

Stained Glass Polygons
Fourth Grade Math
Higher Order Thinking (H.O.T.) Lesson 2

Wednesday, September 26, 2007
Approximate Time: 45 minutes

Learning Objectives:

The student will be able to –

1. Construct regular and irregular polygons.
2. Create a geometric stained-glass window design following specific criteria.
3. Analyze a peer's stained-glass window design for the specified geometric elements.

Language Objectives:

The student will be able to –

1. Provide appropriate definitions for “twice as many” and “three more than.”
2. Give geometric definitions for regular polygon and irregular polygon.
3. List elements of the triangle, quadrilateral, pentagon, hexagon and octagon.
4. Discuss the geometric differences between two stained-glass window designs.

Materials:

1. Geometry template
2. Ruler
3. Pencil & eraser
4. Colored pencils/markers/crayons
5. Stained-glass window template
6. Stained-glass design activity sheet
7. Examples of stained glass windows
8. Reflection

Procedures:

1. Tell students that we have been learning a lot about different kinds of polygons (who can give me a definition of a polygon?). But where do we see these polygons? Transition into examples from cathedrals, churches. Show class examples. (~5 min)
2. Tell students they will be creating their own stained-glass window today that uses the geometry we have been talking about!
 - Hand out activity sheet and stained-glass window template.
 - Ask several students to read what the design must include. Review the key vocabulary words making sure students have sound definitions. Give examples of regular polygons and irregular polygons. Students are not limited to the criteria, but that is the minimum.
 - Explain how the color code works.
 - Tell students they will have **15 minutes** to create their design and color it. We do not care about what the design looks like (be creative!) We are not judging based on your artistic ability. We care that you have all the geometry you are supposed to have.
 - Distribute geometry templates (for regular polygons), coloring materials. (Directions & creating stained-glass window ~25 min)

3. Students turn to a neighbor and do the pair analysis on the back of the activity sheet. They should discuss the differences between the two designs. (Why do they look different? Can you envision the design if it was twice as big? Etc.) Monitor pairs work. (~10 min)
4. Have students collect materials and stained-glass window designs. Distribute independent reflection sheets. (~7 min)

Closure:

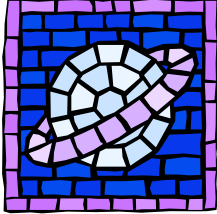
Ask students orally – If I drew 12 pentagons for my stained-glass window design, and I was supposed to draw four times as many triangles, how many triangles do I have in my design?

Assessments:

1. Observations (pairs and independent work)
2. Whole-class discussion to review vocabulary
3. Stained-glass window design (scored against rubric)
4. Pair analysis sheet

Name: _____

The Stained-Glass Window Design



Your stained-glass design must include:

- Three quadrilaterals
- Twice as many triangles as quadrilaterals
- Two regular pentagons
- Three more octagons than pentagons
- One irregular polygon
- Any number of hexagons
- Any other appropriate designs or geometry if you choose

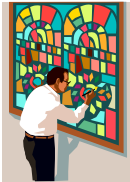
COLOR CODE

<u>Shape</u>	<u>Color</u>
Quadrilaterals	
Triangles	
Pentagons	
Hexagons	
Octagons	
Irregular Polygon	

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NAME: _____

PARTNER'S NAME: _____



PAIR ANALYSIS

DIRECTIONS: LOOK AT YOUR PARTNER'S DESIGN AND WRITE ANSWERS TO THE FOLLOWING QUESTIONS.

1. WHAT KIND OF QUADRILATERALS DID YOUR PARTNER PUT IN THE DESIGN?

2. HOW MANY OCTAGONS DO YOU SEE IN THE DESIGN?

3. HOW MANY TRIANGLES DO YOU SEE IN THE DESIGN?

4A. WHAT KIND OF IRREGULAR POLYGON IS IN THE DESIGN?

4B. WHAT MADE THE IRREGULAR POLYGON IRREGULAR?

DIRECTIONS: DISCUSS THE FOLLOWING QUESTIONS WITH YOUR PARTNER.

1. WHAT MAKES THE TWO DESIGNS LOOK DIFFERENT? WHAT IS SIMILAR ABOUT THE TWO DESIGNS?
2. DID YOU BOTH DRAW THE SAME KINDS OF QUADRILATERALS? WHAT OTHER KINDS OF QUADRILATERALS COULD YOU HAVE DRAWN?
3. WHAT OTHER KINDS OF IRREGULAR POLYGONS COULD YOU HAVE DRAWN?
4. CAN YOU ENVISION WHAT YOUR PARTNER'S DESIGN WOULD LOOK LIKE IF IT WAS TWICE AS BIG?

Name: _____

STAINED-GLASS WINDOW REFLECTION

Directions: Please answer in complete sentences.

1. What words were confusing in this activity? Why do you think these words were confusing?

2. What did you and your partner talk about?
