Vision Empower & XRCVC
Teacher Instruction KIT

Data Handling

Syllabus: Karnataka State Board
Subject: Mathematics
Grade: 7
Textbook Name: MATHEMATICS - Text cum Workbook (Revised) - Seventh Standard
Chapter Number & Name: 3. Data Handling

1. OVERVIEW

1.1 OBJECTIVE & PREREQUISITES

Objective

Students will be able to:

- read and interpret data.
- calculate the mean, mode, median, and range.
- construct a bar graph.
- understand and calculate the probability.

Prerequisite Concept

- *Collect, Classify, Organize, Represent and Interpret Data*

TIK_MATH_G6_CH9_Data Handling

Content Index

*Kindly Note: Activities marked with * are mandatory*

Exercise Reading
Perform Textbook Activity
Provide Homework

2. LEARN

2.1 KEY POINTS

- To find the mean, add up all the numbers you have, and divide by how many numbers there are in total.
    - Mean = sum of the values / number of values .
- The mode is the most frequent number or the number that appears most often.
- The median is the middle number in a set of numbers. To find the median, you must order up the numbers in numerical order, and then identify the one in the middle.
- The range is the difference between the highest value and the smallest value.
- Probability is the chance that something will happen, or how likely it is that an event will occur.

2.2 LEARN MORE

3. ENGAGE

3.1 INTEREST GENERATION ACTIVITY

Listening to the NEWS

Activity 1: Listening to the NEWS to interpret the information

Materials Required: *Audio clip of COVID 19 NEWS (state-wise information, number of infected patients, number of patients recovered and number of patients died) or the teacher can tell the information.*
Audio clip: Covid-19 News
(Teacher can play an audio clip of survey related news)
Prerequisites: Interpretation of data (refer to activity 2, TIK_MATH_G6_CH9_Data Handling).

Activity Flow

- *Discuss the following questions with the children*
    1. *What did you hear from the audio clip?*
    2. *What is the use of this news?*
    3. *Why do we need these data?*
    4. *How do they collect these data?*
    5. *What is the use of collecting data?*
    6. *From this data, what is your interpretation?*
- *Encourage the discussion as much as possible to make the children understand the data and its needs.*
- *Data is a collection of facts such as numbers, words, measurements, observations or just description of things.*
- *Collecting data allows you to store and analyse important information.*
    - *In the above audio clip - the data helps to predict the growth of infection rate.*

- *There are many ways to collect data. For example, surveys are one of the ways to collect data.*

3.2 CONCEPT INTRODUCTION ACTIVITIES

Find the mean, median, mode

Activity 1: Find the mean, median, mode and range using cards

Materials Required: Deck of Braille cards.
Prerequisites: Addition, Division

Activity Flow
Average

- *Ask the students to think of situations where they use the word average?*
    - *Average height in a class, average marks, average attendance and average speed.*
- *We use the word average in many places. For example, if your job is to order stock for the school canteen, you need to know what the average people want to buy. If you want to calculate how long a journey will take, you use the average speed.*
- *The term average refers to the middle value or central point.*
- *The average can be calculated in different ways. They are*
    - *mean*
    - *mode*
    - *median.*

Tell the students that they are going to learn how to calculate the mean, median and mode.

Divide the students into a group of 4.

Distribute two sets of Braille cards to each group.

Ask the children to draw any 7 cards from the deck. Then ask them to arrange it in ascending order.

Tell them to consider those cards as the rate of rainfall in cm in the last week of September.

Tell them, they are going to find the average rainfall for the given week.

Mean
The mean is finding the central value by adding all the values divided by the number of values.

- *For example: The data set is 1, 2, 4, 5, 7, 8 and 9*
- *Sum of the values =* $1+2+4+5+7+8+9=36$
- *Number of values = 7*

Mean = sum of the values divided by the number of values = $36/7=5.1$

- *Ask each group to find out the mean for their data set and tell them that is the average rainfall for the given week.*
- *Discuss the use of mean in real life.*

- *The mean is often used in research, academics, and sports.*
  Example, find the average rainfall in each state month wise.

Note: The mean is what you would get if all the values were made equal.

Median

- *The median is the middle value. You can only find it when you can put the data in order of size*
  For example, when five pupils travel to school on Monday, the time that they take is 15 minutes, 17 minutes, 10 minutes, 12 minutes and 46 minutes. If you put these times in order, shortest first, you get:
  - *10, 12, 15, 17,46*
  - *The middle value is 15 minutes. This is called the median time*
  - *It gives a better idea of the average time then the meantime does. The mean time is 20 minutes because of the pupil who took very much longer than the average time.*
- *Ask the children to shuffle the cards.*
- *Ask the children to draw any 9 cards from the deck. Then ask them to arrange it in ascending order.*
- *To find the middle number of their data set, ask them to flip the first and the last card together then, flip the second and second last card together then, flip the third and third last together, and so on till they reach the middle card. Ask the children to find the central/ middle card and tell them that is the median.*
  - *For example 1, 2, 4, 5, 7, 8, and 9*
  - *The middle value is 5*

If the number of cards is even then they will get two middle cards. In that case, they have to find the mean of those two middle cards that value will be the median.

- *For example: 1, 2, 4, 5, 6, 7, 8, and 9*
- *Here the middle values are 5 and 6.*
- *The mean value of 5 and 6 =* $(5+6)/2 = 11/2 = 5.5$

Ask the children to take 10 cards. Then ask them to find the median.

Mode

- *The mode is usually the easiest average to find. It is the commonest value.*
  For example, ten girls have shoe sizes
  - *4, 3, I, 4, 2, 4, 4, 6, 2 ,4*
  - *The commonest shoe size is 4.*
  - *It would not be sensible for the owner of a shoe shop to find the mean shoe size of customers: nobody has size like 6.83 feet! She needs to know what the most popular sizes are and in particular the commonest size of her customers' feet. This commonest size is another kind of average, called the mode.*
- *In the above data set, the number 4 occurs more frequently than other numbers. So, the common size is 4.*
- *Ask the children to shuffle the cards.*

- *Ask the children to draw any 9 cards from the deck. Then ask them to arrange it in ascending order.*
- *Then ask them to find the mode of their data set.*

The Range

- *To find the range, subtract the smallest value from the highest value. Range means the difference between the highest number and the smallest number*

    - Range = Highest value – Smallest value .
    - *For example: 1, 2, 4, 5, 7, 8, and 9*
    - Range = Highest value – Smallest value
      =9-1=8

- *Ask the children to shuffle the cards.*
- *Ask them to draw any 9 cards from the deck. Then ask them to arrange it in ascending order.*
- *Ask them to find the range of their data set.*
- *Discuss the use of range in real life. The range is helpful to understand the spread of data.*

Practice: Ask students to draw a new set of cards (10 cards) to find the mean, mode, median, and range.
Things to remember: Before finding the value of the mode, range, and median; arrange the data set in ascending order.

Reading the tactile bar graph

Activity 2: Reading the tactile bar graph

Materials Required: Tactile graph or raised line graph sheet.
Prerequisites: Reading a data set, and interpreting a data set.

Activity Flow
Note: For the construction of the bar graph refer to TIK_MATH_G6_CH9_Data Handling, Activity 3.

Bar graphs can be defined as a chart or a graphical representation of data or quantities. Bar graphs are used to compare and contrast numbers, frequencies, or other measures of distinct categories of data.

- *Divide the children into a group of four.*
- *Distribute the tactile graph/raised graph sheet to each group.*
- *Tell the children, you are going to represent the following data in the graph sheet.*

  Fifth – 135 students
  Sixth – 120 students
  Seventh – 95 students

Eighth – 100 students
Ninth – 90 students
Tenth – 80 students

The above data represents the number of students in each grade.

- *For the graph,*
  Give a title to the graph
  Label the X-axis and Y-axis
  The horizontal axis is called the X-axis and the vertical axis is called the Y-axis.

- *Tell them, they are going to represent the number of students on the Y-axis and the categories of grades on the X-axis.*
- *Ask the highest value in the given data set. i.e. 135 so all the bars will lie between 0 and 135.*
- *The number of students should be distributed equally on the Y-axis.*
- *We can't distribute one square unit for one student. So, ask them to take one unit for 20 students. Start the scale from 0.*
- *In X-axis, each unit represents the grade. The first unit for the fifth grade, the second unit for the sixth grade, and so on.*
- *Ask them to stick square shape stickers to represent the number of students in each grade. For the fifth-grade, let them stick the stickers in each square unit from 0 to 135, vertically on top of one another till they reach 135 in the Y-axis.*
  - *For sixth grade, ask the children to move one unit horizontally in the graph (x-axis, each unit represents the grade, so move one unit to represent the 6th grade) and let them stick the stickers in each unit from 0 to 120 in a vertical way.*
  - *Similarly, ask them to continue for the grade seventh, eighth, ninth, and tenth.*
- *Ask the following questions to the children, let them find out the answers.*
  1. *Which class has the maximum number of children? and the minimum?*
  2. *Find the ratio of students of class sixth to the students of class eight.*
- *Tell them, using the bar graph we can easily understand the data.*

Practice:
Give a new tactile graph to each group with a different data set. Let them try to represent the given data set in the given graph sheet. Observe the students' activity, assist them if they need any support. Once they have finished, ask the children to exchange their graphs.
Now, give some time to read the graph they got and ask the following questions to each group.

1. *What is the graph about?*
2. *What kind of information did you gather from the given graph?*

Finding the probability

Activity 3: Finding the probability

Materials Required: Coin and Dice
Prerequisites: Guessing numbers.

Activity Flow

- *Probability is the chance that something will happen, or how likely it is that an event will occur.*
  Here are some possible events:
    - *A. It will rain tomorrow.*
    - *B. I will be younger tomorrow than I am today.*
    - *C. I will come to school tomorrow.*
    - *D. The queen will appear on T.V tomorrow.*
- *Ask the following questions:*
    - *1 Which do you think is more likely, A or C.*
    - *2. Which is more likely C or B.*
- *Ask them to compare all possible pairs. State which is more likely in each case.*
- *Ask them to write all four events in order starting with the least likely to most likely.*
- *Then, tell the students that they are going to play a guessing game.*
- *The instructor has to toss a coin and the children have to guess the outcome.*
- *For each correct guess give one point to the students.*
- *For each wrong guess give one point to the instructor.*
- *Repeat the activity for 6 times.*

Reflections:
Ask the following questions;

1. *How was the game?*
2. *Did you have fun?*
3. *Who won the game? How?*
4. *Is this possible to get a tail at the first try?*
5. *When the instructor tosses the coin, what are the possible outcomes? The possible outcomes are head and tail.*
6. *Is it possible to get both the head and tail together? No*
7. *Is there any possibility to not get the tail at the first six chances?*

- *Let the child express their thoughts then explain the concept of probability.*
  Here, in the above game. If the instructor tosses a coin, either he/she will get the head or the tail. We have only two options in the coin so the probability of getting the head is ½ and the probability of getting the tail is ½. Out of two options, we will get anyone at a time.
- *Tell the children, now I have dice in my hand. It has six sides.*
- *Ask the following questions and ask them to state the reason for their answers.*
    1. *What is the probability of getting six?*
    2. *What is the probability of getting even numbers?*
    3. *What is the probability of getting odd numbers?*

Let the children discuss with the teacher and clear the doubts.

For example:

- *In a dice, there are six sides (1, 2, 3, 4, 5, and 6). If you roll a dice, you may get 1 or 2 or 3 or 4 or 5 or 6. Out of six numbers, they will get anyone number at a time. The probability is* $\frac{1}{6}$ *for each side.*
- *The probability of getting 6 is* $\frac{1}{6}$.
- *The even numbers in the dice are 2, 4, and 6 so; the probability of getting any even number is* $3/6$.

3.3 LET'S DISCUSS: RELATE TO DAILY LIFE*

In our daily life, we are using different data sets to acquire different information. For example, During the COVID 19 situation, Doctors used the data set of affected patients for different reasons. Our government used a data set to find the range of spread in each week. In-class exams, your marks are also a data set, using that we can find the highest score obtained, the lowest score obtained, and the average of our class performance in each subject.

For example: In mobile centres, the shopkeeper sold 19 mobiles of Nokia brand, 55 mobiles of MI brand, and 15 mobiles of Apple brand in the last 3 months. Which brand of mobile is sold most? How did you find the answer? Discuss with the children, help them to understand the application of statistics in daily life.
Ask the children to think of an example of the above topic?

Probability:

Tomorrow, I think the sun will rise in the west. Is it possible? It is not possible.
Is there any possibility of rain tomorrow? It may or may not. Certain things will never happen and certain things might happen.

Ask the children to think of some situations, at least 3 examples of each, that are certain to happen, some that are impossible, and some that may or may not happen i.e., situations that have some chance of happening.
In real life, we express probability with words such as "likely" or "certain". You might not even realize you are expressing probability, but you are.

For example, in Bangalore, the chance of rain is likely to happen at any time during the month of July and August. So the probability of getting rain at any time in July and August is high.

4. EXERCISES & REINFORCEMENT

4.1 EXERCISES & REINFORCEMENT

Practice and Recall

Activity 1: Recall and Practice

Materials Required: None
Prerequisites: Mean, *Median*, *Mode* , *Range*, *Probability*

Activity Flow

1. *In the mid-term test, Arun scored 45 in Math, 78 marks in Science, 67 in Language, 78 in English. Find his average marks in all the subjects.*
2. *Find the mean of the first five whole numbers.*
3. *Find the mode of the following data:*
   12, 14, 12, 16, 15, 13, 14, 18, 19, 12, 14, 15, 16, 15, 16, 16, 15, 17, 13, 16, 16, 15, 15, 13, 15, 17, 15, 14, 15, 13, 15, 14

4. *The runs scored in a cricket match by 11 players are as follows: 6, 15, 120, 50, 100, 80, 10, 15, 8, 10, 15 Find the mean, mode and median of this data. Are the three the same?*
5. *Tell whether the following is certain to happen, impossible, can happen but not certain.*

i. *You are older today than yesterday.*
ii. *A tossed coin will land heads up.*
iii. *A dice when tossed shall land up with 8 on top.*
iv. *The next traffic light seen will be green.*
v. *Tomorrow will be a cloudy day.*

6. *There are 6 marbles in a box with numbers from 1 to 6 marked on each of them.*
   (i) What is the probability of drawing a marble with number 2?
   (ii) What is the probability of drawing a marble with number 5?
8. *A coin is flipped to decide which team starts the game. What is the probability that your team will start?*

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 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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