Lesson 5: Right Triangles in Construction

SPECIFIC OBJECTIVES

Use Pythagorean Theorem to determine the missing side of a right triangle and to create a 90 degree angle.

By the end of this lesson you will understand that...

- Pythagorean Theorem is a formula that allows you to find the missing side of a right triangle
- A right triangle has one 90 degree angle
- Right triangles are used in construction to create/confirm right angles
- A Pythagorean Triple is a set of whole numbers that make the Pythagorean Theorem true

By the end of this lesson you will be able to...

- Use square roots to solve the Pythagorean Theorem for a missing side of a triangle
- Use a Pythagorean Triple to confirm or create an angle that is exactly 90 degrees.
- Use the construction master calculator to solve for the missing side of a right triangle

PROBLEM SITUATION #1 : Exploring Right Angles

In this problem situation, you will be going into the shop in your group and working together to figure out how to connect 3 of the pieces of masonite provided, to create a right (90°) triangle. You may use a framing square when you are done to check that your angle is about 90 degrees.

1. Use 3 of the pieces to create a right angle. Sketch the shape you created and label it with as much information as you know.

Commented [SA1]: Do we need to specify that no other tools but square are to be used?

Commented [SA2]: Don't you tell them above to use a framing square?

2. Once you see another group done with their work, check out their shape and compare it to yours.
    a. Describe all of the ways that the shapes are similar.

    b. Describe all of the ways that the shapes are different.

3. Repeat 2a and 2b with another group.
    a. Similarities

    b. Differences

Now, let your instructor know you are done and wait for your instructor to lead a whole class conversation…

PROBLEM SITUATION #2 : Pythagoras

In this part of the lesson, you will need to wait until your instructor gives you guidelines on next steps. Take notes on what is shared in the space below:

Commented [CP3]: Here is a big question. How important is the proof for the Pythagorean Theorem. It is an interest proof, but does it add value to this lesson?

4. What units did you decide to use to construct your squares?

5. Discuss in your group how you can use your 3 squares to prove that the areas of the two smaller squares = the area of the larger square ($a^2 + b^2 = c^2$). Write down your selected strategy below.

6. Now, use your strategy you described in #5. Did it work? If not, why not?

7. Now take the measurements you wrote down for the triangle you created in problem situation #1 and substitute those 3 numbers into the Pythagorean Theorem. Calculate and determine if they make the equation true. Show your work below.

8. What if you want to make a right angle, how can you use the Pythagorean Theorem to help you? Discuss in your group and write down your explanation below.

PROBLEM SITUATION #3: Uses for the Pythagorean Theorem in construction

9. With your group, brainstorm as many ways a possible that you think you could use a 3-4-5 right triangle to help you on a construction site. Once all groups have shared their ideas, we will select one of the applications you came up for #10 below.

10. State the *best* way you think you could use a 3-4-5 right triangle for the task.

11. Let's go out to the shop and practice squaring a wall using 2 tape measures. Once you are in the shop, listen to the instructions from your instructor and then write down your values of x and y below:

X = ___________________ y = _________________

12. Calculate your hypotenuse (diagonal) using the Pythagorean Theorem ($a^2 + b^2 = c^2$). Show your work below.

13. Check your work by measuring out your triangle. Did it work?

Commented [CP4]: Cool! I did not know this method! Learning something new!

MAKING CONNECTIONS

Record the important mathematical ideas from the discussion.

Practice

Pg 121 2, 4
Pg 122 5
Pg 128 2, 5
Pg 129 7, 8, 10
Pg 130 11, 12
Pg 131 19