

Weight of Rounaq = 56.7 kg
He reduces his weight in the ratio 7 : 6
His new weight = $\frac{6}{7} \times 56.7 = 6 \times 8.1 = 48.6$ kg

Applications:

Example 1: Simplify the ratio $1/3 : 1/8 : 1/6$

Solution: L.C.M. of 3, 8 and 6 is 24.

$$1/3 : 1/8 : 1/6 = 1 \times 24/3 : 1 \times 24/8 : 1 \times 24/6 \\ = 8 : 3 : 4$$

Example 2: The ratio of the number of boys to the number of girls in a school of 720 students is 3 : 5. If 18 new girls are admitted in the school, find how many new boys may be admitted so that the ratio of the number of boys to the number of girls may change to 2 : 3.

Solution: The ratio of the number of boys to the number of girls = 3 : 5

Sum of the ratios

$$= 3 + 5 = 8$$

So, the number of boys in the school

$$= (3 \times 720)/8 = 270$$

And the number of girls in the school

$$= (5 \times 720)/8 = 450$$

Let the number of new boys admitted be x , then the number of boys become $(270 + x)$.

After admitting 18 new girls, the number of girls become $450 + 18 = 468$

According to given description of the problem, $(270 + x)/468 = 2/3$

$$\text{or, } 3(270 + x) = 2 \times 468$$

$$\text{or, } 810 + 3x = 936 \text{ or, } 3x = 126 \text{ or, } x = 42.$$

Hence the number of new boys admitted = 42.

5. If the ratio of two similar quantities can be expressed as the ratio of two integers and therefore, $\sqrt{3}$ and $\sqrt{2}$ are said to be commensurable; otherwise, they are said to be incommensurable. $\sqrt{3} : \sqrt{2}$ cannot be expressed as the ratio of two integers and therefore, $\sqrt{3}$ and $\sqrt{2}$ are incommensurable quantities.

6. Continued Ratio is the relation (or comparison) between the magnitudes of three or more quantities of the same kind. The continued ratio of three similar quantities a, b, c is written as a : b : c.

Applications:
Illustration 1: The continued ratio of ₹ 200, ₹ 400 and ₹ 600 is ₹ 200 : ₹ 400 : ₹ 600 = 1 : 2 : 3.

Example 1: The monthly incomes of two persons are in the ratio 4 : 5 and their monthly expenditures are in the ratio 7 : 9. If each saves ₹ 50 per month, find their monthly incomes.

Solution: Let the monthly incomes of two persons be ₹ 4x and ₹ 5x so that the ratio is ₹ 4x : ₹ 5x = 4 : 5. If each saves ₹ 50 per month, then the expenditures of two persons are ₹ (4x - 50) and ₹ (5x - 50).

$$\frac{4x - 50}{7} = \frac{5x - 50}{9} \text{ or } 36x - 450 = 35x - 350$$

$$\text{or, } 36x - 35x = 450 - 350, \text{ or, } x = 100$$

Hence, the monthly incomes of the two persons are ₹ 4 × 100 and ₹ 5 × 100 i.e. ₹ 400 and ₹ 500.

PYQ July 21

(13) A vessel contained a solution of acid and water in which water was 64%. Four liters of the solution were taken out of the vessel and the same quantity of water was added. If the resulting solution contains 30% acid, the quantity (in liters) of the solution, in the beginning in the vessel, was

- a. 12 b. 36
c. 24 d. 2

let volume of sol. at
the beginning is x litres

	Begin	less	add	End
acid	$0.36x$	(1.44)	0	$0.3x$
water	$0.64x$	(2.56)	4	$0.7x$
solution	x	(4)	(4)	x

$$0.36x - 1.44 = 0.3x$$

$$x = 24$$

$$0.64x - 2.56 + 4 = 0.7x$$

$$1.44 = 0.06x$$

$$x = 24$$

- (14) Incomes of R and S are in the ratio 7 : 9 and their expenditures are in the ratio 4 : 5. Their total expenditure is equal to income of R.

☆

What is the ratio of their savings?

- a. 23 : 36 b. 28 : 41
c. 31 : 43 d. 35 : 46

let income of R and S are $7x, 9x$
expend of R and S are $4y, 5y$

$$4y + 5y = 7x$$

$$9y = 7x$$

$$y = \frac{7}{9}x$$

savings of R

Income of R - exp of R

$$\frac{\text{savings of R}}{\text{savings of S}} = \frac{\text{Income of R} - \text{exp of R}}{\text{Income of S} - \text{exp of S}}$$

$$= \frac{7x - 4y}{9x - 5y} = \frac{7x - 4\left(\frac{7}{9}x\right)}{9x - 5\left(\frac{7}{9}x\right)}$$

$$= \frac{x \left[7 - \frac{28}{9} \right]}{x \left[9 - \frac{35}{9} \right]} = \frac{\frac{63 - 28}{9}}{\frac{81 - 35}{9}}$$

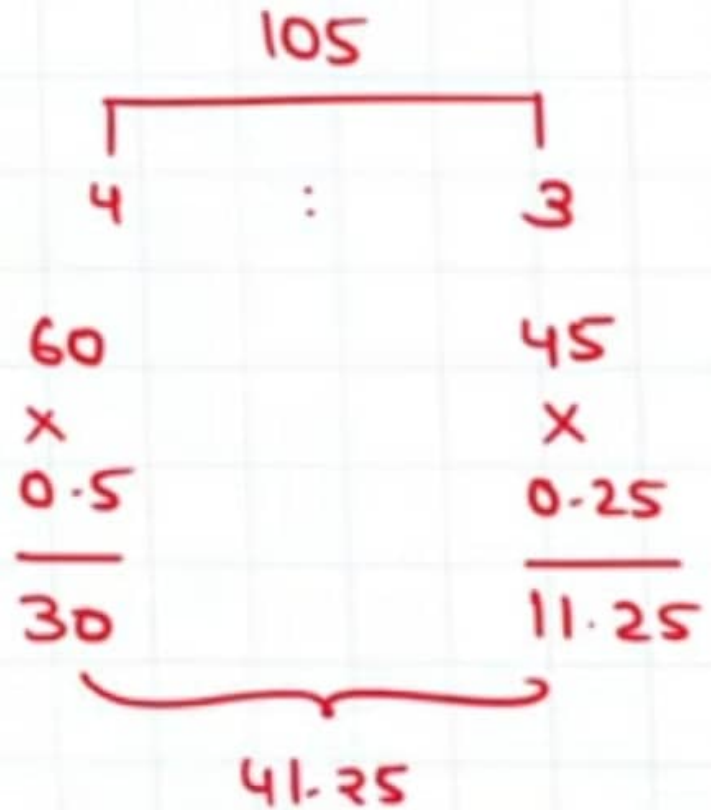
$$= \frac{35}{46} = 35:46$$



PYQ Dec. 21

(15) A bag contains 105 coins containing some 50 paise, and 25 paise coins. The ratio of the number of these coins is 4 : 3. The total value (in ₹) in the bag is

- a. 43.25 b. 41.25
c. 39.25 d. 35.25



PYQ Dec 22

- (19) A group of 400 soldiers posted at border area had a provision for 31 days. After 28 days 280 soldiers from this group were called back. Find the number of days for which the remaining ration will be sufficient?
- a. 3 b. 6
c. 8 d. 10

$$400 \text{ soldiers} \times 31 \text{ days} = 12400 \text{ units}$$

Used in 28 days

$$400 \text{ sold} \times 28 = 11200 \text{ units}$$

Balance = 1200 units

Bal soldiers = 120 soldiers
(400 - 280)

10 days

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$$\text{Bal soldiers} = 120 \text{ soldiers} \\ (400 - 280)$$

$$\frac{1200}{120} = 10 \text{ days}$$

MTP Nov 18

(2) For $p, q, r, s > 0$ the value of each ratio is

A $\frac{p}{q+r} = \frac{q}{r+s} = \frac{r}{s+p} = \frac{s}{p+q}$

☆

- a. $\frac{1}{2}$ b. $\frac{1}{3}$
c. $\frac{1}{4}$ d. 1

addendo

$$\frac{p}{q+r} = \frac{q}{r+s} = \frac{r}{s+p} = \frac{s}{p+q} = \frac{p+q+r+s}{2p+2q+2r+2s} = \frac{p+q+r+s}{2(p+q+r+s)} = \frac{1}{2}$$

MTP May 20

(10) The ratio of the prices of two houses was 16:23. Two years later when the price of the first has increased by 10% and that of the second by ₹ 477, the ratio of the prices becomes 11:20. Find the original prices of the two houses.

- a. ₹ 848, ₹ 1,219
- b. ₹ 838, ₹ 1,119
- c. ₹ 828, ₹ 1,219
- d. ₹ 848, ₹ 1,229

$$\frac{H_1}{H_2} = \frac{16x}{23x} = \frac{16 \times 53}{23 \times 53} = \frac{848}{1219}$$

$$\frac{(16x \times 1.1)}{23x + 477} = \frac{11}{20}$$

$$352x = 253x + 5247$$

$$99x = 5247$$

$$x = 53$$

MTP Nov 20

(13) A bag contains ₹187 in the form 1 rupee, 50 paise and 10 paise coins in the ratio 3:4:5.

☆ Find the number of each type of coins.

- a. 102, 136, 170
- b. 136, 102, 170
- c. 170, 102, 136
- d. None of these

$$(3x \times 1\text{ ₹}) + (4x \times 0.5\text{ ₹}) + (5x \times 0.1\text{ ₹}) = 187$$

$$5.5x = 187 \quad x = 34$$

$$\left. \begin{array}{l} 3x = 102 \\ 4x = 136 \\ 5x = 170 \end{array} \right\}$$

MTP Nov 20

(14) The ratio of the speed of the two trains is 2: 5.

C If the distances they travel are in the ratio 5:

☆ 9, find the ratio of times taken by them.

- a. 2:9 b. 18:25
c. 25:18 d. 10:45

$$\frac{D}{T} = S$$

$$T = \frac{D}{S}$$

$$T_1 = \frac{5y}{2x}$$

$$T_2 = \frac{9y}{5x}$$

2x, 5x

5y, 9y

$$\begin{aligned} \frac{T_1}{T_2} &= \frac{5y}{2x} \times \frac{5x}{9y} \\ &= \frac{25}{18} = 25:18 \end{aligned}$$

MTP June 22

(27) X, Y, Z together starts a business, if X invests 3 times as much as Y invests and Y invests two third of what Z invests, then the ratio of capitals of X, Y, Z is

- a. 3:9:2 b. 6:3:2
c. 3:6:2 d. 6:2:3

Note: Option given in MTP Ans key (b) is incorrect.

$$X = 3Y$$

$$Y = \frac{2}{3}Z$$

$$X:Y:Z$$

$$\frac{X}{Y} = \frac{3}{1} = \frac{6}{2}$$

$$\frac{Y}{Z} = \frac{2}{3}$$

$$\underline{\underline{6:2:3}}$$

PYQ May 18

(1) $\frac{2^n + 2^{n-1}}{2^{n+1} - 2^n}$
B
☆ a. $\frac{1}{2}$ b. $\frac{3}{2}$
c. $\frac{2}{3}$ d. $\frac{1}{3}$

$$\frac{2^n + \frac{2^n}{2}}{2^n \cdot 2 - 2^n} = \frac{2^n \left(1 + \frac{1}{2}\right)}{2^n (2-1)}$$



DD

PYQ Dec. 21

(16) In a department, the number of males and females are in the ratio 3 : 2. If 2 males and 5 females join the department, then the ratio becomes 1 : 1. Initially, the number of females in the department is

- a. 9 ✓ b. 6
c. 3 d. 8

$$\frac{3x+2}{2x+5} = \frac{1}{1}$$

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

$$x = 3$$

$$2x = 2(3) = 6$$



P D D D D

PYQ June 22

(17) A box contains 25 paise coins and '10' paise coins and 5 paise coins in ratios 3 : 2 : 1 and total money is ₹ 40. How many '5' paise coins are there?

- a. 65 b. 55
c. 40 d. 50

$$(3x \times 0.25) + (2x \times 0.1) + (x \times 0.05) = 40$$

$$1x = 40, \quad x = 40$$

no. of 5 p coins = $x = 40$ coins



D**MTP May 18**

- (1) P, Q and R three cities. The ratio of average temperature between P and Q is 11:12 and that between P and R is 9:8. The ratio between the average temperature Q and R
- a. 22:27 b. 27:22
c. 32:33 d. None of these

$$\frac{P}{Q} = \frac{11}{12}$$

$$\frac{P}{R} = \frac{9}{8}$$

$$\frac{P}{Q} = \frac{99}{108}$$

$$\frac{P}{R} = \frac{99}{88}$$

$$Q:R = \frac{108}{88} = \frac{27}{22} = 27:22$$



D

MTP Nov 19

(8) The ratio of the earnings of two persons 3:2. If each saves $\frac{1}{5}$ th of their earnings, the ratio of their saving

a. 2:3

b. 3:2

c. 4:5

d. 5:4

$$\text{saving} = \text{Earning} - \text{Exp}$$

$$\frac{E_1}{E_2} = \frac{3x}{2x}$$

$$\frac{S_1}{S_2} = \frac{\frac{3x}{5}}{\frac{2x}{5}} = \frac{3x}{2x} = 3:2$$



(9)

SPK

29. What is the value of $\left(\frac{x^b}{x^c}\right)^{(b+c-a)} * \left(\frac{x^c}{x^a}\right)^{(c+a-b)} * \left(\frac{x^a}{x^b}\right)^{(a+b-c)$?

(A) $x^{(a+b+c)}$

(B) x^{abc}

(C) -1

(D) 1

$x^{b^2+c^2+a^2+2bc+2ca+2ab}$
 $\frac{x^{b^2+c^2+a^2+2bc+2ca+2ab}}{x^{a^2+b^2+c^2+2ab+2bc+2ca}}$

30. A number consists of two digits. The digits in the ten's place is 3 times the digit in the unit's place. If 54 is subtracted from the number, then the digits are reversed. The number is :

(A) 62

(B) 39

(C) 93

(D) 31

$20^2 = 104$
 $104 = 3x$

31. A person purchased 2 apples and 5 bananas at the cost of ₹ 90. Later he visited to another shop where shopkeeper told him that if you give me ₹ 50 and one banana, I can give you 3 apples. He agreed to the deal. What is the cost of one apple and one banana ?

(A) (10, 15)

(B) (15, 10)

(C) (10, 20)

(D) (20, 10)

$2x + 5y = 90$
 $3x + y = 50$

 $13x = 160$

32. The ratio of income of A and B is 5 : 4 and their expenditure is 3 : 2. If at the end of year each saves ₹ 1,600, then the income of A is :

(A) ₹ 3,600

(B) ₹ 3,400

(C) ₹ 4,000

(D) ₹ 4,400

$2x + 5y = 90$
 $3x + y = 50$

33. The mean proportional between $12x^2$ and $27y^2$ is :

(A) $81xy$

(B) $18xy$

(C) $8xy$

(D) $19.5xy$

$Inc = 5 : 4$
 $Exp = 3 : 2$
 $5x - 3x = 160$

34. $\log_2 \log_2 \log_4 256 + 2 \log_{\sqrt{2}} 2$ is equal to :

(A) 3

(B) 2

(C) 5

(D) 7

SPK

