Development of Virtual lab :Round 1 (R1) Pedagogy - Template (Worksheet)

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Discipline to which the Lab belongs: Trigonometric Mathematics
Name of the Lab: Engineering Mathematics
Name of experiment: Pythagoras Theorem
(only one Experiment per worksheet. for submitting more than one experiments, please fill up another worksheet)**:**

Kindly Refer these documents before filling the worksheet

1. **Coursework (MOOC) on Pedagogy , Storyboard , Lab Manual : http://bit.ly/Vlabs-MOOC**
2. **Additional Documentation booklet for reference. http://vlabs.iitb.ac.in/vlabs-dev/document.php**
3. **Sample Git Repository. :**

1.1 FOCUS AREA:
Basic Mathematics.

1.2 About the Experiment:
The Pythagorean theorem is an important math concept that is applied everywhere in math and technology. The idea is simple in that $a^2 + b^2 = c^2$ for a right angle triangle that has two sides, a and b, and a hypotenuse of c.

The Pythagorean Theorem and its many proofs. In a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the legs. There are several methods to prove the Pythagorean Theorem.

1.3 Learning Objectives:
Pythagoras theorem states that "**In a right-angled triangle, the square of the hypotenuse side is equal to the sum of squares of the other two sides**". The sides of this triangles have been named as Perpendicular, Base and Hypotenuse. Here, the **hypotenuse** is the longest side, as it is opposite to the angle 90°. The sides of a right triangle (say x, y and z) which has positive integer values, when squared are put into an equation, also called a Pythagorean triple.

$$\text{Hypotenuse}^2 = \text{Perpendicular}^2 + \text{Base}^2$$
$$c^2 = a^2 + b^2$$

where, c is Hypotenuse
b is Base and a is Hight.

2. Instructional Strategy

Typically, the Pythagorean theorem is studied right after square roots or in a geometry course. This happens usually in middle school, not in elementary grades.

In my opinion, if children have not yet been taught the concept of square root, then there is no way you can explain BOTH the Pythagorean theorem AND the concept of square root in one lesson. Besides, before learning about square roots, students need to know about squaring numbers (exponents).

The only way I can see around this is if you don't even try to explain what square roots are but just tell the students to get them from the calculator. That way you can concentrate on teaching them this basic idea:

The Pythagorean theorem lets you find the third side of a right triangle if you already know the two other sides.

2.1 Assessment Method:

This lesson introduces students to the Pythagorean Theorem through a real world problem which requires application of the converse of the theorem. After students engage in hands-on practice of the theorem using color tiles to create squares, they are asked to independently solve a converse problem.

3. Task & Assessment Questions

Complete the following table with details of the various tasks and assessment questions you will give to the students.

Sr. No.	Learning Objective to be met	Tasks to be performed by the students	Assessment questions aligned to the task
1	Calculate the sides	Take the individual value of $a^2 = c^2 - b^2$ $b^2 = c^2 - a^2$ $c^2 = a^2 + b^2$	We should provide at least two value out of three sides of triangle and calculate value of remain one side.
2	Analyze the importance of the Pythagoras theorem and understanding mathematical problems.	To find out the Height, Base and Hypotenuse.	Use the Simulation.

4. Simulator Interactions

1. Find a right angled triangle by giving base and heights in the input box.
2. Find the respective three sides of a triangle.
3. Pythagoras theorem is used to check if a given triangle is a right-angled triangle or not.
4. Use the Pythagorean theorem to derive the equation of a circle.
5. Use the area of right triangles to deduce the areas of other shapes.
6. Use the Pythagorean Theorem a^2+b^2=c^2 to write an equation to be solved.
7. Rearrange the same four triangles such that they form two equal rectangles inside a larger square.
8. Recognize that the area not formed by the triangles is equal in both arrangements.
9. In a right triangle, the square of the hypotenuse is equal to the sum of the square of the other two sides.