Introductory

Google Earth (Street View Challenge), The Coordinate Plane Challenge, and Local History

Florida State Standards: MAFS.6.G.1.3 - Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

Objective: To give students an authentic opportunity to physically walk on a coordinate plane to designated and undesignated locations. To have students construct polygons from predetermined and self selected coordinates, connect the points with straight lines, and then determine the types of polygons that they have constructed. To integrate technology and the culturally responsive element of local history into a fun mathematics based activity in order to impact students across the academic and behavioral spectrum.

"When a lesson is relevant, the student becomes a learner, their interests are sparked and their brains ignite, and that is how we close the achievement gap," says Alicia Discepola, a digital literacy and learning specialist for Millville Public Schools in New Jersey.

The Google Earth and The Coordinate Plane challenge was specifically designed to ensure relevance to students and to inject movement, collaboration and fun into the learning experience. The use of popular technology (Google Earth) allows students to explore and see connections

to the real world.

The coordinate plane (Cartesian Plane; named after mathematician Rene Descartes), like most mathematical concepts, has wide application in the real world. Cartographers use principles of the coordinate plane in the map making process. When the United States Department of Defense developed The Global Positioning System (GPS), the foundation for this system was the coordinate plane. Streets and avenues in neighborhoods, cities and counties are laid out using coordinate plane principles. The concept of a two dimensional grid with two perpendicular axis is used extensively in many industries.

<u>The Challenge</u> (Students Collaborate on this portion of the challenge) There is an obelisk-like structure located near the northwest corner of the Middle Learning Center's basketball courts (This obelisk-like structure, as far as I am aware, is on the campus of each Miami Dade Public School (Communications Tower)). This obelisk stands approximately 65 feet off the ground (it has a communications device mounted on top of it). Also, there is a bronze statue of Julia Tuttle in Bayfront Park in Downtown. Mrs. Tuttle is a Miami pioneer and is considered to be the mother of our great city.

For the purposes of this project, Miami Dade-County will become our coordinate plane and the Everglades K-8(your school) Obelisk will be our origin.

<u>Part 1</u>

1a. What is the distance in miles from the base of the obelisk to the base of Mrs Tuttle's bronze statue? (Use Google Earth and its tools to measure this distance).

1b. Use the measuring tool in Google Earth to confirm the height of the Everglades Obelisk (This structure is on the campus of most public schools).

2. Convert the distance from question 1, which is in miles, to feet (show your work).

3. If a line is drawn from the top of the obelisk to the base of the statue, what is the length of this line in feet? (show all working)

*****(Anytime the word line is mentioned in mathematics a straight line is understood).**

4. Use the coordinate plane to draw and label the details of the math challenge. (Hint: Use a particular type of triangle)

5. With the obelisk being the origin of our coordinate plane, which quadrant will Mrs Tuttle's bronze statue be located in?(The X (east to west) and Y(north to south) axis pass through the Obelisk at a right angle (perpendicular to).

6. Use the cardinal directions to give a precise location of the Tuttle statue with the obelisk as a point of reference. (Hint: East, West, North and South. Remember that there are smaller units of directions between the major four directions; be precise).

7a. Suppose that there was another statue in the quadrant directly diagonal to the Tuttle statue and the same distance from the origin. What quadrant would the second statue be in?

7b. What would be the distance between the two statues? (Show all work)

<u>Part 2 (Students can work independently on this portion of the challenge)</u> Use Google Earth and its tools to determine the following:

1. What is the distance from Everglades K-8 Center(your school) to The White House?

2. What quadrant will the White House be in?

3. What is the total distance if you travel from Everglades(your school) to the following sites:

-To the Ronald Reagan (40th President of The United States of America) statue at Tropical Park. Click here to learn more about President Reagan: https://www.whitehouse.gov/about-the-white-house/presidents/ronald-reagan/)

-Then to the Jose Marti (A Cuban National Hero) Statue in Little Havana. Click here to learn more about Jose Marti: https://www.britannica.com/biography/Jose-Marti

-Then to the Tuttle Statue ("The mother of Miami") in Bayfront Park. Click here to learn more about Julia Tuttle: https://miamigirls.org/miamigirls/julia-tuttle-miami-history/

-Then to the Lyric Theatre (Iconic African American landmark) in Overtown. Click here to learn more about The Lyric Theatre: https://www.miamiandbeaches.com/things-to-do/art-and-culture/venues/tour-historic-overtown-s-lyric-theater

Then back to Everglades (your school)

4. When connected with lines, what geometric shape do they make? Explain if the shape is a regular or irregular polygon.

5. With Everglades (your school) as the origin, what quadrants are the locations from question 3 in?

The Coordinate Plane Floor Game (Teams)

1. Clear desks to the side of the classroom.

2. Construct a Coordinate Plane in the center of the floor (masking tape)

3. Write Coordinate Plane Game and Street View Challenge on Board (With Colors)

4. Break Class Into Four Teams

Members from each team have to find and then stand in specific locations on the coordinate plane. Each group will want to win this challenge so the teacher must ensure that all students have an opportunity to participate.

Question 1 for Group 1

Student 1 from Group 1

Teacher: “Please locate the coordinate (1, 1) and stand there”

Student 2 Group 1

Teacher: “Please locate the coordinate (7,1) and stand there”

Student 3 Group 1

Teacher: “Please locate the coordinate (3, 7) and stand there”

Student 4 Group 1

Teacher: “Please locate the coordinate (9,7) and stand there”

All Group 1 Students

Teacher: “Connect the coordinates that your group members are standing on with lines and determine which geometric shape that they have made.” --Each correct coordinate location receives 1 point. The correct determination of the geometric figure receives 5 points.

--If a student cannot find the location in the coordinate plane, a student from another group can find it and his/her group will receive the points.

--This becomes fun and playfully rowdy in a short space of time.

The following are suggested coordinates for subsequent groups.

Group 2

Locate these coordinates: (-4, 1) (-4, -4) (0,-4)

What geometric shape is formed?

Group 3

Locate these coordinates (2, -1) (0,-3) (4, -1) (5, -3)

What geometric shapes are formed?

Group 4

Locate these coordinates (-7, 5) (0,5)

What is the length of the line that connects the two points?

Locate these coordinates (-9, 0) (-9, -5)

What is the length of the line that connects the two points?

More questions:

If I start at the origin(2) and move 7 units to the left (Name the coordinate)(2)
Then if I move 5 units up (name the coordinate)(2)

Then 7 Units to the Right (name the coordinate)(2)

What is the polygon?(5)

What is the Perimeter?(5)

One monster truck is located at (-1, 4)(facing east) (2)
Another monster truck is at (3,0) Facing North(2)

If they accelerate at the same rate, at the same time, in a straight line, are they likely to crash? 2

If so where? 5

Coordinate Plane Game

Homeroom:

Question #	Point Total Grand Total

1	
2	
3 4 5	
6	
7	