Vision Empower & XRCVC

Teacher Instruction KIT

Patterns

Syllabus: Karnataka State Board
Subject: Math
Grade: 5
Textbook Name: Karnataka State Board
Chapter Number & Name: 20.Patterns

1. OVERVIEW

1.1 OBJECTIVE AND PREREQUISITES

Objective

- Understand the rule followed in the pattern,
- Complete the pattern by following the rule,
- Create designs,
- Know that numbers can be arranged in patterns,
- Identify the number pattern,
- Form triangular and square numbers through patterns,
- Recognize number pattern and solve the problem,
- Relate sequence of odd numbers and consecutive square numbers,
- Make border strips and tile patterns,
- Know about different kinds of border strips and tiling patterns

Prerequisite Concept

- Patterns

TIK_MATH_G4 _CH16_Patterns and Symmetry

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*Kindly Note: Activities marked with * are mandatory*

NUMBER PATTERNS

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BORDER STRIPS AND TILING PATTERNS

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3.3 LET'S DISCUSS: RELATE TO DAILY LIFE*

4 EXERCISES & REINFORCEMENT

HOMEWORK PROBLEMS

Activity 5: Homework problems

4.2 IMPORTANT GUIDELINES*

Exercise Reading

Perform Textbook Activity

Provide Homework

2. LEARN

2.1 KEY POINTS

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: Create shapes and patterns

Materials required: Tangrams

Prerequisites: Counting, identifying shapes

Activity Flow

Game Overview and Basic Rules for Play:

A tangram is a two-dimensional re-arrangement puzzle created by cutting a square into seven pieces. Seven geometric shapes called "tans"

These tangram shapes can be fitted together as a large square, rectangle, or triangle. They can also be arranged in a variety of complex shapes, including fanciful ones.There are many ways to play with tangrams. The simplest way is to let kids create their own complex shapes. But traditionally, tangrams are treated as puzzles.

Tangrams offer kids an excellent opportunity to test out different geometric manipulations, also number sense and become familiar with the properties of the shapes they use.

But notice the triangles-big, medium, and small or are all the same shape.

Session 1:

- *Give them the tangrams and let them explore the shapes.*
- *Ask them how many different shapes that they come across and which they are. Also ask them how many small, medium and big shapes are there.*
- *Ask them to create any design/shape that they want to. Once it is completed ask them how many shapes they have used.*
- *Give the same number to the whole class, so that they have to take only those many shapes and create their own design and later explain one by one what they have done.*
- *Ask the students, if they can give examples for in and around or in their surrounding the shapes they have seen in tangrams.*
- *Ask them to take a random number of shapes without counting and make it two groups.*
- *From each group they should create one story. And later see which story had used more shapes.*
- *Take only 10 shapes and divide it into two groups and hold it in both the hands. Show them one hand, let them count the number of pieces it has, then ask them how many pieces will be there in the other hand.*
- *Similarly, ask them to pair up themselves and do it with each other.*
- *Once they are completely familiar with the tangrams, ask them to sort the tangrams. Let it be based on shapes, structure, length, size etc.*
- *Then once they are done with sorting they will have a few groups and ask them based on what features they sorted or grouped those tangrams. Later ask them to make some designs from each different group of tangrams.*
- *Ask them to use only two kinds of shapes and make anything out of it pattern/design/bigger shapes.*
- *Also, check with the students, if they want try making any 3D shapes using tangrams.*

Activity 2: Patterns

Materials required: 3 broad items/boxes of different materials such as wood, steel and plastic. 3 steel glasses of similar size, preferably little longer in height, 1 steel spoon and water.
Prerequisites: None

Activity Flow

Number of players: 4

Game overview and basic rules for play:
The objective of the game is to make sound and form a pattern with these sounds by first hitting 3 different items and then hitting the glasses filled with different levels of water.
The game starts by hitting 3 items of different materials with a spoon, one by one and then forming a pattern.
In the second round replace the items with glasses filled with different levels of water and then produce sound by hitting them with a spoon. Once the children get familiar with different sounds, they would make patterns with sounds.

Play session plans:

Session 1

- *Place 3 different items on the table, in front of the child (items made up of wood, plastic, steel).*
- *First, help the children understand where these objects are on the table.*
- *Once they get familiar, ask them to hit one item with a spoon/ thick stick, recognize the sound, and similarly hit all 3 items one by one.*
- *Ask the children to give names to these items. For example: first item is A, second item is B, third item is C. Now, tell them to make different sounds by hitting them in different sequences such as, make a sound by hitting A then B and then C (pattern ABC , ABC) or AA , then BB and then CC(pattern AABBCC, AABBCC).*
- *These are the patterns which children made, now ask each of them to make their own pattern. While one is producing the sound others can guess the pattern. Later the child can share what pattern he made.*
- *Later, replace 3 different items with 3 steel glasses of similar size.*
- *First, ask the children to hit one empty glass with a spoon and listen to the sound.*
- *Then pour some water (half of the glass) in another glass, ask the children to put their fingers and check how much water is there.*
- *Help the child in the beginning to hit the glass filled with water. And then compare the difference in sounds made by hitting an empty glass and a glass filled with half water.*
- *Now keep all three glasses on the table, in front of the child. One empty glass, one half filled and one completely filled glass.*
- *In the first turn, assist the child in knowing where these glasses are , they can also first hold the glass and then hit it with a spoon.*
- *Once they get familiar, ask them to make different patterns the way they did with different items.*

3.2 CONCEPT INTRODUCTION ACTIVITIES

NUMBER PATTERNS

Activity 3: Patterns with numbers

Materials required: Bindis, Geoboard/Graph sheet.
Prerequisites: Patterns, numbers

Activity Flow

Ask the following questions to the students to give the next 4 numbers

1. *5, 10, 15, 20, 25, 30, ___*
2. *2, 3, 6, 7, 10, 11, 14, 15, ___*
3. *8, 16, 24, 32, ___*
4. *19, 18, 17, 16, ___*

Number pattern:

- *While doing the number pattern, ask them to write their own number pattern and ask for the logic.*

Square numbers:

- *Make use of geoboard or graph sheet and bindis as dots to make figures of squares numbers 4, 9, 16 and 25. Also ask them if they can make a big square using bindis as dots and count the maximum number of dots it has.*
- *Also tell them that the sum of consecutive odd numbers will give square numbers. Then ask them to find the next 4 square numbers.*

  Example: $1+3=4$
  $1+3+5=9$
  $1+3+5+7=16$
- *Also ask them if they can find the next 5 square numbers.*

Triangular numbers:

- *Ask them to use 3 bindis to make triangles on a graph sheet. Then using 6 bindis to make a triangle.*
- *Also ask them if they can make triangles using 10, 15 and 21 bindis.*
- *Then discuss that numbers like 3, 6, 10, 15, and 21 are called triangular numbers. Also ask them what could be the next 3 triangular numbers.*
- *Later, ask them to list 5 numbers that do not form triangular numbers.*

BORDER STRIPS AND TILING PATTERNS

Activity 4: Border strips and tiling patterns

Materials required: Tangrams, bowl of water
Prerequisites: Patterns

Activity Flow

This pattern of laying a collection of individual tiles together without any gaps or overlaps to fill some flat space is called Tiling.

- *Use the tangram shapes to create their own border and tile patterns and do this on the back of the slate. Before using the shapes, dip it in water and then use it, so that it will not move easily.*
- *Even the students can try drawing the borders or any pattern on parchment paper.*

3.3 LET'S DISCUSS: RELATE TO DAILY LIFE*

- Examples of natural patterns include waves, cracks, or lightning. Man-made patterns are often used in design and can be abstract, such as those used in mathematics, science, and language. In architecture and art, patterns can be used to create visual effects on the observer.
- Repeating patterns can be found in nature and everyday life. Patterns are present in architecture, clothing, multiplication tables, and even on the bottom of your shoes.
- The brick pattern on a building or home
- The pattern on the sidewalk or driveway
- The tree rings
- The patterns on a leaf
- The number of petals on flowers
- The neighborhood house colors, shape, size
- The shadows of people, trees, buildings

4 EXERCISES & REINFORCEMENT

4.1 PRACTICE EXERCISES

HOMEWORK PROBLEMS

Activity 5: Homework problems

Materials required: None

Prerequisites: Patterns

Activity Flow

1. *How many square numbers are there from 1 to 50 ?*
2. *How many triangular numbers are there from 1 to 50 ?*
3. *Express the following square numbers as the sum of consecutive odd numbers. 16, 36, 81, 100, 121, 144, 169, 225 Example :* $9 = 1 + 3 + 5$
4. *List the first four square numbers and triangular numbers. Represent them through dot diagrams.*
5. *Make designs by using tangram shapes.*
6. *Create your own new tile design out of a square. Can you do the same with a triangle ?*

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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