

Lecture-3 : Ratio, Proportion & Mixture (MCQ)

Teacher's Work

Topic-1: General Ratio Determination.

01. The cost of 9 mangoes and 5 apples is equal to the cost of 7 mangoes and 8 apples. Find the ratio between cost of 1 mango and the cost of 1 apple. [BB-Officer Cash-2023]
a) 3 : 2 b) 2 : 3 c) 5 : 8 d) 9 : 7
02. A sum of Tk. 53 is divided among A, B, C is such a way that A gets Tk. 7 more than what B gets and B gets Tk. 8 more than what C gets. The ratio of their shares is: (BB AD 14)
a) 16:9:18 b) 25:18:10
c) 18:25:10 d) 15:8:30
03. If the income of A is 10% more than that of B and the income of B is 20% less than that of C, then the incomes of A, B and C respectively are in the ratio: [HB FC (OF)-2017]
a) 10 : 9 : 7 b) 22 : 20 : 25
c) 11 : 10 : 8 d) 22 : 18 : 25
04. If 'a' and 'b' are integers greater than 100 such that $a + b = 300$, which of the following could be the exact ratio of a to b? (Pubali SO 2013) & [Agrani (Cash)-2017]
a) 9 to 1 b) 5 to 2 c) 5 to 3 d) 3 to 2

Topic-2: Fundamental Use of Ratio

05. The present ratio of students to teachers at a certain school is 30 to 1. If the number of students were to increase by 50 and that of teachers were to increase by 5, the ratio of students to teachers would then be 25 to 1. What is the present number of teachers? [20 Based Combined SO: 20-01-2023]
a) 8 b) 10 c) 12 d) 15

Topic-3: Ratio Involving Unitary Methode

06. A sum of money is divided amongst A, B, C and D in the ratio of 3 : 7 : 9 : 13. If the share of B is Tk. 4872, then what will be the total amount of money of A and C together?
a. Tk. 8352 b. Tk. 6998
c. Tk. 9784 d. Tk. 7456

Topic-4: Ratio Involving Equation

07. The ratio of the number of boys to that of the number of girls in a class is 5:7. When 24 more boys enter, the ratio reversed. How many girls are in the class? (Agrani Off 2011)
a) 25 b) 35 c) 32 d) 26
08. The ratio of income of A to that of B is 7:5 and expenditure of A to that B is 3:2. If at the end of the year, each saves Tk. 500, find the income of A? [Sonali (Officer-Cash)-2018]
a) Tk. 2500 b) Tk. 300
c) Tk. 3200 d) Tk. 3500

Topic-5: Multiple to Single Ratio

09. If $a : b = 8 : 15$, $B : C = 5 : 8$ and $C : D = 4 : 5$, then $A : B : C : D$ is equal to
a. 8 : 15 : 24 : 30 b. 24 : 30 : 15 : 8
c. 30 : 7 : 15 : 4 d. 8 : 24 : 15 : 30
10. If $x : y = 5 : 3$, then $(8x - 5y) : (8x + 5y) = ?$ (Agrani SO-2013, 2018) & [Sonali (SO)-2018] (BB-Office-2019)
a) 5 : 11 b) 6 : 5 c) 5 : 6 d) 3 : 8
11. If $a : b = b : c$, then ratio of $a^4 : b^4$ is equal to
a) $ac : b^2$ b) $a^2 : c^2$
c) $c^2 : a^2$ d) $b^2 : ac$

Topic-6: Miscellaneous Rules

12. A jar contains red balls and green balls in the ratio of 3: 1. If the jar contains only these types of balls, which of the following cannot be the number of balls in the jar? (BB Officer 2001)
a) 96 b) 80 c) 72 d) 54
13. A person buys some pen and pencil. The pen costs Tk. 7 each and pencils cost Tk. 3 each. If he spends exactly Tk. 81 and buys the maximum number of pen possible under these conditions, what is the ratio of pen to pencil? (BB AD 2001)
a) 4 : 3 b) 5 : 2 c) 3 : 2 d) None
14. A recipe for 4 servings requires salt and pepper to be added in the ratio of 2 : 3. If the recipe is adjusted to make 8 servings, what is the ratio of the salt and pepper that must now be added?
a) 4 : 3 b) 2 : 6 c) 2 : 3 d) 3 : 2

Topic-7: Mixture Involving Equation

15. A mixture of 20 kg of sprit and water contains 10% water. How much water must be added to this mixture to raise the percentage of water to 25% [IFIC (PO)- 2009] + [PKB - (EO Cash) - 2018] + [Combined-4Banks (Officer)-2019]
a) 2 b) 4 c) 5 d) 6
16. In a sugar-water solution, the ratio of water to sugar is 8: 3. If you add 2kgs of sugar, the ratio becomes 2:1. What was the amount of sugar in the original solution? (Janata SO 2011)
a) 4 b) 5 c) 8 d) 6
17. In a mixture of 45 liters, the ratio of milk and water is 4:1. How much water must be added to make the mixture ratio 3:2? [Janata Officer (RC) - 28-06-2024]
a) 15 liters b) 20 liters c) 25 liters d) 10 liters
18. The ratio of quantity of water in fresh fruits to that of dry fruits is 7:2. A 400 kg of dry fruits contain 50 kg of water then find the weight of the water is same fruits when they were fresh? [Janata (AEO)-2019]
a) 100 kg b) 150 kg c) 175 kg d) 125

Topic-8: Replacement Problems

19. A 20 litre mixture of milk and water contains milk and water in the ratio 3 : 2. 10 litres of the mixture is removed and replaced 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?

- a) 1 : 9 b) 9 : 1 c) 4 : 1 d) 1 : 4

Topic-9: Rule of allegation

20. Babu bought two varieties of pulse, costing Tk. 50 and Tk. 60 per kg. each, and mixed them in some ratio. He then sold the mixture at Tk. 70 per kg. making a profit of 20 percent. What was the ratio of the mixture? [BPEX - AM Exam - 2023]

- a) 1 : 10 b) 1 : 5
c) 2 : 7 d) None of these

Illustrative Questions

1. If $a:b = 3:5$ and $b:c = 7:8$, find (i) $a:c$ (ii) $a:b:c$.

Sol. (i) $\frac{a}{b} = \frac{3}{5}$ and $\frac{b}{c} = \frac{7}{8}$.

$$\therefore \frac{a}{c} = \left(\frac{a}{b} \times \frac{b}{c}\right) = \left(\frac{3}{5} \times \frac{7}{8}\right) = \frac{21}{40}$$

$$\therefore a:c = 21:40.$$

(ii) $a:b = 3:5$ and $b:c = 7:8 = 1:\frac{8}{7} = 5:\frac{40}{7}$.

$$\therefore a:b:c = 3:5:\frac{40}{7} = (3 \times 7):(5 \times 7):\left(\frac{40}{7} \times 7\right)$$

$$= 21:35:40.$$

2. If $3a = 4b$ and $5b = 6c$, find $a:b:c$.

Sol. $(3a = 4b \Rightarrow \frac{a}{b} = \frac{4}{3})$ and $(5b = 6c \Rightarrow \frac{b}{c} = \frac{6}{5})$

$$\therefore a:b = 4:3 = 8:6 \text{ and } b:c = 6:5.$$

$$\Rightarrow a:b:c = 8:6:5.$$

3. If $\frac{a}{10} = \frac{b}{15} = \frac{c}{20}$, find $a:b:c$.

Sol. Let $\frac{a}{10} = \frac{b}{15} = \frac{c}{20} = r$, Then

$$A = 10r, b = 15r \text{ and } c = 20r.$$

$$\therefore a:b:c = 10r:15r:20r = 2:3:4.$$

4. If $(3x + 5y) : (3x - 5y) = 5 : 1$, find $x:y$.

Sol. $\frac{3x + 5y}{3x - 5y} = \frac{5}{1} \Rightarrow (3x + 5y) = 5(3x - 5y)$

$$\Rightarrow 3x + 5y = 15x - 25y$$

$$\Rightarrow 12x = 30y$$

$$\Rightarrow 2x = 5y$$

$$\Rightarrow \frac{x}{y} = \frac{5}{2}.$$

$$\therefore x:y = 5:2.$$

5. If $x:y = 4:3$, then $(7x - 3y) : 7x + 3y = ?$

$$\text{Sol. } \frac{7x - 3y}{7x + 3y} = \frac{7\left(\frac{x}{y}\right) - 3}{7\left(\frac{x}{y}\right) + 3} = \frac{7\left(\frac{4}{3}\right) - 3}{7\left(\frac{4}{3}\right) + 3} = \frac{28 - 9}{28 + 9} = \frac{19}{37}.$$

6. Find: (i) fourth proportional to 6, 8 and 12.

(ii) third proportional to 8 and 12.

(iii) mean proportional between 18 and 32.

(i) Let the 4th proportional to 6, 8, 12 be x . Then

$$8:12::12:x \Rightarrow 8 \times 12 = x \Rightarrow x = \frac{8 \times 12}{6} = 16$$

\therefore 4th proportional to 6, 8, 12 is 16.

(ii) Let the 3rd proportional to 8 and 12 be x . then

$$8:12::12:x \Rightarrow 8 \times x = 12 \times 12 \Rightarrow x = \frac{12 \times 12}{8} = 18.$$

\therefore 3rd proportional to 8 and 12 is 18.

(iii) Mean proportional between 18 and 32

$$= \sqrt{18 \times 32} = \sqrt{36 \times 16} = (6 \times 4) = 24.$$

7. Divide Rs 420 among A, B and C in the ratio $\frac{1}{3} : \frac{5}{6} : \frac{7}{9}$.

Sol. Ratio $\frac{1}{3} : \frac{5}{6} : \frac{7}{9} = \frac{1}{3} \times 18 : \frac{5}{6} \times 18 : \frac{7}{9} \times 18 = 6 : 15 : 14.$

Sum of ratio terms = $(6 + 15 + 14) = 35.$

$$\therefore \text{A's part} = \text{Tk} \left(420 \times \frac{6}{35}\right) = \text{Tk } 72.$$

$$\text{B's part} = \text{TK} \left(420 \times \frac{15}{35}\right) = \text{Tk } 180.$$

$$\text{C's part} = \text{Tk} \left(420 \times \frac{14}{35}\right) = \text{Rs } 168.$$

8. A bag contains one- Tk , 50- p and 25- p coins in the ratio 5:7:12 amounting to Tk 69. Find the number of coins of each type.

Sol. Let the number of one Tk, 50- p and 25- p coins be $5x$ and $12x$ respectively.

Then, their values are Tk $5x$, Tk $\frac{7x}{2}$ and Tk $\frac{12x}{4}$ respectively.

$$\therefore 5x + \frac{7x}{2} + \frac{12x}{4} = 69$$

$$\Rightarrow 20x + 14 + 12x = 276 \Rightarrow 46x = 276$$

$$\Rightarrow x = \frac{276}{46} = 6.$$

$$\therefore \text{Number of one-Tk coins} = (5 \times 6) = 30,$$

$$\text{Number of 50-p coins} = (7 \times 6) = 42,$$

$$\text{Number of 25-p coins} = (12 \times 6) = 72.$$

9. The number of boys and that of the girls in school is in the ratio 5:3. If 16% of the boys and 20% of the girls are scholarship holders, find the percentage of those who are not scholarship holders.

Sol. Let the number of boys and girls be $5x$ and $3x$ respectively.

$$\text{Total number of students} = (5x + 3x) = 8x.$$

$$\text{Number of those who are not scholarship holders} = (84\% \text{ of } 5x) + (80\% \text{ of } 3x)$$

$$= \left(\frac{84}{100} \times 5x\right) + \left(\frac{80}{100} \times 3x\right) = \left(\frac{21x}{5} + \frac{12x}{5}\right) = \frac{33x}{5}.$$

$$\text{Required percentage} = \left(\frac{33x}{5} \times \frac{1}{8x} \times 100\right)\%$$

$$= \frac{165}{2}\% = 82.5\%$$

Home Practice

01. The average of two numbers is 62. If 2 is added to the smaller number, the ratio between the number becomes 1:2. What is the smaller number? [Janata Officer (RC) - 28-06-2024]
 a) 40 b) 30 c) 60 d) 80
02. When 30% of one number is subtracted from another number, the second number reduces to its four-fifths. What is the ratio of the first to the second number? [BB-AD: 20-10-23]
 a) 3 : 2 b) 2 : 3 c) 2 : 5 d) 4 : 7
03. If $a:b = 4:7$ and $b:c = 5:6$ then $a:b:c = ?$ [BB-AD: 28-10-22]
 a) 8:15:12 b) 20:35:42
 c) 20:35:24 d) None
04. Which is the larger between two numbers if they are in the ratio of 6: 13 and their least common multiple is 312? [21 Based Combined SO: 10-11-23]
 a) 52 b) 26 c) 24 d) 12
05. At an animal shelter, the ratio of tigers to Zebras is 4 to 7. If there are 27 more zebras than tigers, how many tigers are there in the shelter? [BD Gas Fields - AM Exam - 2017]
 a) 75 b) 36 c) 45 d) 52
06. A jar contains only marbles of three colors: red, green and yellow. The red and green marbles are in the ratio of 2 : 5, and the yellow and red marbles are in ratio of 5 : 6. Which of the following could be the total number of marbles? [বাংলাবাদের গ্যাস এ.এম (জেনারেল) পরীক্ষা - ২০১৭]
 a) 52 b) 64 c) 100 d) 112
07. A cement mixture is composed of 3 elements. By weight, $\frac{1}{3}$ of the mixture is sand, $\frac{3}{5}$ is water and the remaining 12 pounds of the mixture is gravel. What is the weight of the entire mixture in pounds? [BD Gas Fields - AM Exam - 2021]
 a) 60 b) 80 c) 90 d) 180
08. 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 percent of the weight of this mixture is solution X? [Titas Gas AM (General) Exam - 2021]
 a) 10% b) 33.3% c) 40% d) 42.5%
09. By mixing two qualities of pulse 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: [Titas Gas AM (General) Exam - 2021]
 a) 23 b) 24 c) 25 d) 26
10. If $\frac{1}{2}$ of A = $\frac{2}{5}$ of B = $\frac{1}{3}$ of C, then A : B : C is equal to
 a) 4 : 5 : 6 b) 6 : 4 : 5 c) 5 : 4 : 6 d) 4 : 6 : 5
11. If $4a = 5b$ and $7b = 9c$, then a : b : c is equal to
 a) 45 : 36 : 28 b) 44 : 33 : 28
 c) 28 : 36 : 45 d) 36 : 28 : 45
12. If $\frac{a}{7} = \frac{b}{9} = \frac{c}{11}$, then find a : b : c
 a) 8 : 9 : 7 b) 9 : 7 : 11
 c) 7 : 9 : 11 d) 11 : 7 : 9
13. If $2A = 3B = 4C$, then find A : B : C
 a) 2 : 3 : 4 b) 4 : 3 : 2 c) 6 : 4 : 3 d) 3 : 4 : 6
14. One-half of a certain number is equal to 65% of the 2nd number. Find the ratio of 1st to 2nd number.
 a) 10 : 13 b) 8 : 13 c) 13 : 8 d) 13 : 10
15. In a class of 49 students, the ratio of girls to boys is 4 : 3. If 4 girls leave the class, the ratio of girls to boys would be
 a) 11 : 7 b) 8 : 7 c) 6 : 5 d) 9 : 8
16. The marks of 3 students A, B and C are in the ratio 10 : 12 : 15. If the maximum marks of the paper are 100, then the marks of B cannot be in the range of
 a) 20 - 30 b) 40 - 50 c) 70 - 80 d) 80 - 90
17. A sum of Tk. 300 is divided among P, Q and R in such a way that Q gets Tk. 30 more than P and R gets Tk. 60 more than Q. Then, ratio of their shares is
 a) 2 : 3 : 5 b) 3 : 2 : 5 c) 2 : 5 : 3 d) 5 : 3 : 2
18. If a sum of Tk. is divided between P and Q in the ratio of $\frac{1}{3} : \frac{1}{5}$, the find P's share.
 a) Tk. 1085 b) Tk. 1015
 c) Tk. 1090 d) Tk. 1040
19. If $a:b = 4:7$ and $b:c = 5:6$, then $a:b:c = ?$ (Agrani SO-2010) & [IFIC (MTO)-2017]
 a) 4:7:6 b) 20:35:24
 c) 20:35:42 d) 24:35:30
20. The ratio of boys and girls in a school is 3 to 7. If there are 150 boys and girls, how many boys are there?
 a) 75 b) 45 c) 25 d) 95
21. Four students aged 11, 9, 7 and 4 years share a sum of money in the ratio of their ages. If the youngest student receives Tk. 1,200; what is the sum of money? (BB AD 2001)
 a) 9,600 b) 9,300 c) 9,000 d) 8,600
22. In a certain population, there are three times as many people aged 21 or under as there are people over 21. The ratio of those 21 or under to the total population is: (National PO 13)
 a) 1 to 2 b) 1 to 3 c) 1 to 4 d) 3 to 4
23. The salaries of A, B, and C are in the ratio of 1:2:3 The salary of B and C together is Tk. 6000. By what percent is the salary of C more than that of A? [PKB-(EO)- 2019]
 a) 100% b) 150% c) 200% d) 250%
24. Some money is divided among three workers A, B and C such that 5 times A's share is equal to 12 times B's share which is equal to 6 times C's share. The ratio between the shares is? [PKB-(EO-Cash)-2019]
 a) 5 : 10 : 12 b) 10 : 12 : 5
 c) 12 : 5 : 10 d) 5 : 12 : 10

25. 35% of Nadia's income is equal to 25% of Nuru's income. The ratio of their income is:
a) 2:5 b) 7:5 c) 5:7 d) 7:3
26. The ratio of two numbers is 7:4. If 8 is added to both the numbers ratio becomes 13:8, what is the smaller number? [BSC (SO-8 Bank) -2018]
a) 40 b) 56 c) 38 d) 52
27. Given that 24 carat gold is pure gold, 18 carat gold is $\frac{3}{4}$ th of pure gold and 20 carat gold is $\frac{5}{6}$ th of pure gold, the ratio of the pure gold is 18 carat gold to the pure gold in 20 carat gold is? [Sonali (off:Cash)-2019-(FF)]
a) 5:8 b) 10:9 c) 8:5 d) 9:10
28. 125 gallons of a mixture contains 20% water. What amount of additional water should be added such that water content is raised to 25%? [Sonali (Officer-Cash) 2018]+[Sonali (Off-FF)-2019]
a) $\frac{15}{2}$ gallons b) $\frac{17}{2}$ gallons
c) $\frac{19}{2}$ gallons d) $8\frac{1}{3}$ gallons
29. 100 kg of solution A is mixed with 60 kg of solution B. If solution A has tin and copper in the ratio 1:4 and solution B has lead and tin in the ratio 3:2, then what is the amount of tin in the new solution? [SB (off.)-2019-(FF)]
a) 70 kg b) 36 kg c) 44 kg d) 56 kg
30. If $2A=3B=4C$, then A:B:C =?
a) 2:3:4 b) 4:3:2 c) 6:4:3 d) 3:4:6
31. If 10% of x is the same as 20% of y, then x:y =?
a) 1:2 b) 2:1 c) 5:1 d) 10:1
32. If $0.75 : x :: 5 : 8$, then x is equal to:
a) 1.15 b) 1.25 c) 1.20 d) 1.30
33. The fourth proportional to 5, 8, 15 is:
a) 15 b) 22 c) 17 d) 24
34. Two numbers are respectively 20% and 50% more than a third number. The ratio of the two numbers is:
a) 2:5 b) 3:5 c) 4:5 d) 6:5
35. A sum of money is to be distributed among A, B, C, D in the proportion of 5 : 2 : 4 : 3. If C gets Tk. 1000 more than D, what is B's share?
a) Tk. 500 b) Tk. 1000
c) Tk. 1500 d) Tk. 2000
36. In a mixture 60 liters, the ratio of milk and water 2 : 1. If this ratio is to be 1 : 2, then the quantity of water to be further added is:
a) 30 b) 40 c) 50 d) 60
37. The sum of three numbers is 98. If the ratio of the first to second is 2 : 3 and that of the second to the third is 5 : 8, then the second number is:
a) 30 b) 40 c) 50 d) 60
38. The salaries A, B, C are in the ratio 2 : 3 : 5. If the increments of 15%, 10% and 20% are allowed respectively in their salaries, then what will be new ratio of their salaries?
a) 3 : 3 : 10 b) 23 : 33 : 60
c) 10 : 11 : 20 d) 10 : 15 : 27
39. A man has some hens and cows. If the number of heads be 48 and number of feet equals 140, the number of hens will be:
a) 22 b) 23 c) 24 d) 26
40. In a bag, there are coins of 25 p, 10 p and 5 p in the ratio of 1 : 2 : 3. If there is Rs. 30 in all, how many 5 p coins are there?
a) 100 b) 150 c) 200 d) 250
41. The students in three classes are in the ratio 2:3:5. If 20 students are increased in each class, the ratio changes to 4:5:7. The total number of students before the increase were:
a) 10 b) 90 c) 100 d) 120
42. Three numbers are in the ratio 3:4:6 and their product is 1944. the largest number is:
a) 21 b) 23 c) 17 d) 18
43. In a certain English class, 25% of the number of girls is equal to $\frac{1}{6}$ of the total number of students. What is the ratio of boys to number of girls in the class?
a) 3 : 2 b) 3 : 4 c) 1 : 2 d) 3 : 1
44. In a mixture of 50 liters, milk and water are in the ratio of 3:2. How much water would be added to the mixture to make the ratio of the two equal? [Agrani Bank-(SO)-2017]
a) 14 liters b) 12 liters
c) 10 liters d) 8 liters
45. How many litres of a 90% of concentrated acid needs to be mixed with a 75% solution of concentrated acid to get a 30 liter solution of 78% concentrate acid [Janata (AEO)-2019]
a) 8 b) 6 c) 7 d) 9
46. Akash bought two varieties of rice, costing Tk. 50/kg and Tk. 60/kg each, and mixed them in some ratio. Then he sold the mixture at Tk. 70/kg, making a profit of 20%. What was the ratio of the mixture? [Union Bank MTO-2015, IBA-MBA-2014]
a) 1:10 b) 1:5 c) 2:7 d) 3:8
47. How many kilograms of tea worth Tk. 25 per kg must be blended with 30 kg, there should be a gain of 10%?
a) 36kg b) 40 kg c) 32 kg d) 42 kg
48. A container contains 40 litres of milk. From this container 4 litres of milk was taken out and replaced by water. This process was repeated further two times. How much milk is now contained by the container?
a) 26 L b) 29.16 L c) 28 L d) 28.2 L
49. If A:B=3:4, C:B=5:4, C:D=10:9 then A:B:C:D is? [Janata Bank (AEO-RC)-2017]
a) 8 : 6 : 9 : 10 b) 8 : 6 : 10 : 9
c) 6 : 8 : 10 : 9 d) 6 : 8 : 9 : 10