Zigzag Geometry

Student/Class Goal
Geometry is necessary for students transitioning to postsecondary education; students often need practice with these skills.

Outcome (*lesson objective)*
Students will calculate the area of compound geometric figures.

Time Frame
Two 1-hour classes

Standard *Use Math to Solve Problems and Communicate*

NRS EFL 6

COPS	**Activity Addresses Components of Performance**
Understand, interpret, and work with pictures, numbers, and symbolic information.	Students are working to find the area of compound geometric figures.
Apply knowledge of mathematical concepts and procedures to figure out how to answer a question, solve a problem, make a prediction, or carry out a task that has a mathematical dimension.	In preparation for postsecondary courses, students must become proficient in identifying geometric figures and calculating area for any given layout.
Define and select data to be used in solving the problem.	Teacher examples and classroom resources are used for students to practice fining area of complex geometric figures.
Determine the degree of precision required by the situation.	Accurate measurements must be used when calculating area of figures.
Solve problem using appropriate quantitative procedures and verify that the results are reasonable.	Identify geometric formulas used when solving problems.
Communicate results using a variety of mathematical representations, including graphs, chart, tables, and algebraic models.	Students create one complex area problem, work the calculations and then share with another student to complete and compare.

Materials
Paper, pencils, colored pencils, compass
graph paper both ¼ inch square and 1 inch square
I inch square plastic tiles 48 per team
Footprint of a House Handout
Family Room Area Scenarios
Zig-Zag Transparency Quiz
Basic College Mathematics (2006). Prentice Hall*,* 545-548.

Learner Prior Knowledge
Students should already be able to substitute and evaluate in geometric formulas.

Instructional Activities
Step 1 - Using the *Footprint of a House* handout/overhead, students will graph and tally the types of geometric shapes incorporated into the drawing. Discuss reasons for knowing the exact area of these spaces and determine the units necessary to report the results.

Step 2 - Discuss types of units where area is measured. What are the conventional units of measure used in household applications?

What is meant by a perfect square? Outline the perfect squares of 5^2 and 8^2 on your graph paper. The teacher reviews and reinforces writing factors.

Step 3 - Students will arrange a “play space” or “dance area” in a family room using 48 square tiles. Choose a partner and complete scenarios A and B. Return to a full class discussion of your answers to A and B above. How did you find the area of the play floor and fireplace apron? Check your answers to all of the questions. Under what circumstances in homes, driveways, and patios or decks might irregular geometric figures appear?

Step 4 - Ask students to list the various plane geometric formulas they used in their work. Add any miscellaneous formulas such as finding the area of a trapezoid. Informally quiz students about what formulas are used for particular geometric figures.

Step 5 - Assign each student to devise the footprint of a single level deck. They are to outline the figure and calculate the exact area. The problems should be collected and reviewed by the teacher. For additional practice students can complete p. 545, 19- 24 and pp. 546- 548, 40 – 59 in the textbook.

Step 6 - Each student will devise one complex area problem of his own and write out calculations to find total area. Problems will then be shuffled and distributed for fellow students to complete and compare with original student's work.

Step 7 - Homework assignment will be checked for evaluation. Distribute Zig-Zag Transparency Quiz, students will calculate the total area of the figure. They will need to recognize the diameter of the circle to complete the width of the rectangle. Then using the Pythagorean Theorem, students can determine that the length of the rectangle is 12 feet. They must also find half the area of the circle since the other half is already contained in the rectangle. They would then add the area of the rectangle, triangle, and semicircle together to find the total area of the figure.

Assessment/Evidence (*based on outcome)*
student-generated problems
homework assignment
Zig-Zag Transparency Quiz

Teacher Reflection/Lesson Evaluation
This lesson has not yet been field tested.

Next Steps
Review and introduce square measurement conversion and expansion to acres and miles and metric measurement problems

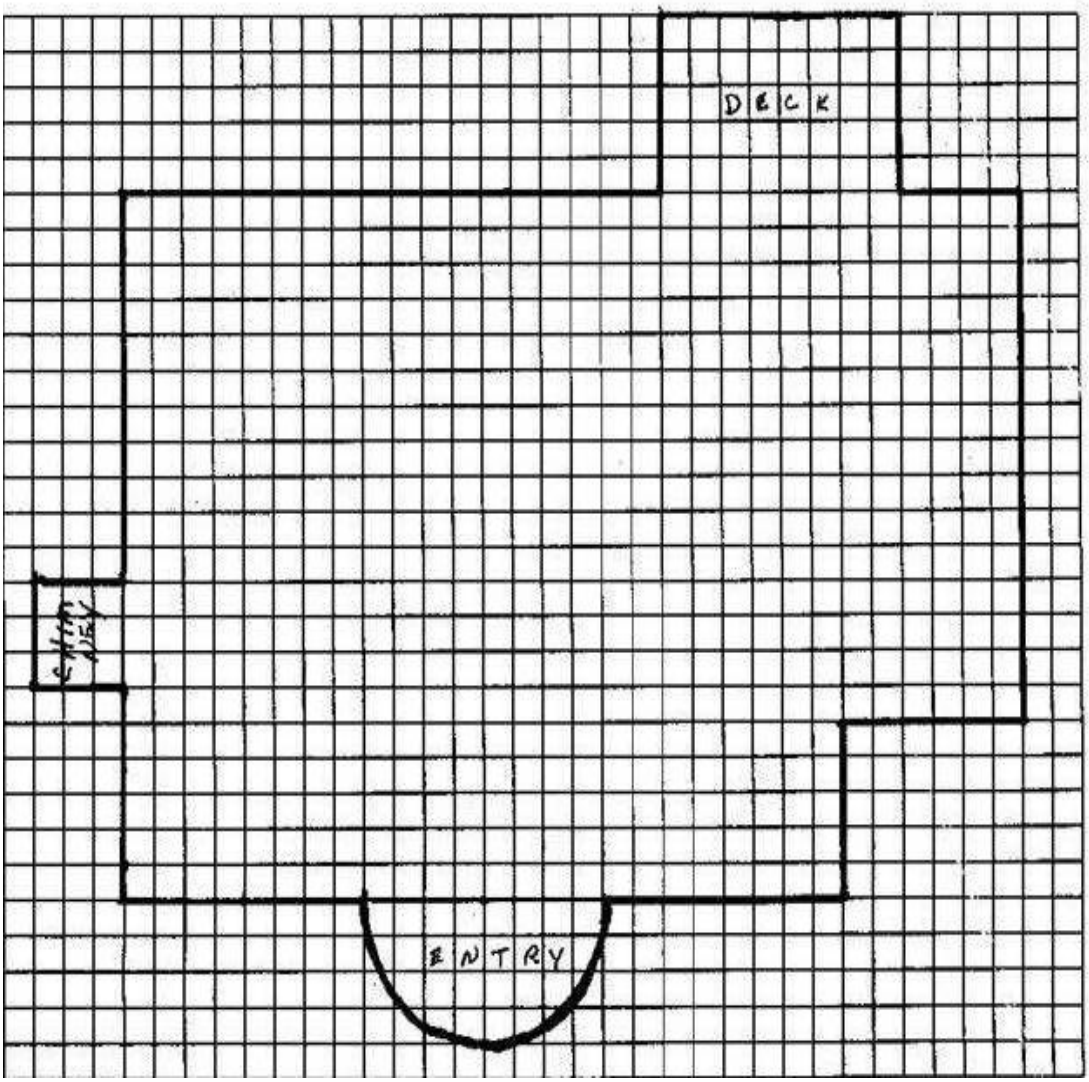
Technology Integration

Purposeful/Transparent
Postsecondary transition classes work on building geometry skills by calculating area of geometric figures.

Contextual
Students are given various situations around the home to determine area of driveways, patios, decks, rooms or any irregular figure.

Building Expertise
Students practice using substitution in geometric formulas and calculating the area of compound geometric figures.

Footprint of a House



This is a footprint of a house. Assume that each square on the paper represents one square foot. Outline different plane figures with different pencil colors. List the various shapes that are seen in the worksheet diagram. Then tally the number of plane geometric figures.

Geometric Figures **Tally**

1.

2.

3.

When might we need to know the area of such irregular features such as a driveway, flower garden, a lot, or a room? Might there ever be a need to know a third dimension? What and when would that be? Discuss with your group.

Family Room Area Scenarios

Choose a partner and complete parts A and B below.

A. If you had a large floor space in your family room and wished to define one area where the children could play games on a hard surface for “driving” cars and trucks or even dancing, how many different rectangular arrangements of one foot square linoleum tiles would you have? Suppose you have 48 tiles. Use your graph paper to outline all of the arrangements. How many more tiles would it take to make a perfect square? What number of tiles would you need for the next larger perfect square?

B. Choose one of the 48 tile arrangements that seemed appropriate. Draw a diagram and add a semicircular area adjacent to the rectangle. The fireplace apron has a diameter of seven feet. Determine the total square feet required for the two features. If the room has dimensions of 18 x 21 feet, what percent of the area of the family room remains for carpeting? How many square feet of carpeting would be needed?

Zig-Zag Transparency Quiz

Calculate the total area of the figure. **Note** The hypotenuse of the triangle is 13 feet.