

Senior officer short courses

Lecture-03 (Ratio, Proportion, Mixture)

Part-1: CLASS DISCUSSION

Group 01: Common use of Ratio

- The ratio of three numbers is 3: 4: 5 and the sum of their squares is 1250. The sum of the numbers is:
(A) 30 (B) 50 (C) 60 (D) 90 (E) 65
- Two whole numbers whose sum is 64, which of the following cannot be the ratio of the numbers:
(A) 5: 3 (B) 7: 1 (C) 3: 4 (D) 9: 7 (E) 3: 5
- The number of girls in a class is 5 times the number of boys. Which of the following cannot be the total number of children in the class?
(A) 24 (B) 30 (C) 35 (D) 42 (E) 48
- Three business partners, Rahim, Sohail, and Karim agree to divide their total profit for a certain year in the ratios of 2 : 5 : 8, respectively. If Sohail's profit was Taka 20,000, what was the total profit (in taka) of the business for the year?
(A) 8,000 (B) 32,000 (C) 52,000 (D) 60,000 (E) 7500
- The ratio of quantity of water in fresh fruits to that of dry fruits is 7:2. If 400 kg of dry fruits contain 50 kg of water then find the weight of the water in same fruits when they were fresh?
(A) 100 Kg (B) 150 Kg (C) 175 kg (D) 125 Kg (E) 185 Kg

Group 02: HCF, LCM and Ratio

- Two numbers are in the ratio of 15: 11. If their H.C.F. is 13, find the numbers.
(A) 195 and 143 (B) 190 and 143 (C) 195 and 145 (D) 195 and 145 (E) None of these
- Two numbers are in the ratio of 4: 3. If their L.C.M is 180, find the HCF.
(A) 5 (B) 10 (C) 15 (D) 60 (E) 45

Group 03: Successive Ratio

- The ratio of Red to White marble is 3:4 and white to green marble is 5:6. What is the ratio of green to red marbles?
(A) 6:3 (B) 8:5 (C) 4:5 (D) 5:8 (E) 1:2
- If A: B=3:4, B:C=5:6 and C:D=11:9 then A:D = ?
(A) 50:60 (B) 55:72 (C) 60:70 (D) 65:75 (E) None
- Kamal has a collection of red, blue and green marbles. If the ratio of red to blue marbles is 5:2 and the ratio of green to blue marbles is 10:3, what is the ratio of red to green marbles?
(A) 2:3 (B) 4:1 (C) 3:4 (D) 3:2 (E) 3:4
- K : L = 4:3 and L : M = 5:3, then find K : L : M?
(A) 20:15:9 (B) 18:24:11 (C) 9:15:1 (D) 21:7:3 (E) 21:7:4

Group 04: Special use of Ratio

- In a sugar-water solution, the ratio of water to sugar is 8:3. If you add 2 Kgs of sugar, the ratio becomes 2:1. What was the amount of sugar in the original solution?
(A) 4.5 (B) 5 (C) 8 (D) 6 (E) None
- The present ratio of students to teachers at a certain school is 30 to 1. If the student enrollment were to increase by 50 students and the number 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?
(A) 5 (B) 8 (C) 10 (D) 12 (E) 15
- At the beginning of the year, the ratio of male to female students in a college was 3 to 4. During the year, 10 male and 20 female students left, while no new students joined the college. If, at the end of the year, the ratio of male to female students was 4 to 5, how many female students were there in the college at the beginning of the year?
(A) 80 (B) 90 (C) 100 (D) 120 (E) None

15. A bag contains tomatoes that are either green or red. The ratio of green tomatoes to red tomatoes in the bag is 4 to 3. When 5 green tomatoes and 5 red tomatoes are removed, the ratio becomes 3 to 2. How many red tomatoes were there originally in the bag?
 (A) 20 (B) 18 (C) 15 (D) 12 (E) 10
16. In a box there are black and white marbles. If $\frac{3}{4}$ of the white marbles is equal to $\frac{5}{12}$ of the total marbles, what is the ratio of black marbles to white marbles in the box?
 (A) 3:5 (B) 4:5 (C) 5:4 (D) 5:3 (E) None
17. Two equal glasses are respectively one-third and one fourth full of milk. They are then filled up with water and the contents are mixed in a tumbler. Ratio of milk and water in tumbler is:
 (A) 7:5 (B) 7:17 (C) 3: 7 (D) 11: 23 (E) 11: 33
18. \$3660 is divided among X, Y & Z in such a way that if \$10, \$20 & \$30 are removed from the sums that X, Y & Z respectively, then the sums that they will get will be in the ratio of 3:4:5. How much did X receive?
 (A) 890 (B) 905 (C) 910 (D) 915 (E) None
19. The value of "A" varies in inverse proportion as the square of "B". If the value of "A" is equal to 40 when "B" is equal to 12. What would be the value of "A" when "B" is equal to 24?
 (A) 15 (B) 11 (C) 20 (D) 10 (E) 22

Group 04: Mixture

20. A solution of 27 gallons of acid contains 9 gallons of pure acid. How much water in gallons, should be added to produce a 25 percent solution of this acid?
 (A) $6\frac{3}{4}$ (B) 9 (C) $15\frac{3}{4}$ (D) 18 (E) 27
21. A 60 liter solution with 20% glycerin is mixed with 40 liters of pure water. What is the percentage of Glycerin in the new solution?
 (A) 10% (B) 12% (C) 15% (D) 18% (E) None
22. How much salt must we add to 10 grams of a 20% salt solution to strengthen it into a 50% solution?
 (A) 5 gm (B) 3 gm (C) 6 gm (D) 4 gm (E) None
23. In a mixture of 50 liters, milk and water are in the ratio of 3 : 2. How much water should be added to the mixture to make the ratio of the two equal?
 (A) 8 liters (B) 10 liters (C) 12 liters (D) 14 liters (E) None
24. 125 gallons of a mixture contains 20% water. What amount of additional water should be added such that the water content is raised to 25%?
 (A) $\frac{15}{2}$ Gallons (B) $\frac{17}{2}$ Gallons (C) $\frac{19}{2}$ Gallons (D) $8\frac{1}{3}$ Gallons (E) $\frac{25}{2}$ Gallons
25. A certain company that sells only cars and trucks reported that revenues from car sales in 1997 were down 11 Percent from 1996 and revenues from truck sales in 1997 were up 7 percent from 1996. If total revenues from car sales and truck sales in 1997 were up 1 percent from 1996, what is the ratio of revenue from car sales in 1996 to revenue from truck sales in 1996?
 (A) 1: 2 (B) 4: 5 (C) 1: 1 (D) 3: 2 (E) None

Group 05: Partnership

26. A starts business with Tk. 3500 and after 5 months, B joins with A as his partner. After a year, the profit is divided in the ratio 2 : 3. What is B's contribution in the capital?
 (A) Tk. 7500 (B) Tk. 8000 (C) Tk. 8500 (D) Tk. 9000 (E) Tk. 7500
27. A, B and C enter into a partnership with a certain capital in which A's contribution is Tk. 10,000. If out of total profit Tk. 1,000, A gets Tk. 500, B gets Tk. 300 then C's capital is:
 (A) Tk. 4000 (B) Tk. 3200 (C) Tk.5200 (D) Tk.6000 (E) Tk. 800
28. Alim and Badrul enter into a partnership and Alim invests Tk 10,000 in the partnership. At the end of 4 months he withdraws Tk 2000. At the end of another 5 months, he withdraws another Tk 3000. If Badrul receives Tk 9600 as his share of the total profit of Tk 19,100 for the year, how much did Badrul invest in the company?
 (A) 12,000 (B) 96,000 (C) 8,000 (D) 6,000 (E) None
29. The monthly incomes of A and B are in the ratio 4 : 5, their expenses are in the ratio 5 : 6. If 'A' saves Tk. 25 per month and 'B' saves Tk.50 per month, what are their respective incomes?
 A. Tk.400 and Tk.500 B. Tk.240 and Tk.300
 C. Tk.320 and Tk.400 D. Tk.440 and Tk.550 (E) None
30. A, B, and C enter into a partnership in the ratio $\frac{7}{2} : \frac{4}{3} : \frac{6}{5}$. After 4 Months, A increases his share by 50%. If the total profit at the end of one year is Tk. 21,600, then what is B's share in the profit?
 (A) 12,000 (B) 4,000 (C) 8,000 (D) 6,000 (E) None

Part-2: Take-Home Assignment

1. Two numbers A and B are such that the sum of 5% of A and 4% of B is two-third of the sum of 6% of A and 8% of B. Find the ratio of A : B.
 A. 1 : 1 B. 3 : 4 C. 4 : 3 D. 2 : 3 E. None
2. If 0.4 times of a number is equal to 0.06 times of another number, the ratio of the numbers is:
 A. 3 : 4 B. 3 : 20 C. 20 : 3 D. 2 : 3 E. None
3. Two numbers are in the ratio 1 : 2. If 7 is added to both, their ratio changes to 3 : 5. The greater number is:
 A. 24 B. 26 C. 28 D. 32 E. None
4. If $(x + 2) : 3 = (x + 5) : 4$, what is the value of x?
 A. 7 B. 6 C. 5 D. 4 E. None
5. Bottle A is 40% filled with water and bottle B is 30% filled with water. Another bottle C can be completely filled by pouring either 10% of the content of bottle A or 20% of the content of bottle B. What is the ratio of the capacity of bottle A to bottle B?
 A. 3:2 B. 8:3 C. 4:5 D. 5:6 E. None
6. The salaries of A, B, C are in the ratio of 2 : 3 : 5. If the increments of 15%, 10% and 20% are allowed respectively in their salaries, then what will be the new ratio of their salaries?
 A. 3 : 7 : 10 B. 10 : 11 : 20 C. 23 : 33 : 60 D. 23 : 33 : 55 E. None of these
7. A man has Tk. 210 in coins alone. The coins consist of one taka, 50 paisa and 25 paisa whose numbers form a ratio of 5: 6: 8 respectively. How many coins are there in the 50 paisa denomination?
 A. 210 B. 168 C. 126 D. 105 E. None of these
8. 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?
 A. 40 B. 300 C. 200 D. 100 E. None of these
9. Sazu is younger than Rabi by 4 years. If their age ratios are of 7 : 9 respectively, how old is Sazu?
 A. 12 years B. 14 years C. 14.5 years D. 41 years E. None of these
10. The total of the ages of Ali, Gazi and Masud is 93 years. Ten years ago, the ratio of their ages was 2 : 3 : 4. What is the present age of Masud?
 A. 24 years B. 38 years C. 34 years D. 32 years E. None of these
11. The present ages of three persons are in proportions of 4 : 7 : 9. Eight years ago, the sum of their ages was 56. Find their present ages (in years).
 A. 8, 20, 28 B. 16, 28, 36 C. 20, 35, 45 D. 22, 35, 30 E. None of these
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-
 A. Tk 1425.00 B. Tk. 1537.50 C. TK. 1576.00 D. TK. 1500.00 E. None of these
13. The ratio of girls to boys in a class is 3 : 4. The number of students in the class could be any of the following except.
 A. 36 B. 28 C. 49 D. 40 E. None of these
14. Tanim's salary is 150% of Jamal's salary. Jamal's salary is 80% of Shakil's salary. What is the ratio of Shakil's salary to Tanim's Salary?
 A. 5:6 B. 5:7 C. 5:8 D. 6:5 E. None of these
15. Last year, the ratio of salary of X and Y was 1:2 and that of X and Z was 1:3. This year everyone got an increment of Tk. 1000. If Z is now drawing Tk. 25,000, what is the salary in Tk. of Y this year?
 A. 15000 B. 17000 C. 17500 D. 18000 E. None of these
16. The number of pens possessed by X, Y and Z is in the ratio 2:4:7. If the total cost of the pens is Tk. 1170 and the average cost of one pen was Tk. 30, how many pens does Y have?
 A. 8 B. 12 C. 15 D. 16 E. None of these
17. At the beginning of the year, the ratio of male to female students in a college was 3 to 4. During the year, 10 male and 20 female students left, while no new students joined the college. If, at the end of the year, the ratio of male to female students was 4 to 5, how many female students were there in the college at the beginning of the year?
 A. 80 B. 90 C. 100 D. 120 E. None of these

18. Three friends A, B, & C divide \$1,105 among them in such a way what if \$10, \$20 & \$15 are removed from the sums that A, B & C respectively, then the sums that they will get will be in the ratio of 11:18:24. How much did C receive?
A. 495 B. 510 C. 480 D. 375 E. None of these
19. The ratio of the cost of two articles 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/loss?
A. 2% loss B. 2% gain C. 4% loss D. 4% gain E. None of these
20. In a school, 10% of the boys are same in number as $\frac{1}{4}$ th of the girls. What is the ratio of boys to girls in that school?
A. 2 : 1 B. 3 : 2 C. 4 : 3 D. 5 : 2 E. None of these
21. The monthly incomes of A and B are in the ratio 4 : 5, their expenses are in the ratio 5 : 6. If 'A' saves Tk. 25 per month and 'B' saves Tk.50 per month, what are their respective incomes?
A. Tk.400 and Tk.500 B. Tk.240 and Tk.300 C. Tk.320 and Tk.400
D. Tk.440 and Tk.550 E. None of these
22. How many liters of water should be added to a 30 liter mixture of milk and water containing milk and water in the ratio of 7 : 3 such that the resultant mixture has 40% water in it?
A. 7 liters B. 10 liters C. 5 liters D. 3 liters E. None of these
23. In what ratio should a 20% methyl alcohol solution be mixed with a 50% methyl alcohol solution so that the resultant solution has 40% methyl alcohol in it?
A. 1:2 B. 2:1 C. 1:3 D. 3:1 E. None of these
24. In a mixture of 50 liters, milk and water are in the ratio of 3 : 2. How much water should be added to the mixture to make the ratio of the two equal?
A. 8 liters B. 10 liters C. 12 liters D. 14 liters E. None of these
25. In what ratio must a grocer mix two varieties of pulses costing Tk. 15 and Tk. 20 per kg respectively so as to get a mixture worth Tk. 16.50 per kg?
A. 3 : 7 B. 5 : 7 C. 7 : 3 D. 7 : 5 E. None of these
26. In what ratio must a grocer mix two varieties of tea worth Tk. 60 per kg and Tk. 65 per kg so that by selling the mixture at Tk. 68.20 per kg he may gain 10%?
A. 3 : 2 B. 3 : 4 C. 3 : 5 D. 4 : 5 E. None of these
27. If 4 (A's capital) : 6 (B's capital) : 10 (C's capital), then out of a profit of Tk. 4650, C will receive:
A. Tk. 900 B. Tk. 1550 C. Tk. 2325 D. Tk. 465 E. None of these
28. In a business, A and C invested amounts in the ratio 2: 1, whereas the ratio between amounts invested by A and B was 3: 2. If Tk. 157,300 was their profit, how much amount did B receive?
A. Tk. 24,200 B. Tk. 36,300 C. Tk. 72,600 D. Tk. 48,400 E. None of these
29. Alim and Badrul enter into a partnership and Alim invests Tk 10,000 in the partnership. At the end of 4 months he withdraws Tk 2000. At the end of another 5 months, he withdraws another Tk 3000. If Badrul receives Tk 9600 as his share of the total profit of Tk 19,100 for the year, how much did Badrul invest in the company?
A. 12,000 B. 96,000 C. 8,000 D. 6,000 E. None of these
30. Three partners A, B, C start a business. Twice A's capital is equal to thrice B's capital and B's capital is four times C's capital. Out of a total profit of Tk.16,500 at the end of the year, B's share is:
A. Tk. 4000 B. Tk. 6000 C. Tk. 7500 D. Tk. 6600 E. None of these
31. Rina and Shila entered into a partnership with their capitals in the ratio 5 : 6. At the end of 8 months, Rina withdraws her capital. If they receive the profit in the ratio of 5 : 9, find how long Shila's capital was used?
A. 12 months B. 14 months C. 16 months D. 18 months E. None of these
32. A & B start a business with initial investments in the ratio of 12 : 11 and their annual profits were in the ratio of 4 : 1. If A invested his money for 11 months, B invested the money for-
A. 3 months B. 4 months C. 5 months D. 6 months E. None of these
33. A and B started a business jointly. A's investment was thrice the investment of B and the period of his investment was two times the period of investment of B. If B received Tk. 4000 as profit, then their total profit is:
A. Tk. 16,000 B. Tk. 20,000 C. Tk. 24,000 D. Tk. 28,000 E. None of these
34. P and Q invested in a business. The profit earned was divided in the ratio 2 : 3. If P invested Tk. 40000, the amount invested by Q is-
A. Tk. 40000 B. Tk. 50000 C. Tk. 70000 D. Tk. 60000 E. None of these

35. X, Y & Z has started business with a profit sharing ratio 7 : 8 : 9. If at the end of the year, Y gets a total of Tk. 4000 what will be Z's profit?
 A. Tk. 4,500 B. Tk. 4,000 C. Tk. 3,500 D. Tk. 5,500 E. None of these
36. 125 gallons of a mixture contains 20% water. What amount of additional water should be added such that water content is raised to 25%?
 A. $\frac{15}{2}$ gallons B. $\frac{17}{2}$ gallons C. $\frac{19}{2}$ gallons D. $8\frac{1}{3}$ gallons E. None of these
37. The ratio of the number of boys and girls in a college is 7 : 8. If the percentage increase in the number of boys and girls be 20% and 10% respectively, what will be the new ratio?
 A. 8 : 9 B. 11:15 C. 21:22 D. 25:27 E. None of these
38. A & B are 2 alloys of gold & copper prepared by mixing metals in proportions 7:2 and 7:11 respectively. If equal quantities of alloys are melted to form a third alloy C, the proportion of gold and copper in C will be:
 A. 5:9 B. 5: 7 C. 7:5 D. 9:5 E. None of these
39. The annual incomes and expenditures of a man and his wife are in the ratio 5:3 and 3:1 respectively. If they decide to save equally and find a balance of tk. 4000 at the end of the year, what was their income?
 A. 5000, 3000 B. 2000,7000 C. 4000, 3000 D. 5500, 6000 E. None of these
40. A jar has 40 L milk. From the jar, 8 L of milk was taken out and replaced by an equal quantity of water. If 8 L of the newly formed mixture is taken out of the jar, what is the final quantity of milk left in the jar?
 A. 32.5 L B. 30 L C. 25.6 L D. 42.2 L E. None of these
41. In a business A and C invested amounts in the ratio 2 : 1 whereas A and B invested amounts in the ratio 3:2. If their annual profit be Tk 157300, then B's share in the profit is-
 A. Tk. 24,200 B. Tk. 36,300 C. Tk. 72,000 D. Tk. 48,400 E. None of these
42. A, B, C subscribes Tk. 50,000 for a business. A subscribes Tk. 4000 more than B and B Tk. 5000 more than C. Out of a total profit of Tk. 35000 A receives-
 A. Tk. 14,700 B. Tk. 1,900 C. Tk. 13,600 D. Tk. 8,400 E. None of these
43. A and B started a partnership business investing some amount in the ratio of 3: 5. C joined them after six months with as amount equal to that of B. In what proportion should the profit at the end of the first year be distributed among A, B and C?
 A. 3 : 5 : 2 B. 3 :5 : 5 C. 6 : 10 : 5 D. 2 :5 : 4 E. None of these
44. A and B start a business with initial investment in the ratio 12:11 and their annual profit were in the ratio 4:1. If A invested the money for 11 months, B invested the money for?
 A. 2 B. 3 C. 6 D. 4 E. None of these
45. In a partnership, A invests $\frac{1}{6}$ of the capital for $\frac{1}{6}$ of the time, B invests $\frac{1}{3}$ of the capital for $\frac{1}{3}$ of the time and C, the rest of the capital for the whole time. Out of a profit of Tk. 4600, B's share is
 A. 803 B. 840 C. 200 D. 800 E. None of these
46. A, B and C started a business with their investment in the ratio 1 : 3 : 5. After 4 months, A invested the same amount as before and B as well as C withdrew half of their investments. The ratio of their profits at the end of the year is:
 A. 4 : 3 : 5 B. 5 : 6 : 10 C. 6 : 5 : 10 D. 10 : 5 : 6 E. None of these
47. P, Q and R start a business. P invests 3 times as much as Q invests and Q invests $\frac{2}{3}$ rd as much as R invests. Find the ratio of capitals of P, Q and R?
 A. 3 : 2 : 6 B. 6 : 2 : 3 C. 2 : 6 : 3 D. 5 : 2 : 3 E. None of these
48. Aunik, Kamal and Jamal invested Tk. 8000, Tk. 4000 and Tk. 8000 respectively in a business Aunik left after six months. If after eight months, there was a gain of Tk. 4005, then what will be the share of Kamal?
 A. Tk. 890 B. Tk. 1335 C. Tk. 1602 D. Tk. 1780 E. None of these
49. Kamal started a business investing Tk. 9,000. After five months. Sameer joined with a capital of Tk. 8,000. If at the end of the year, they earn a profit of Tk. 6970, then what will be the share of Sameer in the profit?
 A. Tk. 2380 B. Tk. 2300 C. Tk. 2280 D. Tk. 2260 E. None of these
50. In a business A and C invested amounts in the ratio 2 : 1 whereas A and B invested amounts in the ratio 3 : 2. If their annual profit be Tk. 157300, then B's share in the profit is
 A. Tk. 24200 B. Tk. 24300 C. Tk. 48000 D. Tk. 48400 E. None of these

Answer : Home assignment

1	C	2	B	3	C	4	A	5	A	6	C	7	C	8	C	9	B	10	B
11	B	12	D	13	A	14	A	15	B	16	B	17	D	18	A	19	A	20	D
21	A	22	C	23	A	24	B	25	C	26	A	27	A	28	D	29	C	30	B
31	A	32	A	33	D	34	D	35	A	36	C	37	C	38	C	39	A	40	C
41	D	42	A	43	C	44	B	45	D	46	B	47	B	48	A	49	A	50	D

Part-3: Question Bank With Explanation

1. P, Q and R start business. P invests 3 times as much as Q invests and Q invests $\frac{2}{3}$ rd as much as R invests. Find the ratio of capitals of P, Q and R?

(A) 3:2:6

(B) 6:2:3

(C) 2:6:3

(D) 5:2:3

Solution:

Let, Investment of R = $3x$

$\therefore$ Investment of Q = $3x \times \frac{2}{3} = 2x$

$\therefore$ Investment of P = $2x \times 3 = 6x$

P : Q : R = $6x : 2x : 3x = 6 : 2 : 3$

2. Tk. 385 has been divided among A, B, C in such a way that A receives $\frac{2}{9}$ th of what B and C together receive. Then A's share is?

(A) Tk. 77

(B) Tk. 82.50

(C) Tk. 70

(D) Tk. 85

Solution:

Let, B and C together receive = $9x$

A receives = $9x \times \frac{2}{9} = 2x$

A.T.Q $2x + 9x = 385 \Rightarrow x = 35$

A's Share = $35 \times 2 = 70$

3. 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) 10

(B) 20

(C) 40

(D) 30

Solution:

Let the numbers are A, B and C

Given that, $A : B = 2 : 3$ and $B : C = 5 : 8$

$\therefore A : B : C = 10 : 15 : 24$

$\therefore B = \frac{15}{49}$ of 98 = 30

4. A and B start a business with initial investment in the ratio 12:11 and their annual profits were in the ratio 4:1. If A invested the money for 11 months B invested the money for-

(A) 3 months

(B) 4 months

(C) 5 months

(D) 6 months

Solution:

Let, B invested the money for M months

According to the question,

$$\frac{12 \times 11}{11 \times M} = \frac{4}{1} \Rightarrow \frac{12}{M} = \frac{4}{1} \Rightarrow 4M = 12 \Rightarrow M = 3$$

5. 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 in the container? -

(A) 29.16 liters

(B) 27.36 liters

(C) 28 liters

(D) 26.34 liters

Solution:

Amount of Milk left after 3 operations = $[40(1 - \frac{4}{40})^3]$ liters = 29.16 liters

6. The average height of girls in a class is 5 ft and that of boys is 5.7 ft. If the average height of the students in class is 5.5 ft what could be the possible strength of boys and girls respectively in the class:

(A) 50, 20

(B) 30, 20

(C) 20, 30

(D) 60, 50

Solution:

$$5G + 5.7B = 5.5(G+B) \Rightarrow 0.5G = 0.2B \Rightarrow B : G = 5 : 2$$

Possible strength = 50, 20.

7. P and Q start a hotel. P left after 6 months. After the year ends P gets Tk. 6000 as profit out of total profit of Tk. 9000. What will be amount invested by Q if P had invested Tk. 20000?

(A) Tk. 5000 (B) Tk. 6000 (C) Tk. 8000 (D) Tk. 7000

Solution: Let, Q invested 'x' Tk.

A.T. Q.

$$\frac{P \times 6}{Q \times 12} = \frac{6000}{9000 - 6000} \Rightarrow \frac{20000 \times 6}{x \times 12} = \frac{6000}{3000} \Rightarrow \frac{10000}{x} = \frac{2}{1} \Rightarrow 2x = 10000 \Rightarrow x = 5000$$

8. In a class, the number of girls is 20% more than that of the boys. The strength of the class is 66. If 4 more girls are admitted to the class, the ratio of the number of boys to that of the girls is-

(A) 1 : 2 (B) 1 : 4 (C) 3 : 5 (D) 3 : 417.

Solution: Number of Boys = x

A.T. Q.

$$x + x + x \times 20\% = 66 \Rightarrow x + x + \frac{x}{5} = 66 \Rightarrow 11x = 66 \times 5 \Rightarrow x = 30$$

Number of Boys = 30

Number of Girls = 66 - 30 = 36

$$\text{Required ratio} = \frac{30}{36+4} = \frac{30}{40} = 3 : 4$$

9. A, B, c subscribe Tk. 50,000 for a business. A subscribes Tk. 4000 more than B and B Tk. 5000 more than C. Out of a total profit of Tk. 35,000, A receives-

(A) Tk. 14,700 (B) Tk. 1,900 (C) Tk. 13,600 (D) Tk. 840010.

Solution:

Let, Investment of C = x Tk

Investment of B = (x + 5000)Tk

Investment of A = (x + 5000 + 400)Tk = (x + 9000) Tk

A.T. Q.

$$x + x + 5000 + x + 9000 = 50000 \Rightarrow 3x = 36000 \Rightarrow x = 12000$$

Ratio of their investment = 21000 : 17000 : 12000 = 21 : 17 : 12

$$\text{Profit of A} = \frac{21}{50} \times 35000 = 14700$$

10. If x : y = 5 : 2, then (8x + 9y) : (8x + 2y) is-

(A) 29 : 22 (B) 22 : 29 (C) 26 : 61 (D) 61 : 26

Solution:

$$x : y = 5 : 2 \Rightarrow \frac{x}{y} = \frac{5}{2} \Rightarrow 2x = 5y \Rightarrow 8x = 20y$$

$$(8x + 9y) : (8x + 2y) = \frac{8x+9y}{8x+2y} = \frac{20y+9y}{20y+2y} = \frac{29y}{22y} = 29 : 22$$

11. If x:y = 5:3, then (8x-5y) : (8x+5y) = ?

(A) 5:11 (B) 6:5 (C) 5:6 (D) 3:8

Solution:

$$\text{Given that, } \frac{x}{y} = \frac{5}{3} \Rightarrow 5y = 3x$$

$$\therefore (8x - 5y) : (8x + 5y) = (8x - 3x) : (8x + 3x) = 5x : 11x = 5 : 11$$

12. If A and B are in the ratio 3:4, and B and C in the ratio 12:13, then A and C will be in the ratio-

(A) 3:13 (B) 36:13 (C) 13:9 (D) 9:13

Solution:

Given that, A : B = 3 : 4

$$\text{and, } B : C = 12 : 13 = \frac{A}{B} \times \frac{B}{C} = \frac{3}{4} \times \frac{12}{13} = \frac{9}{13} = 9 : 13$$

13. In a 729 liters mixture of milk and water, the ratio of milk to water is 7:2. To get a new mixture containing milk and water in the ratio 7:3, the amount of water to be added is

(A) 71 liters (B) 81 liters (C) 56 liters (D) 50 liters

Solution:

Amount of water to be added = x liters

$$\text{Existing Amount of water} = 729 \times \frac{2}{9} = 162 \text{ liters}$$

$$\text{Existing Amount of milk} = 729 \times \frac{7}{9} = 567 \text{ ,,}$$

$$\text{A.T.Q. } \frac{567}{162+x} = \frac{7}{3} \Rightarrow x = 81$$

14. If 2 kg of metal, of which $\frac{1}{3}$ is zinc and the rest is copper, be mixed with 3 kg of metal, of which $\frac{1}{4}$ is zinc and the rest is copper, then what will be the ratio of zinc to copper in the mixture?

(A) 13 : 42 (B) 19 : 43 (C) 15 : 42 (D) 17 : 43

Solution:

$$\text{Amount of copper} = 2 \times \frac{2}{3} + 3 \times \frac{3}{4} = \frac{8+9}{12} = \frac{17}{12}$$

$$\text{Amount of zinc} = 2 \times \frac{1}{3} + 3 \times \frac{1}{4} = \frac{8+9}{12} = \frac{17}{12}$$

$$\therefore \text{Required Ratio} = \frac{17}{12} : \frac{17}{12} = 17 : 17$$

15. A mixture of 20 kg of spirit and water contains 10% water. How much water must be added to this mixture to raise the percentage of water to 25%?

(A) 2 (B) 5 (C) 4 (D) 6

Solution:

$$\text{Amount of water} = 20 \times 10\% = 2 \text{ kg}$$

$$\text{Amount of spirit} = 20 - 2 = 18 \text{ kg}$$

$$\text{Let, water to be added} = x \text{ kg}$$

A.T.Q.

$$\frac{18}{x+2} = \frac{75\%}{25\%} \Rightarrow \frac{18}{x+2} = \frac{3}{1} \Rightarrow x = 4$$

16. The sum of the squares of three numbers is 532 and the ratio of the first and the second as also of the second and the third is 3 : 2. Then the first number is-

(A) 18 (B) 6 (C) 12 (D) 20

Solution:

$$\text{Given that } 1^{\text{st}} : 2^{\text{nd}} = 3 : 2$$

$$2^{\text{nd}} : 1^{\text{st}} = 2 : 3$$

$$1^{\text{st}} : 2^{\text{nd}} : 3^{\text{rd}} = 9 : 6 : 4$$

$$\text{Now, numbers are } 9a, 6a, 4a$$

$$\Rightarrow (9a)^2 + (6a)^2 + (4a)^2 = 532 \Rightarrow 133a^2 = 532 \Rightarrow a^2 = 4 \Rightarrow a = 2$$

$$\text{So, the first number is } = 9 \times 2 = 18$$

17. There are 2 numbers in the ratio of 4:5. If 4 is subtracted from both numbers the ratio becomes 3:4. What will be the ratio if 4 is added in the both numbers?

(A) 1:2 (B) 2:3 (C) 5:6 (D) 1:4

Solution:

$$\text{Let the numbers are } 4x \text{ and } 5x$$

A.T.Q.

$$\frac{4x-4}{5x-4} = \frac{3}{4} \Rightarrow x = 4$$

$$\text{Required ratio} = \frac{4x+4}{5x+4} = \frac{20}{24} = 5 : 6$$

18. 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?

(A) 40 (B) 56 (C) 38 (D) 52

Solution: Let, the number are $7x$ and $4x$

A.T.Q.

$$\frac{7x+8}{4x+8} = \frac{13}{8} \Rightarrow x = 10; \text{ Smaller number} = 4 \times 10 = 40$$

19. The ages of A and B are in the ratio 3: 1. Fifteen years hence, the ratio will be 2: 1. Their present ages are:

(A) 21 years, 7 year (B) 30 years, 10 years (C) 45 years, 15 years (D) 60 years, 20 years

Solution:

Given, their present age ratio 3: 1; so assume their present age is $3x$ and x respectively, in 15 years the ratio becomes 2: 1

$$\therefore \frac{3x+15}{x+15} = \frac{2}{1} \Rightarrow 3x+15 = 2x+30 \Rightarrow x = 30-15 = 15$$

$\therefore$ Their present ages are $(3 \times 15) = 45$ and 15 years respectively.

20. Two numbers are such that the ratio between them is 4 : 7. If each is increased by 4, the ratio becomes 3 : 5. The larger number is :

(A) 64 (B) 36 (C) 48 (D) 56

Solution: Let the numbers be $4x$ and $7x$

$$\text{Now, } \frac{4x+4}{7x+4} = \frac{3}{5} \Rightarrow 20x+20 = 21x+12 \Rightarrow x = 8$$

$$\therefore \text{Larger number } 7 \times 8 = 56$$

21. The ratio of the present ages of two brothers is 1 : 2 and 5 years back, the ratio was 1 : 3. What will be the ratio off their ages after 5 years?

- (A) 5 : 6 (B) 1 : 4 (C) 2 : 3 (D) 3 : 5

Solution: Let, The age of younger brother is x and the older is $2x$

$$\therefore (x - 5) : (2x - 5) = 1 : 3$$

$$\Rightarrow \frac{x - 5}{2x - 5} = \frac{1}{3}$$

$$\Rightarrow 3x - 15 = 2x - 5$$

$$\Rightarrow 3x - 2x = -5 + 15 \quad \therefore x = 10$$

$$\therefore \text{Ratio off their ages after 5 years} = (x + 5) : (2x + 5) \\ = (10 + 5) : (2 \times 10 + 5) = 15 : 25 = 3 : 5$$

22. The ratio of boys to girls in a class $\frac{2}{5}$. If 2 boys leave and 4 girls join the class, the ratio of the

boys to the girls becomes $\frac{1}{4}$. Originally, how many girls were in the class?

- (A) 16 (B) 20 (C) 21 (D) 24

Solution: Let, Originally, there were $2x$ boys and $5x$ girls in the class.

$$\frac{2x - 2}{5x + 4} = \frac{1}{4}$$

$$\text{Now, } 5x + 4$$

$$\Rightarrow 4(2x - 2) = 5x + 4$$

$$\Rightarrow 8x - 8 = 5x + 4$$

$$\Rightarrow 8x - 5x = 4 + 8 \quad \Rightarrow 3x = 12 \quad \therefore x = 4$$

$$\therefore \text{Originally number of girls} = 5 \times 4 = 20$$

23. An amount of Tk. 735 was divided between A, B and C. If each of them had received Tk. 25 less, their shares would have been in the ratio of 1 : 3 : 2. The money received by C was:

- (A) Tk. 195 (B) Tk. 200 (C) Tk. 245 (D) Tk. 225

Solution: If each of them received Tk. 25 less their total = $735 - 25 \times 3 = 660$

$$\text{Individual ratio amount} = \frac{660}{1 + 3 + 2} = 110$$

$$\therefore \text{Share received by c} = (110 \times 2) + 25 = 220 + 25 = 245$$

24. Taka 1105 was divided among A, B and C. The amount of money received by A and B were in the ratio of 1 : 2. Amount of money received by B and C were in the ratio of 3 : 4. How much money did A receive?

- (A) 390 (B) 130 (C) 195 (D) None of these

Solution: Given, $A : B = 1 : 2 = 1 \times 3 : 2 \times 3 = 3 : 6$

$$B : C = 3 : 4 = 3 \times 2 : 4 \times 2 = 6 : 8$$

$$\therefore A : B : C = 3 : 6 : 8$$

$$\therefore A's \text{ amount} = \frac{3 \times 1105}{3 + 6 + 8} = \frac{3 \times 1105}{17} = 195 \text{ Tk.}$$

25. In what ratio must a grocer mix two varieties of tea worth Tk. 60 a kg and Tk. 65 a kg so that by selling the mixture at Tk. 68.20 a kg he may gain 10%?

- (A) 3 : 2 (B) 3 : 4 (C) 3 : 5 (D) 4 : 5

Solution: Let he mixes the tea in ratio $x : y$.

Therefore the cost price = $60x + 65y$

Selling price = $68.20(x + y)$

We know,

Profit = sells price – cost price

$$\Rightarrow 10\% \text{ of } (60x + 65y) = 68.20(x + y) - (60x - 65y)$$

$$\Rightarrow \frac{10(60x + 65y)}{100} = 68.20x + 68.20y - 60x - 65y$$

$$\Rightarrow 6x + 6.5y = 8.20x + 3.20y$$

$$\Rightarrow 2.2x = 3.3y$$

$$\frac{x}{y} = \frac{3}{2}$$

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

26. 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:

- (A) 10 : 9 : 7 (B) 22 : 20 : 25 (C) 11 : 10 : 8 (D) 22 : 18 : 25

Solution:

Let, the income of B is = 100

So, the income of A is = $100 \times 110\% = 110$

Again, B = 80% of C

$$\Rightarrow 100 = \frac{80}{100} \times C$$

$$C = 125$$

$$\therefore \text{Required ratio of A:B:C} = 110 : 100 : 125 \\ = 22 : 20 : 25.$$

27. There are 2 numbers in the ratio of 4:5. If 4 is subtracted from both numbers the ratio becomes 3 : 4. What will be the ratio if 4 is added in the both numbers?

- (A) 1 : 2 (B) 2 : 3 (C) 5 : 6 (d) 1 : 4

Solution:

Let the numbers are 4x and 5x

$$\text{ATQ, } \frac{4x-4}{5x-4} = \frac{3}{4}$$

$$\Rightarrow 16x - 16 = 15x - 12$$

$$\Rightarrow 16x - 15x = 4 \therefore x = 4$$

$$\therefore \text{Required ratio} = (16 + 4) : (20 + 4) = 20 : 24 = 5 : 6$$

28. The current ratio of boys to girls at a certain school is 2 to 5. If 12 additional boys were added to the school, the new ratio of boys to girls would be 4 to 9. How many boys do currently attend the school?

- (A) 27 (B) 54 (C) 72 (D) none of these

Solution:

Let, number of boys and girls be 2x & 5x

ATQ,

$$\frac{2x+12}{5x} = \frac{4}{9}$$

$$\text{Or, } 20x = 18x + 108$$

$$108 = 2x \therefore x = 54$$

$$\text{So, the numbers of boys at present is } 2 \times 54 = 108$$

29. Three boys have marbles in the ratio of 19 : 5 : 3. If the boy with the least number has 9 marbles, how many marbles does the boy with the highest number have?

- (A) 57 (B) 15 (C) 76 (D) 38

Solution:

Let, the largest number be 19x and smallest number be 3x.

As per question,

$$3x = 9$$

$$\text{Or, } x = \frac{9}{3} = 3$$

$$\therefore 19x = 19 \times 3 = 57$$

$$\therefore \text{The largest number} = 57.$$

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

Solution:

$$\text{Ratio } \frac{1}{3} : \frac{5}{6} : \frac{7}{9} = \left(\frac{1}{3} \times 18\right) : \left(\frac{5}{6} \times 18\right) : \left(\frac{7}{9} \times 18\right) \\ = 6 : 15 : 14.$$

$$\text{Sum of ratio terms} = (6 + 15 + 14) = 35.$$

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

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

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