_**Instructions to Students:**_  The notes provided must be copied to the math's copy & then do the Homework in the same copy.

Suppose that the weight of 150 liter's & 100 liter's of kerosene are 135 kg & 90 kg respectively. Then ;

Ratio of volumes = 150 : 100 = 3 : 2

Ratio of weights = 135 : 90 = 3 : 2

Thus, 150 : 100 = 135 : 90

Such an equality of two ratios is called a proportion

And, we write, 150 : 100 : : 135 : 90, where : : stands for 'is as'.

Thus we define a proportion as under :

_Proportion_ : Four quantities a, b, c, d are said to be in proportion if a : b = c : d & we write it as a : b : : c : d.

We read it as (A is to B) as (C : D).

Here a, b, c, d are respectively known $1^{st}$ , $2^{nd}$ , $3^{rd}$ , $4^{th}$ terms of the proportion.

In a proportion, we call the;

i)     $1^{st}$ & $4^{th}$ terms as extreme terms or extremes.
ii)    $2^{nd}$ & $3^{rd}$ terms as middle terms or means.

## An Important Result

In a proportion, we have;

Product of extremes = product of means.

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

$\Longrightarrow$ $\frac{a}{b}$ = $\frac{c}{d}$ $\Longrightarrow$ ad = bc    {Rules of cross multiplication}

So whenever ad = bc, then a, b, c, d are in proportion

And, if ad ≠ bc, then a, b, c, d are not in proportion .

## Solved Examples

➢ Check whether the ratio 51 : 68 & 85 : 102 from a proportion or not .

*Solution* : we consider each of the given ratio in simplest form;

| Consider 51 : 68 | 51) 68 (1 |
| --- | --- |
| | 51 |

HCF of 51 & 68 is 17

17 ) 51 ( 3

Ω  51 : 68 = $\frac{51}{68}$ = $\frac{51 \div 17}{68 \div 17}$ = $\frac{3}{4}$ = 3 : 4

51

X

Again, considering   85 : 102

HCF of 85 & 102 is 17

85) 102 (1

85 : 102 = $\frac{85}{102}$ = $\frac{85 \div 17}{102 \div 17}$ = $\frac{5}{6}$ = 5 : 6

85

17) 85 (5

Thus , 51 : 68  ≠ 85 : 102.

85

Hence, 51 : 68 & 85 : 102 do not form a proportion.

X

➢ Show that the number 16, 28, 4, 7 form a proportion

*Solution :*  The given terms are 16, 28, 4, 7

Product of extremes = 16 × 7 = 112

Product of means =     28 × 4 = 112

Ω Product of extremes = product of means

Hence 16, 28, 4, 7 are in proportion .

➢ If 51 : 85 : : 57 : X , find the value of X.

Solution :  In proportion we have ;

Product of extremes = Product of means

Ω 51 × X = 85 × 57

$\Longrightarrow$ X = $\dfrac{85 \times 57}{51}$ = 95

Hence, X = 95

➢ The 1st , 3rd , & 4th terms of proportion are 18, 27 & 36 respectively. Find the 2nd term.

Solution:  Let the 2nd term of proportion be X. Then ,

18 : X : : 27 : 36

Now product off means = product of extremes

Ω $\chi \times 27 = 18 \times 36$ $\Longrightarrow$ $\chi = \dfrac{18 \times 36}{27}$ = 24

Hence , the 2nd term of the given proportion is 24

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# Home Work
# Exercise  $\longrightarrow$  8 . 2 { Question No. 1, 3, 5 }