

1. Express the ratio 16 : 20 in the simplest form.

Ans. We write the given ratio as a fraction. i.e., $\frac{16}{20}$

Now, divide numerator and denominator of the fraction by 4

(Highest Common Factor of 16 and 20) $\frac{16 \div 4}{20 \div 4}$

$$= \frac{4}{5}$$

$$= 4 : 5$$

2. Convert $\frac{1}{6} : \frac{1}{8}$ into a whole number ratio.

Ans. $\frac{1}{6} : \frac{1}{8}$

$$= \frac{1}{6} \div \frac{1}{8}$$

$$= \frac{1}{6} \times \frac{8}{1}$$

$$= \frac{8}{6}$$

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

$$= 4 : 3$$

3. 1. Divide \$60 in the ratio 3 : 2.

Ans. The two parts are 3 and 2

The sum of the parts = $3 + 2 = 5$

Therefore, 1st part = $\frac{3}{5} \times 60 = \36

2nd part = $\frac{2}{5} \times 60 = \24 .

4. Divide 94 columns among A, B and C in the ratio $\frac{1}{3} : \frac{1}{4} : \frac{1}{5}$.

Ans. The least common multiple of 3, 4, 5 is 60.

Therefore, $\frac{1}{3} : \frac{1}{4} : \frac{1}{5}$

$$= \frac{1}{3} \times 60 : \frac{1}{4} \times 60 : \frac{1}{5} \times 60 = 20 : 15 : 12$$

So, the total part = $20 + 15 + 12 = 47$

$$\text{Therefore, 1}^{\text{st}} \text{ part} = \frac{20}{47} \times 94 = 40$$

$$2^{\text{nd}} \text{ part} = \frac{15}{47} \times 94 = 30$$

$$3^{\text{rd}} \text{ part} = \frac{12}{47} \times 94 = 24$$

5. If $a : b = 7 : 12$ and $b : c = \frac{3}{14}$ find $\frac{a}{c}$.

Ans. $\frac{a}{b} = \frac{7}{12}$ (1)

$$\frac{b}{c} = \frac{3}{14}$$
 (2)

Multiplying (1) and (2) we get;

$$\begin{aligned} \frac{a}{b} \times \frac{b}{c} &= \frac{7}{12} \times \frac{3}{14} \\ &= \frac{1}{8} \end{aligned}$$

Therefore, $\frac{a}{c} = \frac{1}{8}$

or, $a : c = 1 : 8$

6. If $a : b = 3 : 5$ and $b : c = 6 : 7$, find $a : b : c$.

Ans. We have,

$$a : b = 3 : 5$$

$$\text{i.e., } a : b = \frac{3}{5} : 1$$

$$\text{Also, } b : c = 6 : 7$$

$$\text{i.e., } b : c = 1 : \frac{7}{6}$$

Therefore, $a : b : c$

$$= \frac{3}{5} : 1 : \frac{7}{6}$$

Taking the L. C. M. of 5 and 6, we get 30

Therefore, $a : b : c$

$$= \frac{3}{5} \times 30 : 1 \times 30 : \frac{7}{6} \times 30$$

$$= 18 : 30 : 35$$

7. A certain amount is divided into 2 parts in the ratio 2 : 3. If the first part is 210, find the total amount.

Ans.

The sum of the parts = 2 + 3 = 5

When first part is 2, then total parts are 5.

When first part is 1, then total parts are $\frac{5}{2}$

When first part is 210, then total parts are $\frac{5}{2} \times 210 = 525$

8. Divide \$105 into three parts such that the first part is $\frac{4}{5}$ of the second and the ratios between the second and third part is 5 : 6.

Ans. Let the ratio of the three parts be a : b : c

$$a = \frac{4}{5} \times b$$

$$\text{Therefore, } \frac{a}{b} = \frac{4}{5}$$

$$\text{i.e., } a : b = \frac{4}{5} : 1$$

$$\text{Again, } \frac{b}{c} = \frac{5}{6}$$

$$\text{Therefore, } \frac{b}{c} = \frac{1}{\frac{6}{5}}$$

$$\text{i.e., } b : c = 1 : \frac{6}{5}$$

$$\text{Therefore, } a : b : c = \frac{4}{5} : 1 : \frac{6}{5}$$

The L. C. M of the denomination is 5

Therefore, a : b : c

$$= \frac{4}{5} \times 5 : 1 \times 5 : \frac{6}{5} \times 5$$

$$= 4 : 5 : 6$$

Now, total number of parts = 4 + 5 + 6 = 15

$$\text{Therefore, first part} = \frac{4}{15} \times 105 = 28$$

$$\text{Therefore, second part} = \frac{5}{15} \times 105 = 35$$

$$\text{Therefore, third part} = \frac{6}{15} \times 105 = 42$$

9. Two numbers are in the ratio 1 : 4. Their difference is 30. Find the numbers.

Ans. Let the common ratio be x. So, the smaller number is 1x.

And the greater number is 4x.

Their difference is 30.

$$\text{i.e., } 4x - x = 30$$

$$3x = 30$$

$$x = \frac{30}{3}$$

$$x = 10$$

$$\text{Therefore, } 1x = 1 \times 10 = 10$$

$$4x = 4 \times 10 = 40$$

Therefore, the two numbers are 10 and 40.

10. The ratio of number of boys and girls in a class is 9 : 5. If the number of boys is 27, find the number of girls.

Ans. $\frac{\text{No. of boys}}{\text{No. of girls}} = \frac{9}{5}$

$$\text{Then, } \frac{27}{\text{No. of girls}} = \frac{9}{5}$$

$$\text{Therefore, No. of girls} = \frac{27 \times 5}{9}$$

The number of girls in the class is 15.

11. Determine if 8, 10, 12, 15 are in proportion.

Ans. Product of extreme terms = $8 \times 15 = 120$

$$\text{Product of mean terms} = 10 \times 12 = 120$$

Since, the product of means = product of extremes.

Therefore, 8, 10, 12, 15 are in proportion.

12. Check if 6, 12, 24 are in proportion.

Ans. Product of first and third terms = $6 \times 24 = 144$

$$\text{Square of the middle terms} = (12)^2 = 12 \times 12 = 144$$

$$\text{Thus, } 12^2 = 6 \times 24$$

So, 6, 12, 24 are in proportion and 12 is called the mean proportional between 6 and 24.

13. Find the fourth Proportional to 12, 18, 20.

Ans. Let the fourth proportional to 12, 18, 20 be x.

Then, $12 : 18 :: 20 : x$

$\Rightarrow 12 \times x = 20 \times 18$ (Product of Extremes = Product of means)

$$\Rightarrow x = \frac{20 \times 18}{12}$$

$$\Rightarrow x = 30$$

Hence, the fourth proportional to 12, 18, 20 is 30.

14. Find the third proportional to 15 and 30.

Ans. Let the third proportional to 15 and 30 be x .

Then, $30 \times 30 = 15 \times x$ [$b^2 = ac$]

$$\Rightarrow x = \frac{30 \times 30}{15}$$

$$\Rightarrow x = 60$$

Therefore, the third proportional to 15 and 30 is 60.

15. The ratio of income to expenditure is 8 : 7. Find the savings if the expenditure is \$21,000.

Ans. $\frac{\text{Income}}{\text{Expenditure}} = \frac{8}{7}$

$$\text{Therefore, income} = \$ \frac{8 \times 21000}{7} = \$24,000$$

$$\begin{aligned} \text{Therefore, Savings} &= \text{Income} - \text{Expenditure} \\ &= \$(24000 - 21000) = 3000. \end{aligned}$$

16. Find the mean proportional between 4 and 9.

Ans. Let the mean proportional between 4 and 9 be x .

Then, $x \times x = 4 \times 9$

$$\Rightarrow x^2 = 36$$

$$\Rightarrow x = \sqrt{36}$$

$$\Rightarrow x = 6 \times 6$$

$$\Rightarrow x = 6$$

Therefore, the mean proportional between 4 and 9 is 6.

17. Compare $3\frac{1}{2} : 1\frac{2}{5}$.

Ans. $3\frac{1}{2} : 1\frac{2}{5}$

$$= \frac{7}{2} : \frac{7}{5}$$

Convert them into equivalent ratios.

$$\frac{7}{2} \text{ and } \frac{7}{5}$$

$$= \frac{7 \times 5}{2 \times 5} \text{ and } \frac{7 \times 2}{2 \times 2}$$

$$= \frac{35}{10} \text{ and } = \frac{14}{10}$$

$$\text{Now, we have } \frac{35}{10} > \frac{14}{10}$$

$$\text{Therefore, } \frac{35}{10} > \frac{14}{10}$$

$$\text{So, } 3\frac{1}{2} > 1\frac{2}{5}$$

$$\text{i.e., } 7 : 2 > 7 : 5.$$