NTS GAT General Past Papers Questions

Quantitative – Exam No. 15

Ratio Problems

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Formulas:

1. Ratio (:) symbol can be replaced with fraction sign, e.g., x:y → x/y
2. Proportion (::) symbol can be replaced with equal sign, e.g., x::y → x = y
3. Divide A in the ratio a:b:c, then:

$$x = \frac{A}{a+b+c}$$

Exercise:

1. If $x : y :: 2 : 3$ and $x = 1 : 2$, find y? (PP)

Solution:

$$x : y :: 2 : 3$$

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

$$\frac{1:2}{y} = \frac{2}{3}$$

$$\frac{1/2}{y} = \frac{2}{3}$$

$$\frac{1}{2y} = \frac{2}{3}$$

$$3 = 4y$$

$$y = \frac{3}{4}$$

It can also be expressed in ratio form as follows:

$$y = 3 : 4$$

2. Divide 144 in the ratio 2:3:7? (PP)

Solution:

$$x = \frac{Total\ value}{Sum\ of\ ratios}$$

$$x = \frac{144}{2+3+7}$$

$$x = \frac{144}{12} = 12$$

Ratio can be found as:

$$2x : 3x : 7x$$

$$2(12) : 3(12) : 7(12)$$

$$24 : 36 : 84$$

3. The ratio of women employees to men employees is 3:2. If total number of employees are 240, find the number of men employees? (PP)

Solution:

$$x = \frac{Total\ number\ of\ employees}{Sum\ of\ ratios}$$

$$x = \frac{240}{3+2}$$

$$x = \frac{240}{5} = 48$$

Men employees can be found as:

$$Men = Respective\ ratio \times x$$

$$Men = 2 \times 48$$

$$Men = 96$$

4. If a : b is 6 : 7 and b : c is 8 : 9, find a : c? (PP)

Solution:

$$a : b = 6 : 7 \quad \rightarrow \quad \frac{a}{b} = \frac{6}{7} \ldots (1)$$

$$b : c = 8 : 9 \quad \rightarrow \quad \frac{b}{c} = \frac{8}{9} \ldots (2)$$

Multiplying equation (1) with equation (2), we get:

$$\frac{a}{b} \times \frac{b}{c} = \frac{6}{7} \times \frac{8}{9}$$

$$\frac{a}{c} = \frac{48}{63}$$

$$\frac{a}{c} = \frac{16}{21}$$

$$a : c = 16 : 21$$

5. If 5a = 6b = 40c, find the value of 8a+5b in terms of c? (PP)

Solution:

As we know that 5a = 6b = 40c, we can write it as follows:

$$5a = 40c$$

$$a = \frac{40c}{5}$$

$$a = 8c$$

$$6b = 40c$$

$$b = \frac{40c}{6}$$

$$b = \frac{20c}{3}$$

We have to find 8a+5b, so by putting the value of a and b in it:

$$8a + 5b = 8(8c) + 5\left(\frac{20c}{3}\right)$$

$$8a + 5b = 64c + \frac{100c}{3}$$

$$8a + 5b = \frac{192c + 100c}{3}$$

$$8a + 5b = \frac{292c}{3}$$

6. If p = q/3, then find the ratio of p to 3q? (PP)

Solution:

$$p = \frac{q}{3}$$

$$\frac{p}{3q} = ?$$

Putting the value of p from 1st equation in 2nd equation:

$$= \frac{q/_3}{3q}$$

$$= \frac{q}{9q} = \frac{1}{9} = 1:9$$

7. It takes flour, sugar and milk to make a chocolate in the ratio 4:1:3. If we want to make 232 units of chocolates, how many units of milk are needed?

Solution:

$$x = \frac{Total\ units\ of\ chocolate}{Sum\ of\ ratios}$$

$$x = \frac{232}{4+1+3}$$

$$x = \frac{232}{8} = 29$$

Units of milk needed:

$$Milk = Respective\ ratio \times x$$

$$Milk = 3 \times 29$$

$$Milk = 87\ units$$

8. Which one of these ratios is the highest? (PP)

(A)	6 : 7	(A)	6/7
(B)	7 : 8	(B)	7/8
(C)	8 : 9	(C)	8/9
(D)	All are equal	(D)	All are equal

Solution:

$$\frac{6}{7} \times 100 = \frac{600}{7} = 85.7\ \%$$

$$\frac{7}{8} \times 100 = \frac{700}{8} = 87.5\ \%$$

$$\frac{8}{9} \times 100 = \frac{800}{9} = 88.9\ \%$$

So, the ratio "8/9" is the highest. Option C is correct.

9. In an exhibition, the ratio of boys to girls is 3:4. If there are 135 boys, find the number of girls? (PP)

Solution:

$$B : G = 3 : 4$$

$$\frac{B}{G} = \frac{3}{4}$$

$$G = \frac{4B}{3}$$

$$G = \frac{4(135)}{3}$$

$$G = \frac{540}{3}$$

$$G = 180$$

10. If 2x = 2y = 2z, find 2x+2y in terms of z? (PP)

Solution:

As we know that 2x = 2y = 2z, we can write it as follows:

$$2x = 2z \qquad\qquad 2y = 2z$$

$$x = z \qquad\qquad y = z$$

We have to find 2x+2y, so by putting the value of x and y in it:

$$2x + 2y = 2(z) + 2(z)$$

$$2x + 2y = 4z$$

11. A bakery uses a special flour mixture that contain corn, wheat and barley in the ratio of 3 : 5 : 2. If a bag of mixture contains 5 pounds of barley, how many pounds of wheat does it contain? (PP)

Solution:

$$c : w : b = 3 : 5 : 2$$

$$\frac{w}{b} = \frac{5}{2}$$

$$\frac{w}{5} = \frac{5}{2}$$

$$w = \frac{5 \times 5}{2} = \frac{25}{2}$$

$$w = 12.5\ pounds$$

12. Divide 76 in the ratio $\frac{1}{2} : \frac{1}{4} : \frac{1}{5}$? (PP)

Solution:

$$x = \frac{Total\ value}{Sum\ of\ ratios}$$

$$x = \frac{76}{\frac{1}{2} + \frac{1}{4} + \frac{1}{5}}$$

$$x = \frac{76}{\frac{10 + 5 + 4}{20}}$$

$$x = \frac{76}{\frac{19}{20}}$$

$$x = \frac{76 \times 20}{19}$$

$$x = 4 \times 20$$

$$x = 80$$

Ratio can be found as:

$$\frac{1}{2}x : \frac{1}{4}x : \frac{1}{5}x$$

$$\frac{1}{2}(80) : \frac{1}{4}(80) : \frac{1}{5}(80)$$

$$40 : 20 : 16$$

13. If $12 : x :: x : 3$, find the positive value of x? (PP)

Solution:

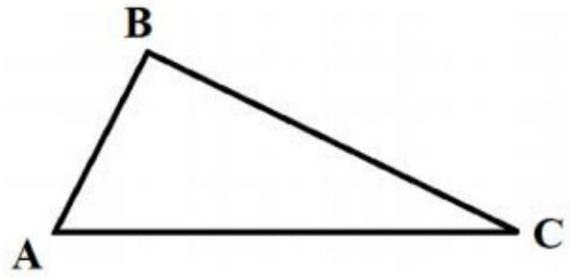
$$12 : x :: x : 3$$

$$x \times x = 12 \times 3$$

$$x^2 = 36$$

$$x = 6$$

14. If the below figure, the angles A, B and C of the given triangle are in the ratio 5 : 12: 13. What is the measure of the angle A? (PP)



Solution:

We know that:

$$x = \frac{Sum\ of\ all\ angles\ of\ a\ triangle}{Sum\ of\ ratios}$$

$$x = \frac{180}{5 + 12 + 13}$$

$$x = \frac{180}{30} = 6$$

Measure of the angle A:

$$Angle\ A = Respective\ ratio \times x$$

$$Angle\ A = 5 \times 6$$

$$Angle\ A = 30\ degrees$$

15. If x : y = 3 and sum of x and y is 80. Find the value of y? (PP)

Solution:

$$x : y = 3$$

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

$$x = 3y$$

Given that the sum of x and y is 80, so:

$$x + y = 80$$

Substituting the value of x in the above equation, we get:

$$3y + y = 80$$

$$4y = 80$$

$$y = \frac{80}{4}$$

$$y = 20$$

16. A group had 3 girls and 5 boys. After a program, same number of boys and girls are added then how many total are member of a group if girls to boys ratio was 3 : 4? (PP)

Solution:

Let "x" be number of persons added, so:

$$\frac{3 + x}{5 + x} = \frac{3}{4}$$

$$(3 + x)4 = (5 + x)3$$

$$12 + 4x = 15 + 3x$$

$$4x - 3x = 15 - 12$$

$$x = 3$$

$$Total\ members = (3 + x) + (5 + x)$$

$$Total\ members = (3 + 3) + (5 + 3)$$

$$Total\ members = 14$$

17. There are boys and girls in an examination hall. Total number of boys is 220. If ratio of boys to girls is 2 : 3, find the number of girls? (PP)

Solution:

$$B : G = 2 : 3$$

$$\frac{B}{G} = \frac{2}{3}$$

$$G = \frac{3B}{2}$$

$$G = \frac{3(220)}{2}$$

$$G = \frac{660}{2}$$

$$G = 330$$

18. If y : x = 2 and sum of x and y is 3, then find the value of y? (PP)

Solution:

$$y : x = 2$$

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

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

Given that the sum of x and y is 3, so:

$$x + y = 3$$

Substituting the value of x in the above equation, we get:

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

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

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

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

$$y = 2$$

19. If x : y is 3 : 5 and y : z is 5 : 7, find x : y : z? (PP)

Solution:

$$x \quad : \quad y \quad : \quad z$$

$$3 \quad : \quad 5$$

$$5 \quad : \quad 7$$

$$3 \times 5 : 5 \times 5 : 5 \times 7$$

$$15 : 25 : 35$$

$$x : y : z = 3 : 5 : 7$$

20. If coffee is made from two components A and B in the ratio 2:3. If the prices of these items are 300 and 500 per kg, then find the price of coffee per kg?

Solution:

$$Coffee\ Price = \left(\frac{A's\ respective\ ratio}{Sum\ of\ ratios} \times A\right) + \left(\frac{B's\ respective\ ratio}{Sum\ of\ ratios} \times B\right)$$

$$Coffee\ Price = \left(\frac{2}{2+3} \times 300\right) + \left(\frac{3}{2+3} \times 500\right)$$

$$Coffee\ Price = \left(\frac{2}{5} \times 300\right) + \left(\frac{3}{5} \times 500\right)$$

$$Coffee\ Price = (2 \times 60) + (3 \times 100)$$

$$Coffee\ Price = (120) + (300)$$

$$Coffee\ Price = 420\ rupees$$

21. The sum of three number is 124. If the ratio between the first and second be 2:3 and that between the second and the third is be 7:9, then find the third number? (PP)

Solution:

Let first number be "x", second number be "y" and third number be "z", so:

$$x + y + z = 124 \ldots (1)$$

$$x : y = 2 : 3 \quad \rightarrow \quad \frac{x}{y} = \frac{2}{3} \quad \rightarrow \quad x = \frac{2y}{3}$$

$$y : z = 7 : 9 \quad \rightarrow \quad \frac{y}{z} = \frac{7}{9} \quad \rightarrow \quad y = \frac{7z}{9}$$

Substituting the value of x and y in equation (1), we get:

$$\frac{2y}{3} + \frac{7z}{9} + z = 124$$

Substituting the value of y in above equation, we get:

$$\frac{2\left(\frac{7z}{9}\right)}{3} + \frac{7z}{9} + z = 124$$

$$\frac{14z}{27} + \frac{7z}{9} + z = 124$$

$$\frac{14z + 21z + 27z}{27} = 124$$

$$\frac{62z}{27} = 124$$

$$z = \frac{124 \times 27}{62}$$

$$z = \frac{2 \times 27}{1}$$

$$z = 54$$

22. An amount of Rs. 900 is to be distributed among A, B and C in the proportion 4 : 5 : 6 respectively. What will be the difference between A's and C's amount? (PP)

Solution:

$$x = \frac{Total\ value}{Sum\ of\ ratios}$$

$$x = \frac{900}{4+5+6} = \frac{900}{15} = 60$$

$$A's\ amount = Respective\ ratio \times x = 4 \times 60 = 240$$

$$C's\ amount = Respective\ ratio \times x = 6 \times 60 = 360$$

$$Difference = 360 - 240 = 120$$

23. The prices of a scooter and a television set are in the ratio 3 : 2 respectively. If a scooter costs Rs. 6,000 more than the television set, find the price of a television set? (PP)

Solution:

$$\frac{S}{T} = \frac{3}{2} \quad \rightarrow \quad 3T = 2S \quad \rightarrow \quad T = \frac{2S}{3}$$

$$T = \frac{2(6{,}000 + T)}{3} = \frac{12{,}000 + 2T}{3}$$

$$3T = 12{,}000 + 2T$$

$$3T - 2T = 12{,}000$$

$$T = 12{,}000$$

24. A rectangle with ratio 5 : 8 for its width and length is called a golden rectangle. If the width of the golden rectangle is 10 cm then find its perimeter? (PP)

Solution:

$$\frac{W}{L} = \frac{5}{8} \quad \rightarrow \quad 5L = 8W \quad \rightarrow \quad L = \frac{8W}{5}$$

$$L = \frac{8(10)}{5} \quad \rightarrow \quad L = \frac{80}{5} \quad \rightarrow \quad L = 16\ cm$$

We know that:

$$Perimeter\ of\ rectangle = 2(L + W)$$

$$Perimeter\ of\ rectangle = 2(16 + 10)$$

$$Perimeter\ of\ rectangle = 2(26) = 52\ cm$$

25. Divide 351 in the ratio 2 : 7, then find the product of these two numbers? (PP)

Solution:

$$x = \frac{Total\ value}{Sum\ of\ ratios}$$

$$x = \frac{351}{2+7} = \frac{351}{9} = 39$$

$$First\ number = 2x = 2(39) = 78$$

$$Second\ number = 7x = 7(39) = 273$$

$$Product = 78 \times 273$$

$$Product = 21{,}294$$

26. If $15 : x :: 8 : 16$, find the value of x? (PP)

Solution:

$$\overbrace{15 : \underbrace{x :: 8}_{} : 16}$$

$$x \times 8 = 15 \times 16$$

$$8x = 240$$

$$x = 30$$

27. Pakistan has won 8 games and lost 3. Find the ratio of games won? (PP)

Solution:

$$Ratio = \frac{Games\ won}{Total\ played}$$

$$Ratio = \frac{8}{8+3} = \frac{8}{11}$$

28. Find the value of x: (PP)

$$\frac{1}{5} : \frac{1}{x} :: \frac{1}{x} : \frac{1}{125}$$

Solution:

$$\frac{1}{5} : \frac{1}{x} :: \frac{1}{x} : \frac{1}{125}$$

$$\frac{1}{5} \times \frac{1}{125} = \frac{1}{x} \times \frac{1}{x}$$

$$\frac{1}{625} = \frac{1}{x^2}$$

$$x^2 = 625$$

$$\sqrt{x^2} = \sqrt{625}$$

$$x = 25$$

29. A lorry covers a distance of 100 km in 2 hours and 30 minutes. A private car runs with a speed of 55 km/hour. Determine the ratio of their speeds? (PP)

Solution:

We know that:

$$Lorry\ speed = \frac{Distance}{Time} = \frac{100}{2.5} = 40\ km/hour$$

$$Private\ car\ speed = 55\ km/hour$$

$$Ratio = \frac{Lorry}{Car} = \frac{40}{55} = \frac{8}{11}$$

$$Ratio = 8 : 11$$

30. In a certain class, the ratio of men to women is $3 : 5$. If the class has 24 people in it, how many are women? (PP)

Solution:

$$x = \frac{Total\ people}{Sum\ of\ ratios}$$

$$x = \frac{24}{3+5}$$

$$x = \frac{24}{8} = 3$$

Women employees can be found as:

$$Women = Respective\ ratio \times x$$

$$Women = 5 \times 3$$

$$Women = 15$$

31. If $3 : 4$ is equivalent to $a : 12$, then find a? (PP)

Solution:

$$3 : 4 :: a : 12$$

$$4 \times a = 3 \times 12$$

$$a = \frac{36}{4} = 9$$

32. In a certain city, the ratio of retailers and wholesalers is $3 : 5$, respectively. If there are 3000 in both categories, then how many are retailers?

Solution:

$$Retailers = \frac{Total\ value}{Sum\ of\ ratios} \times Respective\ ratio$$

$$Retailers = \frac{3000}{3+5} \times 3$$

$$Retailers = \frac{9000}{8} = 1125$$