

RATIO AND PROPORTION

The ratio of monthly incomes of Pawan and Sunil is $4 : 3$ and the ratio of their monthly expenditures is $3 : 2$. If Pawan and Sunil save ₹4000 and ₹6000 respectively per month, then what is the sum of their monthly incomes?

- 1. ₹60000
- 2. ₹700000
- 3. ₹500000
- 4. ₹36000

I $\frac{4:3}{3:2}$ $\frac{8}{8+6} \rightarrow 4000$, $\frac{6}{8+6} \rightarrow 6000$

E $\frac{3:2}{6}$

P S

$\frac{4:3}{4000:3000} \rightarrow 70000$

The monthly incomes of A and B are ₹12000 and ₹15000 respectively. The monthly expenditure of A is ₹8000. If the ratio of the monthly expenditures of A and B is 2 : 3, then what is the sum of their monthly savings?

- 1. ₹7000
- 2. ₹8000
- 3. ₹5000
- 4. ₹6000

$$I = E + S$$

$$2x : 4000$$

$$x = 4000$$

$$\begin{aligned}3x &= 3 \times 4000 \\&= 12000\end{aligned}$$

$$S = I - E$$

A	B
12000	15000
E 8000	12000

$$\text{saving } 4000 + 3000 \\ 7000$$

The monthly incomes of Mohit and Prakash are in the ratio $2 : 3$. Their monthly expenditures are in the ratio $3 : 5$. If each saves ₹5000 per month, then what is the sum of monthly incomes of Mohit and Prakash?

- 1. ₹40000
- 2. ₹50000 ✓
- 3. ₹60000
- 4. ₹42000

$$\begin{array}{r} 20000 \\ 30000 \\ \hline 50000 \end{array}$$

1 \Rightarrow 10

3 : 5

The ratio of ages of A and B, four years ago, was $7 : 5$. The ratio of their ages, 6 years from now, will be $19 : 15$. What is the ratio of the present ages of A and B?

1. $2 : 1$

2. $5 : 2$

3. $4 : 3$

$$\begin{array}{c} S \\ \text{A} \quad \text{B} \\ 7 : 5 \\ \hline 6n \quad 10 \\ \cancel{4x} \quad \cancel{x} \\ \underline{\quad} \quad \underline{\quad} \\ 19 : 15 \end{array}$$

$$\begin{array}{c} S \\ \text{A} \quad \text{B} \\ 7 : 5 \\ \cancel{2} \quad \cancel{5} \\ 19 : 15 \\ \cancel{1} \quad \cancel{1} \\ 10 \quad 10 \\ \hline 105 - 95 \\ 190 - 150 \\ 40 \end{array}$$

$$\begin{array}{c} E \\ \text{A} \quad \text{B} \\ 7 : 5 \\ 7x \quad 5x \\ 28 \quad 20 \\ \hline 32 : 24 \\ 4 : 3 \checkmark \end{array}$$

$$10 \Rightarrow 40$$

$$\begin{array}{l} 7 \Rightarrow 4x \\ = 28 \end{array}$$

Five years ago, the ratio of the ages of A and B was 3 : 4. Five years from now, the ratio of their ages will be 4 : 5. What is the ratio of A and B, 10 years from now?

- 1. 9 : 11
- 2. 6 : 7
- 3. 5 : 6
- 4. 7 : 9

$A : B$

Now ($\frac{3}{0} : \frac{4}{0}$)
5 yr ($\frac{35}{x} : \frac{45}{y}$)
10 yr ($\frac{45}{A} : \frac{55}{B}$)

5 $\frac{3 : u}{u : 5} = \frac{15}{10}$
E $\frac{u}{10} = 10$
 $u = 50$

30 : 40
 $45 : 55 \div 5$
 $9 : 11$

The ratio of incomes of A and B is 3 : 8 and the ratio of their savings is 9 : 25. If the income of A equals the expenditure of B, then the ratio of expenditures of A and B is:

1. 3 : 8

2. 6 : 17

3. 5 : 12

4. 2 : 5 ✓

Income

Savings

EUP

A B

$$3x : 8x$$

$$9y : 25y$$

$$3x - 9y : 8x - 25y$$

$$I : E + S$$

$$E = I - S$$

$$80 = 100 - ?$$

$$3x = 8x - 25y$$

$$25y = 8x - 3x$$

$$25y = 5x$$

$$\frac{x}{y} = \frac{25}{8}$$

$$\frac{x}{y} = \frac{5}{1}, \quad x:5, \quad y:1$$

$$15 - a : 40 - 25$$

$$6 : 15$$

$$\div 3$$

$$\boxed{2 : 5}$$

The ratio of two numbers is $2 : 1$. If each number is increased by 5, then the new ratio becomes $3 : 2$. What is the sum of the numbers?

- 1. 15
- 2. 45
- 3. 30
- 4. 20

s
 n

$$\begin{array}{c} \cancel{2:1} \\ \cancel{3:2} \\ +5 \quad +5 \end{array}$$

15 10

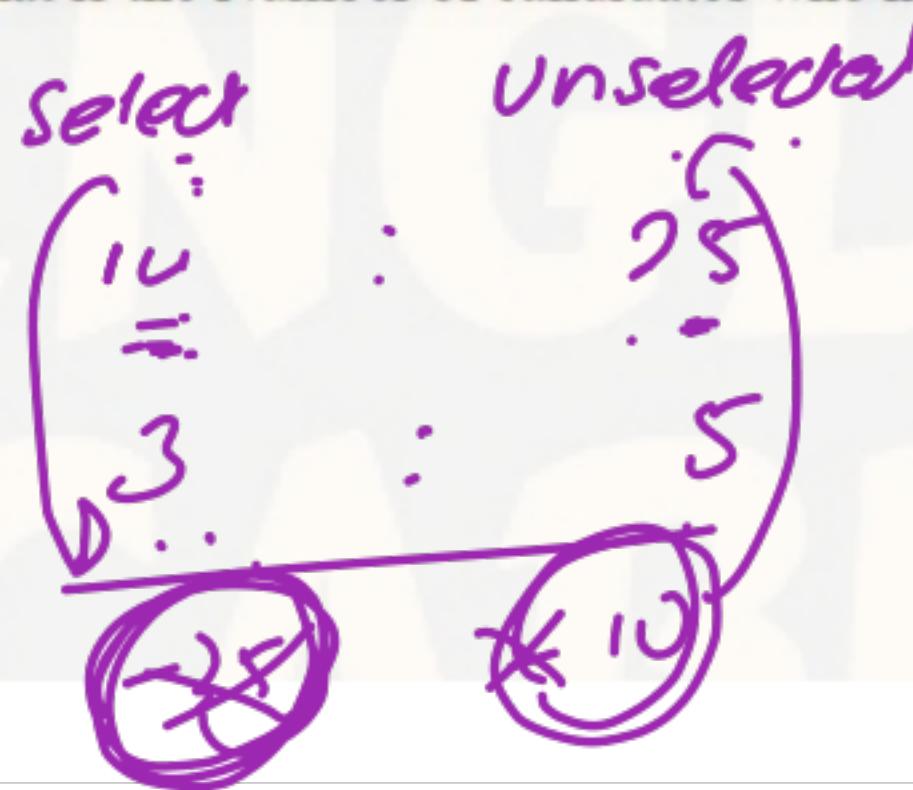
$$1 \Rightarrow 5$$

$$\times 5 \left(\frac{2}{3} \right) \times 5$$
$$10 + 5 = 15$$

If the ratio of selected to unselected candidates was 14 : 25. If 35 less had applied and 10 less selected, the ratio of selected to unselected would have been 3 : 5. What is the Number of candidates who had applied for a job?

- 1. 200
- 2. 175
- 3. 275
- 4. 195

Apply



Setting up the proportion:

$$\frac{14}{25} = \frac{8}{10}$$
$$14 \cdot 10 = 25 \cdot 8$$
$$140 = 200$$
$$200 - 60 = 140$$
$$140 = 80$$
$$80 \times 14 = 112$$
$$112 - 17 = 95$$

$$117 - 112 : 5 \Rightarrow 25$$

$$(x \Rightarrow 5 \times 3^a)$$

$$3^a \Rightarrow 5 \times 3^a = 195$$

The proportion of the number of students in three classes is $1 : 2 : 3$. If 20 students are included in each class, then the proportion becomes $3 : 5 : 7$. What was initially the total number of students in the three classes?

- 1. 200
- 2. 280
- 3. 220
- 4. 240

$$\begin{array}{r} S \quad 1 : 2 : 3 \\ N \quad 3 : 5 : 7 \\ \hline -20 \quad +20 \quad +20 \end{array}$$

$$\begin{array}{r} 1 : 2 \quad 5 \quad 6 \\ 3 : 5 \quad 60 \quad 100 \\ \hline +20 +20 \end{array}$$

$$1 \Rightarrow 40$$

$$\begin{array}{r} 1 : 2 : 3 \\ 60 \quad 80 \quad 120 \quad = 240 \end{array}$$

$$6 \Rightarrow 240$$

The ratio (by volume) of milk and water in a mixture is $2 : 1$. If we add 12 litres of water in the mixture, then the ratio of milk and water becomes $4 : 3$. What is the quantity of water in the new mixture?

- 1. 84 litres
- 2. 24 litres
- 3. 48 litres
- 4. 36 litres

$$\begin{array}{rcl} \text{?} & 2 : 1 & \text{N} \overset{\text{M}}{\sim} \overset{\text{W}}{\sim} 4 : 6 \\ \text{?} & 4 : 3 & \overset{\text{2}}{\cancel{2 : 1}} \Rightarrow 24 \\ & & \overset{\text{1}}{\cancel{1 : 2}} \Rightarrow 12 \\ & 0 : + 12 & 3 \Rightarrow 12 \times 3 \\ & & 36 \end{array}$$

The ratio of milk and water in a mixture is $4 : 3$. If we add 2 litres of water, the ratio of milk and water becomes $8 : 7$. What is the quantity of the final mixture?

~~1.~~ 18 litres

~~2.~~ 30 litres

~~3.~~ 24 litres

$$\begin{array}{ccc} M : W & M : W \\ 4 : 3 & 8 : 7 & 24 \quad 28 \\ 8 : 7 & u : 3 & u \Rightarrow 8 \\ \hline 0 & 2 & 1 \Rightarrow 2 \end{array}$$

$$\begin{aligned} & 8 : 7 \\ & \sqrt{2} \left(\frac{8}{16} + \frac{7}{14} \right) \times 2 \\ & 16 + 14 = 30 \end{aligned}$$

The ratio of monthly incomes of Ram and Rahim is 4 : 3 and the ratio of their monthly expenditures is 3 : 2. If each saves ₹5000 per month, then what are the respective monthly incomes of Ram and Rahim?

1. ₹12000 and ₹9000

2. ₹10000 and ₹7500

3. ₹16000 and ₹12000

4. ₹20000 and ₹15000 ✓

4 : 3

3 : 2

1 \Rightarrow 5

5 5

$$15 \left(\frac{4}{20000} : \frac{3}{15000} \right) \times 5$$

A mixture has milk and water in the ratio (by volume) of 8 : 3. If 3 litres of water is added to it, then new ratio of milk and water becomes 2 : 1. What are the quantities of milk and water respectively in the mixture initially?

- 1. 24 litres and 9 litres
- 2. 32 litres and 12 litres
- 3. 40 litres and 15 litres
- 4. 16 litres and 6 litres

$$\begin{array}{ccc} \text{M} & \text{W} \\ 8 : 3 & & 8 - 6 \\ 2 : 1 & & 2 \Rightarrow 6 \\ \hline 0 & 3 & 1 \Rightarrow 3 \end{array}$$

$$\times 3 \left(\begin{matrix} 8 : 3 \\ 20 : 9 \end{matrix} \right) \times 3$$

In a mixture of 60 litres, the ratio (by volume) of milk and water is 2 : 1. If X litres of water is added in the mixture, the ratio of milk and water becomes 1 : 2, then what is the value of X?

X 1. 40

X 2. 56

X 3. 20

✓ 4. 60 ✓

M W

M W

$$2 : 1 = 2+1 = \frac{60}{3} = \frac{60}{2} = 20 \text{ ltr}$$

2 : 1

$$2 \times 1 : 2 \times 2$$

2 : u

$$2 : 1) 3 = ? = 60$$

$$2 : 1 = 2+1 = \frac{60}{3} = \underline{\underline{60}}$$

Ravi's age is $\frac{3}{5}$ of Shyam's age. After x years the ratio of the ages of Ravi and Shyam becomes $5 : 7$. If initially the sum of their ages is 32, then what is the value of x ?

X 1. 2

X 2. 4

✓ 3. 8

X 4. 7

$R = S + x$

$$\begin{array}{rcl} R & & S \\ 3 & : & 5 \\ S & : & 7 \\ \hline x & & x \end{array}$$

$a'_b \quad a:b$

$$3:5 \Rightarrow 32$$

$$8 \Rightarrow 32$$

$$5x - 7x = 1 \Rightarrow 4$$

$$2 \Rightarrow a \times 2 = 8$$

$$u = 2x$$

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

$$x = 2$$

The sum of the present ages of a father and his son is 78 years. After five years, the ratio of their ages becomes 7 : 4. What is the present age (in years) of the father?

1. 45

2. 51

3. 55

4. 50

present

$$F + S = 78$$

$$S \quad S$$

After 5 yrs.

$$F : S$$

$$7x : 4x$$

$$56 \quad 32$$

$$\text{sum } F+S = 88$$

$$\begin{array}{r} 56 \\ - 5 \\ \hline 51 \end{array}$$

$$32$$

$$7x + 4x = 88$$

$$11x = 88$$

$$x = 8$$

The ratio of the age of a father and his son is $3 : 1$. If the product of their ages is 432, then what is the sum of their ages?

- 1. 36 years
- 2. 48 years
- 3. 60 years
- 4. 54 years

$$F : S$$

$$3x : 1x$$

$$36 + 12 = 48$$

$$3x \cdot x = 432$$

$$x^2 = \frac{432}{3}$$

$$x^2 = 144$$

$$x = 12$$

The ratio of the sum of the salaries of A and B to the difference of their salaries is 11 : 1. The ratio of the sum of the salaries of B and C to the difference of their salaries is also 11 : 1. If A's salary is the highest and C's is the lowest then what is B's salary (in ₹), given that the total of their salaries is ₹18,200?

~~X~~ 1. 8500

$$\frac{A+B}{A-B} = \frac{11}{1}$$

~~X~~ 2. 5500

$$A+B = 11(A-B)$$

~~X~~ 3. 6000

$$A+B = 11B - 11A$$

$$11B + B = 11A - A$$

$$12B = 10A$$

$$A/B = \frac{12}{10} = \frac{6}{5}$$

$$A/B = 6/5$$

$$\frac{B/C}{B-C} = \frac{11}{1} \quad x = 200$$

$$30x =$$

$$B/C = 6/5 \quad 30 \times 100$$

$$A:B = 6:5$$

$$\underline{B:C = 6:5}$$

$$A:B:C = 36:30:25$$

$$36 \times 1 \ 30 \times 1 \ 25 \times 1 = 18200$$

$$91x = 18200$$

The ratio of the number of males and females in a group is $6 : 7$. Fifteen females leave the group. As a result, this ratio becomes $12 : 11$. Now, if 6 males join the group, then what will be the ratio of the number of males and females in the group?

- 1. $3 : 2$
- 2. $6 : 5$
- 3. $4 : 3$
- 4. $5 : 4$

$$\begin{array}{rcl}
 M & : & F \\
 6 & : & 7 \\
 \hline
 0 & : & 5
 \end{array}$$

84 - 66
 18 \Rightarrow 90
 1 \Rightarrow 5

$$\begin{array}{rcl}
 12 & & 11) \times r \\
 \times 5(& & \\
 60 & & 55 \\
 56 & & \\
 66 & : & 55 \\
 & & 6 : 5
 \end{array}$$

A sum of ₹5200 is divided amongst A, B, C and D such that the ratio of shares of A and B is 2 : 3, that of B and C is 4 : 5 and that of C and D is 1 : 2. What is the difference between the shares of B and D?

✓ 1. ₹1440 ✓

✗ 2. ₹1360

✗ 3. ₹1200

✗ 4. ₹1280

$$\begin{array}{c} \begin{array}{l} A:B \\ B:C \\ C:D \end{array} \\ \hline \end{array} = \begin{array}{c} 2:3 \\ | \\ 4:5 \\ | \\ 1:2 \end{array}$$
$$65x = \frac{5200}{\cancel{1040}}$$
$$x = \frac{5200}{65}$$
$$x = 80$$

$$30x - 12x = 18x$$

$$= 18 \times 80 = 1440$$

A sum is divided between two persons in the ratio $3 : 2$. If one person got ₹12 less than the other person, then what is the sum?

- 1. ₹60 ✓
- 2. ₹50
- 3. ₹72
- 4. ₹44

$$\begin{array}{r} \text{∴ } 3 : 2 - 20 \\ \underline{1} - 12 \\ 5 = 60 \end{array}$$

The sum of two numbers x and y is 48 and their difference is 6. Then $x : y = ?$

1. $8 : 9$

2. $7 : 6$

3. $9 : 7$ ✓

4. $3 : 7$

$$x + y = 48$$

$$x - y = 6$$

$$2x = 54$$

$$x = \frac{54}{2}$$

$$x = 27 \quad y = 21$$

$$x : y = 27 : 21$$

$$27 - y = 6$$

$$27 - 6 = y$$

$$21 = y$$

What is the proportion equivalent to $\frac{X}{Y} : \frac{Y}{Z} : \frac{X}{Z}$, if $X : Y : Z = 4 : 7 : 9$?

1. $36 : 49 : 32$

2. $16 : 21 : 14$

3. $36 : 51 : 28$

4. $36 : 49 : 28$

$$\frac{4}{7} : \frac{7}{9} : \frac{4}{9} \quad 7 \times 9 = 63$$

$$\frac{4 \times 9}{7 \times 9} : \frac{7 \times 7}{9 \times 7} : \frac{4 \times 7}{9 \times 7}$$

$$\underline{36} : \underline{49} : \underline{28}$$

The ratio of boys and girls in a college was 4 : 5. New students got admitted and the number of boys went up by 50% and the number of girls went up by 60%. What is the new ratio of boys and girls in the college?

~~X~~ 1. $3 : 5$

~~✓~~ 2. $3 : 4$

~~X~~ 3. $5 : 8$

~~X~~ 4. $2 : 3$

B G

$$\begin{array}{rcl} 400 & & 500 \\ \underline{200} & & \underline{300} \\ 600 & : & 800 \end{array}$$

$$400 \times \frac{50}{100}$$

$$200$$

$$500 \times \frac{60}{100}$$

$$6 : 8$$

$$3 : 4$$

$$300$$

The number of students studying subjects A, B and C in a school are in the proportion 12 : 15 : 16. There is a proposal to increase the number of students studying A, B and C, respectively by 50%, 20% and 50%. What will be the new proportion of the number of students studying A, B and C?

1. $3 : 3 : 5$

2. $3 : 3 : 4$ ✓

3. $2 : 3 : 3$

4. $5 : 8 : 12$

A	B	C	
12	15	16	1200
50%	20%	50%	$\frac{150}{100}$
+6	+3	+8	1500

$$\begin{array}{r} 18 \quad 18 \quad 20 \\ \hline 3 \quad 3 \quad 4 \end{array} \quad \frac{30}{10}$$

If three numbers are in the ratio $2 : 3 : 5$ and the twice of their sum is 200. The square of the largest of three numbers is:

- 1. 2500
- 2. 1000
- 3. 625
- 4. 2250

$$\begin{array}{c} \checkmark \text{ 1. } 2500 \quad \cancel{\text{2 : 3 : 5}} \\ \times \text{ 2. } 1000 \\ \times \text{ 3. } 625 \\ \times \text{ 4. } 2250 \end{array}$$

$2x \quad 3x \quad 5x$
 \downarrow
 50

$$2(a+b+c) = \frac{200}{100}$$

$$a+b+c = 100$$

$$2x+3x+5x = 100$$

$$10x = 100$$

$$x = 10$$

$$\begin{aligned} 5x^2 &= 50 \times 50 \\ &= 2500 \end{aligned}$$

The ratio of the ages of two persons is $3 : 4$. If the age of one of them is greater than the other by 8 years, then what is the sum of their ages?

- 1. 54 years
- 2. 58 years
- 3. 60 years
- 4. 56 years

$$\begin{array}{r} 3 : 4 = 7 \times 8 : 56 \\ | \qquad | \\ 24 \qquad 32 \end{array}$$

A sum of ₹3200 was to be divided between A, B, C and D in the ratio $4 : 6 : 7 : 3$. But by mistake, it was divided in the ratio $3 : 5 : 6 : 2$. As a result, who got $16\frac{2}{3}\%$ less than her due?

- 1. C
- 2. A
- 3. B
- 4. D

A bag contains ten rupee, five rupee and two rupee notes in the ratio $10 : 5 : 2$. The total value of five rupee notes in the bag is ₹84 more than that of two rupee notes. The total value of ten rupee notes in the bag (in ₹) is:

- 1. 350
- 2. 450
- 3. 300
- 4. 400 ✓

Value	10	5	2	$u = u$
No. R	$\underline{10x}$	$5x$	$2x$	$100x = ux \times 100$
T. Value =	$\underline{\underline{100x}}$	$\underline{\underline{25x}}$	$\underline{\underline{ux}}$	$= u00$

$$25x - ux = 84$$

$$21x = 84$$

$$x = \frac{84}{21}^u$$

A bag contains one rupee, 50 paise and 25 paise coins in the proportion 5 : 7 : 9. If the total amount in the bag is ₹430, then how many 25 paise coins are there?

~~X~~ 1. 400

Value - 100

50

25

₹ 430/-

(₹) 03 ⁰⁰ =
172

✓ 2. 360 Nos - 5x : ? x : 9x

~~X~~ 3. 380

$$(5x \times 100) + (7x \times 50) + (9x \times 25) = 43000$$

$$500x + 350x + 225x = 43000$$

$$9x = 9 \times 60 \\ = 360$$

$$1075x = 43000, \frac{40}{220}$$

$$\frac{8600}{43000}$$

$$x = \frac{40}{1075}$$

$$x = 00.375$$

A bag contains 5 rupee, 2 rupee, 1 rupee and 50 paise coins in the proportion 1 : 2 : 3 : 4. If the total amount in the bag is ₹168, then how many 50 paise coins are there?

~~X~~ 1. 46

value

5 2 1 0.5

2.0

~~X~~ 2. 52

Number

$1x : 2x : 3x : \underline{4x} = 4x \times 12$

~~X~~ 3. 56

48 —

✓ 4. 48 ✓

5₹ 6₹ 3₹ 2₹

$$5x + 6x + 3x + 2x = 168$$

$$16x = 168$$

$$x = \frac{168}{16} \quad x = 12$$

In a bag, the ratio of the number of 2 rupee, 1 rupee and 50 paise coins is $3 : 4 : 5$. If the total amount in the bag is ₹250, then how many 1 rupee coins are there? Q3

- 1. 70 value
 - 2. 100
 - 3. 60 NO
 - 4. 80 ✓
 1. value

$$\begin{array}{r}
 200 \quad 100 \quad 50 \\
 \underline{3x} : \quad \underline{4x} : \quad 5x \\
 \hline
 600x + 400x + 250x = 25000 \\
 x = 20 \\
 4x = 4 \cdot 20 \\
 = 80
 \end{array}$$

$$100 \times = 100 \times 20$$

$$\begin{array}{rcl} 1250x & = & 2500 \\ & & \frac{100}{2500} \\ & & 125 \\ & & \underline{125} \\ & & 8 \end{array}$$

Kartik's father age is four times the age of Kartik. Three years ago, Kartik's father age was seven times the age of Kartik. The present age of Kartik is:

- 1. 12 years
- 2. 6 years
- 3. 9 years
- 4. 8 years

In a school there are 550 students. The ratio of the boys to that of the girls is 6 : 5. How many more girls should join the school so that the ratio becomes 5 : 6?

- 1. 25
- 2. 170
- 3. 50
- 4. 110

In a mixture of 100 litres of milk and water, the ratio of milk and water is 3 : 2. If this ratio is to be 1 : 1, how much more water is to be added to the mixture?

- 1. 25 litres
- 2. 15 litres
- 3. 30 litres
- 4. 20 litres

The ratio of ages of A and B, four years ago, was 7 : 5. The ratio of their ages, 6 years from now, will be 19 : 15. What is the ratio of the present ages of A and B?

- 1. 2 : 1
- 2. 5 : 2
- 3. 4 : 3