Vision Empower & XRCVC

Teacher Instruction KIT

Ratio and Proportion

Syllabus: Karnataka State Board
Subject: Mathematics
Grade: 6
Textbook Name: Math Text cum workbook
Chapter Number & Name: 12. Ratio and Proportion

1. OVERVIEW

1.1 OBJECTIVE AND PREREQUISITES

Objective

Students will be able to:

- understand the concept of ratio
- understand the concept of proportion
- apply ratios and proportions to solve problems.

Prerequisite Concept

- Fractions
  TIK_MATH_G5_CH14_Fractions and Decimals.

Content Index

*Kindly Note: Activities marked with * are mandatory*

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2. LEARN

2.1 KEY POINTS

Ratio and Proportion: The concept of ratio defines us to compare two quantities while the proportion is an equation which shows that two ratios are equivalent. Whereas, the proportion, on the other hand, is the relation between two ratios such as $a:b::c:d$ or $\frac{a}{b}=\frac{c}{d}$, where a,b,c and d are integers.

2.2 LEARN MORE

3 ENGAGE

3.1 INTEEST GENERATION ACTIVITY

Activity 1: Discussion
Materials Required: None
Prerequisites: None

Activity Flow

- *Tell the following information to the students.*
- *To make rice pudding for 4 people, we need the following ingredients.*

Rice Pudding Ingredients:

- *2 cups of cooked rice*
- $\frac{1}{2}$ *cup of sugar*
- *2 eggs, slightly beaten*
- *2 cups of milk*
- $\frac{1}{4}$ *cup of raisins*
- $\frac{1}{2}$ *tsp of powdered cinnamon*

- *Tell the students, there are many ratios involved with the ingredients. What is the ratio of cooked rice to milk?*
- *For two cups of rice, we need 2 cups of milk. So the ratio of rice to milk is* $2:2$.
- *Now ask the students, ingredients needed to make a cup of coffee and the ratios between any two ingredients.*

For example, 1 cup of milk, 1 tsp of coffee powder and 1 tsp of sugar.

Here the ratio of coffee powder to sugar is $1:1$

- *Give similar kinds of examples and ask the ratio.*

3.2 CONCEPT INTRODUCTION ACTIVITIES

INTRODUCTION TO RATIO

Activity 2: Introduction to Ratio

Materials Required: None

Prerequisites: Multiplication and Division

Activity Flow

Note: Include given examples along with the textbook examples to explain the concepts.

Introduce the concept of ratio with the following examples.

- *If the height of a long stick is 15 cm and a small stick is 5 cm. How many small sticks together will give you the long stick?*
  Answer: Since the height of a small stick is 5 cm, if we join 3 such sticks together then we will get a long stick with a height of 15 cm.

So, 3 times 5 = 15.

Or the other way to compare the lengths is to do it by division.

That is, if we divide the length of the long stick by the length of the small stick then the obtained number will be the number of times.

i.e. $15/5=3$

- *There are 5 slates and 10 sheets of paper. How many sheets does each slate will get?*
- *Ask the students to use the above method to find the answer.*
  - *Answer: So, every slate will have 2 sheets. That is, dividing 10 by 5 will get 2. This is nothing but the ratio of number of sheets to the number of slates.*
  - $\frac{10}{5}=\frac{2}{1}$
  - *This implies that every slate will have 2 sheets. Or for every 2 sheets of paper will have one slate.*
  - *Hence, ratio is the relation between the quantities of different things.*

Example:

- *There are 6 apples and 9 oranges and the ratio of apples to oranges is* $\frac{6}{9}$.

  We can simplify the ratio by dividing the numerator and denominator by 3. We get $\frac{2}{3}$.
  This shows that for every 2 apples there are 3 oranges or for every 3 oranges there are 2 apples.
  Here mathematical representation of ratio of numbers is the same as representing fraction but the interpretation is different.

RATIOS

Activity 3: Ratios

Materials Required: Geometry kit, parchment paper.

Prerequisites: Concept of ratio.

Activity Flow

- *Ask the students to draw a line having a length of 18 cm.*
- *Ask them how many short lines they can make with that long line, if the length of the short line is 6 cm.*
- *Let them measure and find the answer.*

Similarly, the following example

- *For a dance programme, the teacher wants to group 3 boys with 2 girls. And there are 40 students all together, how many such groups can be made and what is the total number of girls and boys?*
- *Ask the students to think and give their solutions.*
  Answer:
  - *We know that for every 3 boys there are 2 girls or for every 2 girls there are 3 boys*
  - Number of girls + number of boys in a group =2+3=5
  - *So, each group will have 5 students with 2 girls and 3 boys.*
  - *And if we divide 40 by 5 will get 8 such groups.*
  - *We know that each group will have 2 girls, so multiplying 2 and 8 will give 16 and multiplying 3 and 8 will give 24.*
  - *Therefore there are 16 girls and 24 boys of 40 students in a class.*

Note:

- *Explain to them that ratio is a type of comparison of two quantities by division.*
- *Ratio compares the two quantities whereas the fraction gives the part of the whole object divided equally.*

PROPORTIONS

Activity 4: Proportions

Materials Required: None

Prerequisites: None

Activity Flow

- *If two ratios are equal then we say that they are in proportion and use the symbol* $::$ *or* $=$ *to equate the two ratios.*

Example:

- *On day 1, Rita had 6 chocolates and Gita had 36 chocolates. On day 2, Rita had 2 chocolates and Gita had 12 chocolates.*
  - *Solution: If we simplify a ratio of 6 to 3 , we get* $1:6$ *and similarly for a ratio of 2 to 12, then also we get the same* $1:6$*. Which says that they both have equal proportions of chocolates on both the days.*
- *Ask the students to find whether 4 and 6, 8 and 12 are in proportion are not.*
  - *Solution:*
  - $4/6 = 2/3$
  - $8/12 = 2/3$

- *Since their ratios are the same or equal. Then we say that they are in proportion.*

UNITARY METHOD

Activity 5: Unitary Method

Materials Required: None

Prerequisites: Division, multiplication, fraction

Activity Flow

- *The method in which first we find the value of one unit and then the value of the required number of units is known as Unitary Method.*

Examples:

- *The cost of 3 books is Rupees 60, find the total amount required to buy 8 books.*
  - *Solution: We know that the cost of 3 books is Rupees 60,*
  - So, the cost of 1 book $= 60/3 = 20$.
  - *So, the cost of 1 book is Rupees 20.*
  - Therefore the amount required to buy 8 books $= 8 \times 20 = 160$.
- *Rani purchases 11 pens for rupees 121 and Mani buys 9 pens for rupees 81 in the same shop on different days. Can you say who got the pens for less price.*
  - *Solution: Rani purchased 11 pens for 121.*
  - So, the cost of one pen $= 121/11 = 11$.
  - *Mani purchased 9 pens for Rupees 81. Then the cost of one pen* $= 81/9 =$ Rupees 9.
  - *Now if we compare the cost of a single pen, then it shows that Mani got the pens for less price.*
- *Prajwal earns Rupees 1750 for 10 days and how much will he earn in 25 days?*
  - *Solution: For 10 days he earns 1750.*
  - So, for one day he earns $= 1750/10 = 175$.
  - Therefore for 20 days, the total amount he earns $= 175 \times 25 = 4375$.

3.3 LET'S DISCUSS: RELATE TO DAILY LIFE*

- In our daily life, many times we compare two quantities of the same type.
- For example,
  If the height of Rahim is 150 cm and that of Aishwarya is 140 cm then, we may say that the height of Rahim is $(150 - 140 = 10)$ 10 cm more than Rahim.
- We often encounter things related to ratios.
  For example, Aishwarya's weight is twice of Priya's

- Grocery shopping, cooking and getting from place to place are three common, real-life situations in which ratios are not only prevalent but essential to correct, cost-effective performance.
  For example, When driving a car, the speed at which you drive is a ratio comparing the miles you are traveling to the time.

4 EXERCISES & REINFORCEMENT

4.1 PRACTICE EXERCISES

Activity 6: Practice and Recall

Materials Required: None

Prerequisites: Ratio and proportion

Activity Flow

1. There are 20 girls and 15 boys in a class.

(a) What is the ratio of the number of girls to the number of boys?

(b) What is the ratio of number of girls to the total number of students in the class?

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. Find the ratio of the following:

(a) 81 to 108

(b) 98 to 63

(c) 33 km to 121 km

(d) 30 minutes to 45 minutes

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

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

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

5. There are 102 teachers in a school of 3300 students. Find the ratio of the number of teachers to the number of students.

6. In a college, out of 4320 students, 2300 are girls. Find the ratio of

(a) Number of girls to the total number of students.

(b) Number of boys to the number of girls.

(c) Number of boys to the total number of students.

7. Cost of a dozen pens is 180 Rupees and the cost of 8 ball pens is 56 Rupees. Find the ratio of the cost of a pen to the cost of a ball pen.

8. Consider this situation:

Raju went to the market to purchase tomatoes. One shopkeeper tells him that the cost of tomatoes is Rupees 40 for 5 kg. Another shopkeeper gives the cost as Rupees

42 for 6 kg. Now, what should Raju do? Should he purchase tomatoes from the first shopkeeper or from the second? Will the comparison by taking the difference help him decide? No. Why not?
9. If the cost of 7 m of cloth is 1470 Rupees, find the cost of 5 m of cloth.
10. Ekta earns 3000 Rupees in 10 days. How much will she earn in 30 days?
11. Shaina pays 15000 Rupees as rent for 3 months. How much does she have to pay for a whole year, if the rent per month remains the same?
12. The weight of 72 books is 9 kg. What is the weight of 40 such books?
13. Raju purchases 10 pens for 150 Rupees and Manish buys 7 pens for 84 Rupees. Can you say who got the pens cheaper?

4.2 IMPORTANT GUIDELINES*

Exercise Reading
It is very important that the children practice their learnings as well as their Reading. Hence have the children read out the newly learned concepts from their textbooks or other available resources.

Perform Textbook Activity
It is good practice to have the children perform the textbook activities. Your textbook activities might not be accessible hence go through this resource to learn how to make textbook content accessible

Provide Homework
To evaluate their understanding and to help the student revise and implement the new learnt concept ensure to provide them with homework. Students should perform one or two of the questions mentioned above or from the textbook exercises with the teacher in Class and the remaining may be given for homework. Also, ensure that the student knows their special skills linked to independently using their accessible books as it will be critical to doing homework independently

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