BAL BHARATI PUBLIC SCHOOL, PITAMPURA
SUBJECT: - MATHEMATICS
CLASS: - VI

WEEK: 18th Jan.'21 to 22th Jan. '21

NO. OF BLOCKS :3

CHAPTER- : RATIO AND PROPORTION

GUIDELINES

Dear Students

Kindly refer to the following notes/video links for the Chapter-12 "RATIO AND PROPORTION" PART -1 and thereafter do the questions in your Mathematics notebook.

NOTE- Students can download the NCERT textbook using the following link: -

http://ncert.nic.in/textbook/textbook.htm?hemh1=0-16

Subtopics:

1) Ratio
2) Proportion

Learning Outcomes :

Each student will be able to-

(i)   Compare two quantities of same kind by division.
(ii)   Understand that in certain situations, comparison by division makes better sense than comparison by taking the difference.
(iii)   Two quantities can be compared only if they are in the same unit.
(iv)   Two ratios can be compared and if equivalent then they are in proportion.

Teaching Aids used :

E-lesson

Whiteboard or register using Device Camera

YouTube videos

Khan Academy link.

LESSON DEVELOPMENT

SUBTOPIC 1

In our daily life, many a times we compare two quantities of the same type.

For example, if height of Rahim is 150 cm and that of Avnee is 140 cm then, we may say that the height of Rahim is 150 cm – 140 cm = 10 cm more than Avnee. This is one way of comparison by taking difference.

If we wish to compare the lengths of an ant and a grasshopper, taking the difference does not express the comparison. The grasshopper's length, typically 4 cm to 5 cm is too long as compared to the ant's length which is a few mm.

Consider another example. Cost of a car is ` 2,50,000 and that of a motorbike is ` 50,000. If we calculate the difference between the costs, it is ` 2,00,000 and if we compare by division;

$$\text{i.e.} \quad \frac{2,50,000}{50,000} = \frac{5}{1}$$

We can say that the cost of the car is five times the cost of the motorbike. Thus, in certain situations, comparison by division makes better sense than comparison by taking the difference. The comparison by division is the Ratio

In the above examples, we compared the two quantities in terms of 'how many times'. This comparison is known as the Ratio. We denote ratio using symbol ':'

The ratio of father's weight to Isha's weight = $\frac{75}{25} = \frac{3}{1} = 3:1$

The ratio of the cost of a pen to the cost of a pencil = $\frac{10}{2} = \frac{5}{1} = 5:1$

DAILY LIFE APPLICATION

The idea of ratio is widely used in our daily life.:

- Length of a room is 30 m and its breadth is 20 m. So, the ratio of length of the room to the breadth of the room = $\frac{30}{20} = \frac{3}{2} = 3:2$

- There are 24 girls and 16 boys going for a picnic. Ratio of the number of girls to the number of boys = $\frac{24}{16} = \frac{3}{2} = 3:2$

  The ratio in both the examples is 3 : 2.

Example 1 : Length and breadth of a rectangular field are 50 m and 15 m respectively. Find the ratio of the length to the breadth of the field.

Solution : Length of the rectangular field = 50 m

Breadth of the rectangular field = 15 m

The ratio of the length to the breadth is 50 : 15

The ratio can be written as $\dfrac{50}{15} = \dfrac{50}{15}\dfrac{5}{5} = \dfrac{10}{3} = 10 : 3$

==Two quantities can be compared only if they are in the same unit.==

Example 2 : Find the ratio of 90 cm to 1.5 m.

Solution : The two quantities are not in the same units. Therefore, we have to convert them into same units.

1.5 m = 1.5 × 100 cm = 150 cm.

Therefore, the required ratio is 90 : 150.

$= \dfrac{90}{150} = \dfrac{90}{150}\dfrac{30}{30} = \dfrac{3}{5}$

Required ratio is 3 : 5.

Example 3 : There are 45 persons working in an office. If the number of females is 25 and the remaining are males, find the ratio of:
 (a) The number of females to number of males.
 (b) The number of males to number of females.

Solution : Number of females = 25

Total number of workers = 45

Number of males = 45 − 25 = 20

Therefore, the ratio of number of females to the number of males
$$= 25 : 20 = 5 : 4$$

And the ratio of number of males to the number of females
$$= 20 : 25 = 4 : 5.$$

(There is a difference between the two ratios 5:4 and 4:5)

A ratio may be treated as a fraction, thus the ratio 10 : 3 may be treated as $\dfrac{10}{3}$.

Two ratios are equivalent, if the fractions corresponding to them are equivalent. Thus, 3 : 2 is equivalent to 6 : 4 or 12 : 8.

A ratio can be expressed in its lowest form. For example, ratio 50 : 15 is treated as $\dfrac{50}{15}$;

in its lowest form $\dfrac{50}{15} = \dfrac{10}{3}$. Hence, the lowest form of the ratio 50 : 15 is 10 : 3.

EXERCISE 12.1 : Q 2 ,3, 7, 8 ,11

2. Out of 30 students in a class, 6 like football, 12 like cricket and remaining like tennis. Find the ratio of

   (a) Number of students liking football to number of students liking tennis.

   (b) Number of students liking cricket to total number of students.

3. See the figure and find the ratio of

   (a) Number of triangles to the number of circles inside the rectangle.

   (b) Number of squares to all the figures inside the rectangle.

   (c) Number of circles to all the figures inside the rectangle.

7. Find the ratio of the following:

   (a) 30 minutes to 1.5 hours   (b) 40 cm to 1.5 m

   (c) 55 paise to ₹ 1   (d) 500 ml to 2 litres

8. In a year, Seema earns ₹ 1,50,000 and saves ₹ 50,000. Find the ratio of

   (a) Money that Seema earns to the money she saves.

   (b) Money that she saves to the money she spends.

11. Out of 1800 students in a school, 750 opted basketball, 800 opted cricket and remaining opted table tennis. If a student can opt only one game, find the ratio of

   (a) Number of students who opted basketball to the number of students who opted table tennis.

   (b) Number of students who opted cricket to the number of students opting basketball.

   (c) Number of students who opted basketball to the total number of students.

Home Assignment (to be done in Mathematics Notebook)
EXERCISE 12.1 : Q1 , Q4 , Q5 , Q6, Q9 ,Q10
Refer to the following link :
1. https://www.youtube.com/watch?v=QfgWs-gyW6k
2. https://www.youtube.com/watch?v=bp4-qX2Fz5w
3. https://www.youtube.com/watch?v=KPLAdvAywvo
4. https://www.youtube.com/watch?v=NtYqxe4zvoE

LESSON DEVELOPMENT

Word problems based on Ratio

Example 4: Ratio of distance of the school from Mary's home to the distance

of the school from John's home is 2 : 1.

(a) Who lives nearer to the school?

(b) Complete the following table which shows some possible distances that Mary and John could live from the school.

Distance from Mary's home to school (in km.)	10		4		
Distance from John's home to school (in km.)	5	4		3	1

(c) If the ratio of distance of Mary's home to the distance of Kalam's home from school is 1 : 2, then who lives nearer to the school?

Solution : (a)   John lives nearer to the school (As the ratio is 2 : 1).

(b)

Distance from Mary's home to school (in km.)	10	8	4	6	2
Distance from John's home to school (in km.)	5	4	2	3	1

(c) Since the ratio is 1 : 2, so Mary lives nearer to the school.

Example 5: Divide ₹ 60 in the ratio 1 : 2 between Kriti and Kiran.

Solution : The two parts are 1 and 2.

Therefore, sum of the parts = 1 + 2 = 3.

This means if there are ₹ 3, Kriti will get ₹ 1 and Kiran will get ₹ 2. Or, we can say that Kriti gets 1 part and Kiran gets 2 parts out of every 3 parts.

Therefore, Kriti's share $= \dfrac{1}{3}$ 60 = ₹ 20

And Kiran's share $= \dfrac{2}{3}$ 60 = ₹ 40.

Refer to the following link :

1. https://youtu.be/nbssZ_bo8Ic
2. https://youtu.be/amMl6a7q6E8
3. https://www.youtube.com/watch?v=EkqXTB48yak
4. https://www.youtube.com/watch?v=6TX_bi0Xtql

EXERCISE12.1 : Question (12 , 16)

Q12. Cost of a dozen pens is ` ₹ 180 and cost of 8 ball pens is ₹ 56. Find the ratio of the cost of a pen to the cost of a ball pen.

Q16. Present age of father is 42 years and that of his son is 14 years. Find the ratio of -

(a) Present age of father to the present age of son.

(b) Age of the father to the age of son, when son was 12 years old.

(c) Age of father after 10 years to the age of son after 10 years.

(d) Age of father to the age of son when father was 30 years old

Home Assignment (to be done in Maths fair Notebook)

EXERCISE 12.1 : Q14 , Q15

BLOCK III

LESSON DEVELOPMENT

(1)

Bhavika has 28 marbles and Vini has 180 flowers. They want to share these between themselves. Bhavika gave 14 marbles to Vini and Vini gave 90 flowers to Bhavika. But Vini was not satisfied. She felt that she had given more flowers to Bhavika than the marbles given by Bhavika to her.

 What do you think? Is Vini correct?

Let's solve this problem.

Out of 28 marbles, Bhavika gave 14 marbles to Vini.

Therefore, ratio is 14 : 28 = 1 : 2.

 And out of 180 flowers, Vini had given 90 flowers to Bhavika.

Therefore, ratio is 90 : 180 = 1 : 2. Since both the ratios are the same, so the distribution is fair.

(2)

Raj purchased 3 pens for ` 15 and Anu purchased 10 pens for ` 50.

Whose pens are more expensive?

Ratio of number of pens purchased by Raj to the number of pens purchased by Anu = 3 : 10.

Ratio of their costs = 15 : 50 = 3 : 10

Both the ratios 3 : 10 and 15 : 50 are equal.

Therefore, the pens were purchased for the same price by both.

So, the ratio of number of pens = ratio of their cost.

Since both the ratios are equal, hence, we say that they are in proportion.

If two ratios are equal, we say that they are in proportion and use the symbol '::' or '=' to equate the two ratios.

Thus, we can say 3, 10, 15 and 50 are in proportion which is written as

$$3 : 10 :: 15 : 50$$

and is read as 3 is to 10 as 15 is to 50 or it is written as 3 : 10 = 15 : 50.

> If two ratios are not equal, then we say that they are not in proportion. In a statement of proportion, the four quantities involved when taken in order are known as respective terms. First and fourth terms are known as extreme terms. Second and third terms are known as middle terms.

For example, in 35 : 70 : : 2 : 4;

35, 70, 2, 4 are the four terms. 35 and 4 are the extreme terms. 70 and 2 are the middle terms.

Example6 : Are the ratios 25g : 30g and 40 kg : 48 kg in proportion?

Solution :

25 g : 30 g = 25 : 30 = 5 : 6

40 kg : 48 kg = 40 : 48 = 5 : 6

So, 25 : 30 = 40 : 48.

Therefore, the ratios 25 g : 30 g and 40 kg : 48 kg are in proportion

$$25 : 30 :: 40 : 48$$

The middle terms in this are 30, 40 and the extreme terms are 25,

Example6

Do the ratios 15 cm to 2 m and 10 sec to 3 minutes form a proportion?

Solution :

Ratio of 15 cm to 2 m = 15 : 2 × 100 (1 m = 100 cm)

                                 = 3 : 40

Ratio of 10 sec to 3 min = 10 : 3 × 60 (1 min = 60 sec)

                                 = 1 : 18

Since, 3 : 40 ≠ 1 : 18, therefore, the given ratios do not form a proportion.

Class Assignment (To be done in Maths practice notebook)

EXERCISE12.2 : Question1(a ,b , c) , 2 (a , b, c)

Q1. Determine if the following are in proportion.

(a) 15, 45, 40, 120   (b) 33, 121, 9,96   (c) 24, 28, 36, 48

Q2. Write True (T) or False (F) against each of the following statements :

(a) 16 : 24 :: 20 : 30   (b) 21: 6 :: 35 : 10   (c) 12 : 18 :: 28 : 12

Q4. Determine if the following ratios form a proportion. Also, write the middle terms and extreme terms where the ratios form a proportion.

(a) 25 cm : 1 m and ` 40 : ` 160

(b) 39 litres : 65 litres and 6 bottles : 10 bottles

(c) 2 kg : 80 kg and 25 g : 625 g

(d) 200 ml : 2.5 litre and ₹ 4 : ₹ 50

Home Assignment (to be done in Maths fair notebook)

EXERCISE 12.2 : Q1(d , e , f)) Q2(d , e , f) , Q3

Summary

1. For comparing quantities of the same type, we commonly use the method of taking difference between the quantities.

2. In many situations, a more meaningful comparison between quantities is made by using division, i.e. by seeing how many times one quantity is to the other quantity. This method is known as comparison by ratio. For example, Isha's weight is 25 kg and her father's weight is 75 kg. We say that Isha's father's weight and Isha's weight are in the ratio 3 : 1.

3. For comparison by ratio, the two quantities must be in the same unit. If they are not, they should be expressed in the same unit before the ratio is taken. The same ratio may occur in different situations.

5. Note that the ratio 3 : 2 is different from 2 : 3.

Thus, the order in which quantities are taken to express their ratio is important

6. A ratio may be treated as a fraction, thus the ratio 10 : 3 may be treated as $\frac{10}{3}$.

7. Two ratios are equivalent, if the fractions corresponding to them are equivalent. Thus, 3 : 2 is equivalent to 6 : 4 or 12 : 8.

8. A ratio can be expressed in its lowest form. For example, ratio 50 : 15 is treated as $\frac{50}{15}$; in its lowest form $\frac{50}{15} = \frac{10}{3}$. Hence, the lowest form of the ratio 50 : 15 is 10 : 3.

9. Four quantities are said to be in proportion, if the ratio of the first and the second quantities is equal to the ratio of the third and the fourth quantities. Thus, 3, 10, 15, 50 are in proportion, since $\frac{3}{10} = \frac{15}{50}$. We indicate the proportion by 3:10 :: 15:50, it is read as 3 is to 10 as 15 is to 50. In the above proportion, 3 and 50 are the extreme terms and 10 and 15 are the middle terms.

10. The order of terms in the proportion is important. 3, 10, 15 and 50 are in proportion, but 3, 10, 50 and 15 are not, since $\frac{3}{10}$ is not equal to $\frac{50}{15}$.

Practice Assignment

ratio and proportion

(https://www.studiestoday.com/mcq-ratio-and-proportion-cbse-class-6-mathematics-ratio-and-proportion-mcqs-set-311888.html)

Q1. Which of the following is the ratio of one rupee to 50 paisa ?

(i) 1:1

(ii) 2:1

(iii) 1:2

(iv) 1:50

Q2. Which of the following is the equivalent ratio of 6:4?

(i) 3:2

(ii) 6:8

(iii) 12:4

(iv) 1:1

Q3. If Rs.60 is divided between X&Y in the ratio of1:2,which of the following is the share of X?

(i) 50

(ii) 20

(iii) 40

(iv) 180

Q4. There are 100 teachers in a school for 3000 students. Which of the following is the teacher stud

(i) 3:100

(ii) 1:1

(iii) 30:1

(iv) 1:30

Q5. If the cost of six pens is Rs.60 , which of the following is the cost of 10 such pens?

(i) 10

(ii) 100

(iii) 600

(iv) 6