

GIRLS' HIGH SCHOOL AND COLLEGE, PRAYAGRAJ

WORKSHEET -6

SESSION 2020 -2021

CLASS 7(A, B, C, D, E & F)

SUBJECT -MATHS

Note: Parents please ensure that the student takes the reference of the chapter from the link mentioned below.

<https://www.ncertbooks.guru/selina-concise-mathematics-class-7-icse-solutions-chapter-6/>

CHAPTER: RATIO & PROPORTION

TOPIC 1: RATIO

A. STUDY MATERIAL

DEFINITION: A ratio is a relationship between two quantities of the same kind with same unit and is obtained on dividing first quantity by the second. The symbol for ratio is “:” and it is put in between the two quantities to be compared. Thus, the ratio between 15 kg and 20 kg = 15kg : 20 kg = $\frac{15}{20} = \frac{3}{4} = 3 : 4$.

Remember the following

- The two quantities must be of the same kind.
Thus, there can be a ratio between Rs.50 and Rs.80, but there can be no ratio between Rs.50 and 80 kg.
- The ratio between 3 and 4 is written as 3 :4 (read as 3 is to 4) or $\frac{3}{4}$.
- In the ratio 3 : 4, the first term (i.e., 3) is called **antecedent** and the second term (i.e., 4) is called **consequent**. In a ratio antecedent and consequent are co- prime.
- A ratio is a pure number.
- In order to find the ratio between two quantities, both the quantities must be in the same unit, e.g., ratio between 30 cm and 2 metre
$$\begin{aligned} &= 30 \text{ cm} : 200 \text{ cm} && [\text{As , 2 metre} = 200\text{cm}] \\ &= \frac{30}{200} = \frac{3}{20} \\ &= 3 : 20 \end{aligned}$$
- A ratio must always be expressed in its lowest terms in simplest form.
A ratio is said to be in simplest form, if both its terms (antecedent and consequent) are coprime i.e., their H.C.F. is 1.
e.g. 1. The ratio 4 : 5 is in simplest form as H.C.F. of 4 and 5 = 1.
e.g. 2. The ratio 6:8 is not in simplest form as H.C.F. of 6 and 8 is 2 not 1.

When the given ratio is not in simplest form, divide it's each term by their HCF
Because H.C.F. of 6 and 8 is 2.

Therefore, 6:8 in the simplest form = $\frac{6 \div 2}{8 \div 2} = \frac{3}{4} = 3 : 4$.

- A ratio has no unit because it is simply a number.

a. To convert a fractional ratio into a whole number ratio

Example 1

Convert the ratio $1/3: 1/4$ into simplest form

Solution

$$\begin{aligned} 1/3: 1/4 &= 1/3 \times 4/1 && \text{[Dividing 1}^{\text{st}} \text{ quantity by the 2}^{\text{nd}}] \\ &= 4/3 = 4:3 && \text{Ans} \end{aligned}$$

b. To divide a given quantity into given ratio

Example 2

20 sweets are distributed between A and B in the ratio 2: 3. How many does each get?

Solution:

A and B gets sweets in the ratio 2: 3 => If A gets 2 parts, then B gets 3 parts.

In other words, if we make $(2+3) = 5$ equal parts, then A should get 2 parts out of these 5 equal parts.

$$\Rightarrow \text{A gets} = 2/5 \text{ of the total number of sweets} = 2/5 \text{ of } 20 = 2/5 \times 20 = 8 \text{ sweets.}$$

Similarly, B gets 3 parts out of 5 equal parts.

$$\Rightarrow \text{B gets} = 3/5 \text{ of the total.}$$

$$\text{number of sweets} = 3/5 \text{ of } 20 = 3/5 \times 20 = 12 \text{ sweets.}$$

Thus, A gets 8 sweets and B gets 12 sweets. **Ans.**

Example 3

The ratio between two numbers is 4: 5. If their L.C.M. is 180, find the numbers.

Solution:

Let the numbers be $4X$ and $5X$

L.C.M. of $4X$ and $5X = 4 \times 5 \times X$

$$= 20 X$$

Given L.C.M.=180

$$20 X = 180 \quad \text{and } X = 180 / 20 = 9$$

Required numbers = $4X$ and $5X$

$$= 4 \times 9 \text{ and } 5 \times 9$$

$$= 36 \text{ and } 45 \quad \text{Ans .}$$

Example: 4

The ratio between two numbers is 3: 4. If their H.C.F. is 15, find the numbers.

Solution:

Let the two numbers be $3X$ and $4X$

H.C.F. of $3X$ and $4X$ = Largest number common to $3X$ and $4X$
= X

Given H.C.F. = 15 $\Rightarrow X = 15$

Required numbers = $3X$ and $4X$

= 3×15 and 4×15

= 45 and 60 **Ans**

QUESTIONS:**Solve the following sums:**

1. Express each of the given ratios in its simplest form:

a) 22: 66

b) $6\frac{1}{4}$: $12\frac{1}{2}$

c) 3 hours: 1 day

d) 200 m: 5 km

e) $1\frac{1}{3}$: $2\frac{1}{4}$: $2\frac{1}{2}$

f) 40 kg: 1 quintal

2. Divide 64 cm long string into two parts in the ratio 5 :3.

3. The sum of three numbers, whose ratios are $3\frac{1}{3}$: $4\frac{1}{5}$: $6\frac{1}{8}$ is 4917. Find the numbers.

4. The angles of a triangle are in the ratio 3: 2: 7. Find each angle.

5. Two numbers are in the ratio 4: 7. If their L.C.M. is 168, find the numbers.

6. The ratio between two numbers is 5: 9. Find the numbers, if their H.C.F. is 16.

7. Divide Rs. 260 among A, B and C in the ratio $\frac{1}{2}$: $\frac{1}{3}$: $\frac{1}{4}$

8. Ten gm of an alloy of metals A and B contains 7.5 gm of metal A and the rest is metal B find the ratio between the weights of metals A and B in the alloy.

9. Which ratio is larger in the following pair: 9: 20; 8: 13.

10. The ratio of boys and girls in a school is 8: 3. If the total number of girls be 375, find the number of boys in the school.

11. The ages of the two boys A and B are 6 years 8 months and 7 years 4 months respectively. Divide Rs. 3,150 in the ratio of their ages.

12. The ratio between the prices of a scooter and a refrigerator is 4: 1. If the scooter cost Rs.45000 more than the refrigerator, find the price of the refrigerator.

TOPIC 2: PROPORTION

A. Study Material

When four quantities are so related that the ratio between the first and the second quantities is equal to the ratio between the third and the fourth quantities , the quantities are said to be in proportion . Thus , proportion is equality of two ratio .

In order to represent a proportion , either put the sign of equality (=) between the two ratio or put a double colon (: :) .

Consider four quantities (number) 15 ,20 ,9 and 12 .

The ratio between the first and the second quantities is $15 : 20 = 15 / 20 = \frac{3}{4} = 3 : 4$.Whereas , the ratio between the third and the fourth quantities is $9 : 12 = 9 / 12 = \frac{3}{4} = 3 : 4$. Since , the ratio between the first and the second quantities is same as the ratio between the third and the fourth quantities , we say the four quantities 15 , 20 , 9 , and 12 are in proportion and we write : $15 : 20 = 9 : 12$ or $15 : 20 : : 9 : 12$.

Remember the following :

(1) Each quantities in a proportion is called its **term** or its **proportional** .

(2) In a proportion , the **first** and the **last terms** are called the **extremes** , whereas the **second** and the **third terms** are called the **means** .

(3) For every proportion , **the product of the extremes is always equal to the product of the means**.

E .g . , In proportion $15 : 20 : : 9 : 12$; product of extremes = $15 \times 12 = 180$

and , product of means = $20 \times 9 = 180$.

(4) The **fourth term** of a proportion is called **fourth proportional** .

Example 5

Find the fourth proportional of 3, 4 and 18.

Solution:

Let the 4th proportional be X = 3, 4, 18 and X are in proportion

$$3 : 4 = 18 : X$$

$$3 \times X = 4 \times 18 \quad \text{Product of extremes} = \text{Products of means}$$

$$X = \frac{72}{3} = 24 \quad \text{Ans.}$$

CONTINUED PROPORTION

Three quantities are said to be in continued proportion, if the ratio between the first and the second quantities is equal to the ratio between the second and the third quantities.

i. e., a, b and c are in continued proportion, if $a : b = b : c$.

The **second quantities** are called the **mean proportional** between the first and the third.

i. e., in $a : b = b : c$, b is the mean proportional between a and c.

When b is mean proportion between a and c .

\Rightarrow a, b and c are in continued proportion

$\Rightarrow a : b = b : c$

$\Rightarrow \frac{a}{b} = \frac{b}{c}$ i. e. $b \times b = a \times c \Rightarrow b^2 = ac$ and $b = \sqrt{ac}$

Thus, mean proportion between 2 and 8

$$= \sqrt{2 \times 8} = \sqrt{16} = 4$$

The **third quantity** is called **third proportional** to the first and the second.

i.e., in $a : b = b : c$, c is the proportional to a and b.

Example 6:

(1) Find the mean proportion between 4 and 9.

(2) Find the third proportional to 12 and 30.

Solution:

(1) Let the mean proportion be X \Rightarrow 4, X and 9 are in continued proportion.

$$4 : X = X : 9$$

$$\Rightarrow X \times X = 4 \times 9$$

$$\Rightarrow X^2 = 36$$

$$\Rightarrow X = 6 \quad \text{Ans.}$$

(2) Let X be the third proportional \Rightarrow 12, 30 and X are in continued proportion

$$12 : 30 = 30 : X$$

$$\Rightarrow 12 \times X = 30 \times 30$$

$$\Rightarrow X = 900 / 12 = 75$$

$$\Rightarrow X = 75 \quad \text{Ans.}$$

Example 7:

If $a : b = 4 : 5$ and $b : c = 6 : 7$, find a : c.

Solution:

$$\text{Since, } a : b = 4 : 5 \Rightarrow a/b = 4/5$$

$$b : c = 6 : 7 \Rightarrow b/c = 6/7$$

$$a/b \times b/c = 4/5 \times 6/7$$

$$\Rightarrow a/c = 24/35$$

$$\Rightarrow a : c = 24 : 35 \quad \text{Ans.}$$

Example 8:

If $a : b = 4 : 5$ and $b : c = 6 : 7$, find $a : b : c$.

Solution:

$$a : b = 4 : 5 = \frac{4}{5} : \frac{5}{5} \text{ or } \frac{4}{5} : 1 \quad [\text{Dividing each term by } 5]$$

$$b : c = \frac{6}{6} : \frac{7}{6} \text{ or } 6 : 7 = 1 : \frac{7}{6} \quad [\text{Dividing each term by } 6]$$

In both the given ratios, the quantity b is common, so we have made the value of b same i.e., one (1)

$$\begin{aligned} \text{Clearly, } a : b : c &= \frac{4}{5} : 1 : \frac{7}{6} = \frac{4}{5} \times 30 : 1 \times 30 : \frac{7}{6} \times 30 \quad [\text{L.C.M. of } 5 \text{ and } 6 = 30] \\ &= 24 : 30 : 35 \quad \text{Ans.} \end{aligned}$$

QUESTIONS:

SOLVE THE FOLLOWING SUMS

1. Check whether the following quantities form a proportion or not:

- a) $3X, 7X, 24$ and 56
- b) $1 \frac{1}{2}, 3 \frac{1}{4}, 4 \frac{1}{2}$ and $9 \frac{3}{4}$
- c) $2 \frac{1}{2}, 5 \frac{1}{2}, 3.0$ and 6.0

2. Find the fourth proportional of:

- a) $3, 12$ and 4
- b) $2.1, 1.5$ and 8.4
- c) 4 hours 40 minutes, 1 hour 10 minutes and 16 hours

3. Find the third proportional of:

- a) 27 and 9
- b) $2\text{m } 40\text{ cm}$ and 40 cm
- c) $1/7$ and $3/14$

4. Find the mean proportional between:
- a) 16 and 4
 - b) 0.9 and 2.5
 - c) $\frac{1}{4}$ and $\frac{1}{16}$
5. a) If $A : B = 3 : 5$ and $B : C = 4 : 7$, find $A : B : C$.
- a) If $m : n = 4 : 9$ and $n : s = 3 : 7$, find $m : s$.
 - b) If $a : b = 1.5 : 3.5$ and $b : c = 5 : 6$, find $a : c$.
6. If $x : y = 5 : 4$ and $2 : x = 3 : 8$, find the value of y .
7. Show that 2, 12 and 72 are in continued proportion.
8. Are the numbers 2, 4, 8 in continued proportion
9. Find X such that: $X : 14 = 18 : 63$
10. Find X when: X, 8, 24 are in continued proportion

The End