Special Right Triangles

30-60-90- and 45-45-90

Virginia Lynch
High School_11&12
Trigonometry-Special Right Triangles
Advanced Algebra II-Special Right Triangles

State Competency

Math 9-12: Geometry Standard 3: Triangles and Trig Ratios #2

"Apply the 45-45-90 and 30-60-90 right triangle relationships to
solve problems and verify using algebraic and deductive proofs"

Objectives

The student will:

1) Be able to label each side of the special triangles in terms of
x
2) Use that information to solve for the missing lengths of sides
in the special triangles
3) Represent the ratios in three ways; angle:angle:angle,
side:side:side in terms of x: and side:side:side
4) Construct several triangles and derive the ratios deductively
5) Prove the ratios algebraically

Materials

- 3 sheets of colored paper per student (2 of 1 color(not black) and 1
of a contrasting color)
- Graph paper or engineering paper
- Scissors
- Glue stick
- Smart board lesson: Special Right Triangles
- Smart Board Activity
- Homework Handouts: (levels A,B, C and "Velma" 2 pages
- Scooby Do Test- 2 copies per student, to be used as Pre and Post
Test

Prior Skills

In order to perform well on this lesson, the student should already be
familiar with the Pythagorean theorem and the properties of right
triangles. They should also have skills in working with radicals in
equations.

Daily Lesson Plan

Day 1: Pre-Test

Day 2: Foldable Construction Model *(Auditory, Tactile & Visual)*

I had two classes doing this lesson so I only did one construction in each class and had each class look at the others models. Actually took more than one class period.

Day 3: Proofs (Auditory, Tactile & Visual)

Algebraic: Draw an Equilateral triangle, draw an altitude. Label side of triangle as 2x and then derive the other sides in terms of x using properties of right triangles & the Pythagorean Theorem. Take care to write out the ratio of the sides in terms of x: x: x $\sqrt{3}$:2x .   Draw a Square with a diagonal. Label the sides of the square x and then derive the length of the diagonal in terms of x using the Pythagorean theorem. Again write out the ratio of the sides of the triangle in terms of x: x: x: x$\sqrt{2}$.

Deductive: Hand each student 2 strips of paper, 11" x ½". On one strip have them mark off 4 cm and 8 cm from one end. Fold at these 2 marks and tape to make a right triangle (make the right angle at the first fold between the two 4cm lengths. Have each student measure their third side and find the class average. If you divide this by the $\sqrt{2}$ you should get close to 4. With the other strip, make a mark at 4cm and at 12 cm from one end. Fold at the two marks and tape to form a right triangle, using the length from 4cm to 12 cm as the hypotenuse. Measure the third side and find the class average. Again, divide, this time by the $\sqrt{3}$, and you should get something close to 4. Discuss how close you got and what could have caused you to do worse or better.   Also went longer than expected.

Day 4: Velma handout together *(Auditory & Visual)*

This is much like the pre-post test. Address issues found on pretest, for example putting answers in radical or exact form vs. rounding answers.

Day 5: Handout finding missing lengths (leveled handouts) *Visual*

Day 6: Test

Day 7: Go Over Test (We also looked at pre-test & compared)
Discussed what we knew before and what we learned.

Modification

This is an upper level skill. Although I have no students with IEP's in either class, one of my classes is definitely more math challenged. I allowed some to use the foldable on the test. I could also only assign the level A worksheet for them to do on their own and not assign all the problems.

Reflection

I taught this lesson to 2 classes. One was a trig class and the other a class we call Adv Alg II where we go over things missed in Geometry and Alg II. The first 4 days of the lesson plan actually took 6 days and the students in Trig were ready for the test so we took it and moved on. Mistakenly, I also gave the test to the other class. It was Friday and the lesson plans were due. I had 2 zeros. So I added:

Day 5: *(Auditory, Visual & Tactile)*

Make a foldable with the ratios and other right triangle properties. Then do Smart Activity to reinforce ratios, proofs and begin applying to find missing lengths. (I would do this on day 3 if I were doing it over)

They liked the foldable much more than the construction. They worked hard on them. The smart activity caught their attention and they actually really liked the little move the labels activity at the end, and the disappearing boxes. We spent another day working the worksheet problems on the board, taking turns working them for the class.

Once again, I relearned something I've learned before. No 2 classes are alike, what works with one may totally flop with the next. So, I would add the foldables and the smart activity about day 3, before I did the Velma worksheet. I would also only make one construction model per class. It just takes too much time. It was fun and a change up but I don't think it helped that much.