Ratios and Proportions

Ratios

- Ratio is a comparison of two numbers.
- Ratios can be written in several ways.

→ as a fraction

→ using the word “to” (or)

→ a semi colon [:] .

For Example : Express the ratio of yellow stars to blue stars in the 3 ways

* as a fraction → 4/7
* using the word “to” → 4 to 7
* using a semi colon → 4:7

- Ratios are not just comparing two numbers.
- We should see that, the two numbers have same units.
- Only if they possess same units, then ratios can be found.

For example :

(i) The ratio of 16 ounces to 9 ounces

16 : 9

(ii) The ratio of 1 foot and 17 inches

1 foot = 12 inches

Therefore, the ratio should be expressed between 12inches and 17inches.

12:17

Note : Order is important for the ratios.

For Example : 13:16 is not equal to 16:13

If we need to find the ratio between 3feet to 2feet, then the ratio is 3:2 and not 2:3.

Equivalent Ratio

- Equivalent Ratio can be obtained by multiplying the terms of the ratio by the same number.

For example : Find the equivalent ratio for 5/6

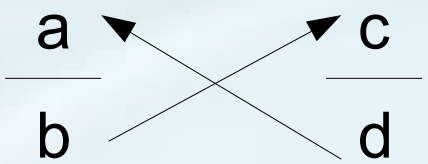
Multiply the terms of the ratio by 2 , 3 , 4 .....

we will get 10/12, 15/18, 20/24, ...

Therefore, the equivalent ratios for 5/6 are 10/12 , 15/18, 20/24 , ...

Comparison Ratios

Two ratios a/b and c/d can be compared using the method of cross multiplication.



If ad = bc , then ratios are equal.

If ad > bc , then a/b > c/d

If ad < bc , then a/b < c/d

→ **Example :** In test 1, Tom gets 19 correct out of 25 questions. In test 2, he gets 11 correct out of 15 questions. Find which score is better?

Solution : Test 1 = 19/25

Test 2 = 11/15

Compare the ratios : $\frac{19}{25} \quad \frac{11}{15}$

= 285 > 275

Therefore 19/25 > 11/15

Hence, Test 1 is better than Test 2.

Examples

1) A score of 72 points was shared by 3 players in a basket ball team , in the ratio 1:2:3. How many points did each player score?

Given : Scores are in the ratio 1:2:3

The sum of ratios will be 6

Total scores = 72 points.

Solution : Score of first player = 72 x 1/6 = **12points**

Score of second player = 72 x 2/6 = **24points**

Score of third player = 72 x 3/6 = **36 points.**

2)The ratio of Johny's age to his mother's age is 1:3. If his mother's age is 33, then how old is Johny.

Given : Johny's age : His mother's age = 1:3

Mother's age = 33 years

Note : In this question, we are not considering the total ratio, because, we do not know, the total age of Johny and his mother.

Solution :

Johny's age = [Mother's age x (his ratio / Mother's ratio)]

Johny's age = 33 x 1/3 = **11 years.**

Proportions

- Proportion is an equation stating that two ratios are equal.
- For finding the equality, we should compare the ratios .
- Proportion can be expressed in 2 ways.

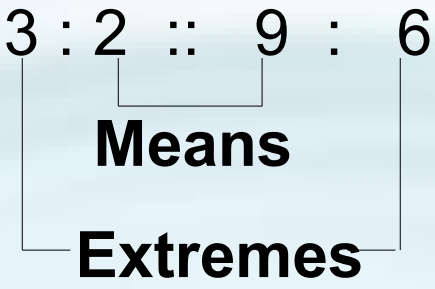
→ by fraction

→ ratio notation

- **If 3:2 equal to 9:6, it can be expressed as**

* fraction → 3/2 = 9/6

* ratio notation → 3:2 :: 9:6



Two ratios are said to be in proportion, only if

product of extremes = product of means

In the above ratio, product of extremes =3 x 6 = 18 and

product of means = 2 x 9 = 18

Therefore, 3:2 :: 9:6 is said to be a proportion.

Note : If only three numbers in the proportion are known, then we can find the fourth number by using

product of extremes = product of means.

Let us consider the same example

The ratio of Johny's age to his mother's age is 1:3. If his mother's age is 33, then how old is Johny.

Given : Ratio of Johny's age : Ratio of his mother's age = 1 : 3

His mother's age = 33

To Find : Johny's age.

Solution : This can be written as

Johny's age : 33 :: 1 : 3

Means

Extremes

product of extremes= product of means

John's age x 3 = 33 x 1

Therefore John's age = **11 years**.

Quiz

Send you solutions to support@greedge.com

1) If in your class, there are 34 girls and 43 boys, then express the ratio between boys and girls ?

2) What value of n will make this a proportion , 6 / 15 = n / 25

3)

Column A	Column B
2 inches to 4 inches	2 foot to 72 inches

4) A score of 72 points was shared by 3 players in a basket ball team in the ratio 2:3:4. How many more points did the highest scorer score compared to the lowest scorer?

5) 4 cups of tea contains milk and water in the ratio 3 : 1.How much of milk is used to prepare 4 cups of tea?

6) Find 3 equivalent ratios for 1/5 ?

7) Find whether the ratios are equal , 4/5 = 5/6

8)Angles of the triangle are in the ratio 3:4:5. Find the angles?

9) Two cars consume petrol in the ratio 4:5. If both the cars covers the same distance and the second car consumes 25 liters. Find how much petrol the first car uses?

10)

Column A	Column B
45/55	42/56