Vision Empower & XRCVC

Teacher Instruction KIT

Perimeter and Area of Simple Geometrical Figures

Syllabus: Karnataka State Board
Subject: Math
Grade: 4
Textbook Name: Mathematics text cum workbook
Chapter Number & Name: 1 & Perimeter and area of simple geometrical figures

1. OVERVIEW

1.1 OBJECTIVE & PREREQUISITES

Objective

Students will be able to

- Understand the concept of perimeter.
- Build simple geometrical shapes.
- Find the perimeter of geometrical figures.
- Find the perimeter of real-life objects like a book, table, and Taylor frame.
- Understand a model sum that explains the perimeter of the triangle.
- Match with appropriate perimeter values for the given geometric figures.
- Find the length of the remaining side when the perimeter and values of other sides are given.
- Finding the perimeter of a geometrical figure having zero sides is called the circle.
- Find the perimeter of irregular closed figures.
- Find an area of different geometrical figures drawn on a graph sheet.
- Find an area of the triangle, rhombus, and irregular shape.
- Make two shapes on a graph sheet having a perimeter of 16 cm and 20cm and to find an area of each of them.

Prerequisite Concept

- Addition, Multiplication, and identification of shapes.

TIK_MATH_G3_CH1_Shapes, TIK_MATH_G3_CH5_Multiplication

Content Index

*Kindly Note: Activities marked with * are mandatory*

2. LEARN

2.1 KEY POINTS

- Perimeter - Perimeter is the distance around the outside of a shape. Perimeter is found by adding together the length of all a shape's sides.

- Area - In geometry, the area can be defined as the space occupied by a flat shape or the surface of an object. The area of a figure is the number of unit squares that cover the surface of a closed figure. The area is measured in square units such as square centimeters, square feet, square inches, etc.

2.2 LEARN MORE

3. ENGAGE

3.1 INTEREST GENERATION ACTIVITY

Activity 1: Discover length

Materials Required: Tactile ruler and any small objects

Prerequisites: Measurement

Activity Flow

- *Recall the following concepts.*
  - *Length is the distance along an object from end to end.*
  - *Width is the distance from one side of an object to the other side.*
  - *Height is the distance from the lowest point to the highest point of an object or a person.*
- *Ask the students to take any 3 small objects which are nearer to them.*
- *Ask them to compare and order those objects by their length.*
- *Ask the students to measure the length of those objects by hand spans and then by the tactile ruler.*
- *Similarly, ask them to measure the height of the objects.*

3.2 CONCEPT INTRODUCTION ACTIVITIES

INTRODUCTION TO PERIMETER

Activity 1: Introduction to the perimeter.

Materials Required: Tactile ruler and parchment paper.

Prerequisites: Identification of shapes.

Activity Flow

Explain the following examples to the students.

1. *Raju's father has purchased a piece of land and it needs to be fenced. How many meters of wire is required?*

2. *Rita wants to put a border around her table. How many meters of the border is required for her?*

To solve the above problems, the total length has to be calculated. The total length is also called a perimeter, which is the sum of the length of each side. Length is measured using a tactile ruler or measuring tape.

- *Ask the students to make a line on a paper with the slate and stylus and measure the length of it?*
- *Ask the students to create square shapes on parchment paper, with the length of each side as 4 units and a rectangle of length 3 units and width as 4 units. Then ask them, what could be the total length of square and rectangle shapes?*
  The total length of the square is 16 units and the rectangle is 14 units. Hence finding the total length is called the perimeter.
- *Ask them what can be done to get the required length of wire for the land and border of the table?*
  Let them think for a while. Then explain, to calculate the required length of wire, they should know the total length of the land, and that total length is called the perimeter.
- *Then ask them how they measure the length of a table or book?*
  Tell the students to use the tactile ruler to measure the total length of the book or Taylor frame. Explain, a measuring tape can be used to measure a large space like land or table. Once we know the total length, which is the perimeter, it is easy to buy the required measurement of the fence for the land and border for the table.

GEOMETRICAL SHAPES

Activity 1: Building simple geometrical shapes.

Materials Required: Straw with hinges/ Ice cream sticks, tactile ruler.
Prerequisites: Identification of shapes.

Activity Flow

- *Ask the students to name any three geometrical shapes?*
  Examples: Circle, Rhombus, Triangle, Rectangle, Square.
- *Explain to them with an example by constructing a rectangle using straws with hinges.*
- *Ask the students how many straws are required to construct a rectangle?*
  - *They might say, they need 4 straws along with hinges to connect. But by the property of the rectangle, opposite sides are equal, and those 4 straws can be used to construct a square but not a rectangle. So they have to take a minimum of 6 straws along with hinges, where out of 6 straws 4 can be taken to construct the 2 lengths in the rectangle by joining two straws together. The remaining 2*

straws are used to construct the breadth of the rectangle. Finally, they will have a rectangular shape.

- *Now ask the students, what is the total length of the rectangle?*
    - *Since all straws have the same length, it is enough to know the length of a single straw using a tactile ruler.*
        - *To make a square we need 4 same length straws because all sides are equal. In the rectangle, we have 4 sides but not all sides are equal. The length should be more than the breadth. So to make the rectangle we need 6 straws. Two straws at the top and two straws at the bottom, one straw on the left and one straw on the right side.*
        - *Since there are 6 straws. If each straw is 10 cm, then adding 10 cm six times or multiplying 6 with 10 will give the perimeter of the rectangle.*

Similarly, ask students to construct a square and triangle and calculate its perimeter.

OR

- *They can construct basic geometric shapes such as triangles, rectangle, square, pyramids.*
  For example, stick 3 ice cream sticks in the shape of a triangle. Use ice cream sticks to create various closed figures.

FINDING PERIMETER

Activity 1: Finding the perimeter of geometric figures.

Materials Required: Tactile diagram representing 4 sided closed figure, paper strips, ice cream sticks, tactile ruler.
Prerequisites: Multiplication

Activity Flow

- *Ask the students to construct any two closed geometric figures using only 8 ice cream sticks. Later ask them, what is the total length of each figure, if each ice cream stick measures 2 units.*
  $8 \times 2 = 16$ Units
- *Explain to them the tactile diagram and ask them to give the length of each side.*

Activity 2: Finding the perimeter of geometric figures constructed by them.

Materials Required: Tactile ruler, cotton thread, straw with hinges/A4 sheet and toothpicks.
Note: Take an A4 sheet and if they fold it diagonally they will get a triangle.
Prerequisites: Addition.

Activity Flow

- *Ask them, whether they can find the perimeter of a shape that is constructed by only two lines?*
    - *No, since as per the concept of perimeter. The perimeter can be found only for the closed figures.*
- *Ask the students to measure the length of each side of an A4 sheet which is an example of a rectangular shape using the tactile ruler and also ask them to find the total length by adding the length of all sides. Hence, this total length will be the perimeter of a rectangle.*
- *Take one more A4 sheet and ask the students to fold it vertically and the obtained shape will be a smaller rectangle. Let them find the length of each side then add them together to get the perimeter of it.*
- *Ask the students to make a triangle using toothpicks. Let them measure the length of each side of the triangle using a calliper and add them together to get a perimeter.*

OR

- *Take a cotton thread, start at any corner of the shape. Measure each side with the thread.*
- *When they come back to the initial point, ask them to take out the thread and measure its length using a tactile ruler. The obtained length will be its perimeter.*
- *Similarly, do it for triangle and rectangle.*

Note: Assist students in measuring the perimeter for each different geometrical shape formed by folding paper using the tactile ruler.

Activity 3: Finding the perimeter of everyday life objects.
Materials Required: Cotton thread, book, table, Taylor frame, and tactile ruler.
Prerequisites: Addition.

Activity Flow

- *List any 4 real examples, for which perimeter can be calculated.*
  For example- Book, Table, Taylor frame, Tactile ruler, Instrument box.

As we discussed in the previous activity in which we measured the perimeter of square, rectangle and triangle. Similarly, now will consider the real-life objects book, table and Taylor frame and measure perimeter for each of them.

- *Ask any 4 children to voluntarily participate to hold the thread at each corner of the table.*

- *Once they reach the initial point, take out the thread and measure the length of it using a tactile ruler and that will be the perimeter of the table.*
- *Similarly, assist the students to do it for a book and taylor frame.*

Activity 4: Perimeter of the triangle.
Materials Required: Tactile diagram representing triangle ABC having different lengths say, side AB = 4cm, BC = 7cm and CA = 6cm.
Prerequisites: Addition.

Activity Flow

- *Ask the students to answer the question given below.*
- *How many sides does a triangle have?*
    - *The rhombus has 4 sides and the triangle has 3 sides.*
- *Let students observe the diagram carefully and ask them, what is the total length of the triangle and how will they find it?*
- *Ask them to explain it orally.*
    - *Add the length of all three sides of the triangle, which is given by, AB+BC+CA = 4+7+6=17 cm = perimeter of triangle ABC.*

Activity 5: Perimeter of different geometrical figures with length.
Materials Required: Tactile Diagrams
- Tactile diagram 1 representing 5 sided geometric figure, EFGHIE with sides EF=3cm, FG=5cm, GH=7 cm, HI=5 cm, IE=4cm.
- Tactile diagram 2 representing 5 sided geometric figure, JKLMNJ with sides JK=8cm, KL=6cm, LM=6cm, MN=5cm, NJ=2cm.
- Tactile Diagram 3 representing 6 sided geometric figure PQRSTUP with sides, PQ=4cm, QR=2cm, RS=2cm, ST=4cm, TU=3cm, UP=3cm.
- Tactile Diagram 4 representing 6 sided geometric figure WXCNRMW with sides, WX= 7cm, XC=8cm, CN=4cm, NR=6cm, RM=3cm, MW=2cm.

Prerequisites: Addition.

Activity Flow
- Assist the students in finding the perimeter of geometrical figures having different lengths using the tactile ruler.
- Ask the perimeter of each shape.

Activity 6: To match with appropriate perimeter values.
Materials Required: Tactile diagrams.

- Tactile Diagram representing a 4 sided geometric figure ABCDA with sides AB= 4cm, BC=3cm, CD=6cm, DA=5cm. Associated with perimeter value 18cm.
- Tactile Diagram representing a 4 sided geometric figure KLMNK with sides KL=7cm, LM=6cm, MN=2cm, NK=5cm. Associated with perimeter value 20cm.
- Tactile Diagram representing a 3 sided geometric figure PQRP with sides PQ=5cm, QR=5cm, RP=5cm. Associated with perimeter value 24cm

Prerequisites: Addition and perimeter.

Activity Flow

- *There are 4 geometric figures in the first column with corresponding perimeter values, which are randomly associated with the figures in the second column.*
- *Ask the students to go through all the shapes one by one and simultaneously find the correct perimeter value in the second column then combine and write the question number along with the answer number.*
  Example: For the 1st figure if an answer is b, then the student should combine the question number and answer number and write it as 1b beside the figure.

FINDING LENGTH OF THE UNKNOWN SIDE

Activity 1: Finding the third side of the triangle.

Materials Required: Tactile Diagram representing triangle PQR with sides
PQ= 6cm, RP=5cm, and QR=?

Prerequisites: Addition.

Activity Flow

- *Tell the value of the perimeter to the students. The perimeter is 15 cm.*
- *Before getting into the model sum, ask the students to think about finding the length of the unknown side when this data is given. Also, you can give simple examples that are relevant to this exercise.*

For example,

1. *If 2 books cost 40 rupees and if one book costs 25 rupees then what could be the cost of another book? i.e 15 rupees.*
2. *If 3 pens cost 30 rupees if one pen costs 15 rupees and the second pen costs 9 rupees, what is the cost of a third pen? i.e 6 rupees.*

- *Ask them to explain how they are going to solve these problems step by step using the given data. Then proceed with the actual problem.*
- *The perimeter of the triangle is 15cm and the sum of the other two sides are 11cm, find the length of the third side?*
  - *They know that the perimeter of the triangle = 15 cm.*
  - *PQR= length PQ + length RP + length QR*

- *15cm=6cm+5cm+length QR*
- *15= 11+length QR*
- Length QR $= 15 - 11 = 4$ cm

PERIMETER OF CIRCLE

Activity 1: Finding the perimeter of a geometrical figure having zero sides.

Materials Required: Bangle/Ring /Tactile Diagram of a circle, cotton thread, tactile ruler.
Prerequisites: Comparison of numbers.

Activity Flow

- *Ask the following question to the children.*
  - *Which is the closed curved geometric shape with zero sides? I.e circle.*
- *Give them circular objects like bangle, ring, and plate and see if they can find the perimeter of each object using cotton thread and calliper/tactile ruler.*
- *Ask them to compare the boundary of each of them and tell which object has a greater perimeter and lesser perimeter.*

PERIMETER OF AN IRREGULAR CLOSED FIGURE

Activity 1: Finding the perimeter of an irregular closed figure.

Materials Required: Tactile diagram of irregular closed figure, cotton thread, tactile ruler.
Prerequisites: Addition and the concept of perimeter.

Activity Flow

In general, the perimeter of any figure is the total length of its boundary.

- *Ask the students, how do they measure the perimeter of the foot when standing firmly on the ground.*
  - *When one of them is standing on the ground, let another student come and wrap a cotton thread around the foot and mark it then measure the length using a tactile ruler. The shape of the foot is an example of a curved irregular figure.*
  - *Irregular shapes will not have equal length and angle of sides, but regular shapes will have length and angle for all sides of the figure.*
- *Let the students draw any two closed curved irregular figures of their own choice and ask them to find the perimeter for each using a cotton thread by wrapping it around and measuring the length of thread using the tactile ruler.*
  Or
- *Give them the sticks and ask them to construct any 3 irregular closed geometric figures.*

- *Ask if they can find the perimeter of irregular figures without using a tactile ruler or thread. Given that each stick measures 5cm.*
  Example, if there is an irregular closed figure constructed using only 5 sticks then each stick measures 5cm, so the perimeter of an irregular figure = 5 + 5 + 5 + 5 + 5 = 25cm. Likewise, ask them to do it for the rest of the figures.

AREA

Activity 1: The concept of an area.

Materials Required: Tactile ruler, A4 sheet, Braille book.
Prerequisites: None

Activity Flow

- *Start with an example, the teacher wants to conduct an activity, so the teacher will place all the required materials like a calliper, book, Taylor frame, slate on the table and the table is full. But she cannot keep the Braille book and instrument box on the table.*
- *Ask the students, why can't she place Braille book and box on the table?*
  - *It is because the table is already full of other materials.*
  - *I.e. The whole surface of the table or the space on the table is occupied by other materials. So, the space of the table is full.*
- *Explain to the students that in general, space or the region occupied by an object is called an area.*
- *Give them A4 sheets and different objects such as calliper, Taylor frame, Slate.*
- *Ask them if they can place Taylor frame and braille slate without overlapping next to each other on an A4 sheet.*
  - *They can't place both the materials on the A4 sheet.*
  - *Since the place is already covered by one material so they cannot place the second material next to it. That is, the area on an A4 sheet is already occupied by an object called an area.*
- *Now ask the students, how will they find an area of an A4 sheet?*
  - *They know that the Taylor frame occupies the entire space of the sheet, so let them measure the length of the horizontal and vertical side which is the length and breadth of the Taylor frame then multiply to get an area.*

Activity 2: Finding an area of different geometrical figures.

Materials Required: Tactile Diagram representing an irregular geometrical shape drawn on a graph sheet, where each square is 1 sq. cm, Tactile graph sheet, Stickers(bindi).
Prerequisites: Multiplication

Activity Flow

- *Give them the square tangram shapes.*
- *Ask them to cover the main page of the book or slate using square tangram shapes. Once they complete, ask them how many square shapes are used to cover the page.*
- *Then build the concept of area, suppose if each square measures one unit square of area, then what is the area of braille slate or book?*

OR

- *Ask the students to construct a square and rectangle by placing stickers on each grid(box) on the tactile graph sheet.*
- *Then, let them count the number of stickers required to create each shape and since each grid is of 1 unit square. So the area of that shape will be the number of stickers in the grids.*
    - *Example: Constructed a square shape of 4 cross 4 which will have 16 grids. Hence the area of the square is 16 unit square.*
- *Ask them to try making a rectangle and measure its area.*
- *Similarly, ask the students to find the area for the figures on page number 10 and 11 (irregular shapes), by counting the total number of unit squares. Also, verify the answers written by the students and ask them to write it in a sentence as the area of a given shape is _____sq. unit.*

Activity 3: To know the unit of area.

Materials Required: Tactile diagram of the unit of area. Tactile diagrams representing the square and rectangle on the graph sheet.

Prerequisites: Multiplication.

Activity Flow

When the two measurements are expressed in centimetres (cm) or meter, when length and breadth are multiplied, the unit of the product obtained is expressed in square centimetres or square meters.

- *Assist them in observing the two diagrams (rectangle and square on the graph sheet) and ask if they can find the area of those two figures without using the tactile ruler. See, if they are able to observe small unit squares inside those two figures.*
- *Ask, how do those small squares help them to find an area?*
  Finally, they would be able to count the number of squares say 9 and 8 which is an area of square and rectangle respectively.
- *Students know that area is the product of length and breadth, ask them to get the length and breadth of each diagram.*

- *For example: An area of square is 3 centimeter times 3 centimeter = 9 centimeter square and a rectangle is 4 centimeter times 2 centimeter = 8 centimeter square.*

Here, they can observe that when two measurements are expressed in cm their product will be cm square.

Similarly, if the measurement is in kilometer, its area will be square kilometer and in general, it is in square units.

Activity 4: To find an area of the triangle, rhombus, and irregular shape.

Materials Required: Triangular and rhombus-shaped objects, sticks.

Paste bindis on a graph sheet to get a triangular shape and rhombus shape.

Prerequisites: Counting and addition.

Activity Flow

- *Ask the following question to students.*
  - *What does an irregular shape or figure mean?*
- *Get individual opinions about an irregular shape. Also, ask them to draw or give an example of an irregular shape.*
  - *For example, the outline of a palm.*
- *Ask them to make a triangle and rhombus in each different graph sheet using sticks.*
- *Ask them to observe the squares which are completely inside the triangle formed by the sticks and the shapes which are diagonally divided to form triangular shaped unit cells. By which they can observe that joining of the two triangular cells in a graph will give one complete unit square.*
- *Ask them to count the number of complete square cells and count the number of triangular cells.*
  - *Example: If there are 6 complete squares and 4 partially filled triangular squares, and tell them that 2 triangular cells=1 square cell. Therefore 8 unit squares in total as an area of the triangle.*
- *Similarly, ask them to find an area of a rhombus shape.*

COMPARISON OF PERIMETER AND AREA

Activity 1: Comparison of perimeter and area.

Materials Required: Tactile graph sheet, Bindis.

Prerequisites: Counting and addition.

Activity Flow

- *Ask the students, how will they find an area of braille slate?*

    - *Find the length and breadth of the slate and multiply them together to get the area.*
- *Ask the students to construct two shapes(square and rectangle) having a perimeter of 20 cm and 16cm by placing bindis on tactile graph sheets and also find areas of those shapes.*
- *Ask them, what can they conclude after observing the area and perimeter of those two shapes.*
- *For example,*
    - *Square 1 whose perimeter is 20 cm = 5+5+5+5 and area is 25 sq. cm = 5 times 5.*
    - *Rectangle 1 whose perimeter is 20 cm =2+2+8+8 and the area is 16 sq. cm=2 times 8.*
    - *Square 2 whose perimeter is 16cm =4+4+4+4, and the area is 16 sq. cm=4 times 4.*
    - *Rectangle 2 whose perimeter is 16 cm =3+3+5+5 and area is 15 sq. cm=3 times 5.*
- *Observe that the square and rectangle shapes have a perimeter of 20 cm but have different areas which are 25 and 16 sq. units respectively.*
- *Similarly, square and rectangles have a perimeter of 16 cm but have different areas which are 16 and 15 sq. units respectively.*
- *Hence we can conclude that any two geometric shapes having the same perimeter will have different areas and vice versa.*

3.3 LET'S DISCUSS: RELATE TO DAILY LIFE*

Ask the following question to the students.

- Why do we need measurements?

Measurements play an important role throughout everybody's life.
For example, during a medical check-up, a doctor/ nurse will check the weight, height, blood count, pressure level to understand the condition of the body. When building a house, the engineer will design a plan based on the area of the land.

- Now, ask the children to give some examples of where we can use measurement in our daily life and its importance.

4. EXERCISES & REINFORCEMENT

4.1 PRACTICE EXERCISES

PRACTICE EXERCISES

Activity 1: Practice and Recall

Materials Required: Tactile diagrams.

- Tactile diagram representing rectangle PQSRP having perimeter of 24cm and length of PQ=10cm, QS=?, SR=10cm and RP=2cm.
- Tactile diagram, representing 5-sided figure AEBDCA with sides are AE=3cm, EB=4cm, BD=? DC=8cm, CA= 4cm and given its perimeter 24cm.

Pre-requisites: Addition, subtraction, properties of rectangle.

Activity Flow

- *Explain the tactile diagram.*
- *Tell them there are two methods to find the unknown side of the rectangle QS.*
    - *One of the methods is by subtracting the sum of the length of known sides with the value of perimeter.*
    - *Since in the rectangle opposite sides are equal. The opposite side of PQ is SR. Similarly QS and RP are opposite to each other. So, RP=2cm and QS should also be 2cm.*
- *Ask the students to verify with the usual way of finding the unknown side with the given data.*
- *Explain the tactile diagram, representing AEBDCA. Ask the students to solve it, before they start writing it in steps, ask them the procedure orally and make sure if they have understood the procedure thoroughly in finding the unknown side.*
- *Explain the diagram representing 4 sided figure KLMNK where the length of one side LM=7cm and all the sides are equal.*
    - *Ask the students, which is the geometric figure whose length of all sides are equal?*
    - *If they are able to guess it as square and ask them for its perimeter if the length of one side is 7 cm.*
    - *i.e 7+7+7+7=28cm.*

Activity 2: To find an area.

Materials Required: Tactile diagram of geometric figures(pg.no-10).
Tactile diagrams representing geometric figures on the graph sheet.
Prerequisites: Counting and addition.

Activity Flow

- *Let the children observe the diagram and ask them to count the number of squares inside the figure.*
- *Get the replies from the students.*
- *Explain, if there are 7 square shapes and an area of that figure will be 7 sq units.*
- *Meanwhile, explain the role of the graph sheet in finding an area of any given figure.*

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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