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Teacher Training Module:

Mathematics

Learning Cycle 8

Area and Perimeter

Sindh Technical Assistance – Development through Enhanced Education Programme (STA-DEEP)

Introduction and Rationale of the Training

Dear Teachers!

Welcome to the new phase of the Continuous Professional Development (CPD) Program. In the previous phase, we had focused on pedagogical skills that helped you to develop your skills to make classroom more interactive, participative, and joyful for our students. In the new phase, we will continue practicing those pedagogical skills and also learn about the introduced content knowledge and skills in Mathematics, Science, English, Urdu, and Sindhi. As a result, you will be better prepared to deal classroom situation using modern teaching strategies integrated with subject knowledge.

Our vision

Our common goal is to improve the quality of teaching in schools all over Sindh. We want students to become active and collaborative learners, problem solvers, and critical thinkers who approach tasks with creativity and confidence. They are conceptually clear about the subject content and have the skills to link this content with the world around them. To make this possible, we, as teachers, must be better prepared for the classroom demands in pedagogy and the subject content. Moreover, we aim to professionalize these trainings so that the CPD teacher training courses make an impact and substantially change student performance.

Our Teaching Philosophy

The CPD training sessions, including this training, follow a participatory teaching philosophy that engages participants to apply and practice active and collaborative learning, as well as engage in self and peer reflection to become community of practice. The objective is not only to improve the teaching practices but to help you understand the theory of the subject content and the strategies that help students apply the content in daily life with confidence and mastery.

Supporting You

The training module is designed to support you in your classroom teaching. It will introduce you to the subject content and some approaches for use in the classroom. This will make your teaching more manageable and help you grow as a skillful teacher.

Acknowledgement

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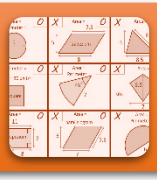
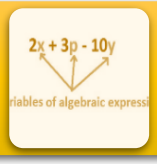
Area and Perimeter

Learning Objectives: By the end of the session, the teachers will be able to:



define area and perimeter of two dimensional shapes;

explore the area and perimeter of Square, Triangle, Parallelogram, Trapezium and Cirlce;

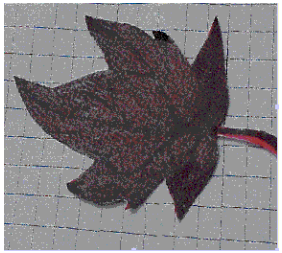


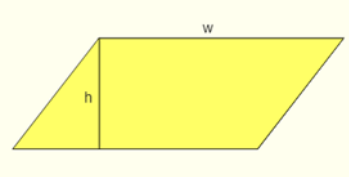
derive the formulae of area and perimeter of two dimentional shapes;

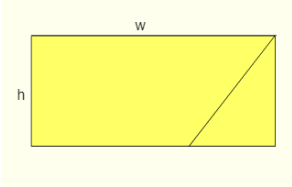
solve real life application problems related to Area and Perimeter.

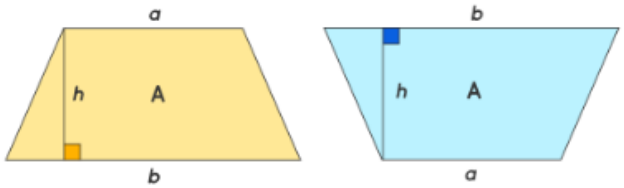
Session Plan

Instructional strategies/activities

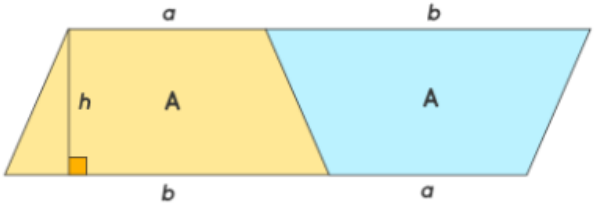
Time	Objective/purpose of the activity	Activities/learning experiences	Materials/resources
20 mins	**Exploring enclosed space and boundary of irregular shapes.**	**Activity 1:** 1. Ask teachers to take a leaf, place it on a square grid paper and trace it with a pencil. 2. Estimate the enclosed space of the leaf (in square units). 3. Find the boundary measurement of the traced leaf with the help of thread and scale 4. Conclude the activity and introduce the vocabulary of area and perimeter **Facilitator's Input:** Enclosed space of a shape is an area and the measurement of the boundary is perimeter.	Scale Thread Leaves Square Grid Paper  

25 min	**Area and Perimeter of square and rectangle**	**Activity 2:** Introduction of Area and Perimeter of square and rectangle 1. Ask teachers to fill the Handout-1a by drawing squares of 1x1, 2x2, 3x3 up to 10x10 on square paper. 2. Ask teachers to fill the Handout-1b by drawing the rectangles of dimensions given in the table on square paper. 3. Conclude the activities by highlighting the formula to calculate the area and perimeter of square and rectangle based on the filled grids.	Square papers Handout-1a Handout-1b
20 mins	**Activity 3:** Area of Triangle	1. Ask teachers to look gird given in handout 2 and follow the given instructions 2. Take random responses and conclude the activity **Facilitators' Input:** Area of the triangle is the half of the multiplication of the base and perpendicular distance from the base to the opposite vertex)	Square Grid papers Dotted papers Handout 2: Drawing Triangles
15 mins	**Activity 4:** Area of Parallelogram	1. Start with a parallelogram with known base length (width) ***w*** and altitude ***h*** (height).  2. Cut off a triangular section.	Cutouts of parallelograms of different measurements of length and altitude.

		3. Translate (move) the copy to touch the original so as to create a rectangle.  This rearranging has created a rectangle whose area is clearly the same as the original parallelogram. Recall that the area of a rectangle is found by multiplying its width times its height. The area of the original parallelogram is therefore *area of parallelogram* = $w \times h$ where w is the width, or length of a base, and h is the altitude (height) of the parallelogram.	
20 mins	**Activity 5:** **Area of trapezium**	1. Take two identical trapeziums, each with bases ***a*** and ***b*** and height ***h*** and A be the area of each trapezium. 2. Turn the second trapezium upside down as shown in the figure below.	Cutouts of several identical trapeziums



3. Attach the above two trapeziums.



Facilitator's Input:

We can see that new figure obtained by joining the two trapeziums is a parallelogram having base $a + b$ and height h and,

We know that

⇨ Area of a parallelogram

$base \times height = (a + b)\, h$

Therefore, the area of the above parallelogram in terms of 'A' is,

$A + A = 2A$

		Thus, $2A = (a + b)\, h$ ⇨ $A = \frac{(a+b)h}{2}$	
20 mins	**Activity 6: Circumference/Perimeter of a Circle**	1. Take a cylinder and wrap a thread round the cylinder. 2. When the thread reaches the initial end point, put a mark on that place. 3. Measure the length of the thread from the initial point to the place marked 4. This is the measure of length of the circumference 5. Measure the diameter of the circle 6. Divide the circumference found by the diameter. We will find approximately 3.14 which is the ratio of circumference to diameter and called π. In other words, Circumference = $\pi \times d$ Or $C = 2 \times \pi \times r$  The perimeter of a circle is also known as the circumference of the circle.	Different objects of cylindrical shapes e.g., cold drink cans.

30 mins	**Activity 7: Area of Circle**	Ask teachers to perform the activity given in Resource 3 to derive the formula for area of the circle. This activity is also available on page No. 219 of STB of grade 7	Handout 3 Cutouts of Circles, pencils, Scissors, glue
20 mins	**Alignment with the textbook**	**Group work** 1. Divide teachers in three groups 2. Each group will be assigned a grade level from five to 7. Ask teachers to: 3. explore the chapter of Area and perimeter of that particular assigned grade level in their respective groups. 4. list down the concepts of area and perimeter covered in that particular chapter, align them with concepts discussed in the session and identify the concepts not covered in the discussion. 5. solve few real-life problems related to their topics. 6. Discuss different strategies, methods and resources for teaching Area and Perimeter in their respective classrooms 7. Present the ideas to the whole class	2 sets of textbooks from (Grade V to VII) STB Textbook Link: https://ebooks.stbb.edu.pk/
10 mins	**Reflection**	Invite teachers to share their learning experience during the session with the whole class (refer to the reflection question)	

Handout-1a

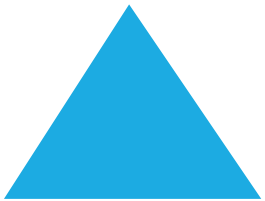
Exploring area and perimeter of square

Draw squares (1x1, 2x2,3x3,… 10x10) on a square paper and fill the table.

Side 1	Side 2	Enclosed space (sq units)	Boundary (Units)
1	1	1x1=1	1x4=4
2	2	2x2=4	2x4=8
3	3	9	12
4	4		
5	5		
6			24
	7		28
		64	
			36
10			
13			
	15		
		441	
			72
S1	S2	?	?

Area of Square=

Perimeter of Square=



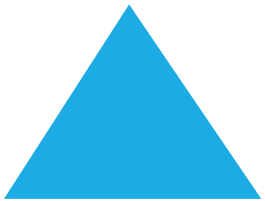
Handout-1b

1. **Exploring area and perimeter of rectangle**
2. **Draw rectangles of given dimensions on a square paper and fill the table.**

Length	Width	Enclosed space/ Area (sq units)	Boundary/ Perimeter (Units)
1	5	1x5=5	(2x1)+(2x5)=12
3	2	3x2=6	(2x3)+(2x2)=10
5	4	20	18
7	3		
4	6		
3		24	22
	5		16
7			24
Length	Width	?	?

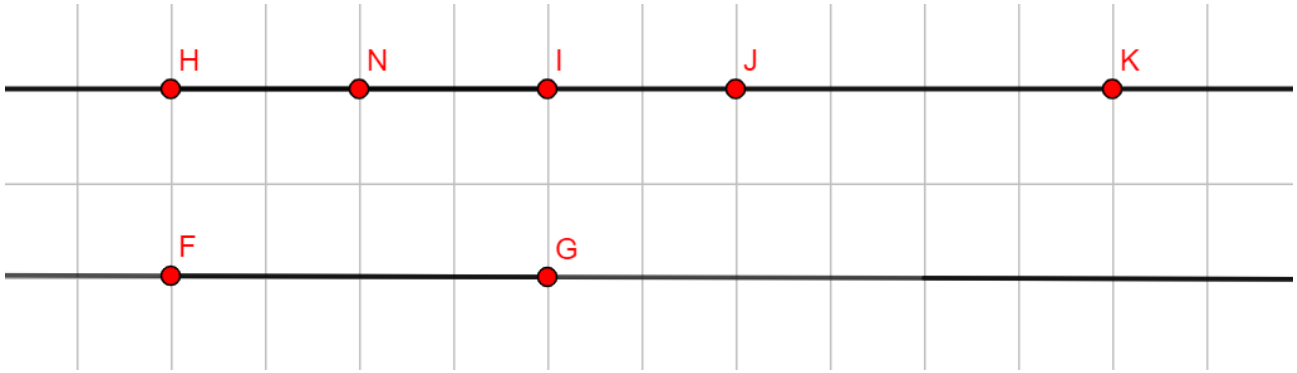
Perimeter of rectangle = _____

Area of rectangle= _____



Handout 2

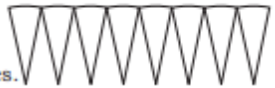
Instructions: Look at the gird below:



- Join F to G.
- Join F to H and G to H. What do you get?
- What would be the area of triangle FGH? How do you know?
- Join F to I and G to I.
- What do you get?
- What would be the area of triangle FGI? How do you know?
- Join F to I and G to J.
- What do you get?
- What would be the area of triangle FGJ? How do you know?
- Join F to I and G to K.
- What do you get?
- What would be the area of triangle FGK? How do you know?
- What do you conclude?

(iii) Fold the circle into two parts.
(iv) Keep on folding the circle, till we get 16 equal parts.

(v) Unfold the circle.
(vi) Shade half of the circle, as shown in the figure
(vii) Now cut the circle with a pair of scissors along the marks formed into 16 parts.



(viii) The length of every segment of the circle is equal to the radius.
(ix) Divide these 16 parts into two equal pieces.
(xi) Arrange the white parts cut in the upper half and the others in lower half.

(xii) The figure so formed is almost a rectangular region.
(xiii) The length of the rectangular region is equal to half of the circumference.
(xiv) The width of the rectangular region is equal to the radius of the circle.

(xv) The area of rectangular region is equal to the area of the circle.

Thus a circular region = Area of the rectangular region.

= Length of the rectangle × Breadth of the rectangle

= Length × Breadth

= (Half of the circumference) × (Radius of the circle)

$$= \left[\frac{1}{2}(2\pi r)\right] \times r$$

$$= \frac{1 \times \cancel{2} \times \pi r \times r}{\cancel{2}} = \pi r^2$$

Hence formula to find the area of a circular region is:

Area of a Circular Region = πr^2

where r is the radius of the circle.