Vision Empower & XRCVC

Teacher Instruction KIT

Shapes and Spatial understanding

Syllabus: Karnataka State Board
Subject: Mathematics
Grade: Second
Textbook Name: Mathematics-Text cum Workbook(Revised)-Second Standard
Chapter Number & Name: 1. Shapes and Spatial understanding

1. OVERVIEW

1.1 OBJECTIVE & PREREQUISITES

Objective

- To identify and draw straight lines.
- Learning to draw horizontal, vertical and slant lines with the help of the tactile ruler.
- To distinguish between straight and curved lines.
- To understand the geometrical attributes of objects which roll/slide.
- To identify 2-D shapes (square, rectangle, triangle, circle) and understanding their features.
- To identify the basic 3-D shapes (cube, cuboid, cylinder, cone) and understanding their features.

Prerequisite Concept

- Shapes
- Numbers
- Counting

Refer TIK's
VE_TIK_Math_G1-01-Spatial Understanding
VE_TIK_Math_G1-02-Solids around us
VE_TIK_Math_G1-03-Digits(1-9)

Content Index

*Kindly Note: Activities marked with * are mandatory*

2. LEARN

2.1 KEY POINTS

The ability to use shapes to describe objects will greatly enhance a child's ability to verbally communicate. The ability to create shapes or draw helps develop the child's creativity. Children can use shapes as a method for sorting objects which in turn helps them develop logical thinking.

2.2 LEARN MORE

None

3. ENGAGE

3.1 INTEREST GENERATION ACTIVITY

Introduction to Straight line

Activity 1: Introducing straight line using a string*
Materials Required: String (2 meters' appx)
Prerequisites: None

Activity Flow
A stretched string appears like a straight line. Teacher needs to tie up each end of the string to a chair or a window and form a straight line. Ask each student to come and feel the straight line formed due to the tension in the string.

Encourage children to form a straight line using their hands.

Ask questions as to where have they observed straight lines in their surroundings? (Answer: clothesline, guitar strings, grills of windows, doors, walls).

3.2 CONCEPT INTRODUCTION ACTIVITIES

Paper folding to make straight lines

Activity 2: Fold the paper and get straight lines*
Materials Required: sheet of coloured paper for each child
Prerequisites: NA

Activity Flow

The teacher can first demonstrate the activity to the class and then let students do it on their own. Hand on hand technique with detailed instructions maybe needed initially to guide the student to make both edges meet when folding. Use a different coloured paper for making straight lines to make it interesting for low vision learners.

Fold the paper into half by joining two opposite ends of the paper. We get one straight line along the fold. Encourage children to feel the crease formed that is the straight line.

In case we fold the paper twice we get two straight lines along the fold. Let children fold the paper by themselves and form straight lines.

How do we draw straight lines?

Activity 3: Drawing straight lines using straight edged objects*
Materials Required: Ruler, book, pencil box, wood piece, rubber board, parchment paper, paper push pins, stylus
Prerequisites: NA

Activity Flow
The parchment paper needs to be cut into A4 size sheets and kept ready for students to do the activity. Teacher will need to help students fix the parchment paper over the rubber board with the help of paper clips on the corner of the sheet. Let every child have a stylus.

Now once the parchment paper is fixed to the rubber board teacher can tell students to draw straight lines. Place the ruler over the parchment sheet and with the help of the edge of a ruler and using the stylus straight lines can be made. Once the line is made, encourage children to feel the line and check if they have formed straight lines. The same can be repeated using a pencil box, book and a piece of wood.

Activity 4: Drawing straight lines using a ruler and free hand*

Materials Required: Ruler, paper push pins, rubber board, parchment paper, stylus.
Prerequisites: NA

Activity Flow

The teacher can give step by step instructions to draw a straight line.

Firstly, help students fix the parchment paper on the rubber board without a crease and place the paper push pins at the corners to hold the paper in place. Tell the children that the area enclosed within the pins is their drawing area. A straight line is formed when two points are joined. Let's do an interesting activity and check if the above statement holds good.

Provide each child with a pair of extra push pins, a ruler and a stylus. Instruct children to fix the push pins a little far away from each other and name them points 'A' and 'B'. Now using the ruler and stylus they need to join point 'A' to 'B' with a straight line. So we see points 'A' and 'B' are end points and a straight line is formed by joining these two points.

Encourage students to repeat the same activity using their free hand.

Activity 5: Horizontal, vertical and slanting lines*

Materials Required: stick/pencil
Prerequisites: NA

Activity Flow

Straight lines are horizontal if they go across from side to side, without going up or down at all.

Horizontal lines are laying down flat. Imagine yourselves sleeping on your bed flat and an imaginary line running from head to toe.

Straight lines are vertical if they go straight up and down, or top to bottom, without going across at all. Vertical lines, stand up tall. (Ask children to stand up straight and imagine a line running from head to toe)

Lines are slanting if they don't go straight across or straight up. They look like a slope and go both up and down, and across too.

With the help of a stick/pencil the teacher can demonstrate to the class horizontal, vertical and slanting lines.

Activity 6: Straight lines and curved lines*
Materials Required: Thread
Prerequisites: NA

Activity Flow
Tie a thread to a window or a table or a pole and hold the thread tightly with your hand. Will the thread form a straight line? Let the children take turns and feel the string. A piece of string held tight will form a 'straight line'.

Tie a thread to a window or a table or a pole and hold the thread loosely with your hand. Will the thread form a straight line? No. Let the children take turns and feel the string. A piece of string held loose will form a 'curved line'.

Understanding rolling and sliding

Activity 7: What rolls? What slides*
Materials Required: Board, objects like orange, tomato, ball, marble, matchbox, mobile, coins, carrom pawns, playing die, book, wooden plank.
Prerequisites: Flat/plane surface, curved surface

Activity Flow
Some objects only roll and some slide. They are a few, which can both roll and slide.

- Objects with plane surfaces will slide. Example: book, wooden plank.
- Objects with curved surfaces will roll. Example ball, marble.
- Objects with plane and curved surfaces will roll and slide. Example: coins, carrom pawns

Teacher needs to demonstrate the activity by creating a slope with a board and elevating it with a pile of books. The objects like orange, tomato, ball, marble, matchbox, mobile, coins, carrom pawns, playing die, book, wooden plank can be dropped one by

one by students from the slope to check if they roll or slide. Encourage children to feel the object and identify if they have a plane surface or a curved surface or both and speak out if the object will slide, roll or both before they drop the object on the slope.

Two dimensional shapes and their features

Activity 8: Square, rectangle, triangle, circle*
Materials Required: tangrams-square, rectangle, triangle and circle.
Prerequisites: Straight lines, slanting lines, horizontal, vertical and curved lines

Activity Flow

1. Introduce the topic to the students with phrases such as – "I have something new to show you today and tell you all about. Would you like to see it?"
2. Seat students with a place mat or tray in front of him. Tell them that they can explore what you are handing over to them and place it in the tray when they wish to keep it down, so that they do not lose it.
3. Hand over the square to them. Ask them if they know what shape this is. Tell them that this is a square! Let them repeat the name of the shape.
4. Now using the hand on hand technique guide them to explore the 4 (slightly) pointed corners of the square. Tell them that those are called corners.
5. Encourage them to count and tell you how many corners the square has. When counting you may have to guide them to keep the finger of their left hand on the corner where they begin counting, while moving their right hand to count the remaining 3 corners so that they know from which corner they began to count and do not count it twice.
6. In a similar manner, with your hand on the student's hand, guide them to feel the 4 sides (from corner to corner) and tell them that these are the sides of the square.
7. Next, encourage them to count and tell you the number of sides in a manner similar to point 5 where needed. Ask them if the sides appear as straight lines or slanting lines.
8. Tell them that they have counted correctly and that a square always has 4 corners and 4 sides.! And what is also special about a square is that all the sides are straight lines and equal in size.

Repeat the above steps for the other shapes such as the rectangle, triangle, circle.
When discussing the rectangle which also has 4 corners and 4 sides, allow the student to explore and identify that unlike the square the rectangle has two long sides and two short sides. Guide the student's hand to identify these if needed. Guide the student to place the square on top of the rectangle to reinforce the difference.
When discussing the circle, point out to the learner that he can find no pointy corners or sides since a circle has no corners and no sides.
Guide the student to identify that the triangle has three sides and two sides of the triangle are slanting lines and one side is a straight line.

Three dimensional shapes (Solid shapes)

Activity 9: Cuboid, cube, cylinder, cone and sphere*

Materials Required: tangrams-square, rectangle, triangle and circle.

Prerequisites: Numbers, Counting, Long & Short, concept of straight, slanting and curved, plane Shapes,

Activity Flow

1. Seat students with a place mat or tray in front of them. Tell them that they can explore what is handed over to them and place it in the tray when they wish to keep it down, so that they do not misplace it.
2. Handover the cube to the student. Ask them what shape is that? If they call it a square, point out to the student's that this is not a square but a cube. Tell them that the square, triangle, circle, and rectangle are all flat planar shapes.
3. Using hand-over-hand technique show the student's the different faces of the cube. Ask them what shape each face is. Tell them that they have correctly identified that each face of the cube is a square.
4. Now encourage them to count and find out how many faces does a cube have.
When counting you may have to guide them to keep the finger of their left hand on the face where they begin counting, while moving their right hand to count the remaining 5 faces so that they know from where they began counting and do not count it twice.
Tell them that since a square has 4 equal sides all faces of a cube are equal in size.
5. In a similar manner using the hand-on-hand method, introduce them to the Edges and Corners (Vertex) of the Cube. And encourage them to count them as directed in point 4.
6. After the student has identified that the cube has 6 faces, 12 edges and 8 corners; encourage them to explore it more and show you independently where the 6 faces, 12 edges and 8 corners of a cube are. Do this to ensure sufficient repetition of the parts of the cube shown to them.

Repeat the above steps for the other shapes such as the Cuboid, Cylinder, Cone, and Prism

While pointing out the following to the student -

Cuboid has 6 faces, 12 edges & 8 corners. All 6 faces are either rectangular in shape or some faces are squares and some are rectangles. All faces of a cuboid need not be equal to each other.

Cylinder has 1 curved surface, 2 circular shaped flat surfaces & 2 curved edges and no corners.

Cone has 1 curved surface, 1 circular flat surface, 1 curved edge.

Sphere has 1 curved face, 0 edges and 0 vertices. And the earth we live in is a sphere.

The below examples of solid shapes in the learner's environment can be presented in either of the following ways-

- Ask the student to look around and tell you the shapes of things in his surroundings.
- Ask the student to find 2 cuboids, 1 cone etc. in his environment.
- Give the student a box with different shaped objects from his environment and ask her/ him to pick something that is a cube, a cone and so on.
- Students could be asked to pair objects of similar shape from the box.

Suggestion for Objects-
Cube - Created with Lego or judo blocks, cardboard box, Rubik's cube, dice
Cuboid - Created with Lego or judo blocks, rectangle cardboard box, pencil box, tiffin box etc.
Sphere – ball, orange
Cone – 3D paper cone, ice cream cone, top, birthday caps,
Cylinder - Cylindrical CD storage box, Tissue roll center, Cylindrical Water bottle, Cheese tin

3.3 LET'S DISCUSS: RELATE TO DAILY LIFE*

There are various shapes in the environment. Shapes are used in various aspects of life. For example a fashion designer uses to design clothes, computer graphics can be created and shapes are widely used in many more visual professions.

4. EXERCISES & REINFORCEMENT

4.1 EXERCISES & REINFORCEMENT

Activity 10: Two dimensional shapes around you

Materials Required: Square biscuits, Square Paper, Square box lid, Handkerchief, Braille Slate, Table top, Mobile Phone, Rectangular Biscuit, TV Screen, Keyboard, Book, Rectangular box, Triangular Biscuit/Chips, CD, Circular Biscuit/Cookie, Circular Wrist Watch or Wall clock, Coins, Lid of a Jar, Bangle, Chapati/ Puri, Plate, Rim of a cup.
Prerequisites: NA

Activity Flow
Present various objects from the learner's environment and ask him to touch and identify the shape. The objects of different shapes could be presented in a bag/box for the learner to pick and tell you the shape.
Alternately the student could be asked to go around and identify the different shapes in his surroundings.
Or place all the objects in front of the student and ask them to pair the similar ones.
Some common examples to help you are given below-
Square – Square biscuits, Square Paper, Square box lid, Handkerchief
Rectangle – Braille Slate, Table top, Mobile Phone, Rectangular Biscuit, TV Screen, Keyboard, Book, Rectangular box
Triangle – Triangular Biscuit/Chips,

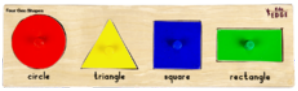
Circle – CD, Circular Biscuit/Cookie, Circular Wrist Watch or Wall clock, Coins, Lid of a Jar, Bangle, Chapati/ Puri, Plate, Rim of a cup.

Activity 11: Shape Sorting

Materials Required: magnet boards or felt boards to match/sort/organize shapes
Prerequisites: Shapes.

Activity Flow

Shape sorting aids to fit the correct shape in the correct slot can be used to give the learner repeated exposure of the shape. This also aids gross motor skill. For this activity leave the learner to try out and explore as many options to find the correct slot. Minimum hand on hand help should be provided.



Low-Cost Alternative-
Use magnet boards or felt boards to match/sort/organize shapes

Activity 12: Re-create the shape

Materials Required: Geoboard, rubber bands.
Prerequisites: Shapes.

Activity Flow

Have the learner copy/create simple shapes on geoboards. Using hand on hand method, direct the student as to how the rubber band needs to be wrapped on a geo board for creating shapes. Later they can make their own shapes based on names or clues such as "four corners", etc.

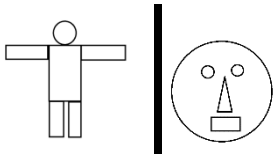
Low Cost Alternative – Types on Taylor Frame with Rubber bands
Other Alternatives for making shapes - Wiki Stick, String along
Using clay shape forms you can cut out shapes from clay or play dough

Activity 13: Draw your own shape

Materials Required: Shape Stencil, parchment paper & rubber mat or felt pen and paper
Prerequisites: Shapes.

Activity Flow

Before beginning this activity, ensure that the learner has sufficient time to explore all the materials being used – writing board, rubber mat, sheet, stencil, stylus/felt pen.
Using hand on hand technique show the learner how to use the writing board with rubber mat & parchment paper; if not already known. Give time to practice this.
Give students practice to scribble lines and curves while applying little pressure on the parchment paper and to see his work.
Next, allow the student to identify the shape on the stencil he wishes to draw.
Guide him to place the stencil correctly on the paper and hold it down with his non dormant hand so that it doesn't move. Ask him to ensure that his hand is not in the way of the area he needs to draw. Using his dormant hand, guide him to trace the shape while keeping the stylus sticking to the border of the stencil.
Shapes can also be drawn with the plastic/wooden shapes TLA used earlier.
To conclude this activity, ask student to draw a boy using different shapes as shown below-



Activity 14: Recreate your own three dimensional shape

Materials Required: Lego blocks/Jodo blocks
Prerequisites: Three dimensional Shapes.

Activity Flow

The student can be encouraged to make a cube or cuboid using Lego blocks and other similar Jodo blocks.

Activity 15: Tracing of solid shapes

Materials Required: Shape Stencil, parchment paper & rubber mat or felt pen and paper
Prerequisites: Shapes.

Activity Flow

Guide the student to trace the solid shapes on the sheets. For example, when you trace a cube you will get a square. You will get a circle when you trace a cylinder and so on.

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

References
Shapes & Sharing Picnic Basket

http://www.pathstoliteracy.org/braille-emergent-literacy-struggling-readers/content/strategies/shapes-sharing-picnic-basket

4.1 IMPORTANT GUIDELINES*

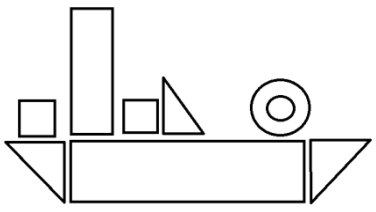
Exercise Reading
It is very important that the children practice their learnings as well as their reading. Hence have the children read out the newly learned concepts from their textbooks or other available resources.

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

1. **All shapes together**

Present tactile or large print shapes as shown below and ask the students to count the number of squares, rectangles, circles & triangles and also colour each shape with a different wax crayon. For example: squares can be coloured red, rectangles-yellow, circles-green and triangles-black.



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