Vision Empower & XRCVC

Teacher Instruction KIT

Patterns and Symmetry

Syllabus: Karnataka State Board
Subject: Mathematics
Grade: IV
Textbook Name: Mathematics Text cum Workbook
Chapter Number & Name: 16, Patterns and Symmetry

1. OVERVIEW

1.1 OBJECTIVE & PREREQUISITES

Objective

Students will be able to:

- find the patterns in multiplication and division,
- find the given numbers as factors of 9,
- recognize the number pattern,
- divide and multiply numbers by 10 and 100,
- recognize geometrical patterns based on symmetry.

Prerequisite Concept

- Patterns in number and shapes

TIK_MATH_G3_CH12_Patterns

Content Index

*Kindly Note: Activities marked with * are mandatory*

Activity 1: Introducing symmetry and line of symmetry
Activity 2: Recognise geometrical patterns on the basis of symmetry

LET'S DISCUSS: RELATE TO DAILY LIFE*

EXERCISES & REINFORCEMENT

Activity 3: Practise Problems
Exercise Reading
Perform Textbook Activity
Provide Homework

2. LEARN

2.1 KEY POINTS

- Symmetry: Symmetrical patterns are a design or pattern that is identical on both halves when folded. Symmetrical patterns can have multiple lines of symmetry.
- Pattern: A pattern is a series or sequence that repeats. Math patterns are sequences that repeat based on a rule.

2.2 LEARN MORE

3. ENGAGE

3.1 INTEREST GENERATION ACTIVITY

Activity 1: Pattern

Materials Required: " Bindi" and toothpick sticks
Prerequisites: None

Activity Flow

- *Distribute 10 sticks and 10 "Bindhi" to each student*
- *Ask them to name the sticks as A and the "Bindhi" as B.*
- *Now ask the students to arrange the object in the given sequence.*
  - *AB*
  - *AA BB*
- *Check whether the students follow the pattern.*
- *Tell the students that a pattern is a design that repeats.*
- *Now, ask them to arrange the given materials using different patterns.*
- *Give the following patterns to the students and ask the students to find the rule of the pattern.*
  - *2, 4,6, 8, 10, ___, ____*
  - *The next two numbers are 12 and 14. The rule is adding 2 to the previous number.*

- *5, 10, 25, 20, ___, ___*
- *The next two numbers are 25 and 30. The rule is adding 5.*

3.2 CONCEPT INTRODUCTION ACTIVITIES

PATTERNS

Activity 1: Make patterns using shapes

Materials Required: Tangrams of basic geometrical shapes (circle, square, triangle and semicircle)

Prerequisites: Concept of the pattern.

Activity Flow

Ask the students to choose many pieces of any two tangram shapes and make their own pattern and let them explore each and everybody's pattern and discuss the different patterns of shapes observed in a class.

Activity 2 Number patterns

Materials required: None

Prerequisites: Concept of the pattern.

Activity Flow

- *Ask the students to find the next two numbers for the following number patterns. Then do the exercises in the book. Also, ask them on what basis they decide the next numbers.*
    a) *1, 3, 5, 7, 9,__ _, ____*
    b) *3, 6, 9, 12, 15, ___, ____*
    c) *15, 20, 25, 30, 35, ___, ____*
    d) *100, 110, 120, 130, ___, ____*
- *Addition of odd numbers, even numbers and natural numbers:*
- *Under all these categories of number patterns, ask the students to add the first 10 numbers together as given in the textbook.*
    - *Addition of odd numbers:*
    - $1+3=4=2^2$
    - $1+3+5=9=3^2$
- *All the exercises we did above shows a pattern is a series or sequence that repeats. Math patterns are sequences that repeat based on a rule.*

Activity 3: Mathematical operation patterns

Materials required: None

Prerequisites: Concept of the pattern.

Activity Flow

A pattern in multiplication:

- *Ask them to write the number 3 table till 10 and ask them what would be the 11th and 12th number in the table and how will they find out.*
- *For example,*
    - $3*1=3;(0+3)$
    - $3*2=6;(3+3)$
    - $3*3=9;(6+3)$

A pattern in division:

- *Ask the students to write table 5 and they have to divide all the numbers by 5 and write the quotient in an order. Then let them explain what they have observed. Also, ask them what they would get if they multiply all the quotients by 10 then divide the product by 5.*
- *For example,*
    - $5\times1=5,\ 5/5=1$ *(divide by 5)* , $1*10=10$ *(multiplication by 10)*
    - $5*2=10,\ 10/5=2,\ 2*10=20$
    - $5*3=15,\ 15/5=3,\ 3*10=20$

SYMMETRY

Activity 1: Introducing symmetry and line of symmetry

Materials Required: A4 sheets, pictures of a circle, semi-circle, pentagon, hexagon, irregular shape, tactile diagram of leaf and butterfly.

Prerequisites: Concept of symmetry.

Activity Flow

What is symmetry?

- *Do the following activity to explain the concept of symmetry.*
- *Take a rectangular sheet of paper and fold it into half (horizontally) and ask them to observe that the middle line divides the paper equally into half. Similarly, when we fold it vertically.*
- *Therefore the line which divides the whole shape equally giving the symmetrical shapes on either side and when we fold the two divided parts should superimpose on each other and should look alike. Then that line is called as lines of symmetry or axis of symmetry.*

Activity 2: Recognize geometrical patterns on the basis of symmetry

Materials Required: A4 sheets, pictures of a circle, semi-circle, pentagon, hexagon, irregular shape, tactile diagram of a leaf, butterfly and equilateral triangle.
Prerequisites: Concept of symmetry.

Activity Flow

- *Take a square paper and try to fold horizontally and vertically we observe that they result in symmetric shapes. Therefore, we have two lines of symmetry. We know that squares have two diagonals, ask the students to fold the square diagonally and see if they get the symmetrical shapes in both the triangles. If so, then the square will have 4 lines of symmetry otherwise 2 lines of symmetry.*
- *Now, ask the students to try folding diagonally on a rectangular sheet of paper and discuss whether they get the symmetrical figures.*
- *Similarly, there are 3 lines of symmetry through which we get the symmetrical shapes by folding them into half in all 3 corners of the equilateral triangle.*
- *Show them the tactile diagram of butterfly and leaf and explain to them that these are the few symmetrical figures that we see in nature. Also we humans are an example of an asymmetrical figure.*
- *Cut and give papers in the shape of a circle, semi-circle, pentagon, hexagon, irregular shape and ask them to find the number of lines of symmetry of each shape by folding.*
- *Also, ask them to give examples for symmetrical objects and non-symmetrical objects which they come across in their daily life or surroundings.*

To get an equilateral triangle from a square sheet of paper:
First show the model of an equilateral triangle

- *Step 1: Take a piece of square paper (origami/ Foam).*
- *Step 2: Fold and unfold the square sheet of paper in half lengthwise (vertically).*
- *Step 3: Now fold the bottom left corner so that it goes over the centerfold. Make sure that the edge of the paper goes from the right bottom corner to the center crease. Pinch where the former bottom right corner meets the center line.*
- *Step 4: Make a fold that goes from where the pinch intersects the center to the bottom right-hand corner, repeat on the left side. These will become the two other sides of the triangle.*
- *Step 5: Now, sharply crease the right side of the triangle both ways. Then lick the crease and rip (or use scissors)*

Note: Link to make a paper triangle from a square: https://www.instructables.com/How-to-make-a-paper-triangle-from-a-square/

3.3 LET'S DISCUSS: RELATE TO DAILY LIFE*

A pattern exists when a set of numbers, colours, shapes or sounds are repeated over and over again. Patterns can be found everywhere: including in animals, plants and even the solar system.
For example,

- Each day we experience sunrise and sunset. This event occurs repeatedly. This pattern caused the Earth's rotation around the sun.
- School time table: Time limit of each period (45 minutes).

4. EXERCISES & REINFORCEMENT

4.1 PRACTICE AND EXERCISES

Activity 3: Practice Problems

Materials Required: None

Prerequisites: Concept of pattern and symmetry

Activity Flow

I. *Observe the example and fill up the missing.*

a. *Example 1:* $(1\times1)-(0\times0)=1-0=1$

Example 2: $(2\times2)-(1\times1)=4-1=3$

Example 3: $(3\times3)-(2\times2)=9-4=5$

$(4\times4)-(3\times3)=$ ___ − ___ = ___

$(5\times5)-(4\times4)=$ ___ − ___ = ___

b. *Example 1:* $(5\times5)-(4\times4)=5+4=9$

Example 2: $(6\times6)-(5\times5)=6+5=11$

Example 3: $(7\times7)-(6\times6)=7+6=13$

$(8\times8)-(7\times7)=$ ___ + ___ = ___

$(9\times9)-(8\times8)=$ ___ + ___ = ___

c. *Example 1:* $9\times1=09;\ 0+9=9$

Example 2:

$9\times2=18;\ 1+8=9$

$9\times3=27;\ 2+7=9$

$9\times4=$ ___

$9\times5=$ ___

$9\times6=$ ___

$9\times7=$ ___

$9\times8=$ ___

$9 \times 9 =$ ___

$9 \times 10 =$ ___

II. Observe and write the pattern:

a. $4 \div 2 =$

$6 \div 3 =$

$8 \div 4 =$

$10 \div 5 =$

$12 \div 6 =$

b. $9 \div ? = 9$

$18 \div ? = 9$

$27 \div ? = 9$

$36 \div ? = 9$

$45 \div ? = 9$

c. $10 \div ? = 10$

$20 \div ? = 10$

$30 \div ? = 10$

$40 \div ? = 10$

IV. Fill up the blanks. Check whether they form any pattern.

a) $1 \times 2 \times 3 =$ ___

$1 \times 4 \times 5 =$ ___

$1 \times 6 \times 7 =$ ___

IV. Fill up the blanks and observe the pattern.

a) $60 \div 5 =$ ___

$60 \div 10 =$ ___

$60 \div 15 =$ ___

$60 \div 20 =$ ___

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

References

1. How to Make an Equilateral Triangle From a Square: Retried from https://www.instructables.com/How-to-make-a-paper-triangle-from-a-square/

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