Geometry Is Everywhere

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Introduction

"Why do we need to know this?" It was a popular question in my math class. For years I have taught the curriculum objectives that were set forth by the state of North Carolina. I rationalized their question because my students needed the objectives in order to pass the End of Grade tests. Or they needed the objectives for sixth grade and high school. But in fifth grade you are not concerned with sixth grade, high school, or SAT scores. A fifth grader is concerned about their baseball game this afternoon, dance practice, the new movie coming out this weekend, or playing on a NFL team when they grow up. After creating this unit I no longer have the same rationalization to the "Why do we need to know this" question.

I decided through this unit that I would expose my students to geometry in their everyday life. They would realize that geometry was a part of their neighborhood, the sports they play, buildings, and artwork. Fifth graders study geometry and begin to build their foundation of geometric shapes. Geometry was not interesting to me in high school. I breezed through the class and never really looked back on it. I wonder if I had been captivated at a younger age with math and geometry, if maybe I would have taken more of an interest in it later on in life. I believe that by integrating what is real and important to fifth graders, that they will develop a love for math and no longer ask, "Why do we need to know this".

Purpose

Through this unit I will teach our North Carolina state curriculum objectives on properties of plane figures. Then I will relate these concepts to sports, architecture, art, and real word objects. The unit will then conclude with culminating project that involves creating a city out of polygon shapes. Students will use their knowledge to create this city. I hope to use appealing topics to introduce the geometric objectives in order for my students to develop the necessary background that will be needed later on in higher level geometry courses.

I have designed this unit for use with elementary students that are in the fifth grade. I teach at JV Washam Elementary in Cornelius, North Carolina. Our teachers are given the freedom to plan a variety of lessons to reach our educational goals, as long as we follow the state curriculum closely. This allows me to incorporate popular culture into my lesson plans and still teach the curriculum objectives. The entire geometry unit will span

over twenty-two days. I have written this curriculum unit based on six lessons that will be taught within the entire unit.

Objectives

The North Carolina geometry objectives expect fifth graders to able to identify and classify polygons, with a huge emphasis on triangles and quadrilaterals. These students must be able to solve problems that involve the properties of all polygons, including how to determine the sum of the interior angles. Students will be able to classify plane figures by the type of symmetry it possesses. Last fifth grade students should be able to make and test conjectures about different polygon angles and diagonals.

In this unit I will introduce lines, rays, and line segments. Students will use art and local landmarks to identify the basic concepts of a shape. Then I will explain how rays are formed to create angles and how to classify angles. I will use different sports to represent the different types of angles. Students will also learn to classify polygons by the different attributes that must be present to form this type of shape. Students will interact with Google Earth and artwork to identify polygons. Next students will learn other attributes that only quadrilaterals possess. I will reinforce this concept with artwork. Last I will teach students how to distinguish between line and rotational symmetry by using historic landmarks and architecture. The unit will conclude with a cumulative project that will involve students creating an aerial view of a village using polygons.

By using everyday items, sports, architecture, and artwork, I hope to motivate my students to look at the geometry that surrounds us in our everyday life. I hope to inspire them to become more focused in mathematics and achieve higher levels of geometric thinking. By incorporating familiar aspects of life and providing experiences to problem solving, my students should be at Level 3 of Pierre and Dina van Hiele's theoretical perspective of levels of thought in geometry. This will require my students to be able to distinguish between different polygons and classify them by their properties. They will be able to deduce the sum of interior angles of a quadrilateral is 360 degrees because two triangles can create a quadrilateral. Students will be able to reason that some shapes will have similar attributes and can fall under the same category. (i.e. A square is a rectangle, but a rectangle is not a square.)

Many of the lesson ideas will require the use of an interactive whiteboard. I am fortunate to have one in my classroom and find it extremely beneficial when teaching mathematics.

Mathematical Background

Vocabulary

In fifth grade, students learn a plethora of geometric vocabulary. Throughout the unit I will introduce the new vocabulary at the beginning of the lesson. Students will record the word, definition, and an illustration in their notebooks. This is to be used as a study guide for the students. It is very important for the students to become familiar with these words and their definitions.

Angle Identification

Fifth grade students must be able to identify angles. This will become important when classifying triangles, quadrilaterals, and other polygons. It is important for students to develop a firm background with acute, right, obtuse, and straight angles. Not only should they be able to identify the type of angles, but fifth grade students must be able to accurately measure angles as well. When students are determining the sum of interior angles this can be done by measuring each individual angle if all angles are unknown. Students must also be able to determine complementary and supplementary angles as well. This concept will assist the student in determining unknown angles that when combined create 90 and 180 degree angles.

Triangle Classification

After students comprehend identifying angles they may begin classifying triangles by the shape's angles and eventually by the shape's sides. Students will then be able to recognize that triangles possess two different classifications (i.e. an acute isosceles triangle, a right scalene triangle). Once students can sort triangles by their angles and sides, then they will be able to understand how to determine the sum of the interior angles of a triangle. Students will also be able to determine that the sum of the lengths of two sides of a triangle must be greater than the third length. Understanding the triangle classifications will allow students to problem solve and determine these unknown factors about triangles.

Quadrilateral Classification

Fifth grade students will also be able to classify quadrilaterals by whether they have parallel sides (i.e. trapezoid) and by the lengths of their sides (i.e. kites). Students will observe the angles, length of sides, perpendicularity, and parallelism to determine what attributes different quadrilaterals possess. Students will use their prior knowledge about the sum of interior angles to determine the sum of the interior angles of a quadrilateral.

Students will thoroughly investigate these characteristics to infer what shapes share common attributes (i.e. All squares are rectangles).

Testing Conjectures about Polygons

Students will be able to test and prove conjectures about triangles, quadrilaterals, and other polygons. By doing this, students will be building a foundation for high school level geometry when they will be writing geometric proofs. The focus of these conjectures will be about the attributes of quadrilaterals and the diagonals of quadrilaterals. For example, students will prove that any rhombus with one right angle is a square. Students will prove that the diagonals of a parallelogram are not perpendicular as well as a pair of diagonals that are congruent, bisecting, and perpendicular create a square. Students will also be able to determine the sum of interior angles of any polygon by realizing the formula (n-2) x 180.

Symmetry

Fifth grade students will be able to determine reflection symmetry, most commonly called line symmetry. This means that there is a line through which the shape can be reflected over to create a mirror image. Students will determine reflection symmetry by finding the shape's line of symmetry. Students will realize that the line of symmetry can go in any direction as long as the two images are reflections of each other.

My students will also be able to determine rotational symmetry as well. This is when a shape remains the same after it is rotated 360 degrees. The order of rotational symmetry is the number of positions that the shape can be rotated to, without changing the original look. For example a square has rotational symmetry to the order four because it can be turn four times and retain its original shape.

Strategies

Before the unit, the teacher should check out numerous books from the library to encourage students to begin building background knowledge about architecture. I have included a list of books in the reading list for students in the bibliography. These books need to be readily available for students to read independently to help apply what they are learning to architecture and art. Students will be able to make connections to what they are learning when they possess prior knowledge of the subject. I will also use these books during my read aloud time as well.

I have incorporated sports, architecture, art, and real world examples throughout my unit. This is done to make the concept more relevant to my students' lives and to make them aware that geometry is all around them.

Sports

Geometry is used throughout numerous sports. Students can locate angles and shapes in the playing field. For example, using right angles creates a soccer field. Polygons can be identified on a chessboard and a baseball field. Students can also create angles by hitting a pool ball or kicking a soccer ball. Making students aware of the angles and shapes in the sports they play will allow them to connect to these concepts and grasp a better understanding of them.

Architecture

Architecture is used throughout the unit, including the cumulative project. Using Google Earth to show an aerial view of buildings in a large city allows students to identify polygons and non-polygons. Taking a picture of a local landmark or even the classroom will allow students to see a familiar place and identify the lines and angles that exist. I will also use historic monuments so students can recognize the line symmetry the buildings possess. This will also be a visual example so that they can create their own building using geoblocks to represent line symmetry. Students will see that geometry is in every building that they enter. By having an architect come and speak to the students about architecture, the students will discover that polygons (especially triangles and quadrilaterals) are used in the construction of buildings. Without geometry we would not have schools, homes, roads, and buildings. The cumulative project will allow students to synthesize their geometry knowledge and create an aerial view of a village that is created using polygon shapes. Students will follow a certain criteria and demonstrate the concepts that have been taught throughout this unit.

Art

Geometric shapes and symmetry are characteristics of countless pieces of artwork. I will use artwork as a visual to allow students to recognize different geometric concepts. I will use the following artists' artwork as examples:

Jackson Pollack
Stenographic
Male-Female
The Moon Woman

Pablo Picasso
House in the Garden
Violin and Guitar
Three Musicians

Josef Albers
Homage to the Square

MC Escher's Symmetry Drawings
Moths
Fish
Fish Birds Turtles

These different pieces of art allow students to visual and interpret the art in a different manner. Students will be able to use the interactive whiteboard to identify lines, rays, angles, polygons, non-polygons, and symmetry with these artistic visuals. They will now possess a background in artwork that contains geometry.

Real World Examples

Last I will use objects and visuals from our daily lives that students are familiar with to teach geometric concepts. Scavenger Hunts are a great way to get students moving and to really see what surrounds them. I will use a visual scavenger hunt twice in my unit. The first will involve students looking for angles in the classroom and school. The second will involve students looking for line and rotational symmetry in the objects around the school. Last I will have the students view a video about line symmetry. The video will show students numerous examples of everyday objects (i.e. butterflies, traffic signs) that possess line symmetry.

Classroom Activities

The following six lessons include activities that will help my students better understand geometry concepts by making connections to the outside world. I have integrated art, architecture, sports, and real world items in order for my students to see that geometry surrounds them in their everyday life. The geometry unit that I will teach will consist of twenty-two lessons. I am including six that I felt best displayed how I have integrated popular culture into the curriculum. The unit will end with a cumulative project that will involve my students becoming architects and designing a village using polygons.

Day 1

I will begin the first lesson the same way I begin every math lesson, by introducing the important vocabulary words. I feel that part of the battle of learning is developing the needed vocabulary so that students can comprehend the skill that is being taught. Throughout the unit, my students will keep a geometry notebook. They will record the

vocabulary words each day as well as an illustration. Students also will record important facts and notes to be used as a study guide.

The first activity will require an interactive website. I will explain that the vocabulary words that were introduced are used throughout different works of art. The words I am referring to are point, line, ray, line segment, perpendicular, intersecting. Using the Google search engine I will find images of Jackson Pollock's paintings, *Stenographic, Male-Female,* and *The Moon Woman.* I will display these paintings and have students come to the interactive whiteboard to circle examples of our new vocabulary. (For example: a student could circle two lines that are intersecting)

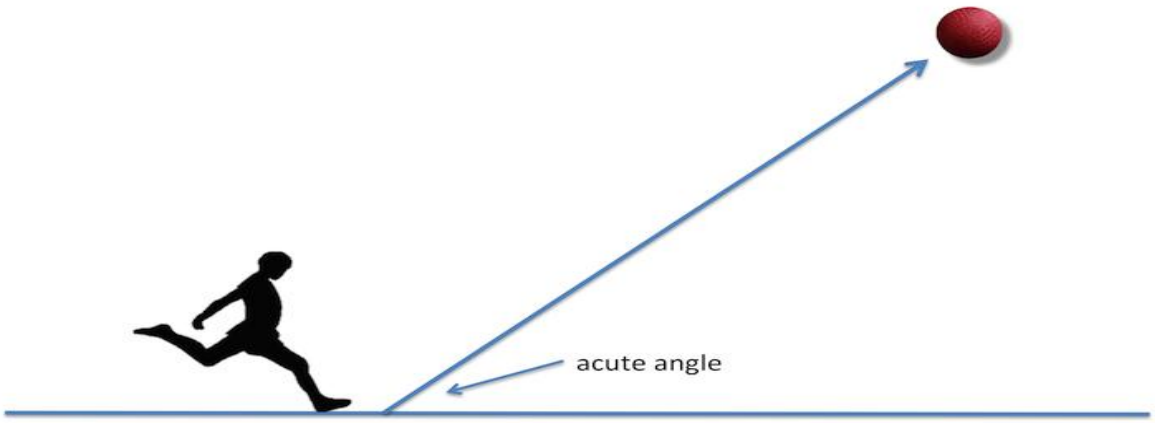
I will then explain that our vocabulary words are also in the world that surrounds us. Prior to the lesson I will take a picture of the classroom, the school, and/or a local landmark. After scanning the photo into a drawing document, the students will be able to highlight the different examples of lines, rays, perpendicular/intersecting lines that are in the photos.

I will conclude the lesson by grouping my students together in pairs or small groups. I will distribute Skittles and pretzel sticks to each student and the pairs/groups will work together to use the Skittles and pretzels to represent each of the vocabulary words in their notebook. The Skittles will be used to represent a point and the pretzels will represent lines, rays, and line segments. The broken pretzels will be used to create arrows. Some concepts I will be assessing are whether the kids can create a line with arrows pointing in either directions or a line of pretzels that have Skittles at two points to represent a line segment. The students will be able to eat their symbols after I have approved the activity and each vocabulary word is created.

Day 2

After the students have a clear understanding of their new vocabulary words, I will use those words to create angles and introduce the three different types of angles to the class. After the students have recorded their new vocabulary into their notebooks as well as a drawing of each angle, I will use the website: http://www.hittingthetarget.com to have students work with identifying angles in sports. There are three games they will play. The first game will allow students to come to the interactive whiteboard and identify the right angles on a soccer field. The second game will involve the students identifying angles by the direction a tennis ball is hit in a tennis match. The third game is similar to the second game and the students identify the angles by the direction a cricket ball is hit.

Next the students will go on a "Visual Scavenger Hunt" around the school and will end in the bus parking lot. Students will create a four-column chart and label each column acute, obtuse, right, and straight. Then the students will move through the hallways, gym, lunchroom, and library. While they are walking they will list or draw objects that possess an angle under the appropriate columns. The class will end the scavenger in the bus parking lot. Prior to this next activity I would already have drawn a straight line across the bus parking lot. I will ask the students to choose a partner and stand on the line I drew with chalk. Depending on how many soccer balls your school has, you may have to have the students form a group of three to four students and take



turns doing this activity. Half of the students will be given a soccer ball and will pretend that the line they are standing on is the base of an angle. Each kicker's partner will move to the other end of the parking lot. I will then call out the words, "Acute, Obtuse, or Straight". The students with a ball will kick their ball in order to form that angle. The angle will be measured against the baseline that they are standing on. For example the students will need to kick the ball to their right in order to create an acute angle. Their partner will collect the ball and the students will change positions. We will continue this for a few more rounds and then return to the classroom.

I will end the lesson by having the students use Geoboards to create different angles. I will tell the students to put their finger on one of the pegs. This will be their starting point. The students will attach a rubber band horizontally and stretch it to the right of the point. This will be the base of their angle. Then students will use another rubber band to stretch to another point. Students will determine if this shape is acute, obtuse, right, or straight. Students will record these angles and label them in their notebooks.

My students will now be able to identify and measure different angles as well as determine whether angles are complementary or supplementary.

Day 5

In this lesson I will now introduce how to identify the different types of polygons. After my students have recorded their vocabulary words for this lesson, we will discuss the attributes that a shape must possess to be classified as a polygon. (It has only straight sides, has three or more sides, has corners, and is a closed shape)

I will then read aloud the book, *Shapes in Sports*, by Rebecca Rissman. The photographs in the book will show my students how different types of shapes are found in the sports we play. Then I use the website: http://www2.scholastic.com/content/collateral_resources/pdf/g/geometry_sports_examples.pdf for the students to identify polygons that are found in basketball, football, pool, baseball, chess, and cricket. The website displays the area that the different sports are played on. My students will use the interactive whiteboard to circle the particular polygons that they identify.

Another resource I will use to identify polygons and non-polygons is Google Earth. I will choose a location (it can be the city we reside in or a larger city around the world). I feel that New York City, Boston, and Chicago are good examples to use. My students will then have a "bird's eye view" of the location. I will call on volunteers to come to the interactive whiteboard and identify shapes and determine whether the shape is a polygon or not. The students will need to justify why they think the shape is/is not a polygon by using the attributes above. I wanted to introduce Google Earth and a "bird's eye view" to my class because the cumulative project will involve them creating an aerial view of a village made of polygons.

To end the lesson, I will use the Google search engine to find images of Pablo Picasso's paintings. I will display different paintings, for example: *House in the Garden, Violin and Guitar, or Three Musicians*. The following website has a variety of Picasso's work to view: http://www.abcgallery.com/P/picasso/picasso.html. After having my students identify other polygons located in the paintings, they would begin their own illustration. Using Picasso's work as an example I would have my students create a picture using coloring utensils that is created out of polygons.

After thoroughly teaching the properties of a triangle, how to classify triangles, and the process of determining the sum of the interior angles of a triangle, I am now ready to teach my students how to recognize the properties of a quadrilateral.

Day 11

I will first introduce the vocabulary words and types of quadrilaterals that the students will be identifying today. I will use a SMART notebook that I created as an introduction to quadrilaterals. The different slides would have an illustration and classification for each quadrilateral. Then the slides would compare the different types of quadrilaterals and the students will identify the differences in the shapes. Students will be given a common characteristic written inside of a boxed-in figure. (For example: This quadrilateral has opposite sides that are congruent.) Then volunteers will come to the interactive whiteboard to drag the shapes that share the characteristic into the box.

After discussing all of the attributes that the different quadrilaterals possess, I will continue the lesson by introducing the class to Josef Albers. For more background information about Josef Albers visit the website: http://www.metmuseum.org/toah/works-of-art/59.160. Then I will use the Google search engine to display images of Josef Albers painting, *Homage to the Square*. I will then have my students create their own Homage to a Quadrilateral. The students will choose a shape that has been introduced to them today and will draw their own picture. Students will also describe the different properties of the shape on an index card. This will probably be a homework assignment depending on how much time is left in the class.

My students will continue to learn how to classify and compare different quadrilaterals. They will also learn how to determine the sum of interior angles of any polygon. After my students have grasped the skills I have taught about angles, triangles, and quadrilaterals, I will then continue to symmetry.

Day 20

I will conclude the geometry unit by teaching my students to recognize symmetry in the figures and shapes we have studied.

The lesson will begin with the students viewing a video found on the website: http://www.linkslearning.org/Kids/1_Math/2_Illustrated_Lessons/4_Line_Symmetry/index.html. The video introduces line symmetry and gives multiple examples of objects in our everyday life that contain line symmetry. My students will sketch or write in their notebooks about the different objects with line symmetry that they viewed in the video.

After the introduction to line symmetry, I will continue the activity by using the website: http://www.mathsisfun.com/geometry/symmetry-reflection.html. I chose this website because of the visuals and the opportunity for students to be able to interact with the interactive whiteboard. The website displays numerous drawings that contain line symmetry. Once the students have seen the artwork and answered the questions from the

website's quiz, I will have each student draw a picture in their notebook that represents line symmetry.

I will continue using visuals that represent line symmetry. Instead of artwork, I will use architecture for the students to determine if line symmetry is present. I will use the Google search engine to find images of the Taj Mahal, the London Bridge, Big Ben, Arche de la Defense, la Geode at La Villette, the Washington Monument, the San Francisco Bridge, and The pyramid at the Louvre. My students will come to the interactive whiteboard and draw the line of symmetry. Other images of line symmetry can be found at http://www.adrianbruce.com/Symmetry/index.html.

After students have investigated symmetry in architecture I will have them investigate their own face. Using the iPad and the Photobooth app, students will take a picture of their own face. Students will look at the photo and determine if their face is truly symmetrical. For students who believe their face has symmetry, I will ask them to take another photo and use the mirror feature to see what their face would actually look like if it were truly symmetrical.

At the end of the lesson I will have my students use pattern blocks to create a piece of architecture that possesses line symmetry. They will create a two dimensional building, bridge, or whatever their minds create. I will move around the room to observe their examples of line symmetry.

After learning to recognize rotational symmetry, the class will move on to determining whether a shape possesses line symmetry, rotational symmetry, or both.

Day 22:

I will begin by reviewing with the class the concepts of line and rotational symmetry. Today I will use artwork from M.C. Escher to review line symmetry. Examples of the artwork can be found in the Picture Gallery at http://www.mcescher.com/. There are numerous examples in his artwork of line symmetry and the students can draw where the line of symmetry occurs using an interactive whiteboard. To review rotational symmetry I will have the students use the mandalas that were created yesterday as a visual reminder that the shape has to reappear before it rotates 360 degrees.

I will then have the students go on a Scavenger Hunt around the classroom, school, or the grounds outside. The students will be looking for examples of objects in our everyday lives that contain line or rotational symmetry. The student will have to determine if one or both types are present. The students will sketch these items in their notebooks. After the class has had time to search the school area, they will return to the classroom to share what they have found.

I will then end the lesson by having the students create a three-dimensional building with a partner using geoblocks (prisms and cubes). The first building will contain line symmetry. The first partner will create one side of the building and then the second partner will create the other side to match the first side. Then the pair of students will work together to create a building or object that has rotational symmetry.

Guest Speaker

At the end of the geometry unit I will invite a guest speaker to come to speak to the class. The speaker will be a local architect. The architect will speak to the class about the different ways that geometry and shapes are used in architecture and construction. He or she will discuss how the triangle and rectangle play a huge role in building the support for a home or building. The architect will also explain how shapes and angles are used to create blueprints for a home or building. My students will have an opportunity to ask questions about architecture and construction.

Cumulative Project: The Popular Village of Polygons

The final assessment of the geometry unit will involve a cumulative project about the concepts I have taught. The project is called, *The Popular Village of Polygons*. Throughout the unit my students have been exposed to geometry that is found in architecture, sports, art, and their everyday world. For their final assessment the students will become architects and design a village from an aerial view, like they viewed on Google Earth.

The students are given an assignment to create a village right outside the city limits of Cornelius NC. The students have to follow the criterion that is given by the city council. The village will have four roads. Two of the roads will run parallel to each other. The third road will have a perpendicular intersection with the parallel roads and the fourth road will intersect one of the three roads. The students will have to identify the parallel, perpendicular, and intersecting roads as well as the angle that are created at the intersections. The students will be able to decide what stores, schools, buildings, shops, and homes that will be a part of the village. They will have to have at least ten buildings that meet the different shape criteria. The buildings will be at least one of the following shapes: an octagon, hexagon, pentagon, trapezoid, parallelogram, rhombus, square, rectangle, isosceles triangle, right triangle, and scalene triangle. The students will name each building and then determine the measure of each angle and the sum of the interior angles of each shape. One of the quadrilaterals will not have the angles measured. Instead the student will have to draw the diagonals of the quadrilateral and describe whether the diagonals bisect each other, are congruent, or are perpendicular. Last the students will create a rectangular pool for the village. The student will determine if the diagonals of the pool are congruent, bisect each other, or are perpendicular.

After the student finishes the project and add his or her own personal touches, the student will use the rubric to determine if all of the requirements have been met. If the student is satisfied with his or her potential grade then he or she can move on to the extension activity. This activity will be open for every student to complete, but will be a requirement for my students that are part of the Talent Development program or those I feel are capable of completing the challenge. The extension activity will be extra credit for the project as well.

In fourth grade the students learned how to determine the area and perimeter of a shape. This is not explicitly taught in fifth grade, but the students should have an understanding of how to compute area and perimeter. In the extension activity students will have to determine the cost of the buildings in the village. To do this they will use a chart that lists the cost of a building depending on the area. The students will find the area of each building and then determine their total cost for the project. I will give my students three days of class time to complete the project.

The Popular Village of Polygons
A Bird's Eye View

Congratulations! You have just become an architect. In fact you are a well-known and wealthy architect in North Carolina. The town of Cornelius needs your help and abilities. A new village is being built along Highway 73. The town of Cornelius has selected you to draw the blueprints. That means you will determine what buildings, restaurants, shops, schools, grocery stores, etc… will be located in this new town. The city council needs you to first create a "bird's eye view" of what your village would look like. Unfortunately you are not the only well-known and wealthy architect in the area. There will be other architects that are competing against you for this project. You need to be creative and make sure your measurements are accurate. Here is what the city is expecting:

Roads

- ✓ One set of parallel lines- these will be two roads
  - Label the roads: **A.** _____ and **B.** _____

- ✓ The 3rd road will be perpendicular intersecting the parallel lines to create right angles.
  - Label the 3rd road: **C.**_____**.** Also label the degrees that these intersections make.

- ✓ The fourth road will intersect one of the other roads and it is not perpendicular. This intersection should create an acute and obtuse angles.
  - Label the 4th road: **D.**_____**.** Also label the degrees that this intersection makes.

Buildings

- ✓ Within the city there can be many buildings and homes. You need to include the following shapes to represent each building:

- 1 Octagon- Labeled: **E.** _____
- 1 Hexagon- Labeled: **F.** _____
- 1 Pentagon- Labeled: **G.** _____
- 1 Trapeziod- Labeled: **H.** _____
- 1 Parallelogram- Labeled: **I.** _____
- 1 Rhombus- Labeled: **J.**_____
- 1 square – Labeled: **K.**_____
- 1 isosceles triangle-Labeled: **L.**_____
- 1 right triangle- Labeled: **M.**_____
- 1 scalene triangle Labeled: **N.**_____

1. The angle of each interior angle needs to be measured and labeled.

2. The sum of the interior angles needs to be calculated and labeled for each building. Inside of the building write SOIA= _____. (Your answer goes in the blank!)

3. You do not need to determine the interior angle measures or the sum of the interior angles of **one** quadrilateral. You get to choose which quadrilateral. Instead you will draw diagonal lines inside of the shape. Then determine if the diagonals are perpendicular, bisecting, or congruent. Label the diagonals inside of the quadrilateral.

Pool

- Inside your city, you will also create a rectangular pool. (Every village needs a pool!) Be sure to label your pool: **O.** _____. Inside the pool you will draw diagonal lines. Then determine if the diagonals are perpendicular, bisecting, or congruent. Label the diagonals inside of the pool.

Please be creative and add your own personal touches to your village!

Bibliography for Teachers

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This book gives background information about Josef Albers to be used with the square activity.

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This book refreshes the mind with the geometry concepts that are taught.

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This book also is about the background concepts that are taught in this unit.

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This article explains how students learned about symmetry by creating quilts.

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This book contains activities that can be used to further the activities and concepts that are taught.

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This book contains background information about M.C. Escher that can be shared with students. It also has some of the drawings that are used in the unit.

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Classroom Materials

Pretzel Sticks
Skittles
Kickball
Geoboards
Rubber bands
Pattern blocks
3-diminsional blocks

Appendix
Implementing District Standards

Objectives
3.01 Identify, define, describe, and accurately represent triangles, quadrilaterals, and other polygons.

Students will learn the attributes of each polygon and how to identify the shape.

3.02 Make and test conjectures about polygons involving:

a. Sum of the measures of interior angles.
b. Lengths of sides and diagonals.

c. Parallelism and perpendicularity of sides and diagonals.

Students will be understand the formula for determining the sum of interior angles as well as determining the attributes of the diagonals of a quadrilateral.

3.03 Classify plane figures according to types of symmetry (line, rotational).

Students will be able to recognize line and rotational symmetry.