Vision Empower & XRCVC

Teacher Instruction KIT

Symmetry

Syllabus: Karnataka State Board
Subject: Mathematics
Grade: 6
Textbook Name: Math Text cum workbook
Chapter Number & Name: 13. Symmetry

1. OVERVIEW

1.1 OBJECTIVE & PREREQUISITES

Objective

Students will be able to:

- identify symmetric figures
- draw lines of symmetry
- understand the concept of two or multiple lines of symmetry.

Prerequisite Concept

- Symmetrical figures

TIK_MATH_G5_CH18_Symmetrical Figures

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*Kindly Note: Activities marked with * are mandatory*

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2. LEARN

2.1 KEY POINTS

Symmetry: Mathematically, symmetry means that one shape becomes exactly like another when you move it in some way: turn, flip or slide. For two objects to be symmetrical, they must be the same size and shape, with one object having a different orientation from the first. There can also be symmetry in one object, such as a face.

2.2 LEARN MORE
None

3. ENGAGE

3.1 INTEREST GENERATION ACTIVITY
INTRODUCTION TO THE TOPIC
Activity 1: Folding test
Materials Required: sheets of paper in rectangular, triangular, square and circle shape.
Prerequisites: None

Activity Flow

- *Tell the students that they can find if a shape has a Line of symmetry by folding it.*
- *Distribute the rectangle shape of paper to the students and ask them to fold the paper. When the folded part sits perfectly on top (all edges matching), then the fold line is a line of symmetry.*

- *Ask them to fold the paper in a different way to find the line of symmetry.*
- *Similarly, distribute the triangle and circle shape paper to the students and ask them to find the line of symmetry.*

or

- *Distribute a circle, square, and a rectangle with a line through the center(mark the line using glue).*
- *Ask students, what do the three shapes have in common?*
- *Allow for responses and discussion. Lead the discussion to the two equal halves of each shape. They are symmetrical.*
- *Introduce the term symmetry to the class.*

3.2 CONCEPT INTRODUCTION ACTIVITIES

SYMMETRY

Activity 2: Introduction to symmetry

Materials Required: Flower, leaf.

Prerequisites: None

Activity Flow

- *Ask and explain the following examples to introduce the concept of symmetry.*
- *Ask them what they do when they want to share a piece of bread among two friends where two of them are equally hungry.*
  Answer: Both of them will make sure that one piece of bread is divided equally in the middle into two.
  This is simple and very often we would come across with such examples. And this is an example of symmetry.
- *Show them the real flower and ask them to rotate it to 90 degrees or any angle of degree and ask them if the shape or the design of the flower got changed or not.*
- *If possible show them the 4 petals or 6 petals flower and ask them to divide the flower into half. Also, ask them how many petals will be there in each half.*
- *Show them the real leaf otherwise tactile diagram of the leaf and explain the symmetry in it.*
- *The human body is vertical line symmetry.*

Note: Symmetry means that one shape becomes exactly like another when you move it in some way such as turn, flip or slide. For two objects to be symmetrical, they must be the same size and shape, with one object having a different orientation from the first.

- *Ask the students to give examples for the symmetry that they see in day to day life.*

Activity 3: Horizontal and vertical line of symmetry
Materials Required: A4 Sheet
Prerequisites: concept of symmetry

Activity Flow

- *Take an A4 sheet of paper, ask them to fold it vertically (The breadth of the two sides has to meet each other) and similarly take another sheet of paper and fold it horizontally(the longer sides have to meet each other).*
- *Then we could observe that the two halves are symmetric to each other and the common line which divides the sheet into equal halves is called the axis of symmetry or vertical line of symmetry and similarly the horizontal line is called the horizontal line of symmetry.*

SYMMETRICAL AND NON_SYMMETRICAL FIGURES

Activity 4: Making symmetric figures
Materials Required: A4 sheet, glitter paints, sand/Rava, leaf stencil.
Prerequisites: Concept of horizontal and vertical line of symmetry.

Activity Flow

- *Take an A4 sheet of paper and fold it vertically and crease it. Then open the two halves, in one of the halves ask them to draw with glitter paints however if they want to make it more effective to touch and feel the painting sprinkle sand/rava on it. After that, fold the paper in half and leave it for a minute then unfold and leave it to dry.*
- *Open the sheet and see that both halves will have the same design giving a pattern of symmetry.*
- *Ask them to observe it.*

OR

- *Take an A4 sheet and fold it into half then crease the middle point. Then cut the leaf stencil into equal half and keep only half portions of the leaf along the crease line.*
- *Let students paint the inside portion of the leaf then take out the stencil and fold the paper. After a while ask them to open and see that the other portion of the leaf is formed on the other side. Finally, they can see the complete leaf just by painting the half leaf will get the whole leaf which is nothing but the middle line acts as the axis of symmetry.*
- *This activity is also an example of one line symmetry.*

Activity 5: Symmetric and non-Symmetric Figures

Materials Required: A4 sheet.
Prerequisites: Concept of symmetry

Activity Flow

- *Ask them when do they say a given figure is not symmetrical?*
- *Do the following activity to understand between symmetric and non-symmetrical figures.*
- *By now they all know that when they fold an A4 sheet of paper vertically or horizontally and the obtained two halves will be symmetric to each other.*
- *Ask them to fold the paper diagonally.*
- *If they fold the A4 paper diagonally and even there they will see two halves but these halves will not coincide or overlap. So this is an example of non-symmetric figures.*
- *Ask the students to give examples of symmetric and non-symmetric figures from their surroundings.*

LINES OF SYMMETRY

Activity 6: Figures with two lines of symmetry

Materials Required: Two sets of two different set squares, tactile diagram of a kite, A4 sheet
Prerequisites: Concept of symmetry.

Activity Flow

- *Show them the tactile diagram of the kite.*
- *Ask them to take two sets of two identical set squares. Place them side by side to form a kite. Then ask them how many lines of symmetry does the shape have?*
- *Also, ask them whether some shapes or diagrams may have more than one line of symmetry and discuss.*

AND

- *Ask the students to take the A4 sheet (rectangular sheet). Fold it once lengthwise so that one half fits exactly over the other half. Is this fold a line of symmetry?*
- *Open it up now and again fold its width in the same way.*
- *Ask them is that second fold also a line of symmetry and why?*
- *Ask them whether they agree to a point that these two lines are the lines of symmetry and discuss.*

Activity 7: Paper folding to show line of symmetry

Materials Required: Scissor, A4 sheet, tangrams of different shapes.
Prerequisites: None

Activity Flow

- *Take an A4 sheet of paper. Fold the paper horizontally (longer sides have to touch each other) and then again fold the paper(vertically) into two equal halves. Again fold the paper vertically(i.e vertically folded the paper twice).*
- *Cut along 3cm horizontally and 3cm vertically in one of the closed corners which have the centre point of the two folds.*
- *Before they unfold the shape ask them to guess the shape they are likely to get.*
- *How many lines of symmetry does the shape have which has been cut out?*
- *Ask them to create their own shapes or designs and discuss the symmetry.*

OR

- *Give tangrams to all and ask them to make their own designs such that each design should have at least two lines of symmetry.*

Activity 8: Figures with multiple lines of symmetry

Materials Required: Geometry kit, parchment paper, Tactile Diagram of page no. 133.
Prerequisites: Concept of horizontal and vertical line of symmetry.

Activity Flow

- *Show them the tactile diagram and explain the step by step procedure to create their designs with lines of symmetry.*
- *Stick parchment paper with pins on the 4 corners on a rubber pad.*
- *Draw a long horizontal and vertical line on the middle of the sheet. So that we will get four equal parts which are also called four quadrants.*
- *Now ask them to draw anything they want to in one of the four parts such that the starting and ending point of line should touch the long lines.*
- *Now ask them to shuffle the design sheet among themselves. Then let them try to draw the same design done by the first person in the very next divided part of the sheet.*
- *Similarly, continue this until they finish the third part and finally the sheet has to reach to the owner for the last part to complete and ask them to observe the overall design they got and also discuss the lines of symmetry.*
- *Do all of them have the same number of lines of symmetry?*
- *Does the line of symmetry depend on the number of quadrants filled with designs?*
- *If only two consecutive quadrants are filled. Then we will get only one line of symmetry.*

Activity 9: Identifying symmetric figures

Materials Required: Tactile Diagram of symmetric and non-symmetric figures or objects which have lines of symmetry (leaf, scissors, box, Id-card) and non- symmetric objects

Prerequisites: Concept of symmetry

Activity Flow

- *Make two groups and mix both symmetric and non symmetric figures and give it to groups and ask them to sort it into symmetric and non symmetric figures.*
- *Ask them based on which reasons they have classified each figure into symmetric and non symmetric.*

Activity 10: Reflection and Symmetry

Materials Required: Tactile diagram of alphabet M and its mirror reflection, Graph sheet, bindis.

Prerequisites: None

Activity Flow

Line symmetry and mirror reflection are naturally related to each other.

- *Show the tactile diagram of the print alphabet M and its reflection.*
- *Explain to the students, the object and its image are symmetrical with reference to the mirror line.*
- *If the paper is folded, the mirror line becomes the line of symmetry. We then say that the image is the reflection of the object in the mirror line.*
- *when an object is reflected, there is no change in the lengths and angles; i.e. the lengths and angles of the object and the corresponding lengths and angles of the image are the same.*
- *In braille the letters e and i are mirror images of each other. Ask if they can think of any other such letters in braille.*

Following activity is an adaptation in the subtopic reflection and symmetry. There is an activity named Do this activity in the textbook page number 138.

- *Put a line of symmetry using bindis such that we will divide the sheet into two parts. Ask them to make whatever designs they want on one side of the sheet and ask them to make the reflected image or mirror image on the other side.*

Paper decoration:

- *Ask them to fold the paper several times (vertically) and create some patterns using their slate and stylus.*
- *After creating their own design, ask them to open the paper and to Identify the line symmetries in the repeating design.*

3.3 LET'S DISCUSS: RELATE TO DAILY LIFE

Nature has plenty of things having symmetry in their shapes.
For example,

- Honey comb- For thousands of years, humans have marveled at the perfect hexagonal figures in honeycombs and wondered how bees can instinctively create a shape humans can only reproduce with a ruler and compass. The honeycomb is a case of wallpaper symmetry, where a repeated pattern covers a plane.
- Animals - Most animals have bilateral symmetry -which means that they can be split into two matching halves, if they are evenly divided down a centerline. Even humans possess bilateral symmetry

Other examples,

- Houses have symmetrical windows, symmetrical roofs
- Buildings and design of see saw, beam balance and the arrangement of wheels in the vehicles.

4. EXERCISES & REINFORCEMENT

4.1 REINFORCEMENT

Activity 11: Practice and Recall
Materials Required: None
Prerequisites: None

Activity Flow

1. *List any four symmetrical objects from your home or school.*
2. *Draw a triangle which has*
   (a) exactly one line of symmetry?
   (b) exactly two lines of symmetry?
   (c) exactly three lines of symmetry?

Teaching Tips:
If there are any additional teaching tips then utilize this section to mention them.

References:
NONE

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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