Title: Exploring Fort Frederica through Coordinate Geometry
Subject: Social Studies and Math

Topic: Coordinate Geometry, Perimeter & Area
Grade: 4th Grade School: Moulton-Branch Elementary

Wiregrass History Consortium Unit Plan			
GPS Standard:	SS4H3 Description: SS4H3 The student will explain the factors that shaped British colonial America. SS4H3 Description: SS4H3 The student will explain the factors that shaped British colonial America M4G3 Description: M4G3 Students will use the coordinate system. a. Understand and apply ordered pairs in the first quadrant of the coordinate system. b. Locate a point in the first quadrant in the coordinate plane and name the ordered pair. c. Graph ordered pairs in the first quadrant. M4G1 Description: M4G1 Students will define and identify the characteristics of geometric figures through examination and construction. M4P4 Description: M4P4 Students will make connections among mathematical ideas and to other disciplines.		
Concept:	Mathematical skills must be used in the formation of a city, like Fort Frederica in St. Simmons. Coordinate graphing and understanding how to calculate perimeter and area are essential when designing the layout of a city.		
Essential questions (2-5 questions) (What you want the students to know.)	How do you graph coordinates? How do you calculate the area of a rectangle? How do you find the perimeter of a rectangle? What is the Cartesian (or Rectangular) Coordinate System?		
Elements (What you want the students to understand.)	* Identify the x and y axis on a grid * Plot coordinates on a grid * Calculate the area of a rectangular shape * Calculate the perimeter of a rectangular shape		
Launch Activity (Hook)	Use literature to introduce the concept of coordinate graphing. You could use one of the following books: 1) **X Marks the Spot** by Lucille Recht Penner - In this book, two boys are trying to find treasure by following a coordinate map. 2) Book ***Fly on the Ceiling: A Math Myth*** by Julie Glass and Richard Walz---This book tells the history of the life of the famous French mathematician Rene Descartes (1596-1650) and how he developed the Cartesian Coordinate System. The story tells of Descartes experience with a fly and how he imagined it to land on the ceiling and saw the ceilings as a coordinate plane. As the fly landed in a spot it represented an ordered pair coordinate. The children's book teaches the math concept of coordinate geometry.		
Knowledge & Skills	**People and Places** **Fort Frederica** **Rene Descartes**	**Vocabulary** **Ordered pairs** **Coordinates**	**Skills** **Graphing** **Multiplication**

(People, Places, times and vocabulary-what the student should be able to do. What skills will they use?	**James Oglethorpe St. Simmons Island**	**Origin (0,0) x-axis y-axis Perimeter Area Cartesian Coordinate System (Cartesian Plane)**	**Addition Measuring**

Assessment Evidence: What evidence will show that students met the learning goal?

Authentic Assessment (Performance Tasks, Rubrics, Projects, Dialogues, etc.,)

Lesson Structure:

1. Whole Group Instruction: Teach the students how to find points on a graph by explaining that they must use steps to find the points or address on the graph. For example, you must move 2 steps over from 0 and 3 steps up from that to find the point represented by the ordered pair (2,3) on a graph. Introduce key vocabulary: ordered pairs, coordinates, Origin (0,0), x axis and y axis. *(If you are using this for 5th grade or middle school age students, incorporate –x and –y as well.)*
(Hint: To teach x-axis, I cross my arms in the shape of an "x" and collapse them down to show that "x lays flat" so the x-axis runs across. To teach y-axis, put your arms over your head like a "v" and use your body as the stem to make a letter "y" and tell them that "y stands tall")

2. Give students geo-boards and rubber bands OR graph paper. (You can glue the graph paper down on construction paper, then laminate it to use is over and over again.) Call out certain coordinates and have the students identify them on the geo-board or graph paper. (I you are using laminated graph paper, you can use dry-erase markers or stickers to make the points.) Walk around to check and see if students understand the concept.

3. Explain to the class that they will be using coordinate geometry to learn about area and perimeter of rectangles. Give the students a set of 4 points to plot on their geo-boards (or graph paper) (make sure that when connected, these points will form a rectangle) ie. A=(2,3), B=(2,6), C=(6,6), and D= (6,3) and connect A to B to C to D to A, forming a rectangle. After the students have found the points, instruct them to connect all of the points using a band. Then have them find the perimeter of the rectangle by counting the spaces between the points. Ask them if they can think of an easier way to find the perimeter (count the spaces between the points for length and width, double it). They can derive the formula; perimeter equals two times length plus two times width.

4. Have the students find the area by counting the square units inside the rectangle. Ask them if they can think of an easier way to find the area (prompt as needed to ensure that students see the relationship between the length & width they counted for perimeter and the total number of spaces between points around the rectangle; if you multiply the length and the width together you get the area.) Practice with one or two more sets of points.

5. Introduce Fort Frederica to the student by showing them a map of the original layout of the town. Ask them what they see when they look at the map. They should be able to see that the map looks like a grid. Give the students a copy of the map. In a collaborative pair or small group, let the student create a coordinate grid on top of the map. Have them write questions at the bottom of their map, such as "Broad Street is located at what coordinates?" or "Give the coordinates for the Barracks." Have the make a key on the back for self assessment. Switch with another group and answer the questions.

6. Make connections with their Social Studies lesson and discuss the Spanish and English struggle at Fort Frederica. Discuss James Oglethorpe's involvement in the city.

Differentiation Associated with this unit

For students that need assistance, put them with a pair that can assist them. You can also give that student(s) a map with the coordinates already labeled and have them located indicated places on the map.

Use the color tiles to explore more ideas with area and perimeter. For example: Use color tiles to explore the concepts of Constant Area and Constant Perimeter by creating array/areas with the color tiles for example 4 x 5 rectangle and explore its area and perimeter. Students can see more connections to the geoboards and the math concept at hand

Enrichment: Another children's literature book for this topic is: *Spaghetti and Meatballs for All: A Mathematical Story* by Marilyn Burns and Debbie Tilley. This book tells the story of a group of people deciding how to arrange enough square tables to all be able to dine out at their favorite restaurant. It teaches the concept of perimeter in the context of a story/problem.

Resources and instructional tools:

-Book *Fly on the Ceiling: A Math Myth* by Julie Glass and Richard Walz
-Book *X Marks the Spot!* By Lucille Recht Penner
- Large/clear geoboards and geobands with grid labeled 1-10 both x- and y-axes
- Graphing paper
- Wax crayons, water based transparency pens, expo markers or stickers for use with graph paper
- Color tiles