



Ratio & Proportion and Partnership

In the ratio $a : b$, we call a as the first term or **antecedent** and b , the second term or **consequent**.

Eg. The ratio $5 : 9$

represents antecedent = 5, consequent = 9

Rule: The multiplication or division of each term of a ratio by the same non-zero number does not affect the ratio

Types of Ratio

1. Duplicate Ratio: If $a : b$ is a ratio, then its duplicate ratio is $a^2 : b^2$

Example: If $2 : 3$ is a ratio, then its duplicate ratio is $2^2 : 3^2$ i.e. $4 : 9$

2. Sub-duplicate Ratio: If $a : b$ is a ratio, then its sub-duplicate ratio is $\sqrt{a} : \sqrt{b}$

Example: If $16 : 25$ is a ratio, then its sub-duplicate ratio is $\sqrt{16} : \sqrt{25} = 4 : 5$

3. Triplicate Ratio: If $a : b$ is a ratio, then its triplicate ratio is $a^3 : b^3$

Example: If $2 : 3$ is a ratio, then its triplicate ratio is $2^3 : 3^3 = 8 : 27$

4. Sub-triplicate Ratio: If $a : b$ is a ratio, then its sub-triplicate ratio is $a^{1/3} : b^{1/3}$

Example: If $8 : 27$ is a ratio, then its sub-triplicate ratio is $\sqrt[3]{8} : \sqrt[3]{27} = 2 : 3$

5. Inverse or Reciprocal Ratio: The inverse ratio of $a : b$ is $1/a : 1/b$

Example: If $2 : 3$ is a ratio, then its inverse ratio is $(1/2) : (1/3)$

6. Compounded Ratio: Compound ratio is the ratio of the products, of the corresponding terms of two or more simple ratios.

Example: The compounded ratio of the ratios: $(A : B)$, $(C : D)$, $(E : F)$ is $(ACE : BDF)$.

Proportion

The equality of two ratios is called proportion.

If $a : b = c : d$, we write $a : b :: c : d$ and we say that a, b, c, d are in proportion. Then,

$$a/b = c/d$$

Here a and d are called **extremes**, while b and c are called **mean terms**.

Product of means = Product of extremes.

Thus, $a : b :: c : d$ means $(b \times c) = (a \times d)$



If $a/b=c/d$, then:

- i. Invertendo - $b:a = d:c$
- ii. Alternendo - $a:c = b:d$
- iii. Componendo - $(a+b):b = (c+d):d$
- iv. Dividendo - $(a-b):b = (c-d):d$
- v. Componendo & Dividendo –
$$(a+b)/(a-b) = (c+d)/(c-d)$$

Direct and Inverse Proportion/ Variation

If X is directly proportional to Y , it means when X increases Y increases and vice versa. If X is inversely proportional to Y , it means when X increases Y decreases and vice versa.

Example: $I = Q/t$ where Q is the charge, I is the current and t is the time.

Here, I is directly proportional to Q when time is constant, and I is inversely proportional to t when charge Q is constant.

Example :

If $0.75 : x :: 5 : 8$, then x is equal to:

A.1.92

B.1.2

C.1.45

D.1.30

Types of Proportions

Fourth Proportional:

If $a : b = c : d$, then d is called the fourth proportional to a, b, c .

Third Proportional:

$a : b = c : d$, then c is called the third proportion to a and b .

Mean Proportional:

Mean proportional between a and b is \sqrt{ab} .

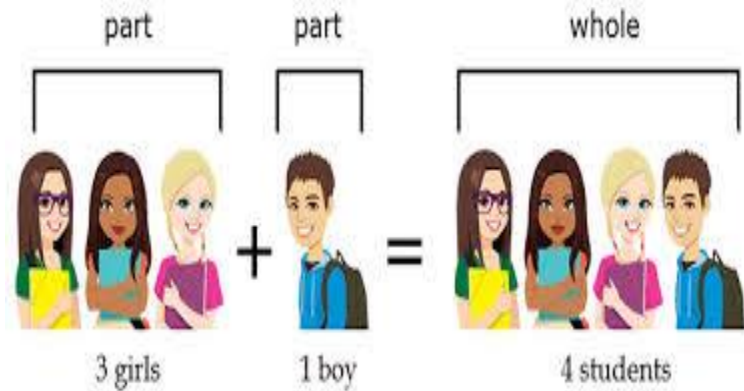
Examples on Ratio And Proportions

Q1. The ratio of A:B:C is 5:2:3

- a) if the sum of B & C is 75 find the no.s
- b) if the sum of A & B is 36 more than C, Find A,B,C
- c) If the product of B & C is 96 find the no.s
- d) if B is 18, Find the no.s

Q2. The ratio of B & G is 10:3, when 36 girl more joined the ratio becomes 10:7. Find the no. of boys?

- A. 90
- B. 100
- C. 60
- D. None



Q 3. The income ratio of A & B is 5:8, if income of A increases by 60000, then the new ratio is 5:4, Find current income of A.

- A.120000
- B.240000
- C.360000
- D.None



Q4. Ratio of boys and girl is 4:5 when 100 girl left the ratio becomes 6:7, find no. of boys

- A. 1200
- B. 600
- C. 800
- D. None

Q5. 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. 17 : 18

C. 21 : 22

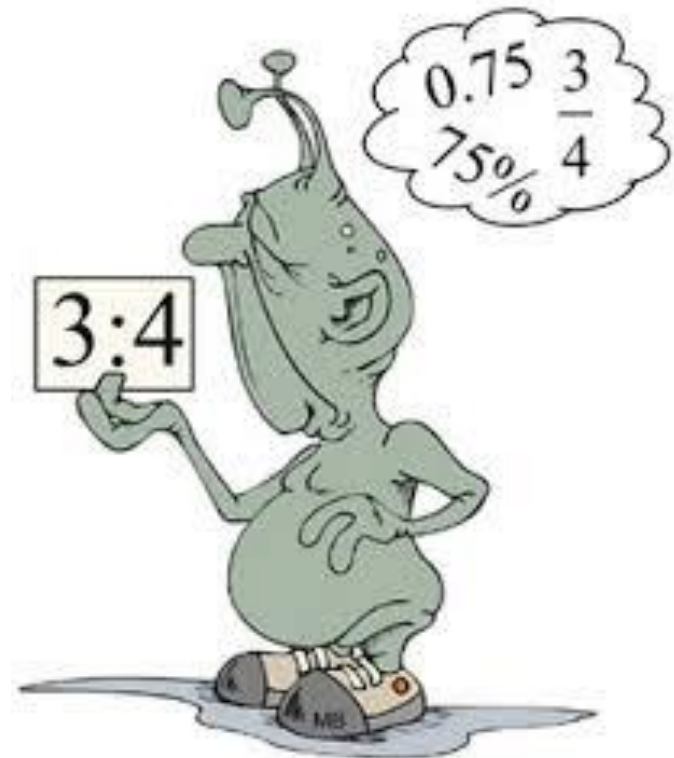
D. Cannot be determined

Q6. 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) 10 : 11 : 20
- c) 23 : 33 : 60
- d) Cannot be determined

Q7. If Rs. 782 be divided into three parts, proportional to $1/2 : 2/3 : 3/4$, then the first part is:

- A.Rs. 182
- B.Rs. 190
- C.Rs. 196
- D.Rs. 204





Q8. The fourth proportional to 5, 8, 15 is:

A.18

B.24

C.19

D.20

Q9. 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.50
- B.100
- C.150
- D.200

Q10. A bag contains Rs. 600 in the form of one-rupee, 50 paise and 25 paise coins in the ratio 3 : 4 : 12. The number of 25 paise coins is

- A. 600
- B. 900
- C. 1200
- D. 1376

Q11. If $x:y$ is $2:3$, find the value of $(3x + 2y) : (2x+5y)$

A. $12 : 25$

B. $11 : 27$

C. $12 : 19$

D. $11 : 23$

Q. Rs. 1400 is divided among Arun, Bheem, Chirag so that Arun receives half as much as Bheem and Bheem half as much as C. Then C's share is

- A. Rs. 500
- B. Rs. 600
- C. Rs. 700
- D. Rs. 800

Q. There are 12 animals in a zoo, what is their head to leg ratio if there are 4 goats, 2 ducks and 6 gorillas?

- A. 8:3
- B. 3:8
- C. 4:5
- D. 7:9

Q . In a bowl there is 30 litre mixtures of milk and water. The ratio of milk and water is 7:3. How much water must be added to it so that the ratio of milk to the water be 3:7?

- A. 20 Ltr
- B. 40 Ltr
- C. 60 Ltr
- D. 50 Ltr

Q. A sum of money is shared between Kamal, Vimal, Keyar and Nishant in the ratio 5:2:4:3. If Keyar gets Rs. 1000 more than Nishant, What is Vimal's share?

- A. Rs. 2000
- B. Rs. 1000
- C. Rs. 700
- D. Rs. 600

Q. The amount Rajesh and Ajju earns are respectively 20% and 50% more than what Kiran earns. What is the ratio at which Rajesh and Ajju earn?

- A. 2:5
- B. 3:4
- C. 4:5
- D. 8:9

What is Partnership?



Important Concepts

Ratio of Divisions of Gains:

Suppose A and B invest Rs. x and Rs. y respectively for a year in a business, then at the end of the year:

$$(A's \text{ share of profit}) : (B's \text{ share of profit}) = x : y.$$

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Suppose A invests Rs. x for p months and B invests Rs. y for q months then,

$$(\text{A's share of profit}) : (\text{B's share of profit}) = xp : yq$$



Example:

- A, B, C Started a business with capitals Rs.60,000, Rs.50,000 and Rs.40,000 respectively. After 9 months C left them. If profit after one year us Rs.14,000 then profit of C is
- A. Rs.5000
- B. Rs.4000
- C. Rs.6000
- D. Rs.3000

Solution:

A invested for one year, B invested for one year and C invested for only 9 months:

A	B	C
6	5	4
*	*	*
12	12	9
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72	: 60	: 36
6	: 5	: 3
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Hence proportion of C is 3 parts out of 14 parts.

$$\begin{aligned}\text{Profit of C} &= \frac{3}{14} * 14000 \\ &= \text{Rs. } 3000.\end{aligned}$$

Practice Questions

Q1. Three partners shared the profit in a business in the ratio 5 : 7 : 8. They had partnered for 14 months, 8 months and 7 months respectively. What was the ratio of their investments?

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

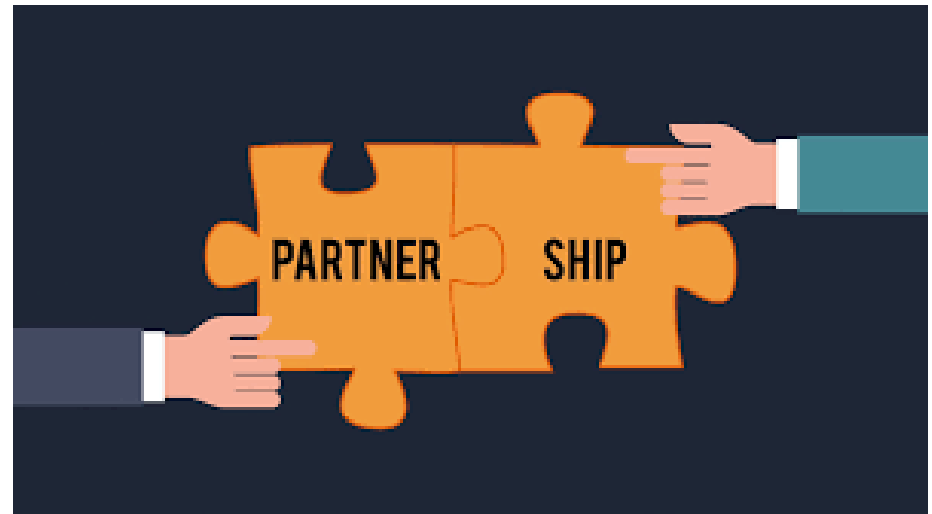


Q2. A, B, C rent a pasture. A puts 10 oxen for 7 months, B puts 12 oxen for 5 months and C puts 15 oxen for 3 months for grazing. If the rent of the pasture is Rs. 175, how much must C pay as his share of rent?

- A. Rs. 45
- B. Rs. 50
- C. Rs. 55
- D. Rs. 60

Q3. A invests Rs.4.000 for 6 months, B invests Rs.6000 for 8 months and C invests Rs.9000 for 4 months in a business. If profit is Rs.1800 then what is the share of B?

- A. Rs.600
- B. Rs.900
- C. Rs.800
- D. Rs.1000



Q4. Jayant opened a shop investing Rs.30,000. Madhu joined him 2 months later, investing Rs.45,000. They earned a profit of Rs.54,000 after completion of one year. What will be Madhu's share of profit?

- A. Rs.27,000
- B. Rs.24,000
- C. Rs.30,000
- D. Rs.36,000



Q5. In a business Ram invests Rs.60,000. After 6 months his uncle invests Rs.40,000. After one year they got a profit of Rs.12,000. Then uncle gets his share as

- A. Rs.2500
- B. Rs.2000
- C. Rs.1000
- D. Rs.3000



Q6. How should a profit of Rs.9000 be divided into two partners, if one of them contributed Rs.24000 for 5 months and other 10,000 for 6 months? (in Rupees)

- A. 1000, 5000
- B. 2000, 3000
- C. 6000, 3000
- D. 2000, 4000



Q7. 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 Rs. 855, the total profit is:

- A.Rs. 1425
- B.Rs. 1500
- C.Rs. 1537.50
- D.Rs. 1576



Q8. A, B, C subscribe Rs. 50,000 for a business. A subscribes Rs. 4000 more than B and B Rs. 5000 more than C. Out of a total profit of Rs. 35,000, A receives:

- A.Rs. 8400
- B.Rs. 11,900
- C.Rs. 13,600
- D.Rs. 14,700



Q9. A, B, C invested the capitals in a business. If A invested Rs.10,000 more than B and C invested Rs.20,000 more than A, then how should a profit of Rs.14,000 be divided among A, B and C?

Given: Capital of B is Rs.10,000.

- A. 2000, 1000, 3000
- B. 1000, 3000, 4000
- C. 3000, 2000, 5000
- D. 4000, 2000, 8000



Q10. A started a business with Rs.50,000. After 6 months A wants to close his business and he withdraws but B joins & continues it for another 6 months with capital of Rs.40,000. If profit after one year is Rs.9000 then share of A is

- A. Rs.9000
- B. Rs.8000
- C. Rs.6000
- D. Rs.5000

