Decimals

Syllabus: Karnataka State Board
Subject: Mathematics
Grade: 6
Textbook Name: Math Text cum workbook
Chapter Number & Name: 8. Decimals

1 OVERVIEW
1.1   OBJECTIVE & PREREQUISITES

Objective

Students will be able to:
- Understand the concept of decimals.
- Represent decimals on the number line.
- Compare two decimals.
- Add and subtract two decimal numbers.

Prerequisite Concept
- Fractions, comparing fractions,
TIK_MATH_G5_CH14_Decimal fractions

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*Kindly Note: Activities marked with * are mandatory*

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2 LEARN

2.1 KEY POINTS

- Decimal fraction: A fraction where the denominator (the bottom number) is a power of ten (such as 10, 100, 1000, etc.)
- You can write decimal fractions with a decimal point (and no denominator), which makes it easier to do calculations like addition and multiplication on fractions.

2.2 LEARN MORE

3 ENGAGE

3.1 INTEREST GENERATION ACTIVITY

Activity 1: Decimal Numbers
Materials Required: Tactile ruler or Measuring tape, geometry kit and thread.
Prerequisites: None

Activity Flow

- *Ask the students to measure the length of the following things:*
  - *Book, Taylor frame, slate and leaf.*
- *Tell them that a tactile ruler helps to measure the length of the given objects accurately.*
- *Ask the students, what does 7.8 cm mean?*
  - *Explain to the students that 7.8 means, it's more than 7cm long and less than 8 cm.*
- *Give them the different lengths of thread and ask them to measure the exact length. Tell them that decimal numbers are used to measure the exact length of the objects.*
- *Ask them to list the objects whose length is not a whole number.*
- *Give the following example to recall the concept of decimal numbers.*

For example, the length of slate is 21.5 cm

- *Ask them, what does 21.5 cm mean and why do we read it as twenty one point five? And why is there a point after 21?*
  Answer: We know that $10 \text{ mm} = 1 \text{ cm}$, *so* $1 \text{ mm} = 1/10 \text{ cm} = 0.1 \text{ cm}$
  Hence, we can see that in a tactile ruler there is a mark in the middle. This is half of $1 \text{ cm} = 0.5 \text{ cm} = 5/10$
- *Ask them as we studied in fractions, anything in the numerator represents the covered portion out of the total which is written in the denominator.*

  Similarly, $21.5 \text{ cm} = 21 \text{ cm} + 5/10 \text{ cm} = 21 \text{ cm} + 0.5 \text{ cm}$

  A decimal number can be defined as a number whose whole number part and the fractional part are separated by a decimal point. The dot in a decimal number is called a decimal point. The digits following the decimal point show a value smaller than one.

3.2 CONCEPT INTRODUCTION ACTIVITIES

Decimals
Activity 2: Introducing decimals
Materials Required: None

Prerequisites: None

Activity Flow

- *Ask the students to assume, they have divided a sheet of paper into 10 equal pieces.*
- *Tell the students to assume, those individual pieces correspond to the millimetre and 10 pieces altogether is 1 cm which is the complete sheet.*
- *Ask the students, how many full sheets of paper and how many small pieces of paper are needed to represent 8.7 cm.*
- *Explain to the students, Example: 8.7 cm or eight and seven-tenths, for which they have to take 8 complete sheets and take one single sheet and make 10 pieces of it, from which take only 7 pieces.*

Fractional numbers into decimals
Activity 3: Fractional numbers into decimals.
Materials Required: None
Prerequisites: Fractions

Activity Flow

- *Use the tactile diagram of the number line of the whole number then ask them to represent the following decimal numbers on a number line.*

Fractions as decimals:

As we have seen in the previous examples, in order to write the fractional numbers into decimals:

- *Ask the students to observe the denominator for the given fractional number.*
- *If the denominator is not number 10, then to make it 10 ask them to multiply in both numerator and denominator.*
  Example: $5/2 = 5 \times 5/2 \times 5 = 25/10 = 20/10 + 5/10 = 2.5$

Here in the above example, the given fraction was $5/2$, so to make the denominator 10, we multiplied number 5 on both numerator and denominator then we would get $25/10$ then split the fraction into its simplest form, which is $20/10 + 5/10$. Now it's easy to divide the number $20/10 = 2$ and $5/10 = 0.5$. Finally, we could represent $5/2 = 2.5$
- *Give them more examples to work out.*

  Example: $9/2$, $13/5$.

Note: This method works only for factors of 10.

And the examples given below are the ones which we cannot write in one-tenth form. Instead, we divide the number and obtain quotient will in its decimal form.

1. $6/9 = 2/3 = 0.66666$ *and so on*
2. $5/7 = 0.7142$ and so on
3. $2/6 = 1/3 = 0.33333$ and so on
4. $3/8 = 0.375$

Decimal as Fractions
Activity 4: Decimals as fractions
Materials Required: Taylor frame
Prerequisites: Fractions

Activity Flow

We have to convert decimals into fractions.

● *Explain to the students, the number which comes after the decimal point tells us it is that so many parts out of 10 parts which is nothing but the fractional number.*

Example: $3.5 = 3 + 5/10$

Here, we have converted the number which comes after the decimal point. Now we need to convert the number 3 into a fraction, for which we know that we can add two fractions only if the denominator is same, so multiply and divide the number 3 by 10 then we get $3 \times (10/10) = 30/10$.

Hence, $3.5 = 30/10 + 5/10 = 35/10$

1. *Ask them to solve the given examples:*
   1. *4.7*
   2. *9.5*
   3. *17.2*
2. *Also, ask them to place value table on a Taylor frame for the decimal numbers. Which is similar to the integers but the only difference is for the number after the decimal point place value is tenths* $(1/10)$.

Hundredths:

● *Ask the students to measure the length of the desk using the thread and then find the length of the thread with the help of a tactile ruler.*
● *The length could be for example 7 metres 20 centimetres. Then ask them to get the measurement only in terms of metres for which they need to convert the centimetre to the metre.*
● *We know that,*

100 cm = 1 m. So , 1 cm = 1/100 m.

Hence 20 cm = 20/100 = 2/10 m

We now have to write in decimals which we know if the denominator is 10 and the numerator is less than the denominator, the decimal number will be 0.2 m.

● *Suppose if the fraction is* 2/100 *which we cannot simplify further by keeping 100 as the denominator then the decimal number will be* 0.02.

● *Then ask them to tell the place value for the decimal numbers given below.*

1. *89.01*
2. *231.2*
3. *101.13*

For example:

Place value of 123.45 is written as 5 in the hundredths place, 4 in the tenths place, 3 in units place, 2 in the tens place and 1 in the hundreds place.

Comparing Decimals
Activity 5: Comparing decimals
Materials Required: None
Prerequisites: Fractions

Activity Flow

● *Tell the students that they are going to compare the place value between the decimal numbers and check the smaller and greater number.*
  For example: Which is greater? 1.43 or 1.49
  1.43 = 1 + 4/10 + 3/100
  1.49 = 1 + 4/10 + 9/100

In the above example, in one's place, both the numbers are the same. In the tenth place also both the numbers are the same. So we are going to compare the digit in the hundredths place. The digit in hundredths place 3 is smaller than 9 and the other digits remain the same in both the numbers. Hence number 1.49 is greater than 1.43.

● *Make two groups and let one group ask the following questions is true or false to the other group and vice versa.*
  1) *0.002 or 0.02*
  2) *3.45 or 3.045*
  3) *11.23 or 11.4*
  4) *9.004 or 8.87*

● *Ask the students where they see the use of decimal numbers in daily life.*

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Some of them are money – from paise to rupee, Length – centimetres to metres and Weight –From grams to kilograms.

Addition

Activity 6 Addition of numbers with decimals

Materials Required: Braille cards from 0 to 9.

Prerequisites: Addition

Activity Flow

Addition of numbers with decimals is the same as usual addition, where we add the numbers in their corresponding place values.

- *Make two groups of 5 students such that each of them represents the place value of 3 digit number with 2 decimal digits. Such that each of them in a group represents hundreds, tens, units, tenths and hundredths place.*
- *Let each of them get Braille number cards from 0 to 9 for both the groups.*
- *Now, give them the decimal numbers for both the groups.*

  Example: To add number 231.56 and 123.45. Let group 1 take the number 231.56 and group 2 take 123.45. Ask them to hold the number card of whichever place value has been assigned to each of them in a group. And we know that we add numbers from right to left. Hence ask the students from both the groups who are in the hundredths place should take the corresponding number card, read the number and ask them to add those numbers, which is 6 + 5 = 11, carry 1 to the tenths place. Similarly, adding numbers in tenths place with carry will give 10, carry 1 to the units place. Adding numbers in units place with carry will give 5, adding numbers in tens place will give 5 and adding numbers in the hundreds place will give 3. So, 231.56 + 123.45 = 355.01, ask the students to observe that the decimal point has been put after the last two digits.

- *Similarly, try other examples.*
- *Similarly, ask them to add the following numbers.*
    1) $0.03 + 4.90$
    2) $12.98 + 67.12$
    3) $456.11 + 987.22$
    4) $901.0 + 100.01$

Subtraction

Activity 7: Subtraction of decimals

Materials Required: Braille cards from 0 to 9.

Prerequisites: Subtraction

Activity Flow

Subtraction of numbers with decimals is the same as usual subtraction but we should be careful about putting decimal points.

- *Make two groups of 5 students. Each student represents the place values of a 3 digit number with 2 decimal digits. The place values represented are hundreds, tens place, units, tenths and hundredths place.*
- *Give braille number cards from 0 to 9 for both the groups.*
- *Now, give them the decimal numbers for both the groups.*

  Example: To subtract number 231.56 and 123.45. Let group 1 take the number 231.56 and group 2 take 123.45. Ask them to hold the number card of whichever place value has been assigned to each of them in a group. And we know that we subtract numbers from right to left. Hence ask the students from both the groups who are in the hundredths place should take the corresponding number card, read the number and ask them to subtract those numbers, which is $6-5=1$. Similarly, subtracting numbers in tenths place will give 1, subtracting numbers in units place with borrow will give 8, subtracting numbers in tens place will give 0 and subtracting numbers in the hundreds place will give 0. So, $231.56-123.45=8.11$, ask the students to observe that the decimal point has been put after the last two digits.

- *Similarly, the rest of the students in the other place value subtract the numbers for the given decimal number.*
- *Similarly, ask them to subtract the following numbers.*
  1) $7.03-4.90$
  2) $121.98-67.12$
  3) $456.11-387.22$
  4) $301.0-110.01$

3.3   LET'S DISCUSS: RELATE TO DAILY LIFE*

- We use decimal numbers to measure the weight. For example 45.5 kg of rice.
- We use decimals consistently while managing cash. For example, 50 paise can be written as 0.50.
- When measuring the length of the table, we use decimal numbers.

4   EXERCISES & REINFORCEMENT
4.1   PRACTICE EXERCISES

PRACTICE

Activity 8: Practice and recall

Materials Required: None

Prerequisites: Comparing decimals

Activity Flow

1. *Write each of the following as decimals :*
    a. *Seven-tenths*
    b. *Two tens and nine-tenths*
    c. *Fourteen point six*
    d. *One hundred and two ones*
    e. *Six hundred point eight*

2. *Write each of the following as decimals:*
    a) $5/10$
    b) $3+(7/10)$
    c) $200+60+5+(1/10)$
    d) $70+(8/10)$
    e) $88/10$

3. *Write the following decimals as fractions:*
    a) 0.6
    b) 2.5
    c) 1.0
    d) 3.8
    e) 13.7

4. *Write each of the following decimals in words:*
    a) 0.03
    b) 1.20
    c) 108.56
    d) 10.07
    e) 0.032

5. *Which is greater?*
    a) *0.3 or 0.4*
    b) *0.3 or 0.4*
    c) *3 or 0.8*

     d) 0.5 or 0.05
     e) 1.23 or 1.2
     f) 0.099 or 0.19
     g) 1.5 or 1.50
     h) 1.431 or 1.490

6. *Find the sum:*
   1. $0.007 + 8.5$
   2. $15 + 0.632$
   3. $27.076 + 0.55$
   4. $25.65 + 9.005$

7. *Rashid spent 35.75 rupees for Math's book and 32.60 rupees for Science book. Find the total amount spent by Rashid.*

8. *Radhika's mother gave her 10.50 rupees and her father gave her 15.80 rupees, find the total amount given to Radhika by the parents.*

9. *Subtract*
   a) $9.756 - 6.28$
   b) $21.05 - 15.27$
   c) $18.5 - 6.79$
   d) *18.25 from 20.75*

10. *Raju bought a book for 35.65 rupees. He gave 50 rupees to the shopkeeper. How much money did he get back from the shopkeeper?*

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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