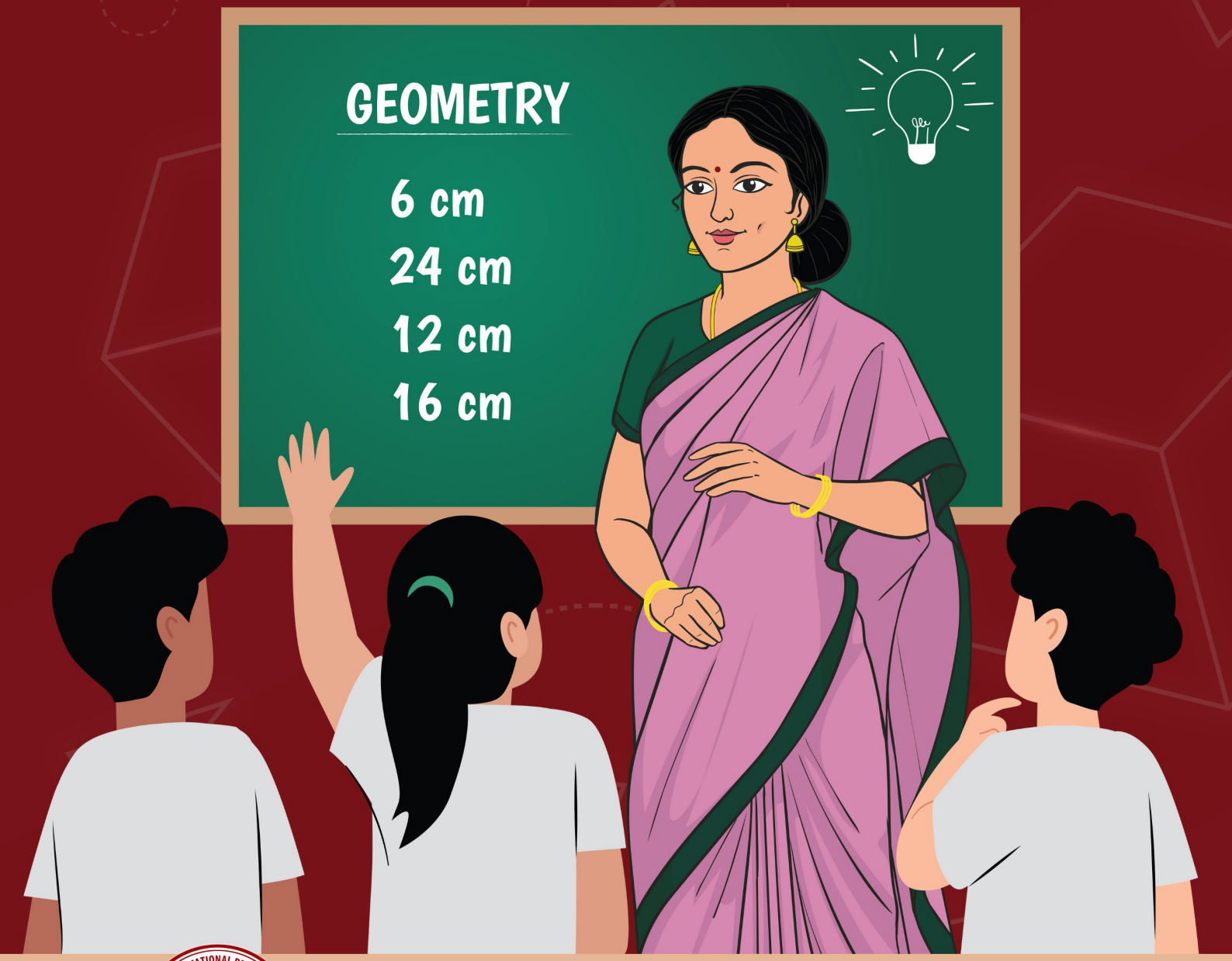
DEPARTMENT OF
SCHOOL EDUCATION

CBA PRACTICE MATERIAL

CLASS 5

MATHEMATICS



STATE COUNCIL OF
EDUCATIONAL RESEARCH
AND TRAINING (SCERT)

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Objective of the material:

To enhance mathematical understanding and address low-performing skills and misconceptions identified through 2023-24's classroom-based assessments (CBA) scores.

The intervention will utilize a structured "CBA Practice Material" following a targeted three-stage approach: LEARN, PRACTICE, ASSESS.

What is a misconception?

A misconception is a misunderstanding of a mathematical concept, often due to **incorrect or missing knowledge**. Example: Students misunderstand the concept of grouping hundreds, tens, and ones leading to issues in solving place value problems.

Why do misconceptions happen?

Students tend to develop misconceptions due to several factors. Some of these factors include:

- **Concrete to Abstract Transition:** When students move from hands-on objects (e.g., counting blocks) to abstract (e.g., numbers, algorithms) without appropriate support, they can form gaps in their understanding, leading to misconceptions.
- **Cognitive Development Stages:** At different developmental stages, children may not be ready to grasp certain abstract concepts fully, leading to misconceptions.
- **Lack of Real-world Application:** Difficulty in connecting math concepts to everyday life can lead to misconceptions.
- **Lack of Practice and Reinforcement:** Repetition and practice of the concept are crucial for building understanding, and without them, misconceptions can become ingrained.

What is the difference between misconceptions and mistakes in Mathematics?

Misconception	Mistake
A misconception is a misunderstanding of a mathematical concept, often due to **incorrect or missing knowledge**.	A mistake is an **error in calculation or judgment** that happens **accidentally** despite having the correct knowledge.
A misconception often stems from **incorrect prior knowledge**.	A mistake might result from a **lapse in attention or calculation**.
A misconception requires **re-teaching, and re-learning of the conceptual understanding** to fix it.	A mistake is **temporary** and can be **corrected immediately**.
For example: Students think that a fraction with a bigger denominator is always bigger. Therefore, they say $\frac{1}{5}$ is greater than $\frac{1}{2}$ because 5 is bigger than 2.	For example: A student wrote that the equivalent fraction of $\frac{3}{4}$ is $\frac{6}{9}$. Here the student did 3x3 instead of 4x2 in the denominator by mistake.

How to use this material?

This material contains identified misconception based on the students' CBA scores 2023-24. The misconception can be resolved through three carefully designed components—videos, practice activities, and MCQ-based assessment.

Teacher preparation:

- Read the sample question and understand the misconception well. It is for you to understand the misconception and is not intended for the student.
- After that, watch the video, and read the activity and MCQ questions to familiarize yourself with the sequence and flow of the content. This will help you utilise the material with the students effectively.

Teacher action:

- **Assign 2 periods in one week** to complete this weekly practice material.
- Each component of the material should be completed in the below sequence.

Step 1 (LEARN) Video: 6-7 minutes (followed by 5-7 minutes of discussion)

- ❑ Show the YouTube video provided to introduce the concept. The video will provide conceptual understanding, ensuring students can grasp the concept effectively.
- ❑ Discuss the questions provided to consolidate learnings from the video.

Step 2 (PRACTICE) Activity: 30-35 minutes

- ❑ Conduct the activity provided to address the misconception and allow students to practice the concept.

Step 3 (ASSESS) Question Bank: 15 minutes

- ❑ Write the questions from the question bank on the board and ask the students to solve the same in their notebooks.
- ❑ In case of the availability of a smart TV, the questions can also be displayed.

Teacher week-wise action plan

- To address multiple misconceptions in grade 5, you will **receive teaching material every week** that must be **completed within the same week**.
- Here is the schedule of the material that you will receive-

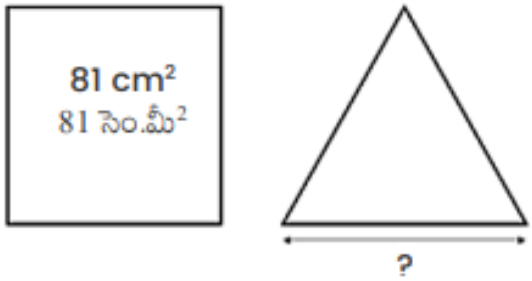
18 - 21, February	24 - 28, February	03 - 07, March	10 - 14, March	17 - 21, March	24 - 28, March
CBA Practice Material 1	CBA Practice Material 2	CBA Practice Material 3	CBA Practice Material 4	CBA Practice Material 5	CBA Practice Material 6

Understanding students' misconceptions

Let's analyze the misconception that led students to choose the wrong answer.

QUESTION:

A piece of wire is used to form a square with an area of 81 sq.cm. The same wire is used to form a triangle with three equal sides, as shown below. What is the length of one side of the triangle?



A. 9 cm B. 12 cm C. 36 cm D. 81 cm

ANSWER ANALYSIS:

➢ **Correct option:** Option B

- ***Reason:*** The area of the square is 81 sq cm, which is 9 cm*9 cm. Therefore the measure of each side is 9 cm.

  The perimeter of the square = 4 x side = 4 x 9 cm = 36 cm.

  Therefore the total length of the wire = 36 cm.

  Since the same wire is used to create the triangle, the perimeter of the triangle will also be 36 cm.

  The perimeter of an equilateral triangle = 3 x side. Therefore, the measurement of each side will be 36 cm / 3 = 12 cm.

➢ **Common incorrect answer:** Option A

- ***Incorrect Option Reason:*** Students also choose option A due to the misconception that using the same wire for both shapes means the triangle and the square must have the same perimeter and area and hence, their sides are also the same, leading to the incorrect answer.

MISCONCEPTION DESCRIPTION:

We can conclude that **students often misunderstand that shapes with the same perimeter must have the same area**, leading to confusion when solving problems that require an understanding of both concepts.

VIDEO

1. The videos can be accessed either by scanning the following QR code or by clicking on the link.

https://youtu.be/1L9Lw3hTXmE?feature=shared

2. After watching the video, ask the following questions to summarise the student's understanding of the video content. Some sample questions that you could ask are-
   - ❑ What did you watch in the video?
   - ❑ What examples were used in the video to explain the topic?
   - ❑ Can you give a different example of what you saw in the video?

ACTIVITY

Objective:

Students will be able to analyze how shapes with the same perimeter can have different areas.

Materials Needed:

- Graph paper
- Threads
- Colored pencils
- Scale
- Scissors

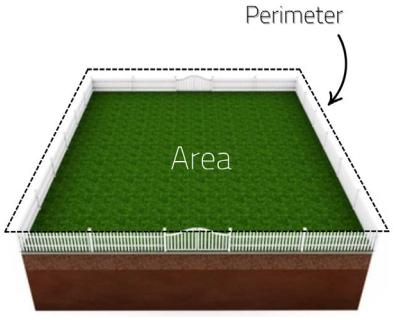
Activity Instructions:

1. ***Introduction:***
   - ❑ Recap the concepts of area and perimeter with the students using graph paper. Define area and perimeter, and provide the formulas for the perimeter and area of a square and a rectangle.

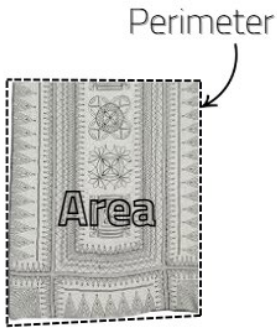
Perimeter	Area
The Perimeter is the total length of all the sides of a shape.	**The area** is the amount of space inside a shape
Perimeter of square = length of side x 4	Area of square = Length of side x length of side
Perimeter of Rectangle = 2 (Length + Breadth)	Area of Rectangle = Length x Breadth

For Example:

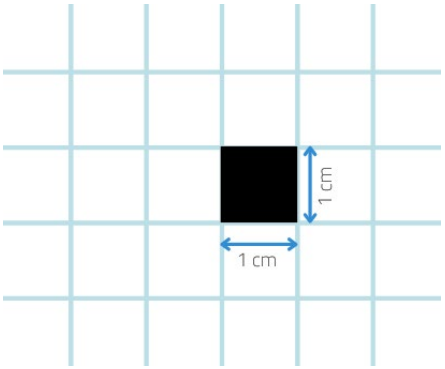
1. In a Garden, the total length of fencing wire required for a garden is the **Perimeter**, and the amount of grass required to cover the garden is the **Area**.



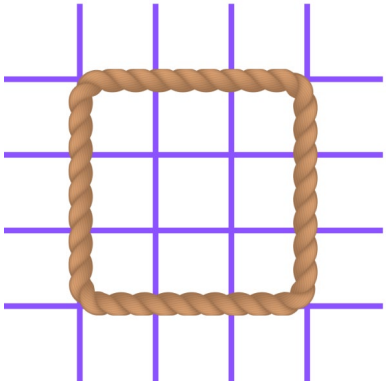
2. For a Dupatta: The total length of the lace border is the **Perimeter** and the fabric required for making a dupatta is the **Area**.



❑ **Explain the graph paper** and tell, "Each Square in the graph paper has a side of 1 cm, so the area of each small square is 1 cm^2."



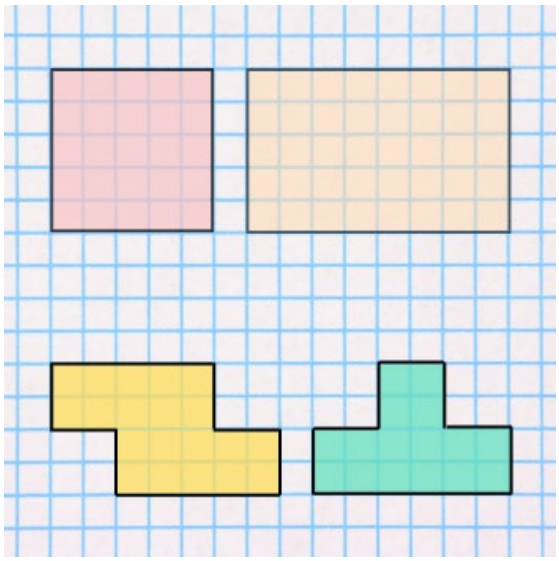
❑ Create a square on the graph paper, using thread as a border as shown in the figure.



❑ Ask the students, "What is the perimeter of the square formed by this thread? And find the area of the figure."

2. *Hands-On Activity:*

1) Give a thread bundle to students and ask students to cut 3 threads of 25 cm each.
2) Ask students to create 3 different shapes on the graph paper using given threads as their boundaries. A few examples of shapes are given as a sample in the image.
3) Now ask students to calculate the area of these three different shapes, formed by these 3 threads of the same length.

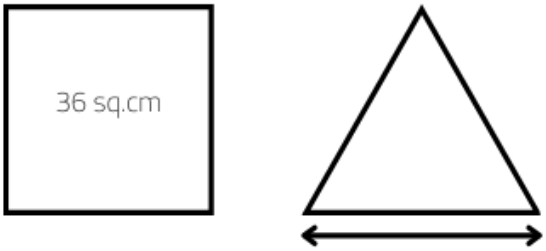


3. *Discussion and Reflection:*

❑ Ask the following questions to the students-

1) What is the perimeter of the three shapes? Are they the same or different?
2) What is the area of these 3 shapes?
3) When we created different shapes with the same size thread(perimeter), did they all have the same area? Why or why not?

❑ Let's do one question on area and perimeter.



Q. A piece of wire is used to form a square with an area of 36 sq.cm. The same wire is used to form a triangle with three equal sides, as shown in the figure.

a. What is the length of the side of a square?
b. What is the perimeter of a square?
c. What is the perimeter of the triangle?
d. What is the length of the side of the triangle?

Answers:

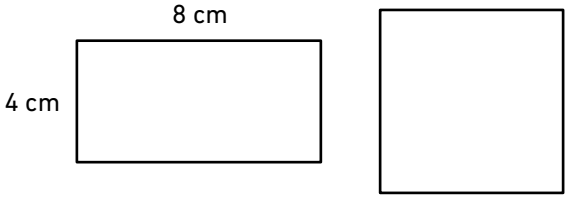
a. The length of the side of the square is "6cm", the **area is Side x Side** = 36 sq.cm, then while checking multiples like 2x2, 3x3, 4x4, 5x5... we get 6x6 is 36. Therefore, the side of the square is 6 cm.
b. The perimeter of the square is 4 x side, which is equal to 4 x 6 = 24 cm.
c. The perimeter of the triangle is equal to the perimeter of the square because they are made by reforming the same wire. That is 24 cm.
d. Since the triangle has all three equal sides, the length of each side is equal to perimeter ÷ 3. That is 8 cm.

(Note: These are the steps to be followed for solving any such questions.)

QUESTION BANK

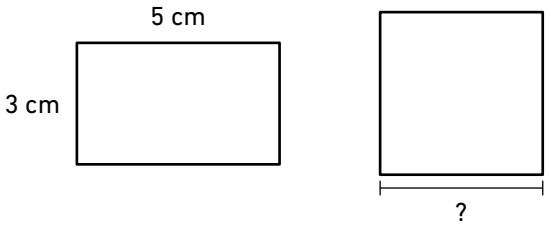
1. A square and a rectangle both have a perimeter of 40 cm. Which of the following statements is true?
    A. Both shapes must have the same area.
    B. The rectangle will always have a larger area.
    C. The rectangle and square will not have the same area.
    D. The square will always have a smaller area.

2. A piece of wire is used to form a rectangle with sides measuring 8 cm and 4 cm. The same wire is reshaped to form a square. What will be the perimeter of the square?



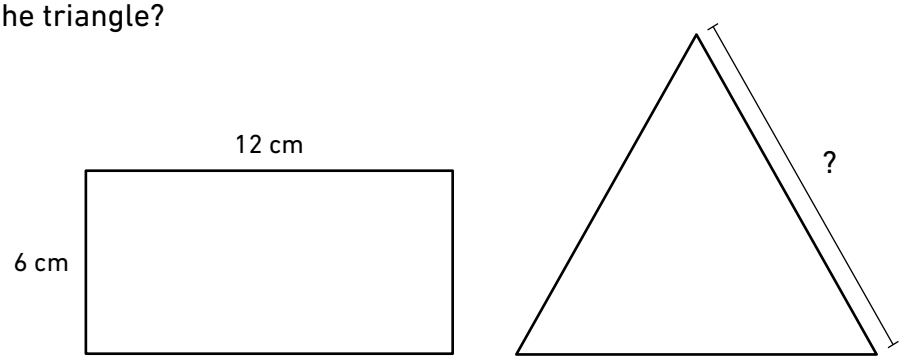
    A. 6 cm
    B. 24 cm
    C. 12 cm
    D. 16 cm

3. A piece of wire is used to form a rectangle with sides measuring 5 cm and 3 cm. The same wire is reshaped to form a square. What will be the length of the side of the square?



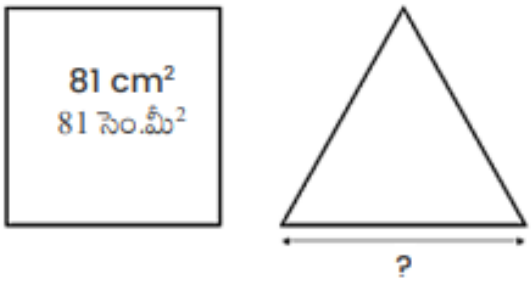
    A. 4 cm
    B. 8 cm
    C. 16 cm
    D. 20 cm

4. A piece of wire is used to form a rectangle with a length of 12 cm and a breadth of 6 cm. The same wire is reshaped to form an equilateral triangle. What will be the length of one side of the triangle?



A. 10 cm
B. 24 cm
C. 18 cm
D. 12 cm

5. A piece of wire is used to form a square with an area of 81 sq.cm. The same wire is used to form a triangle with three equal sides, as shown below. What is the length of one side of the triangle?



A. 12 cm
B. 9 cm
C. 36 cm
D. 27 cm

Answer Key:

1. C

There is no correlation that if the perimeter of two shapes is the same then the area will also be same. Area will change based on the length and width of the shapes.

2. B

*The total wire length is the **perimeter of the rectangle, 24 cm**, which remains the same when reshaped into a square, so the **perimeter of the square is 24 cm**.*

3. A

*The total wire length is the **perimeter of the rectangle, 16 cm,** which remains the same when reshaped into a square, so the **perimeter of the square is 16 cm**. Therefore **length of one side of square is (16 ÷ 4) = 4 cm.***

4. D

*The perimeter of the rectangle is **2 × (12 + 6) = 36 cm**, which remains the same when reshaped into an equilateral triangle. Since an equilateral triangle has three equal sides, each side will be **36 ÷ 3 = 12 cm**.*

5. A

*The area of the square is **81 cm^2**, so each side is **9 cm**. Hence, the perimeter is **4 × 9 = 36 cm**. Since the same wire forms an equilateral triangle, each side is **36 ÷ 3 = 12 cm**.*