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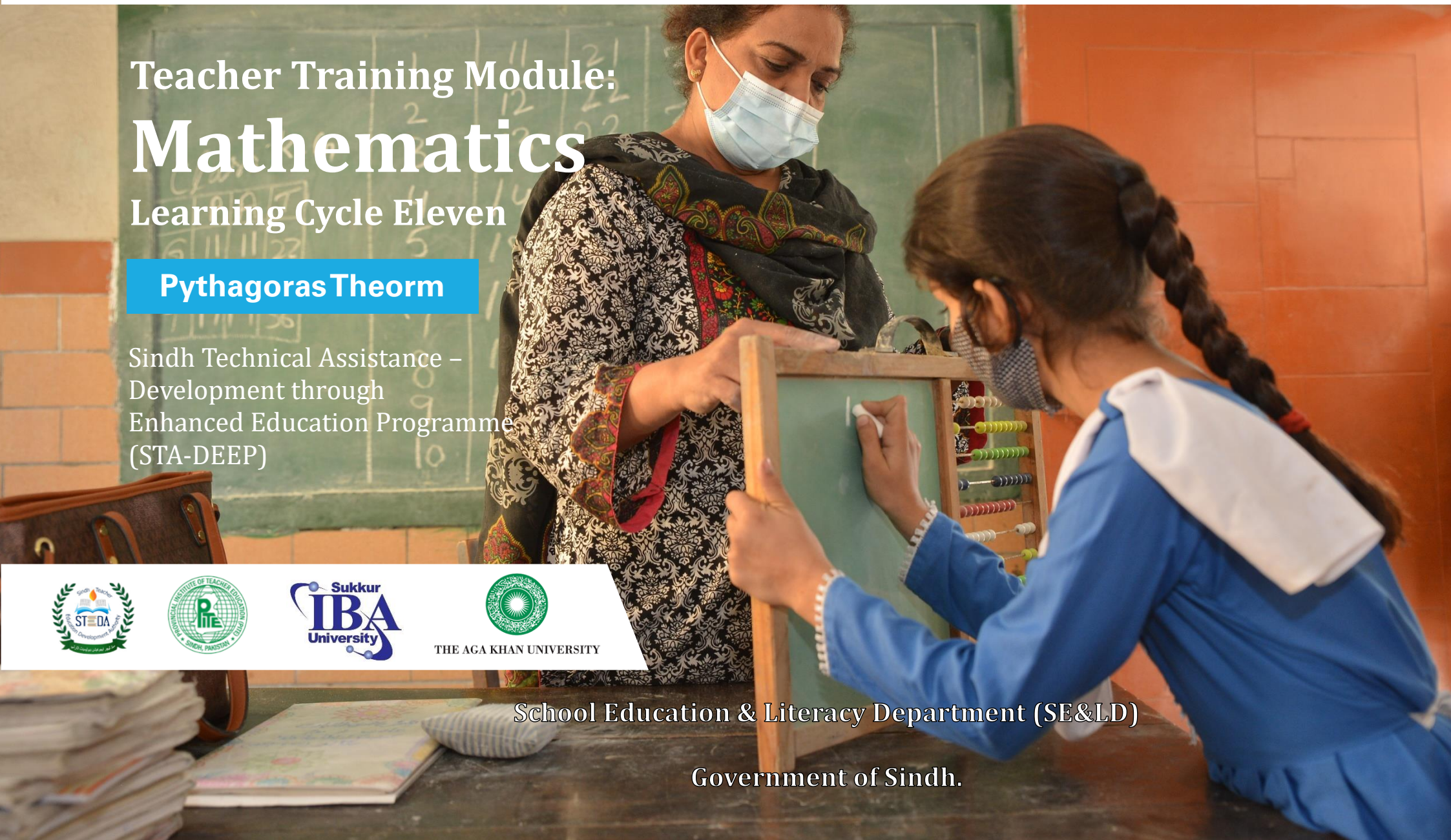
Teacher Training Module:

Mathematics

Learning Cycle Eleven

Pythagoras Theorm

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



School Education & Literacy Department (SE&LD)

Government of Sindh.

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 teachers 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

This module was developed by IBA Sukkur University and Aga Khan University - Institute for Educational Development under the direction of the Provincial Institute of Teacher Education (PITE). It was supported by UNICEF in the scope of the Sindh Technical Assistance Development through Enhanced Education Program (STA-DEEP), funded by the European Union.

We would like to express sincere gratitude to the following contributors:

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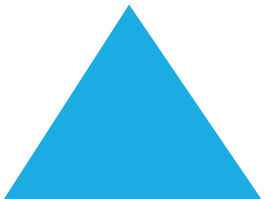
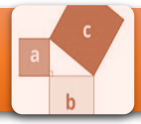
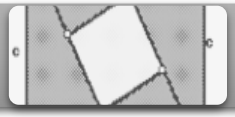


Pythagoras Theorem

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

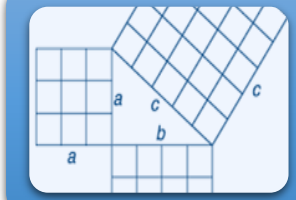


Define and label right-angled triangle



Explore Pythagoras theorem using pictorial representation

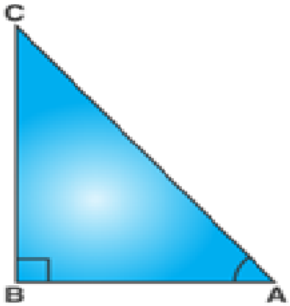
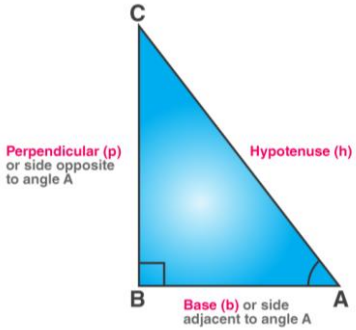
Find the length of unknown side of the Right Traingle using the Pythagoras theorem.

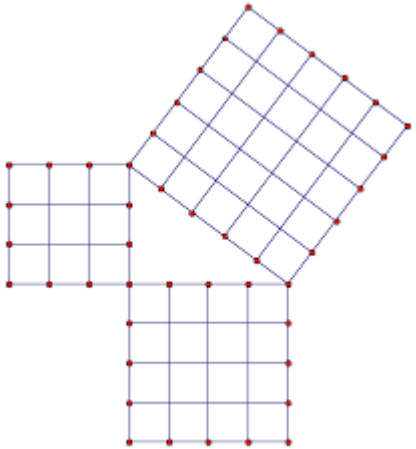


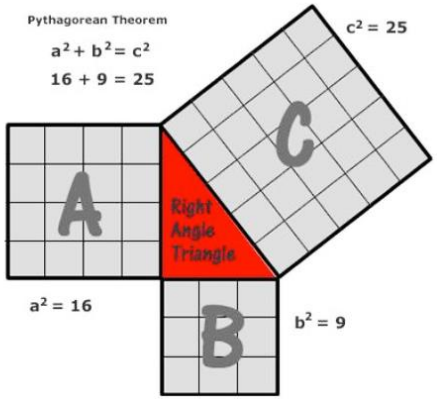
Apply Pythagoras theorm to solve real life problems.

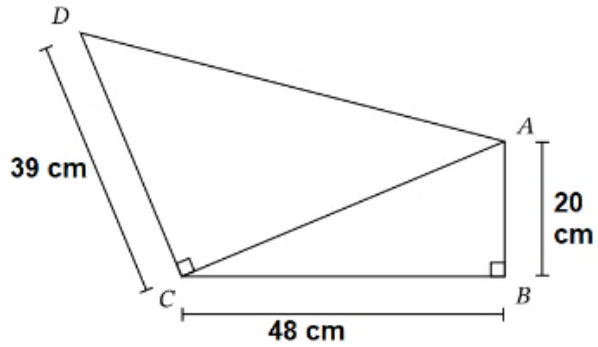
Session Plan

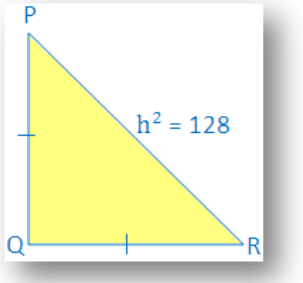
Instructional strategies/activities

Time	Objective/purpose of the activity	Activities/learning experiences	Materials/resources
10 min	**Activity 1:** **Introduction to right-angle triangle**	Teacher will be asked to draw, label and define the right-angled triangle  **Facilitator's Notes:**  	Pencils, Scale, Protractor

		Definition of a right-angled triangle A triangle in which one of the interior angles is 90° is called a right triangle. The longest side of the right triangle, which is also the side opposite the right angle, is the hypotenuse and the two arms of the right angle are the base and perpendicular.	
 30 mins	**Activity 2:**  **Exploring Pythagoras Theorem**	-Teacher will be asked to cut different squares of length 1 unit; 2 units, 3 units, 4 units and 5 units from the given square paper. Using the square cutouts, form a right-angled triangle and share the observation. Teachers will be able to form the following model.  **Key observation**: The square of the length of the hypotenuse of a right triangle equals to the sum of the squares of the lengths of the other two sides.	Handout 19.1

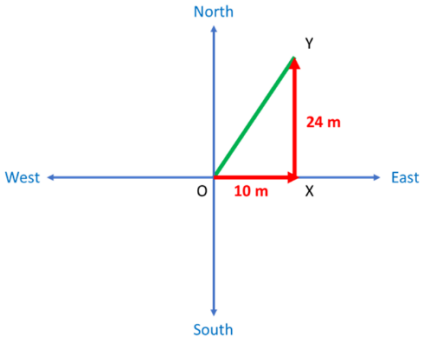
		 Symbolically this is written as $C^2 = A^2 + B^2$	
 30 mins	**Activity 3:**  **Calculating missing sides using Pythagoras theorem**	- Teachers will be asked to solve the following tasks using Pythagoras theorem 1. Find the length of the hypotenuse in the right-angled triangle when its base is 6 cm and its perpendicular side is 8 cm. 2. Find the length of AD in the following figure using Pythagoras theorem. Hint: First calculate AC and then calculate AD	Handout 19.2

		 3. Ask teachers to solve Handout 19.2 as a practice home task.	
 35 mins	**Activity 4:**  **Application of Pythagoras theorem to real life situations**	- Teachers will be asked to solve real life situations using Pythagoras theorem, discuss in the group and invited to come and share with all. 1. A ladder leaning against a wall, forming an angle of 78^0 with the ground. The distance from the base of the ladder to the wall is 5 meters, and the length of the ladder is 13 meters. How high up the wall does the ladder reach? [draw a rough sketch when solve this task] 2. If the square of the hypotenuse of an isosceles right triangle is 128 cm^2, find the length of each side.	

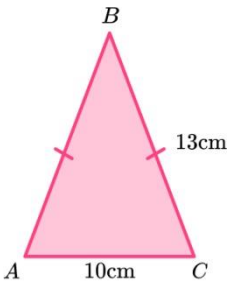


3. A man goes 10 meters to the East and then 24 meters to the North.

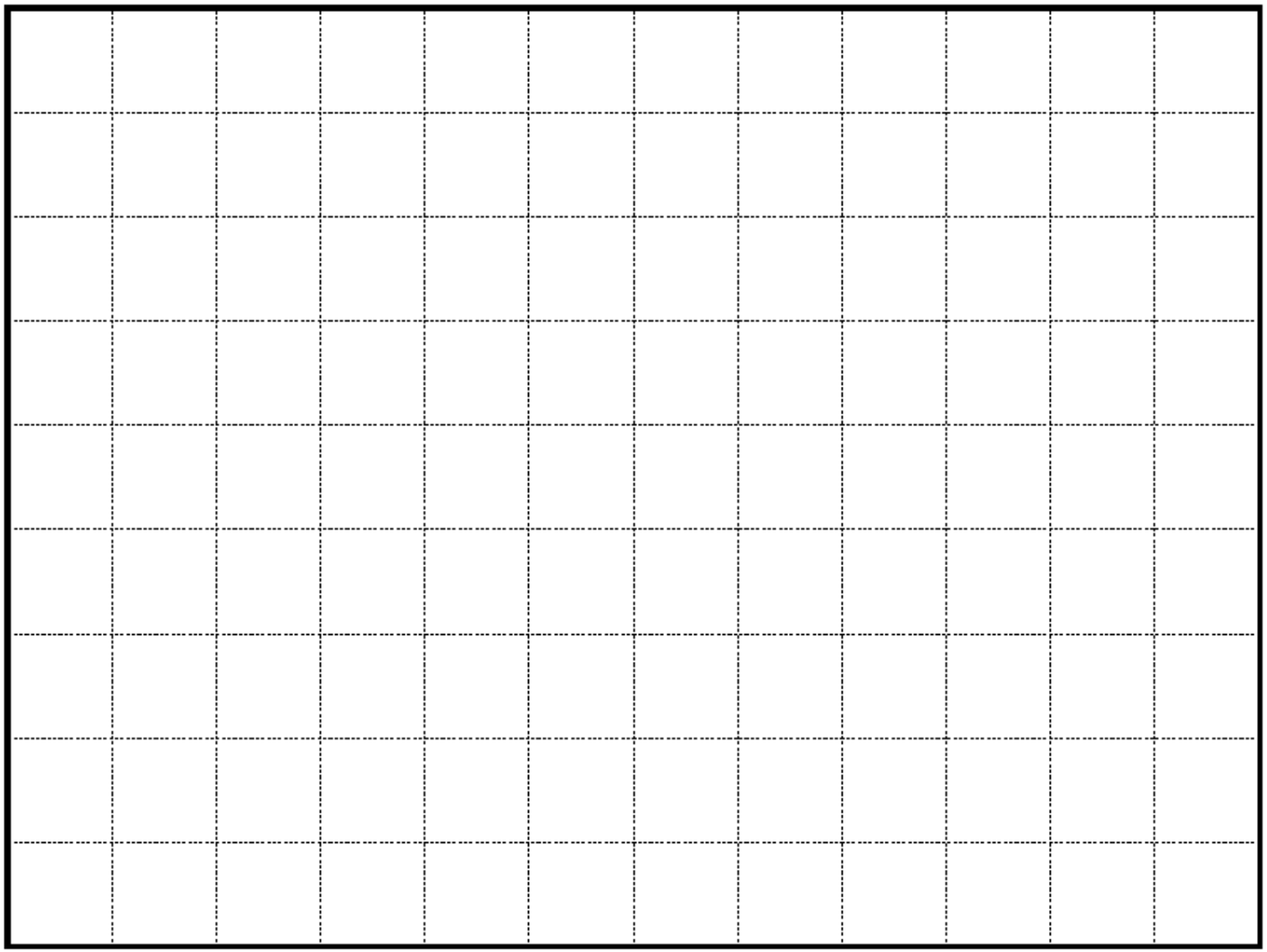
Find the distance from the starting point.

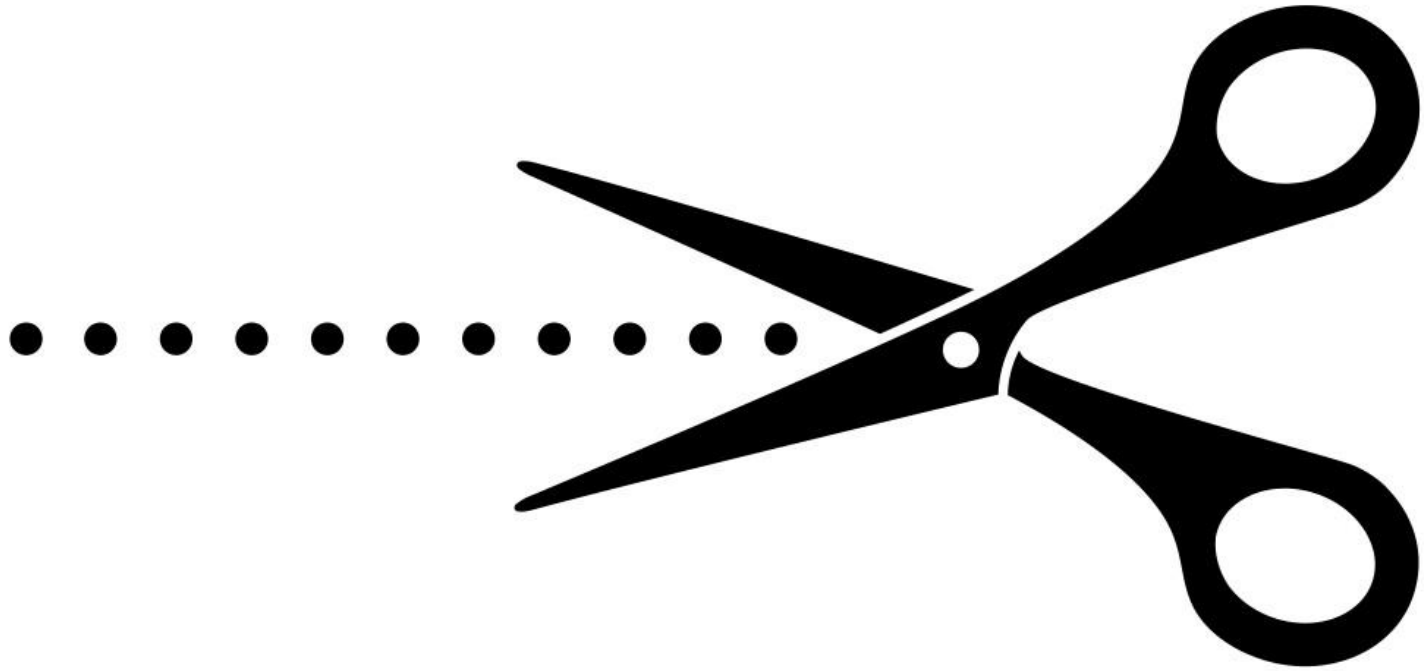


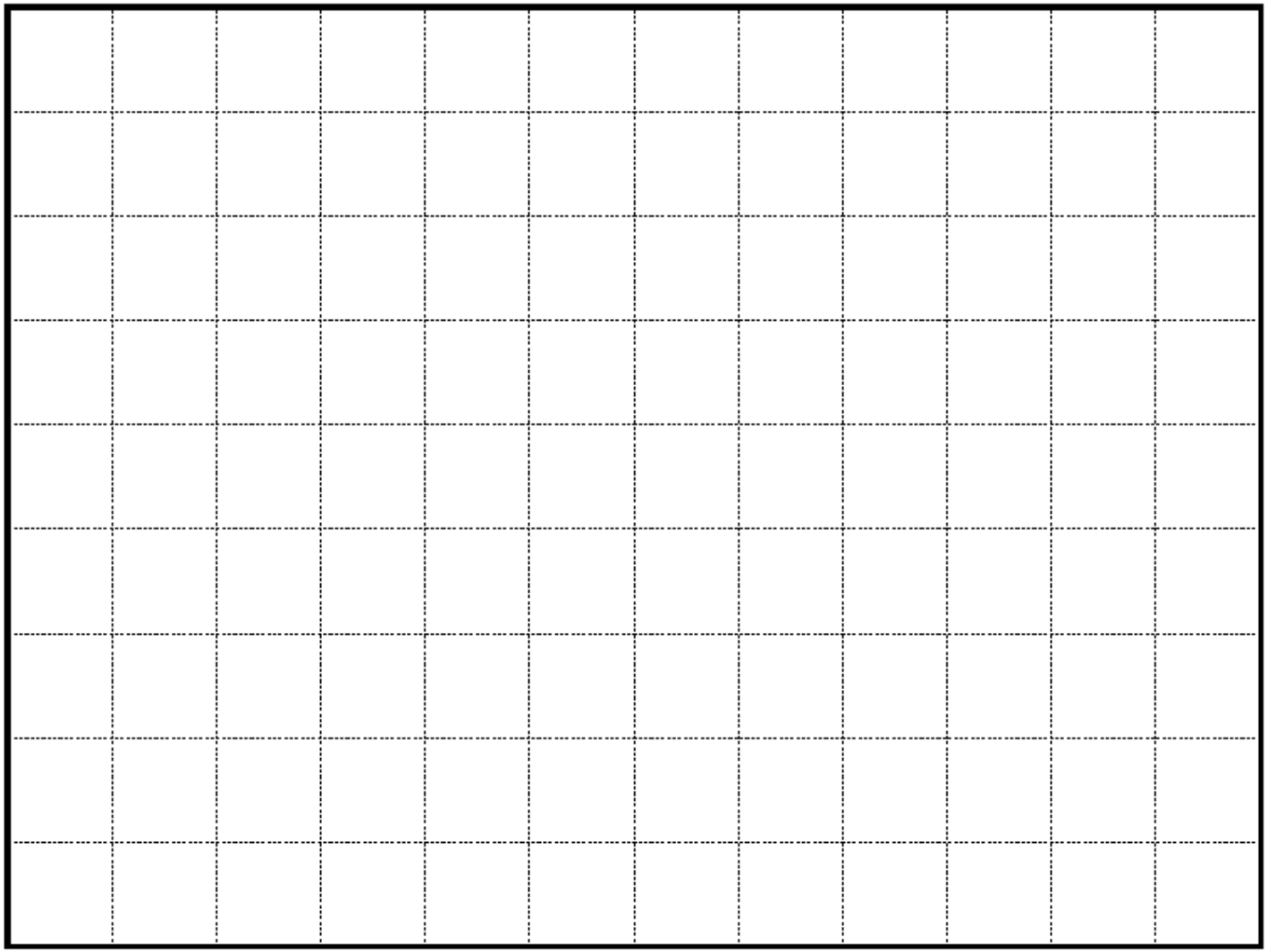
 15 mins	**Activity 5:**  **Assessment**	-Teacher will be asked to complete the assessment sheet 1) Which of the following sets of numbers can form the sides of a right triangle? A) 3, 4, 5 B) 5, 6, 7 C) 7, 8, 10 2) Which of the following statements is true about the Pythagorean theorem? A) It applies to all triangles. B) It applies only to right-angled triangles. C) It applies only to equilateral triangles. 3) Two boats leave the port at 12:00 noon, one of them moving northward at 6 km per hour, and the other moving westward at 8 km per hour. How far apart are the boats after 2 hours?	

		A) 28 km B) 20 km C) 14 km 4) ABC is an isosceles triangle. What is the height of the triangle.  A) 8 cm B) 8.3 cm C) 12 cm 5) Describe a real-life situation where the Pythagorean theorem can be applied. Explain how the theorem is used to solve a problem in this scenario.	

Handout 19.1 – Square Grid



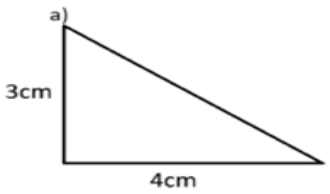




Handout 19.2 – Worksheet

Find the length of the hypotenuse of each of the triangles. Give any decimal answers to two decimal points.

a)



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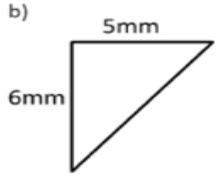
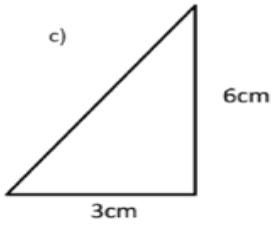
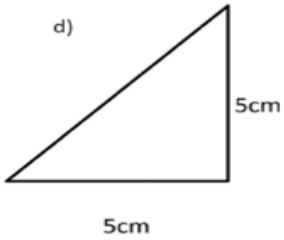


c)



d)



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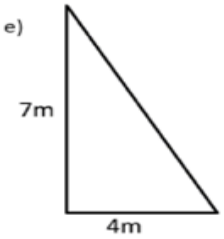
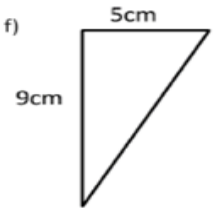
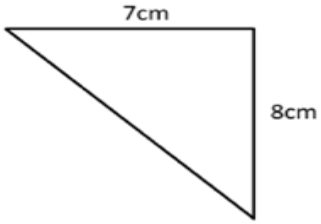


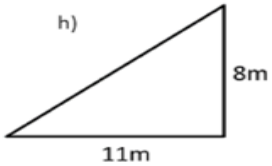
f)



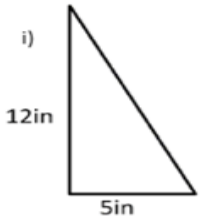
g)



h)



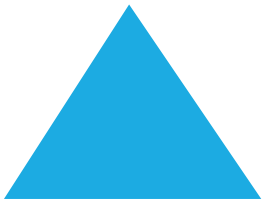
i)



For reference:

List of 1-20 LCs topics

Learning Cycles (LCs)	Topics
LC-1	Developing Number Sense
LC-2	Fractions
LC-3	Decimal and Percentage
LC-4	Ratio and Proportion
LC-5	Introduction to Algebra
LC-6	Algebraic Identities
LC-7	Angle and its Constructions
LC-8	Area and Perimeter
LC-9	Three Dimensional Shapes
LC-10	Information Handling
LC-11	**Place Value**
LC-12	Highest Common Factor (HCF) and Least Common Multiple (LCM)
LC-13	Fraction Addition and Subtraction
LC-14	Fraction Multiplication
LC-15	Laws of Exponents
LC-16	Square Roots
LC-17	Simultaneous Linear Equations
LC-18	Unit Conversion
LC-19	Pythagoras Theorem
LC-20	Construction of Different Types of Triangles



For reference:

List of Resource Items for LCs (11-20)

Items	No. of items	LC-11	LC-12	LC-13	LC-14	LC-15	LC-16	LC-17	LC-18	LC-19	LC-20
Dice	8	✓							✓		
Pair of scissors	8	✓	✓								
Paper Plate	18		✓								
Red beans	½ kg	✓	✓								
Counters (Red/Black)	10								✓		
Counters (Blue/White)	10								✓		
Color pencil box	4			✓	✓						
Measuring tape	8								✓		
Geometry Box	8									✓	✓

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