Interest, C = $P\left(1+\frac{P}{100}\right)^n=1000\left(1+\frac{10}{100}\right)^4=1000\left(1+\frac{1}{10}\right)^4=1000\left(\frac{11}{10}\right)^4=1464.1$

So, Compound Interest = $1464.1-1000=464.1$

So, Required difference = $464.1-400=64.1$

5. The profit on sale of 100 pencils is equal to the selling price of 20 pencils. What is the profit margin?
[IBA MBA June 2016]

A. 20% B. 25% C. 33.33% D. 40% E. None of these

সমাধান: Here, selling price of 100 pencils − Cost price of s100 pencils = Selling price of 20 pencils

⇒ Selling price of 80 pencils = Cost price of 100 pencils

Let, cost price of 100 pencils = x

∴ Selling price of 100 pencils = $\frac{x}{80} \times 100 = \frac{5x}{4}$

So, profit = $\frac{5x}{4} - x = \frac{x}{4}$

∴ Profit percentage = $\frac{x}{4} \times \frac{1}{x} \times 100\% = 25\%$

6. X sells a product to Y and makes a profit of 25%. Y sells it to Z at a loss of 20%. If Z buys it for tk. 140, what is X's purchases price?

A. 200 B. 140 C. 175 D. 250 E. None of these

সমাধান: ধরি, X এর ক্রয়মূল্য P টাকা

প্রশ্নমতে, $P \times \frac{125}{100} \times \frac{80}{100} = 140$

$\Rightarrow P = \frac{140 \times 100 \times 100}{125 \times 80} = 140$ টাকা

7. The selling price of 1 pen and 5 pencils is 50% of the selling price of 5 pens and 1 pencil. If the price of 1 pen and 1 pencil is tk. 200, what is the price of a pencil in taka?

A. 40 B. 50 C. 60 D. 80 E. None of these

সমাধান: Let, price of 1 pen & 1 pencil is x & y respectively.

Then, $x + y = 200$ ... ... (i)

ATQ, $x + 5y = \frac{5x+y}{2}$

$\Rightarrow 2x + 10y = 5x + y$

$\Rightarrow 3x = 9y$

$\Rightarrow x = 3y$

From (i), $3y + y = 200$

$\Rightarrow 4y = 200$

$\Rightarrow y = 50$

8. A 30% discount reduces the tag price of which by Tk. 90. If 20% discount is offered then what will be the price (in Tk.) of that watch? [DBBL (Jr. Channel Officer)-2023]

A. 180 B. 210 C. 240 D. 270 E. None of these

Solution: Let the original price of the commodity be x.

The reduction in price due to the 30% discount is 0.3x. It is given that the 30% discount reduced the price of the commodity by 90 dollars.

Expressing this as an equation yields.

0.3x = 90

⇒ x = 300

Hence, the original price of the commodity was 300 dollars.

The value of a 20% discount on 300 dollars is $0.20(300) = 60$

Hence, the new selling price of the commodity is $300 - 60 = 240$

9. A man purchased a watch for tk. 400 and sold it at a gain of 20% of the selling price. The selling price of the watch is:

A. 300 B. 320 C. 440 D. 500 E. 520

সমাধান: Let, selling price = x

Profit = $\frac{x\times20}{100}$

∴ Actual cost = $x - \frac{20x}{100} = \frac{80x}{100}$

Now, when actual cost is $\frac{80x}{100}$, selling price = x

∴ When actual cost is 400, selling price = $\frac{x\times100\times400}{80x} = 500$

10. An article is listed at Tk. 900 and two successive discounts of 8% and 8% are given on it. How much would the seller gain or lose, if he gives a single discount of 16%, instead of two discounts?

[MTB (MTO) 2019]

A. 5.76 taka loss B. 5.76 Profit C. No profit and no loss D. 5.67 tk loss

Solution: M.P = Tk. 900

Two succexssive discount = 8% and 8%

SP after first discount = 900 − 8% of 900 = $900 - \frac{8}{100}\times900 = 900 - 72 =$ Tk. 828

SP after second discount = 828 − 8% of 828 = $828 - \frac{8}{100}\times828 = 828 - 66.24 =$ Tk. 761.76

A single discount = 16%

SP after single discount = 900 − 16% of 900 = $900 - \frac{16}{100}\times900 = 900 - 144 = 756$

Hence if the seller gives a single discount he gets a loss of Tk. 761.76 − 756 = Tk. 5.76

Practice Math

1. The ratio of the cost of two article is 7:3. The first one was sold at a loss of 20% and the second one was sold at a gain of 40%. What is the overall percentage of gain or loss?

[তিতাস গ্যাস ট্রান্সমিশন অ্যান্ড ডিস্ট্রিবিউশন কো. লি. (সহকারী ব্যবস্থাপক) ২০২১]

A. 2% loss B. 2% profit C. 4% loss D. 4% profit

সমাধান: দেয়া আছে, ক্রয়মূল্যের অনুপাত 7: 3

ধরি, প্রথমটির দাম = 70 টাকা

দ্বিতীয়টির দাম = 30 টাকা

∴ মোট ক্রয়মূল্য = 70 + 30 = 100 টাকা

∴ মোট বিক্রয়মূল্য = 70 এর 80% + 30 এর 140% [যেহেতু প্রথমটিতে 20% লস ও দ্বিতীয়টিতে 40% লাভ হয়]

$= 70\times\frac{80}{100} + 30\times\frac{140}{100}$

$= 56 + 42$

= 98 টাকা

∴ শতকরা ক্ষতি হয় $(100 - 98) = 2$ টাকা

বিকল্প সমাধান: ধরি, ক্রয়মূল্য 7x ও 3x টাকা

∴ মোট ক্রয়মূল্য $7x + 3x = 10x$ টাকা

∴ মোট বিক্রয়মূল্য = $7x$ এর 80% + $3x$ এর 140%

$= 7x\times\frac{80}{100} + 3x\times\frac{140}{100}$

$= \frac{56x}{10} + \frac{42x}{10}$

$= \frac{56x+42x}{10}$

$= \frac{98x}{10}$

$= 9.8x$

∵ $10x > \frac{98x}{10}$ তাই ক্ষতি হয়।

∴ মোট ক্ষতি হয় = $10x - 9.8x = 0.2x$

∴ শতকরা ক্ষতি হয়, $\frac{0.2x}{10x}\times100 = 2\%$

2. A dog takes 3 laps for every 5 laps of a hare. If one leap of the dog is equal to 3 leaps of the hare, the ratio of the speed of the dog to that of the hare is? [তিতাস গ্যাস ট্রান্সমিশন অ্যান্ড ডিস্ট্রিবিউশন কো. লি. (সহ. ব্যবস্থাপক)-২১]

A. 8: 5 B. 9: 7 C. 9: 5 D. 8: 7

সমাধান: এখানে, কুকুরের 1টি লাফ = খরগোশের 3টি লাফ

$\therefore$ কুকুরের 3টি লাফ = খরগোশের $(3 \times 3) = 9$টি লাফ

$\because$ খরগোশের প্রতি 5টি লাফের জন্য কুকুর 3টি লাফ দেয় যা খরগোশের 9টি লাফের সমতুল্য। তাই তাদের অনুপাত হবে, 9: 5।

3. How many liters of water must be evaporated form 50 liters of a 3% sugar solution to get 5% sugar solution? [Bangladesh Bridge Authority (AD) 2020]

A. 6 B. 8 C. 10 D. None of these

সমাধান: Let, water evaporated x.

According to the question,

$(50 - x)$ এর 5% = 50 of 3%

$\Rightarrow (50 - x)$ এর $\frac{5}{100} = 1.5 \Rightarrow (50 - x)$ এর $\frac{1}{20} = 1.5$

$\Rightarrow 50 - x = 30.0 \Rightarrow 50 - 30 = x \Rightarrow x = 20$ liters.

4. 180-liter mixture of milk and water contains 20% of water. how much milk, in liters, must be added to the mixture so that the new mixture will contain water and milk in the ratio of 1: 7? [Dhaka Bank (MTO)-11]

A. 100 B. 144 C. 108 D. 525

সমাধান: 180 লিটার mixture-এ, water = $180 \times 20\% = 36L$

তাহলে, $milk = 180 - 36 = 144L$

ধরি, 'M' liter milk add করতে হবে।

প্রশ্নমতে, $\frac{36}{144+M} = \frac{1}{7}$

$\Rightarrow 144 + M = 252$

$\Rightarrow M = 252 - 144 = 108$

5. Two equal glasses of same type are respectively $\frac{1}{3}$ and $\frac{1}{4}$ full of milk. They are then filled up with water and the contents are mixed in a pot. What is the ratio of milk and water in the pot? [IFIC Bank (MTO)-13]

A. 7: 17 B. 7: 5 C. 3: 7 D. 11: 23

সমাধান: 1st glass contains $\frac{1}{3}$ milk

So, 1st glass contains $\frac{2}{3}$ water [after filling]

Again, 2nd glass contains $\frac{1}{4}$ milk

So, 2nd glass contains $\frac{3}{4}$ water [After filling]

So, total quantity of milk in the pot = $\frac{1}{3} + \frac{1}{4} = \frac{7}{12}$

& total quantity of water in the pot = $\frac{2}{3} + \frac{3}{4} = \frac{17}{12}$

So, Milk: Water = $\frac{7}{12} \times \frac{12}{17} = \frac{7}{17}$

6. 125 gallons of mixture contains 20% water. What amount of additional water should be added such that water content be raised to 25%? [Sonali Bank (Cash Officer) 2018, 2019]

A. $\frac{15}{2}$ gallons B. $\frac{17}{2}$ gallons C. $\frac{19}{2}$ gallons D. $8\frac{1}{3}$ gallons

সমাধান: In the mixture, water content = $125 \times 20\%$

ধরি, 'W' gallon water add করতে হবে = 25 gallons

প্রশ্নমতে, $25 + W = \frac{25}{100}(125 + W)$

$\Rightarrow 100 + 4W = 125 + W$

$\Rightarrow 3W = 25$

$\Rightarrow W = \frac{25}{3}$

$\therefore W = 8\frac{1}{3}$

7. Sumon bought 2 varieties of rice, costing Taka 8 per kg and Taka 12 per kg each and mixed them in some ratio. Then he sold the mixture at Taka 12 per kg. Making a profit of 20%, what was the ratio of the mixture? [Bangladesh Bridge Authority (AD) 2020]

A. 2:1 B. 1:2 C. 1:1 D. 3:1

সমাধান: Let, Two varieties amount = x kg; y kg.

According to the question,

$(8x + 12y)\frac{120}{100} = 12(x + y)$

$\Rightarrow (8x + 12y)\frac{12}{10} = 12(x + y)$

$\Rightarrow (8x + 12y) = 10(x + y)$

$\Rightarrow 8x + 12y = 10x + 10y$

$\Rightarrow 2x = 2y$

$\Rightarrow x = y$

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

$\therefore x: y = 1: 1$

8. Solution X contains 40% salt and 60% water by weights. Solution Y contains 25% salt and 75% water. If a mixture of X and Y contains 30% salt, what percentage of the weight of the mixture is solution X?

[তিতাস গ্যাস ট্রান্সমিশন অ্যান্ড ডিস্ট্রিবিউশন কো. লি. (সহকারী ব্যবস্থাপক) ২০২১]

A. 10% B. 33.3% C. 40% D. 42.5%

সমাধান: মনে করি, X মিশ্রণের পরিমাণ = x একক এবং Y মিশ্রণের পরিমাণ = y একক

প্রশ্নমতে, x এর 40% + y এর 25% = $(x + y)$ এর 30%

$\Rightarrow \frac{40}{100} \times x + \frac{25}{100} \times y = \frac{30}{100} \times (x + y)$

$\Rightarrow \frac{2x}{5} + \frac{y}{4} = \frac{3(x+y)}{10}$

$\Rightarrow \frac{8x+5y}{20} = \frac{3x+3y}{10}$

$\Rightarrow 8x + 5y = 2(3x + 3y)$

$\Rightarrow 8x + 5y = 6x + 6y$

$\Rightarrow 8x - 6x = 6y - 5y$

$\Rightarrow 2x = y$

$\Rightarrow \frac{x}{y} = \frac{1}{2}$

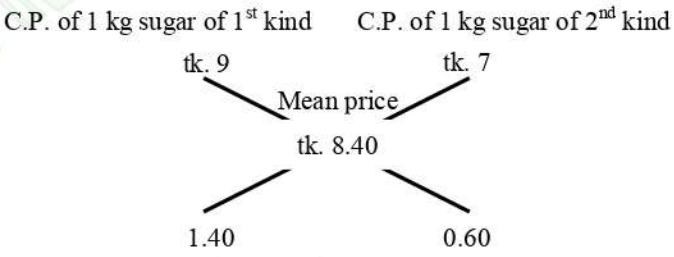
$\therefore x: y = 1: 2$

$\therefore$ X ও Y মিশ্রণে X এর পরিমাণ = $\frac{1}{1+2} \times 100\% = 33.3\%$

9. How many kilograms of sugar costing tk. 9 per kg must be mixed with 27 kg of sugar costing tk. 7 per kg so that there may be a gain of 10% by selling the mixture at tk. 9.24 per kg?

A. 36 kg B. 42 kg C. 54 kg D. 63 kg

Solution:By the rule of allegation:



Therefore, Ratio of quantites of 1st and 2nd kind = 14: 6 = 7: 3

Let x kg of sugar of 1st kind be mixed with 27 kg of 2nd kind.

Then, $7: 3 = x: 27$ or, $x = \frac{7\times27}{3} = 63$ kg

10. A, B, C enter into partnership, A invests 3 times as much as B invests and B invests two third of what C invests. At the end of the year, profit earned is Tk. 6600. What is the share of B?

[কর্ণফুলী গ্যাস ডিস্ট্রিবিউশন কোম্পানী লি. (সহকারী ব্যবস্থাপক) ২০২১]

A. 1100 B. 1150 C. 1175 D. 1200

সমাধান: এখানে, A = 3B আবার B = $\frac{2C}{3}$

$\therefore \frac{A}{B} = \frac{3}{1}$ $\quad\quad$ $\therefore \frac{B}{C} = \frac{2}{3}$

$\therefore A:B = 3:1$ $\quad\quad$ $\therefore B:C = 2:3$

$\therefore A:B:C = 6:2:3$

$\therefore$ B এর শেয়ার $= \frac{2}{6+2+3} \times 6600 = \frac{2}{11} \times 6600 = 1200$

বিকল্প সমাধান: $A:B:C = 6:2:3$

$\therefore$ A এর অংশ 6x; B এর অংশ 2x; C এর অংশ 3x

প্রশ্নমতে, $6x + 2x + 3x = 6600$

$\Rightarrow 11x = 6600$

$\therefore x = 600$

$\therefore$ B এর অংশ $= 2 \times 600 = 1200$

11. A, B and C are partners. 'A' whose money has been in the business for 4 month claims $\frac{1}{8}$ of the profits; 'B' whose money has been in the business for 6 months claims $\frac{1}{3}$ of the profits. If 'C' had tk. 1560 in the business for 8 months, how much money did A and B contribute to the business?

A. 720; 1280 $\quad$ B. 720; 1500 $\quad$ C. 750; 1280 $\quad$ D. 600; 1100

সমাধান: Here, 'A' claims $\frac{1}{8}$ of the profits & 'B' claims $\frac{1}{3}$ of the profits.

So, 'C' claims $1 - \left(\frac{1}{8} + \frac{1}{3}\right) = \frac{13}{24}$ of the profits

So, Ratio is, $A:B:C = \frac{1}{3}:\frac{1}{8}:\frac{13}{24} = 3:8:13$

Now, 'A' invested for 4 months and 'C' invested for 8 months.

So, $\frac{A\times4}{C\times8} = \frac{3}{13}$

$\Rightarrow \frac{A\times4}{1560\times8} = \frac{3}{13}$

$\Rightarrow A = \frac{3\times8\times1560}{13\times4} = 720$

Similarly, $\frac{B\times6}{C\times8} = \frac{8}{13}$

$\Rightarrow B = \frac{8\times1560\times8}{6\times13} = 1280$

12. A and B invest in a business in the ratio 3:2. If 5% of the total profit goes to charity and A's share is tk. 855, the total profit is- [Exim Bank (TO) 2016, Combined 5 Banks (Cash) 2019]

A. tk. 1425 $\quad$ B. tk. 1500 $\quad$ C. tk. 1537.50 $\quad$ D. tk. 1576

সমাধান: Let, total profit = x

Goes to charity = $\frac{5x}{100}$

So, remains = $\frac{95x}{100}$

Now, A's investment: B's investment = 3:2

ATQ, $\frac{95x}{100} \times \frac{3}{5} = 855$

$\Rightarrow x = \frac{855\times100\times5}{95\times3} = 1500$

13. A began a business with tk. 85000. He was joined afterwards by B with tk. 42500. For how much period does B join, if the profits at the end of the year are divided in the ratio of 3:1?

A. 4 months $\quad$ B. 5 months $\quad$ C. 6 months $\quad$ D. 8 months $\quad$ E. None of these

সমাধান: Let, 'B' joins after 'y' years.

প্রশ্নমতে, $\frac{85000\times1}{42500\times y} = \frac{3}{1}$

$\Rightarrow 3y \times 42500 = 85000$

$\Rightarrow y = \frac{85000}{42500\times3} = \frac{2}{3}$

$\therefore y = \frac{2}{3}$ বছর $= \frac{2}{3} \times 12 = 8$ months

14. A person's present age is two-fifth of the age of his mother. After 8 years, he will be one-half of the age of his mother. What is the present age of the mother? [BB AD 2022; Pubali Bank Ltd (SO) 2016]

A. 30 B. 35 C. 40 D. 50

Solution: প্রশ্নে বলা হচ্ছে, একজন ব্যক্তির বর্তমান বয়স তার মাতার বয়সের এক-পঞ্চমাংশ। 8 বছর পর ঐ ব্যক্তির বয়স তার মায়ের বয়সের অর্ধেক হবে। আপনাকে ঐ ব্যক্তির মায়ের বয়স বের করতে হবে।

ধরি, মাতার বর্তমান বয়স x বছর। ∴ ঐ লোকের বয়স হবে $\frac{2x}{5}$ বছর

আবার, 8 বছর পর মাতার বয়স হবে = $(x+8)$ বছর এবং 8 বছর পর ঐ লোকের বয়স হবে = $\left(\frac{2x}{5}+8\right)$ বছর

প্রশ্নমতে, $\frac{1}{2}(x+8) = \left(\frac{2x}{5}+8\right)$

$\Rightarrow \frac{(x+8)}{2} = \frac{2x+40}{5}$

$\Rightarrow 5x + 40 = 4x + 80$

$\Rightarrow 5x - 4x = 80 - 40$

$\therefore x = 40$

অর্থাৎ মাতার বর্তমান বয়স 40 বছর।

15. A father said his son, "I was as old as you are at present at the time of your birth." If the father age is 38 now, the son age 5 years back was:

A. 14 B. 19 C. 33 D. 38

Solution: Let the son's present age be x years.

Then, $(38 - x) = x \Rightarrow x = 19$

Son's age 5 years back = $(19 - 5) = 14$ years

16. If a and b are integer greater than 100 such that $a + b = 300$, which of the following could be the exact ratio of a to b? [IBA BBA 15-16]

A. 9 to 1 B. 5 to 2 C. 5 to 3 D. 4 to 1 E. 3 to 2

সমাধান: Here, $a + b = 300$ & a, b > 100

From the given options, if a = 180 & b = 120

& $a + b = 300$ & $\frac{a}{b} = \frac{180}{120} = \frac{3}{2}$

17. Two container x and y of the same capacity, are each $\frac{4}{5}$ full of water. If 4 liters of water from container x is added to container y, the ratio of water is the two containers becomes 2: 3. What is the capacity of container x? [IBA BBA 14-15]

A. 16 B. 20 C. 25 D. 32 E. None of these

সমাধান: ধরি, x & y container এর capacity = 'P' liter; তাহলে, 'x' container-এ water আছে = $\frac{4P}{5}$

প্রশ্নমতে, $\frac{\frac{4P}{5}-4}{\frac{4P}{5}+4} = \frac{2}{3}$

$\Rightarrow \frac{4P-20}{4P+20} = \frac{2}{3}$

$\Rightarrow 12P - 60 = 8P + 40$

$\Rightarrow 4P = 100$

$\Rightarrow P = 25$

18. The ratio of red and black marbles in a jar is 3: 5. If the number of red marbles is increased by 20% and the number of black marbles is increased by 5 units then the new ratio of red and black marbles remains the same. How many red marbles were in the jar? [IBA MBA June 2015]

A. 12 B. 15 C. 24 D. 30 E. None of these

সমাধান: ধরি, $\frac{R_m}{B_m} = \frac{3x}{5x}$; তাহলে, $\frac{3x \times 120\%}{5x+5} = \frac{3}{5}$ [Ratio remains the same]

$\Rightarrow 15x + 15 = 15x \times 120\% = 18x$

$\Rightarrow 3x = 15$

$\Rightarrow x = 5$

∴ Red marbles = 3x = 3 × 5 = 15

19. One year ago, the ratio of salary of Abir and Rakib was 5: 8. Ratio between this year's and last year's salary of Abir is 28: 25 and the same for Rakib is 23: 20. If the sum of their present salary is tk. 1184, the difference between their present salary is: [IBA MBA June 2017]

A. tk. 448 B. tk. 340 C. tk. 288 D. tk. 240 E. None of these

সমাধান: ধরি, salary of Abir was 5x & salary of Rakib was 8x (one year ago)

Then, Abir's present salary $= \frac{28}{25} \times 5x = \frac{28x}{5}$

& Rakib's present salary $= \frac{23}{20} \times 8x = \frac{46x}{5}$

ATQ, $\frac{28x}{5} + \frac{46x}{5} = 1184$

$\Rightarrow 74x = 1184 \times 5$

$\Rightarrow x = \frac{1184 \times 5}{74} = 80$

So, difference between their present salary $= \frac{46x}{5} - \frac{28x}{5} = \frac{18x}{5} = \frac{18 \times 80}{5} = 288$

20. Five kilograms of orange contained 98% water. If the next day the concentration of water decreased by 2%, what was the new weight of the orange, in kilograms?

A. 4.9 B. 4.8 C. 2.5 D. 2 E. 0.2

সমাধান: Here, Initial weight of the water $= 5 \times 98\% = 4.9$ kg

Let, x = Weight of the water lost (Evaporation)

Then, New weight of the water $= 4.9 - x$

& New weight of range $= 5 - x$

প্রশ্নমতে, $(5 - x) \times 96\% = 4.9 - x$

$\Rightarrow (5 - x) \times 0.96 = 4.9 - x$

$\Rightarrow 4.8 - 0.96x = 4.9 - x$

$\Rightarrow 0.04x = 0.1$

$\Rightarrow x = \frac{0.1}{0.04} = \frac{10}{4} = 2.5$

So, New weight of orange $= 5 - 2.5 = 2.5$ kg

21. A milk vender contains 2 cans of milk. The first contains 25% water and the rest milk. The second contains 50% water. How much milk should he mix from each of the containers so as to get 12 liters of milk such that the ratio of water to milk is 3: 5?

A. 4 liters, 8 liters B. 6 liters, 6 liters C. 5 liters, 7 liters D. 7 liters, 5 liters E. 8 liters, 4 liters

সমাধান: Let, x & y liters of milk should be mixed from each of the containers.

Then, total milk in the mixture $= x \times \frac{3}{4} + y \times \frac{1}{2}$ (75% milk, 25% water) & 50% milk, 50% water

& total water in the mixture $= x \times \frac{1}{4} + y \times \frac{1}{2}$

প্রশ্নমতে, $\frac{x \times \frac{1}{4} + y \times \frac{1}{2}}{x \times \frac{3}{4} + y \times \frac{1}{2}} = \frac{3}{5}$

$\Rightarrow \frac{x + 2y}{3x + 2y} = \frac{3}{5}$

$\Rightarrow 5x + 10y = 9x + 6y$

$\Rightarrow 4x = 4y$

$\Rightarrow x = y$

আবার, $x + y = 12$

$\Rightarrow x + x = 12$

$\Rightarrow 2x = 12$

$\Rightarrow x = 6$

$\therefore y = 6$

Answer: B. 6 liters, 6 liters

22. Silver is 26 times as heavy as Gold and Iron is 17 times as heavy as Gold. You have to prepare a mixture (of Silver & Iron) which is 23 times as heavy as Gold. What will be the ratio of Iron to Silver in the mixture? [IBA MBA June 2017]

A. 2: 1 B. 2: 3 C. 3: 5 D. 1: 2 E. None of these

সমাধান: Let, ratio of Iron to Silver in the mixture = $x: y$

ATQ, $26x + 17y = 23(x + y)$

$\Rightarrow 26x + 17y = 23x + 23y$

$\Rightarrow 3x = 6y$

$\Rightarrow x = 2y$

$\Rightarrow \frac{x}{y} = \frac{2}{1}$

23. The vessels contain water and milk in the ratio 1:2 and 2:5 are mixed in the ratio 1:4. The resulting mixture will have water and milk in the ratio?

A. 31:74 B. 31:75 C. 30:77 D. 30:74 E. 31:77

সমাধান: Let, the water and milk are mixed in the ratio $x: 4x$

Then, total water in the mixture = $x \times \frac{1}{3} + 4x \times \frac{2}{7} = \frac{x}{3} + \frac{8x}{7}$

& total milk in the mixture = $x \times \frac{2}{3} + 4x \times \frac{5}{7} = \frac{2x}{3} + \frac{20x}{7}$

So, $\frac{water}{milk} = \frac{\frac{31x}{21}}{\frac{74x}{21}} = \frac{31}{74}$

24. A sample of x liters from container having a 60 liter mixture of milk and water in the ratio of 2:3 is replaced with pure milk so that the container will have milk and water in equal proportions, what is the value of x?

A. 6 liters B. 10 liters C. 15 liters D. 20 liters E. 30 liters

সমাধান: এখানে, 'x' লিটারে দুধ = $x \times \frac{2}{5}$ এবং পানি = $x \times \frac{3}{5}$

Container এ, মোট দুধ = $60 \times \frac{2}{5} = 24$ লিটার এবং মোট পানি = $60 - 24 = 36$ লিটার

তাহলে, Replacement এর পরে, মোট দুধ = $24 - x \times \frac{2}{5} + x = 24 + \frac{3x}{5}$

এবং মোট পানি = $36 - x \times \frac{3}{5}$

প্রশ্নমতে, $24 + \frac{3x}{5} = 36 - \frac{3x}{5}$

$\Rightarrow \frac{6x}{5} = 12$

$\Rightarrow x = \frac{60}{6} = 10$

25. 8 liters are drawn from a container full of mango juice and is then filled with water. This operation is performed three more times. The ratio of the quantity of mango juice now left in container to that of water is 16: 65. How much mango juice did the container hold originally? [IBA BBA 13-14]

A. 24 liters B. 30 liters C. 36 liters D. 42 liters E. None of these

সমাধান: Let, initial volume of mango juice = V

Volume left after first replacement = $V\left(1 - \frac{8}{V}\right)$

∴ Volume left after fourth replacement = $V\left(1 - \frac{8}{V}\right)^4$

ATQ, $\frac{V\left(1-\frac{8}{V}\right)^4}{V} = \frac{16}{81}$ [16 + 65 = 81]

$\Rightarrow \left(1 - \frac{8}{V}\right)^4 = \frac{16}{81}$

$\Rightarrow \left(1 - \frac{8}{V}\right)^4 = \left(\frac{2}{3}\right)^4$

$\Rightarrow 1 - \frac{8}{V} = \frac{2}{3}$

$\Rightarrow \frac{8}{V} = \frac{1}{3}$

$\Rightarrow V = 24$

26. A milkman purchases the milk at tk. x per liter and sells it at tk. 2x per liters. Still he mixes 2 liters water with every 6 liters of pure milk. What is the profit percentage?

A. 116% B. 133.33% C. 150% D. 166.66%

সমাধান: যেহেতু প্রতি লিটার দুধের ক্রয়মূল্য = x টাকা

∴ 6 লিটার দুধের ক্রয়মূল্য = 6x টাকা

আবার, 1 লিটার দুধের বিক্রয়মূল্য = 2x টাকা

∴ 8 লিটার দুধের বিক্রয়মূল্য = 16x টাকা [6 লিটার দুধ + 2 লিটার পানি]

∴ লাভ = $16x - 6x = 10x$ টাকা

∴ শতকরা লাভ = $\frac{10x}{6x} \times 100\% = \frac{500}{3}\% = 166.66\%$

27. Solution Y is 40% sugar by volume and solution X is 20% sugar by volume. How many gallons of solution X must be added to 150 gallons of solution Y to create a solution that is 25% sugar by volume?

A. 75 B. 150 C. 240 D. 450 [City Bank (MTO)-18]

সমাধান: দেওয়া আছে, solution Y এ চিনি = 40% এবং solution X এ চিনি = 20%

বলা হয়েছে, solution X এর নির্দিষ্ট পরিমাণ [ধরি, a] মিশ্রণ solution Y এর 150 gallon এর সাথে মিশাতে হবে যাতে মিশ্রিত দ্রবণে 25% চিনি থাকে।

শর্তমতে, $\frac{a \text{ এর } 20\% + 150 \text{ এর } 40\%}{a+150} = \frac{25}{100}$

$\Rightarrow \frac{a \times \frac{20}{100} + 150 \times \frac{40}{100}}{a+150} = \frac{1}{4}$

$\Rightarrow \frac{\frac{a}{5}+60}{a+150} = \frac{1}{4}$

$\Rightarrow \frac{\frac{a+300}{5}}{a+150} = \frac{1}{4}$

$\Rightarrow 4\left(\frac{a+300}{5}\right) = a + 150$

$\Rightarrow \frac{4a+1200}{5} = a + 150$

$\Rightarrow 4a + 1200 = 5a + 750$

$\Rightarrow 4a - 5a = 750 - 1200$

$\Rightarrow -a = -450$

$\Rightarrow a = 450$

28. A sum of the money is to be distributed among A, B, C, D proportion of 5:2:4:3. If C gets tk. 1000 more than D. What is B's share? [পল্লী সঞ্চয় ব্যাংক (ক্যাশ অফিসার) ২০১৮]

A. 500 B. 1000 C. 1500 D. 2000

সমাধান: ধরি, A, B, C, D এর অংশ যথাক্রমে 5x, 2x, 4x, 3x

শর্তমতে, $4x - 3x = 1000$

∴ $x = 1000$

∴ B এর অংশ = $2x = 2 \times 1000 = 2000$

29. Shankar started a business with an investment of tk. 120,000. After three months, Aniket joined him with an investment of tk. 1,90,000. They earned a profit of tk. 17,50,000 after one year. What is Aniket's share in the profit?

A. tk. 800000 B. tk. 850000 C. tk. 900000 D. tk. 950000

সমাধান: শংকর এবং অনিকেতের বিনিয়োগের অনুপাত = $(120000 \times 12) : (190000 \times 9)$

$= \left(\frac{120000 \times 12}{9}\right) : \left(\frac{190000 \times 9}{9}\right)$

$= 160000 : 190000$

$= 16 : 19$

∴ অনুপাতদ্বয়ের যোগফল = $16 + 19 = 35$

অনিকেতের লভ্যাংশ = $\left(1750000 \times \frac{19}{35}\right) = 950000$ টাকা

30. The ratio of investment of two partners A and B is 11:12 and the ratio of their profits is 2:3. If A invested the money for 8 months, then for two much time B invested his money?

A. 11 months B. 16 months C. 13 months D. 10 months

সমাধান: ধরি, B x মাস পর্যন্ত বিনিয়োগ করেছিল।

বলা হয়েছে, A 8 মাস পর্যন্ত বিনিয়োগ করেছিল এবং তাদের লাভের হারের অনুপাত $2:3$।

শর্তমতে,

$(11 \times 8):(12 \times x) = 2:3$

$\Rightarrow 88:12x = \frac{2}{3}$

$\Rightarrow \frac{88}{12x} = \frac{2}{3}$

$\Rightarrow 24x = 3 \times 88$

$\Rightarrow x = \frac{3 \times 88}{24}$

$\Rightarrow x = 11$

$\therefore$ B 11 মাস পর্যন্ত বিনিয়োগ করেছিল।

31. Swati and Rajni enter into a partnership with their capitals in the ratio 5:6. At the end of 7 months Swati withdraws her capital. If they receive the profit in the ratio of 5:9, find how long was Rajni's capital used.

A. 10 months B. 12 months C. 14 months D. None of these

সমাধান: ধরি, স্বাতী 5x টাকা 7 মাসের জন্য বিনিয়োগ করেছে এবং রজনী 6x টাকা y মাসের জন্য বিনিয়োগ করেছে।

শর্তমতে, $\frac{5x \times 7}{6x \times y} = \frac{5}{9}$

$\Rightarrow \frac{35}{6y} = \frac{5}{9}$

$\Rightarrow 30y = 9 \times 35$

$\Rightarrow y = \frac{9 \times 35}{30}$

$\Rightarrow y = \frac{21}{2}$

$\Rightarrow y = 10\frac{1}{2}$

$\therefore$ রজনীর টাকা টাকা $10\frac{1}{2}$ মাস ধরে বিনিয়োগ হয়েছে।

32. P and Q started a business in the ratio of 2:3. After 1 year P left business but Q continue. After 2 years the had the total profit of tk. 26000. What is the profit of Q?

A. 10400 B. 13000 C. 18500 D. None of these

সমাধান: ধরি, P ও Q এর প্রাথমিক মূলধন যথাক্রমে 2x ও 3x

$\therefore$ তাদের আয়ের অনুপাত $= (2x \times 12):(3x \times 24)$ [$\because$ 12 মাস = 1 বছর]

$= 24x:72x$

$= 1:3$

অনুপাতদ্বয়ের যোগফল $= 1 + 3 = 4$

$\therefore$ Q এর লভ্যাংশ $= \left(26000 \times \frac{3}{4}\right) = 6500 \times 3 = 19500$ টাকা

33. A woman says, "if you revise my own age, the figure represents my husband's age. He is, of course, senior to me and the difference between our ages is one-eleventh of our sum". What is the age of the women? [উত্তরা ব্যাংক (প্রবেশনারি অফিসার) ২০২১]

A. 23 B. 34 C. 45 D. 54

সমাধান: এ অংশটিতে অপশন টেস্ট করে সমাধান করতে হবে।

অপশন (ক), মহিলা = 23

স্বামী = 32

পার্থক্য $= 32 - 23 = 9$

যোগফল $= 32 + 23 = 55$

$\therefore 9 \times 11 \neq 55$ অথবা $\frac{55}{11} \neq 9$

অপশন (খ), মহিলা = 34

স্বামী = 43

পার্থক্য $= 43 - 34 = 9$
যোগফল $= 43 + 34 = 77$
$\therefore \frac{77}{11} \neq 9$
অপশন (গ), মহিলা $= 45$
স্বামী $= 54$
পার্থক্য $= 54 - 45 = 9$
যোগফল $= 54 + 45 = 99$
$\therefore \frac{99}{11} = 9$

34. A father is 32 years older than the son. In 7 years the father's age will be 5 years more than twice that of the son. The age of the father, 3 years from now, will be? [BB AD-2006]
A. 45 B. 55 C. 65 D. 75
সমাধান: ধরি, পুত্রের বর্তমান বয়স x
পিতার বর্তমান বয়স $(x + 32)$
7 বছর পরে, পুত্রের বয়স হবে $= (x + 7)$ বছর
এবং পিতার বয়স হবে $= (x + 32 + 7) = x + 39$ বছর
শর্তমতে, $2(x + 7) + 5 = x + 39$
$\Rightarrow 2x + 14 + 5 = x + 39$
$\Rightarrow 2x + 19 = x + 39$
$\Rightarrow 2x - x = 39 - 19$
$\Rightarrow x = 20$
$\therefore$ পিতার বর্তমান বয়স $= (20 + 32) = 52$ বছর
তাহলে, 3 বছর পরে পিতার বয়স হবে $= (52 + 3) = 55$ বছর

35. Six years ago, the ratio of the ages of Kamal and Sagor was 6:5. 4 years hence the ratio of their ages will be 11:10. What is Sagor's age at present? [Combined 5 Bank (Cash Officer) 2019]
A. 18 years B. 20 years C. 16 years D. 22 years
সমাধান: ধরি, 6 বছর আগে কামাল ও সাগরের বয়স ছিল যথাক্রমে 6x ও 5x
প্রশ্নমতে, $\frac{(6x+6)+4}{(5x+6)+4} = 11:10$
$\Rightarrow \frac{6x+10}{5x+10} = \frac{11}{10}$
$\Rightarrow 10(6x + 10) = 11(5x + 10)$
$\Rightarrow 60x + 100 = 55x + 110$
$\Rightarrow 60x - 55x = 110 - 100$
$\Rightarrow 5x = 10$
$\Rightarrow x = \frac{10}{5}$
$\Rightarrow x = 2$
$\therefore$ সাগরের বর্তমান বয়স $= (5 \times 2 + 6) = 16$ বছর

36. The sum of ages of 5 children born at the intervals of 3 years each is 50 years. What is the age of the youngest child? [Combined 5 Bank (Cash Officer) 2019]
A. 4 B. 8 C. 10 D. None of these
সমাধান: ধরি, youngest child এর বয়স x বছর
শর্তমতে, $x + (x + 3) + (x + 6) + (x + 9) + (x + 12) = 50$
$\Rightarrow 5x + 30 = 50$
$\Rightarrow 5x = 50 - 30$
$\Rightarrow x = \frac{20}{5}$
$\therefore x = 4$

37. Nahiyan and moon's salary was 43200 and 28800 respectively, both their salary got increased by X and now ratio of their salary is 7:5. find the value of X ? [IBA MBA Dec 2019]
A. 5400 B. 7200 C. 8800 D. 12000 E. None of these

সমাধান: Nahiyan ও Moon এর নতুন Salary যথাক্রমে $43200 + x$ এবং $28800 + x$

নতুন Ratio, $\frac{43200+x}{28800+x} = \frac{7}{5}$

$\Rightarrow 5 \times 43200 + 5x = 7 \times 28800 + 7x$

$\Rightarrow 2x = 14400$

$\Rightarrow x = 7200$

38. The least whole number which when subtracted from both the terms of the ratio 6: 7 gives a ratio less than 16: 21 is-

A. 2 B. 3 C. 4 D. 6 E. 5

Solution: ধরি, ক্ষুদ্রতম পূর্ণসংখ্যাটি হল x

প্রশ্নমতে, $\frac{(6-x)}{(7-x)} = \frac{16}{21}$

$\Rightarrow 126 - 21x = 112 - 16x$

$\Rightarrow 126 - 112 = -16x + 21x$

$\Rightarrow 14 = 5x$

$\Rightarrow 5x = 14$

$\Rightarrow x = 2.8$ অর্থাৎ x এর মান যত বাড়বে অনুপাত তত $\frac{16}{21}$ এর চেয়ে ছোট হবে। $\therefore$ ক্ষুদ্রতম পূর্ণসংখ্যা 3

39. The ratio of the number of plants that Kishore has to the number of plants Saad has is 1:5. After Saad gives Kishore 5 plants, the ratio of plants Kishore has to the plants Saad has will be 2:7. How many more plants will Saad have than Kishore after 5 plants are given?

A. 30 B. 45 C. 50 D. 60 E. 75

Solution: ধরি, কিশোর ও সাদের গাছের সংখ্যার অনুপাত = $x: 5x = \frac{x}{5x}$

সাদ 5টি গাছ কিশোরকে দিলে নতুন অনুপাত হবে,

$\Rightarrow \frac{x+5}{5x-5} = \frac{2}{7}$

$\Rightarrow 7x + 35 = 10x - 10$

$\Rightarrow 7x - 10x = -10 - 35$

$\Rightarrow -3x = -45$

$\Rightarrow x = \frac{-45}{-3}$

$\Rightarrow x = 15$

$\therefore$ বিনিময়ের পূর্বে গাছের সংখ্যার পার্থক্য = $5x - x = 4x = 4 \times 15 = 60$

তাহলে, বিনিময়ের পরে গাছের সংখ্যা = $(x + 5): (5x - 5) = (15 + 5): (5 \times 15 - 5) = 20: 70$

$\therefore$ পার্থক্য = $70 - 20 = 50$

40. The ratio of flour to water to sugar in a recipe is 7: 4: 1. The ratio in a new receipe calls for a doubling of the ratio of flour to water from the original recipe and a halving of the ratio of flour to sugar. If the new recipe calls for 8 cups of water, how much sugar is required?

A. 4 cups B. 6 cups C. 8 cups D. 12 cups E. 16 cups

Solution: দেওয়া আছে, Flour: Water: Sugar = 7: 4: 1

এখানে, Flour: Water = 7:4

$= \frac{7}{4} \times 2$ [$\because$ নতুন রেসিপিতে $F:W$ দ্বিগুণ বলা হয়েছে]

$= \frac{14}{4}$

$= \frac{7}{2}$

$= 7: 2$

আবার, Flour: Sugar = 7: 1

$= \frac{7}{1} \times \frac{1}{2}$ [$\because$ নতুন রেসিপিতে $F:S$ অর্ধেক বলা হয়েছে]

$= \frac{7}{2}$

$= 7: 2$

$\therefore$ নতুন রেসিপিতে Flour: Water: Sugar = 7: 2: 2

তাহলে, প্রতি 2 কাপ পানির জন্য 2 কাপ চিনি লাগবে। অতএব, 8 কাপ পানির জন্য 8 কাপ চিনি লাগবে।

41. Ayon's monthly income is tk. 5250. The ratio of his monthly expenditure to savings is 8: 7. From the next month, he wants to increase his savings by tk. 550 while his monthly income will remain unchanged. What will be the new ratio of his monthly savings to expenditure? [IBA MBA June 2018]

A. 3: 2 B. 2: 1 C. 8: 7 D. 4: 3 E. None of these

সমাধান: Income = Expenditure + Savings

ধরি, Expenditure এবং Savings 8x এবং 7x

∴ মোট, income $= 8x + 7x = 15x$

শর্তমতে, $15x = 5250$

∴ $x = 350$

∴ Expenditure = $350 \times 8 = 2800$

Savings = $350 \times 7 = 2450$

Savings 550 বাড়লে, Expenditure 550 কমবে। অর্থাৎ পরিবর্তন Expenditure এবং Savings হবে,

Expenditure = $(2800 - 550) = 2250$, Savings = $2450 + 550 = 3000$

∴ Ratio, Savings : Expenditure = $3000: 2250 = 4: 3$

42. A drink contains 20% cranberry juice, 20% raspberry juice and the rest is apple juice. You added 250 ml of water to 750 ml of the drink. Now what is the ratio of water to apple juice in the drink? [IBA BBA 15-16]

A. 6:5 B. 9:5 C. 5:12 D. 5:9 E. None of these

Solution: 750 ml জুসে আপেলের পরিমাণ = $\{100 - (20 + 20)\}\% \times 750 = 60\% \times 750 = \frac{60}{100} \times 750 = 450$ml

∴ 250 ml পানি মেশালে পানি ও আপেল জুসের অনুপাত = $250: 450 = 5: 9$

43. A 16-ounce jar birdseed contains 10% sesame. How much sesame must be added to make the jar 20% sesame? [IBA MBA Dec' 2019]

A. 1 ounce B. 1.6 ounce C. 2 ounce D. 2.4 ounce E. 4 ounce

সমাধান: 16 ounce jar-এ 10% sesame. ∴ $16 \times 0.1 = 1.6$ ounce sesame

$16 \times 0.9 = 14.4$ ounce Rest

ধরি, x ounce sesame add করতে হবে।

∴ $\frac{1.6+x}{14.4} = \frac{20}{80} \Rightarrow 128 + 80x = 288 \Rightarrow 80x = 160 \Rightarrow x = 2$ Ounce

44. A trader made 2 different grades of mixture-one containing m kg of melphin and m kg of water and the other mixture containing m kg of melphin and 2m kg of water. Both the mixture were completely sold out. Revenues from selling the mixture were the same. if the selling price of the first mixture was tk. 600 per kg. What was the per kg selling price of the second mixture in taka? [IBA MBA Dec' 2016]

A. 300 B. 400 C. 450 D. 480 E. None of these

সমাধান: প্রশ্নমতে, ১ম মিশ্রণের (mixture) revenue = ২য় মিশ্রণের (mixture) revenue

ধরি, প্রতি কেজিতে ২য় মিশ্রণের revenue x টাকা।

দেওয়া আছে, প্রতি কেজিতে ১ম মিশ্রণের revenue = 600 টাকা।

১ম মিশ্রণের ভর = $m + m = 2m$ কেজি।

২য় মিশ্রণের ভর = $(m + 2m) = 3m$ কেজি।

∴ $2m \times 600 = 3m \times x \Rightarrow x = 400$

45. If 200 lb of a mixture contain 80% husk and 20% sand, then how much husk needs to be extracted in order to have 75% concentration of husk?

A. $\frac{1}{4}$ B. $\frac{20}{3}$ C. $\frac{1}{2}$ D. 40 E. 60

Solution: 200 lb মিশ্রণে,

Husk = $200 \times \frac{80}{100} = 160$ lb

Sand = $200 \times \frac{20}{100} = 40$ lb

ধরি, x% husk উঠিয়ে ফেলা হলে মিশ্রণে 75% husk থাকবে। যেখানে sand একই অর্থাৎ 40 lb হবে।

∴ $160 - x = \frac{75}{100}(200 - x)$

$\Rightarrow 160 - x = \frac{3}{4}(200 - x)$

$\Rightarrow 160 - x = \frac{600-3x}{4}$
$\Rightarrow 4(160 - x) = 600 - 3x$
$\Rightarrow 640 - 4x = 600 - 3x$
$\Rightarrow -4x + 3x = 600 - 640$
$\Rightarrow -x = -40$
$\therefore x = 40$

46. A box contains 200 marbles of which 15% are black and the rest are red. If 100 marbles, comprising of black and red marbles are added to the box, how many of them should be black so that the ratio of black and red marbles in that box becomes 1:5? [IBA MBA Dec' 2016]

A. 20 B. 25 C. 30 D. 40 E. None of these

সমাধান: মোট মার্বেল আছে = 200টি।

$\therefore$ কালো মার্বেল আছে = $200 \times \frac{15}{100} = 30$টি।

অর্থাৎ লাল মার্বেল আছে = $200 - 30 = 170$টি।

ধরি, নতুন 100টি তে কালো মার্বেল আছে xটি এবং লাল মার্বেল আছে $100 - x$টি।

প্রশ্নমতে,

$\frac{30+x}{170+100-x} = \frac{1}{5} \Rightarrow 150 + 5x = 270 - x \Rightarrow 6x = 120 \therefore x = 20$

47. A 19 liter mixture consists by volume of 1 part juice to 18 parts water. If x liter of juice and y liters of water are added to this mixture to make a 54 liter mixture consisting by volume of 1 part juice to 2 parts water, then what is the value of x?

A. 36 B. 35 C. 27 D. 17 E. 16

Solution: ধরি, জুসের পরিমাণ x লিটার এবং পানির পরিমাণ y লিটার

প্রশ্নমতে, $(x + 1) + (y + 18) = 54$
$\Rightarrow x + 1 + y + 18 = 54$
$\Rightarrow x + y + 19 = 54$
$\Rightarrow x + y = 54 - 19$
$\Rightarrow x + y = 35$
$\Rightarrow y = 35 - x \dots\dots\dots\dots\dots (i)$

আবার, বলা আছে নতুন মিশ্রণের পানীয়তে 1 অংশ জুস আর 2 অংশ পানি থাকবে। অর্থাৎ,

$\frac{x+1}{y+18} = 1:2$
$\Rightarrow \frac{x+1}{y+18} = \frac{1}{2}$
$\Rightarrow 2(x + 1) = y + 18$
$\Rightarrow 2x + 2 = 35 - x + 18$ [i নং থেকে মান বসিয়ে]
$\Rightarrow 2x + x = 53 - 2$
$\Rightarrow 3x = 51$
$\therefore x = 17$

48. A mixture contains $\frac{2}{5}$ of element A and $\frac{3}{5}$ of element B. When 5 ml of A is added to the mixture, the proportion of B in the mixture changes to $\frac{1}{5}$. What amount of A was originally present in the mixture before the addition was made?

A. 1 ml B. 1.5 ml C. 2.5 ml D. 6 ml E. None of these

Solution: ধরি, মিশ্রণের পরিমাণ x

যেখানে, উপাদান A = x এর $\frac{2}{5} = \frac{2x}{5} \dots\dots\dots\dots\dots (i)$

এবং উপাদান B = x এর $\frac{3}{5} = \frac{3x}{5} \dots\dots\dots\dots\dots (ii)$

আবার, 5 ml উপাদান A মিশ্রণে যুক্ত করা হলো,

অর্থাৎ B = $\frac{1(x+5)}{5}$

$\Rightarrow \frac{3x}{5} = \frac{x+5}{5}$

$\Rightarrow \frac{3x}{5} = \frac{x}{5} + 1$

$\Rightarrow \frac{3x}{5} - \frac{x}{5} = 1$

$\Rightarrow \frac{3x-x}{5} = 1$

$\Rightarrow \frac{2x}{5} = 1$

$\Rightarrow A = 1$ [$\because A = \frac{2x}{5}$; (i) নং হতে]

$\therefore$ A এর উপাদান 1 ml

49. Two mixture of X and Y have X and Y in the ratio 3:2 and 3:4. In what proportion should these two mixture be mixed to get a new mixture in which the ratio of X to Y is 5:4?

A. 6:1 B. 5:4 C. 20:7 D. 10:9 E. 14:11

Solution: দেওয়া আছে, প্রথম মিশ্রণে $X = \frac{3}{5}$; $Y = \frac{2}{3}$

দ্বিতীয় মিশ্রণে $X = \frac{3}{4}$; $Y = \frac{4}{7}$

ধরি, নতুন মিশ্রণে প্রথম মিশ্রণ থেকে a ও দ্বিতীয় মিশ্রণ থেকে b পরিমাণ জিনিস মেশানো হয়েছিল। অর্থাৎ $a:b$ বের করতে হবে।

$\therefore$ নতুন মিশ্রণে X এর পরিমাণ $= \frac{3a}{5} + \frac{3b}{7} = \frac{21a+15b}{35}$

এবং নতুন মিশ্রণে Y এর পরিমাণ $= \frac{2a}{5} + \frac{4b}{7} = \frac{14a+20b}{35}$

শর্তমতে, $\left(\frac{21a+15b}{35}\right) : \left(\frac{14a+20b}{35}\right) = 5:4$

$\Rightarrow \frac{\frac{21a+15b}{35}}{\frac{14a+20b}{35}} = \frac{5}{4}$

$\Rightarrow \frac{21a+15b}{35} \times \frac{35}{14a+20b} = \frac{5}{4}$

$\Rightarrow \frac{21a+15b}{14a+20b} = \frac{5}{4}$

$\Rightarrow 4(21a + 15b) = 5(14a + 20b)$

$\Rightarrow 84a + 60b = 70a + 100b$

$\Rightarrow 84a - 70a = 100b - 60b$

$\Rightarrow 14a = 40b$

$\Rightarrow 7a = 20b$ [2 দ্বারা ভাগ করে]

$\Rightarrow \frac{a}{b} = \frac{20}{7}$

$\Rightarrow a:b = 20:7$

50. A mixture of sugar and water contain sugar and water in the ratio of 3: 2. Another mixture of sugar and water contains sugar and water in the ratio of 2: 5. In what ratio should the two mixture be mixed so that the resultant mixture contains equal proportion of sugar and water? [IBA MBA June 2016]

A. 2: 1 B. 3: 1 C. 3: 2 D. 4: 1 E. None of these

সমাধান: ধরি, প্রথম মিশ্রণে চিনি ও পানি আছে যথাক্রমে $3x, 2x$ পরিমাণ এবং দ্বিতীয় মিশ্রণে চিনি ও পানি আছে যথাক্রমে $2y, 5y$ পরিমাণ। প্রশ্নে জানতে চাওয়া হয়েছে মিশ্রণ দু'টিকে কি অনুপাতে মিশালে তাতে চিনি ও পানির অনুপাত সমান হবে অর্থাৎ

$\frac{\text{চিনি}}{\text{পানি}} = 1:1 \Rightarrow \frac{3x+2y}{2x+5y} = \frac{1}{1} \Rightarrow 3x + 2y = 2x + 5y$

$\Rightarrow x = 3y \Rightarrow \frac{x}{y} = \frac{3}{1}$ অর্থাৎ 3: 1

51. A certain company that sells only i-pads and i-phones reported that revenues from i-pad sales in 2015 were down 11% from the sale of 2014. And revenues from i-phones sales in 2015 were up 7% from the sale of 2014. If total revenue from i-pad sale and i-phone sales in 2015 were up 1% from sale of 2014, what is the ratio of revenue from i-pad sales in 2014 to revenue from i-phone sale in 2014? [IBA MBA Dec-16]

A. 1: 2 B. 4: 5 C. 1: 1 D. 3: 2 E. None of these

সমাধান: ধরি, 2014 সালে ipad থেকে revenue = x টাকা এবং iphone থেকে revenue = y টাকা।

2015 সালে ipad এর revenue 11% হ্রাস পায় এবং iphone এর revenue 7% বৃদ্ধি পায়। অর্থাৎ,

2015 সালে ipad এর revenue $= x \times \frac{(100-11)}{100} = \frac{89x}{100}$

এবং iphone এর revenue $= y \times \frac{(100+7)}{100} = \frac{107y}{100}$

আবার, 2015 সালে ipad ও iphone এর মোট revenue 2014 অপেক্ষা 1% বৃদ্ধি পায়।

তাহলে প্রশ্নমতে, $\frac{89x}{100}+\frac{107y}{100}=(x+y)\times\frac{(100+1)}{100} \Rightarrow \frac{89x+107y}{100}=(x+y)\times\frac{101}{100}$

$\Rightarrow 89x+107y=101(x+y) \Rightarrow 89x+107y=101x+101y$

$\Rightarrow 12x=6y \Rightarrow \frac{x}{y}=\frac{6}{12} \therefore \frac{x}{y}=\frac{1}{2}$

52. A can contains milk and water in the ratio 3:1. A part of this mixture is replaced with milk, and now the new ratio of milk to water is 15:4. What proportion of original mixture had been replaced by milk?

A. $\frac{3}{19}$ B. $\frac{7}{19}$ C. $\frac{0.3}{19}$ D. $\frac{13}{19}$ E. None of these

সমাধান: Let, the original amount of milk is 3x & the original amount of water is x.

$\therefore$ Total amount of original mixture $= 3x + x = 4x$

Now, we let y amount of mixture is replaced with milk.

So, according to question, $\frac{3x+y}{4x}=\frac{15}{19}$

$\Rightarrow 57x+19y=60x$

$\Rightarrow 60x-57x=19y$

$\Rightarrow 19y=3x$

$\therefore y=\frac{3x}{19}$

$\therefore \frac{3}{19}$ portion of the origianl mixture had been removed.

53. Three partners shared their profit in a business in the ratio 8:7:5. They had partnership for 7 months, 8 months, and 14 months respectively. What was the ratio of their investment.

[Bangladesh Bridge Authority (Assistant Director) 2021]

A. 8:7:5 B. 56:28:17 C. 21:28:38 D. 64:49:20 E. None of these

সমাধান: Let, Their investments be RS. x for 7 months, RS. y for 8 months, and RS. z for 14 months respectively.

Then, 7x:8y:14z = 8:7:5.

$\therefore \frac{7x}{8y}=\frac{8}{7}$

$\Rightarrow \frac{x}{y}=\frac{64}{49}$

$\therefore x:y=64:49$

$\therefore x:y:z=64:49:20$

Shortcut: $\frac{8y}{14z}=\frac{7}{5}$

$\frac{y}{z}=\frac{7\times14}{8\times5}$

$\therefore y:z=49:20$

54. The sum of the ages of Dulal and Farid is y years. If Dulal is 12 years older than Farid , how many years old will Farid be y years from now, in terms of y? [IBA MBA, Dec' 2022]

A. $y-6$ B. $2y-6$ C. $\frac{y}{2}-6$ D. $\frac{3y}{2}-6$ E. $\frac{5y}{2}-6$

Solution: Let, Age of Farid = x; so, age of Dulal = x+12

Total age = $x+x+12$

Now, $x+x+12=y$

$\Rightarrow 2x+12=y$

$\therefore x=\frac{y-12}{2}$

After 'y' years Farid's age = $x+y=\frac{y-12}{2}+y=\frac{3y-12}{2}=\frac{3y}{2}-6$

55. The average age of 16 members of a club is 22. If the minimum age requirement for being a members is 19 years, what is the possible maximum range of the ages? [Bangladesh Bridge Authority (AD) '21]

A. 48 B. 53 C. 67 D. 71 E. None of these

সমাধান: 16 members total age $16\times22=352$

Minimum age of 15 except one $=15\times14=285$

$\therefore$ one maximum age $=(352-285)$ years $=67$ years

Written Math

1. Shakib started a business investing Tk. 25000 in 2009. In 2010, he invested an addion amount of Tk. 10000 and Raihan joined him with an amount of Tk. 35000. In 2011, Shakib invested another additional amount of Tk. 10000 and Jafor jouned them with an amount of Tk. 35000. What will be Raihan's share in the profit of Tk. 1505000 earned at the end of 3 years from the shart of the business in 2009.

   Solution: In 3 years, Skakib's investment = Tk. $(25000 \times 3 + 10000 \times 2 + 10000 \times 1)$ = Tk. 105000

   Raihan's investment = Tk. $(35000 \times 2) = \text{Tk. } 70000$

   Jafor's investment = Tk. $(35000 \times 1) = \text{Tk. } 35000$

   Their investment ratio, Shakib:Raihan: Jafar $= 105000 : 70000 : 35000 = 3 : 2 : 1$

   Sum of the ratios $= 3 + 2 + 1 = 6$

   So, Raihan's share $= \text{Tk. } 150000 \times \frac{2}{6} = \text{Tk. } 50000$

   Answer: Tk. 50000

2. A, B and C together start a business. The ratio of the invests of A, B and C is 0.125:0.75:0.25. After 8 months A adds thrice amount of his earlier investment and C withdraws half of his earlier inverstment. At the end of the year, they earn a total profit of tk. 58,000. What is B's share in the profit?

   Solution: Given that, A, B, C = 0.125:0.75:0.25 = 1:6:2

   Let, the their investment are x, 6x and 2x taka.

   A's capital for 12 months $= 8x + (4 \times 4x) = 8x + 16x = 24x$

   ∴ B's capital for 12 months $= 12 \times 6x = 72x$

   ∴ C's capital for 12 months $= (8 \times 2x) + (4 \times x) = 16x + 4x = 20x$

   ∴ Ratio of their investiment $= 24x : 72x : 20x = 6 : 18 : 5$

   ∴ B's share of profit $= 5800 \times \frac{18}{6+18+5} = 5800 \times \frac{18}{29} = 3600$ taka

   Answer: 3600 taka

3. Mary and Mike enter into a partnership by investing $700 and $300 respectively. At the end of one year, they divided their profits such that a third of the profit is divided equally for the efforts they have put into the business and the remaining amount of profit is divided in the ratio of the investments they made in the business. If Mary received $800 more than Mike did, what was the profit made by their business in that year?

   Solution: Suppose, they got total profit be tk. x.

   From condition, $\frac{1}{3}$ of the profit = x of $\frac{1}{3}$ = tk. $\frac{x}{3}$

   So, Mike got = $\frac{x}{3}$ of $\frac{1}{2}$ = tk. $\frac{x}{6}$ and Mary got = tk. $\frac{x}{6}$

   Remaining Profit = $x - \frac{x}{3} = \frac{3x-x}{3}$ = tk. $\frac{2x}{3}$

   Ratio of invesment of Mary and Mile $= 700 : 300 = 7 : 3$ sum of ration $= 7 + 3 = 10$

   Mary got = $\frac{2x}{3} \times \frac{7}{10}$ = tk. $\frac{7x}{15}$ and Mike got = $\frac{2x}{3} \times \frac{3}{10}$ = tk. $\frac{x}{5}$

   $\left(\frac{x}{6} + \frac{7x}{15}\right) - \left(\frac{x}{6} + \frac{x}{5}\right) = 800$

   $\Rightarrow \left(\frac{5x+14x}{30}\right) - \left(\frac{5x+6x}{300}\right) = 800$

   $\Rightarrow \frac{19x}{30} - \frac{11x}{30} = 800$

   $\Rightarrow \frac{8x}{30} = 800$

   $\Rightarrow x = \frac{30 \times 800}{8} = 3000$

   Answer: 3000

4. A and B start a business with investment of Tk. 5000 and Tk. 4500 respectively. After 4 months, A takes out half of his capital. After two more months, B takes out one-third of his capital while C joins them with a capital of Tk. 7000. At the end of year they earn a profit of Tk. 5080. Find the share of each member in the profit. [Pubali Bank Ltd (SO)-2014]

Solution: A's capital = $5000 \times 4 + 2500 \times 8 = 40000$
B's capital = $4500 \times 6 + 3000 \times 6 = 45000$
C's capital = $7000 \times 6 = 42000$
Ratio of their capital = $40 : 45 : 42$
$40 + 45 + 42 = 127$
Total profit = 5080
A's profit = $\frac{40}{127} \times 5080 = 1600$ tk.
B's profit = $\frac{45}{127} \times 5080 = 1800$ tk.
C's profit = $\frac{42}{127} \times 5080 = 1680$ tk.
Answer: 1600 tk.; 1800 tk. and 1680 tk. (respectively)

5. If $\frac{x}{2}$ years ago Samad was 12, and $\frac{x}{2}$ years from now he will be 2x years old, how will he be 3x years from now? [Al-Arafah Bank (MTO) 2013]

Solution: Given that, $\frac{x}{2}$ years ago Samad was 12 years.
Present age of Samad = $12 + \frac{x}{2}$
After $\frac{x}{2}$ years Samad age will be = $12 + \frac{x}{2} + \frac{x}{2} = 12 + x$
According to the question,
$2x = 12 + x$
$\Rightarrow 2x - x = 12$
$\therefore x = 12$
So, 3x years from now Samad age will be = $\left(12 + \frac{x}{2}\right) + 3x = \left(12 + \frac{12}{2}\right) + 3 \times 12 = 54$
Answer: 54

6. A vessel contains 28 liters of honey and water solution with honey and water ratio 4:3. 21 liters of honey-water solution is added to this that has honey to water ratio as 2:1. Again a 51 liters honey-water solution that has honey to water ratio as 9:8 is added to this. After this, 10 liters of the solution is replaced with pure honey. What is ratio of water to honey in the final mixture?
[Combined Bank (Cash Officer) 2018]

Solution: Total honey = $\frac{4}{7}$ of 28 + $\frac{2}{3}$ of 21 + $\frac{9}{17}$ of 51 = 16 + 14 + 27 = 57 liters
Total water = $(28 + 21 + 51) - 57 = 100 - 57 = 43$ liters
Total solution = $57 + 43 = 100$ liters
When 10 liters solution replaced with pure honey, new solution $= 100 - 10 = 90$ which is 90% of previous.
Total honey = 90% of 57 + 10 = 51.3 + 10 = 61.3 liters
Total water = 90% of 43 = 38.7 liters
$\therefore$ Water: Honey = 38.7: 61.3 = 387: 613
Answer: 387: 613

7. A can contains milk and water in the ratio 3:1. A part of this mixture is replaced with milk, and now the new ratio of milk to water is 15:4. What proportion of original mixture had been replaced by milk?

Solution: Let, the original amount of milk is 3x & the original amount of water is x.
$\therefore$ Total amount of original mixture = $3x + x = 4x$
Now, we let y amount of mixure is repleced with milk.
So, according to question,
$\frac{3x+y}{4x} = \frac{15}{19} \Rightarrow 57x + 19y = 60x \Rightarrow 60x - 57x = 19y \Rightarrow 19y = 3x \therefore y = \frac{3x}{19}$
$\therefore \frac{3}{19}$ portion of the origianl mixture had been removed.
Answer: $\frac{3}{19}$

8. A 20 liters mixture of milk and water contains milk and water in the ratio 3: 2. 10 liters of the mixture is removed and replaced and replace with pure milk and the operation is repeated once more. At the end of the two removal and replacement, what is the ratio of milk and water in the resultant mixture.

[Dhaka Bank (MTO) 2016]

Solution: Given that, Milk: Water = 3:2 and total mixture is 20 liters.

After removing 10 liters mixture, remaining = $(20 - 10)$ liters

Here, milk = $\frac{3}{3+2} \times 10 = 6$ liters and water = $\frac{2}{3+2} \times 10 = 4$ liters

After adding 10 liters milk,

Milk = $(6 + 10) = 16$ liters and water = 4 liters

Milk: Water = $16: 4 = 4: 1$

Again after removing 10 liters mixture, remaining = $(20 - 10)$ liters

Here, milk = $\frac{4}{4+1} \times 10 = 8$ liters and water = $\frac{1}{4+1} \times 10 = 2$ liters

After adding 10 liters milk,

Milk = $(8 + 10) = 18$ liters and Water = 2 liters.

Milk: Water = $18: 2 = 9: 1$

Answer: 9: 1

9. From a container, 6 liters milk was drawn out and was replaced by water. Again 6 liters of mixture was drawn out and was replaced by the water. Thus the quantity of milk and water in the container after these two operation is 9: 16. The quantity of mixture is:

Solution: Let quantity of mixture be x liters.

Suppose a container contains x units of liquid from which y units are taken out and replaced by water.

After operation, the quantity of pure liquid = $x\left(1 - \frac{y}{x}\right)^n$ units, Where n = no of operations.

So, quantity of milk = $x\left(1 - \frac{6}{x}\right)^2$

Given that, milk: water = 9: 16

$\Rightarrow$ milk: (milk + water) = $9: (9 + 16)$

$\Rightarrow$ milk: mixture = 9:25

Therefore, $\frac{x\left(1-\frac{6}{x}\right)^2}{x} = \frac{9}{25}$

$\Rightarrow x = 15$ liters

Answer: 15 liters

10. A gasoline company wants to provide a customer with 1000 liters of premium gasoline tk. 60 per liter by mixing X liters of regular gasoline costing tk. 50 per liter, with Y liters of unleaded gasoline costing tk. 66 per liter. How much of each gasoline should be used to produce the mixture?

[Mercantile Bank (PO) 2011]

Solution: Given that, regular gasoline = x liters and unleaded gasoline = y liters

According to the question, $50x + 66y = 60(x + y)$

$\Rightarrow 50x + 66y = 60x + 60y$

$\Rightarrow 6y = 10x$

$\Rightarrow x: y = 6: 10$

$\therefore x: y = 3: 5$

Now, Sum of the ratios = $3 + 5 = 8$

So, Amount of regular gasoline = $\left(\frac{3\times1000}{8}\right) = 375$ liters

Amount of unleaded gasoline = $\left(\frac{5\times1000}{8}\right) = 625$ liters

Answer: 375 liters and 625 liters