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# Ideas with IMPACT

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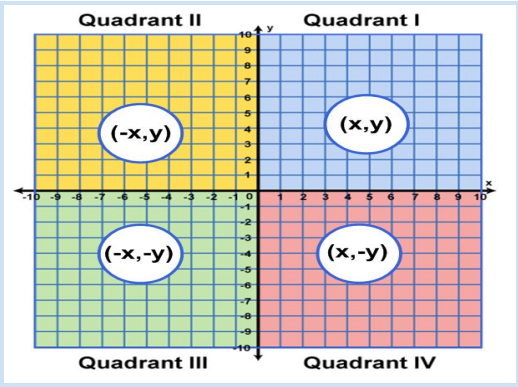
## Google Street View and Classroom Floor Game: Navigating the Coordinate Plane

# The Coordinate Plane Floor Game and Google Earth Project

*"Shouting doesn't grow dendrites."( MarciaTate). " Dendrites grow when abstract math concepts are taught with real world applications." (Kelsey Major)*

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# Goals and Objectives

The principles of the Coordinate Plane system (Cartesian Plane system), like most mathematical concepts, have wide application in the real world. The Cartesian Plane system was developed by French mathematician Rene Decartes in an effort to describe the location of something in a plane. With this development, Decartes was able to establish a link between two important, but previously separate sub-disciplines -algebra and geometry. The establishment of this link opened a plethora of possibilities for mathematicians and scientist that we continue to benefit from today. The principles of the Coordinate Plane system, since its inception, has been a quiet force at the forefront of many technological advances. Today, Decartes' creation undergirds many of the systems and products that we passively and actively use and enjoy.

Cartographers use principles of the coordinate plane in the map making process. They are able to collect earth's 3-Dimensional data points and then represent them with precision on a flat modified Coordinate Plane surface, using lines of latitude and longitude; we call this a map. The Global Positioning System (GPS) technology that drives so much of the modern world was built on Cartesian Plane principles. When Roger Easton, its creator, developed the GPS for the United States Navy, the Coordinate Plane System served as the foundation of the final product. Streets and avenues in neighborhoods, cities and counties are laid out using coordinate plane principles.

The New York Police Department (NYPD) recently deployed a gunshot recognition system that alerts Police Officers, in real time, to the exact location of gunshots; these locations can be identified because the city is laid out in a gridlike system. The Coordinate System underpins all aspects of computer graphics. The pixels on a computer device screen are laid out in a coordinate system. Video game programmers, and programmers in general write code that access and manipulate pixels that represent screen locations. In fact Fortnite, the popular video game, is built on a digital map that displays the coordinates of its players on the top of the screen.

Decartes, like most creative genius', could never have imagined the seemingly infinite reach of his simple discovery. The pervasive and integrative use of coordinate plane principles mandates that we as teachers transfer to our students a fundamental understanding of its core principles. This requisite knowledge will serve as a solid foundation for use in higher level math classes, and can also give students a platform by which actual world problems can be addressed and solved. The real life applications that are underpinned by the concepts of the Cartesian Plane are limitless and will continue to be so. Our responsibility as teacher, I believe, is to take back our classrooms and repurpose them as centers of deep, meaningful learning and infinite fun. This project was created to that end.

# The Florida Standards

The project addresses the following Florida Standards that are related to The Coordinate Plane: MAFS.6.NS.6a; MAFS.6.NS.6b; MAFS.6.NS.6c; MAFS.6.G.1.1; MAFS.6.G.1.3; MAFS.6.NS.3.8

MAFS.6.NS.3.6 (a,b,c): Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.

a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite.
b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

MAFS.6.NS.3.8: Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

MAFS.6.G.1.1: Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

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.

# Course Outline and Overview

The Coordinate Plane Game and Google Earth Challenge was initially used as a classroom game in an effort to motivate students to visualize and to tangibly experience what they were doing mathematically. The playful aspect of the game and the movement that is involved immediately endeared it to the students. The game was then used as a competitive, yet fun, tool during the mundane period of testing (homeroom lockdown). All of the 6 grade homerooms competed against each other for the grand prize of a pizza party.

The challenge is comprised of  two parts. In the first part of the challenge, the floor of the classroom is transformed into a four quadrant coordinate plane using dollar store masking tape. Students are divided into four groups; this should be done strategically to ensure balance among the groups. One student should be designated a captain. The teacher then ask questions(a sample game is included) that requires the students to find coordinate locations, construct polygons, determine distances and lengths, and performs translations and reflections etc. The rules section provides information on how the game should be administered. As students move to locations and perform operations they should be allowed to walk, strut or dance.

The teacher should use this fun time to softly integrate and mention more complex ideas that grow out of the coordinate plane and that the students will encounter in the near future (relativity, the Z-axis (location in space), dilation and rotation etc.)

The second part of the challenge infuses math, local history, and technology. The same groups from the first part of the challenge should be kept. The students will use “The Google Earth” application to find locations in the city. They will use the tools imbedded in the application to make measurements and to draw conclusions. Miami Dade County, for the purposes of this exercise, will become the students coordinate plane. Use a structure that is visible on your campus and that can be located on Google maps as the origin of the plane (we used the obelisk-like communication tower that is located on all MDPCS campuses. Google Earth pictures are included below along with a worksheet for this part of the challenge)).

# The Coordinate Plane Floor Game

This game can be used to differentiate instruction where the learning environment, the process and the product is altered. Additionally, it can be used as a challenge to get students to think more deeply about mathematics while having fun and competing against each other. Although the examples in this presentation are geared towards middle grade students, the adaptability for highschool students requires only a creation of higher order questions. (I can assist you with creation of higher order questions; my contact information is on the cover page)

Equipment:

- Classroom floor with vinyl tiles.
- Dollar Store masking tape.

**A teacher's dream: Easy, Cheap and Fun!**

## Preparing the classroom floor for The Floor Game

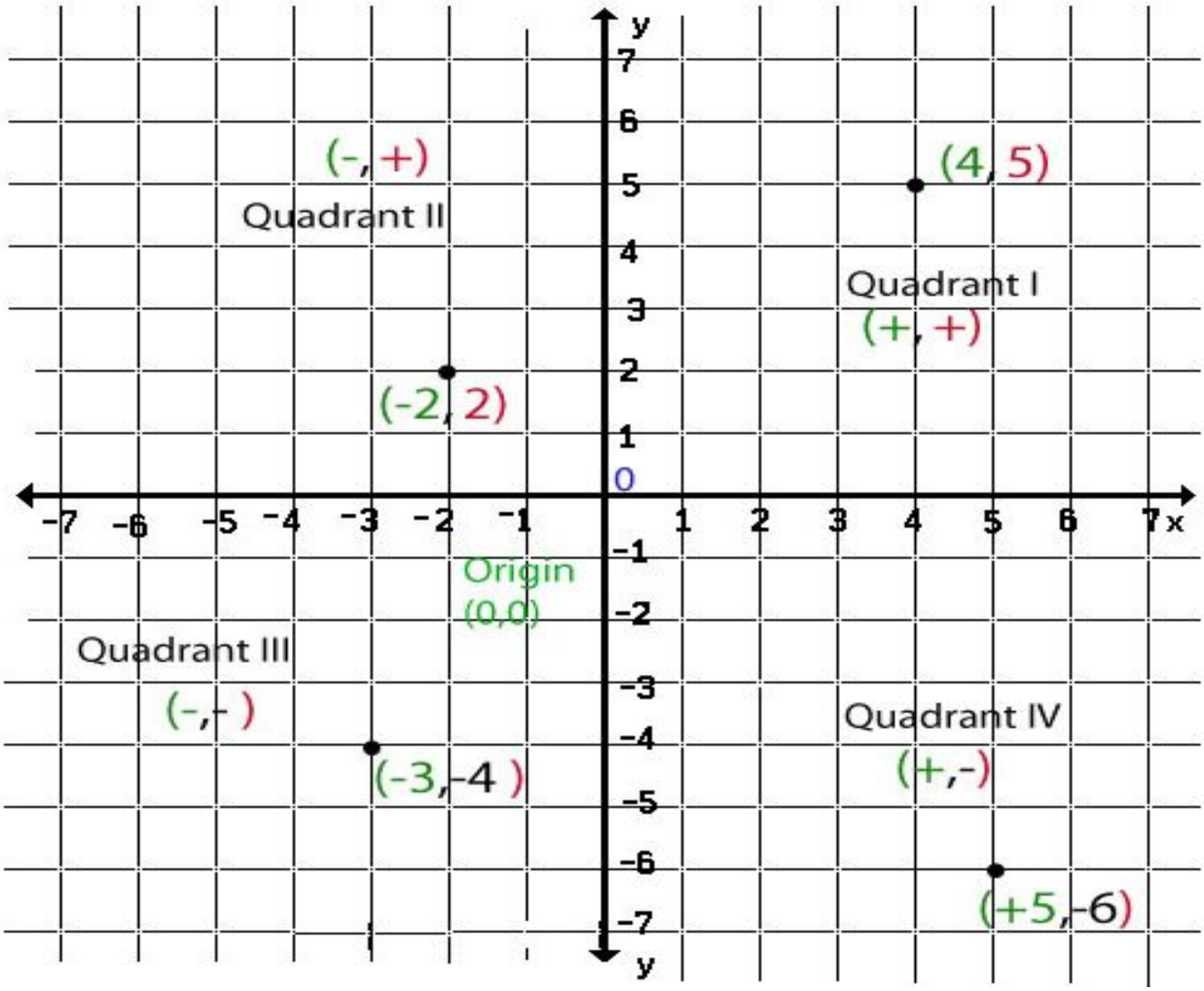
- Classroom preparations should take about 10 minutes the first time and 5 minutes or less thereafter.
- All classroom desks should be moved to the perimeter of the classroom; the center of the floor-space should be empty.
- Make sure that the floor is swept properly to ensure adhesion of the masking tape.
- Determine the center of the accessible open space; this center will become the origin of your coordinate plane.
- Create an X-axis through the established center from one side of the floor to the next using the longest possible strip of masking tape.
- Using the longest possible strip of masking tape, create a Y-axis through the established center from one side of the floor to the next.
- The X and Y axis must be perpendicular to each other. To ensure perpendicularity, use the line between the tiles as a guide for laying the masking tape.
- Label the X and Y axis respectively with masking tape. Be sure to indicate negative and positive directions.
- Labeling quadrants ( I, II, III, IV) and indicating the signs of the ordered pairs in each quadrant (+,+), (-,+), (-,-), and (+,-) is optional. (This is recommended as an introductory measure and perhaps should be taken away as students progress in comprehension. Remember that such instructions are not provided during formal assessments or in life.)
- Align the X and the Y axis with the four cardinal directions (East, West, North and South). This will be helpful as points of reference for “The Google Earth” portion of the exercise. (North = Positive Y, South = Negative Y, East = Positive X, and West = Negative X).
- If possible, it is recommended that the moving of the desks and the construction of the Cartesian Plane should be done prior to class.
- (Note: I played the Coordinate Plane Game regularly with my students and I always tried to have the classroom setup prior to class. However, when I did the 6th Grade Challenge during testing (Homeroom lockdown) I employed a crew of 10 students that prepared each of the five homerooms for the teachers.)
- ****Setting up the classroom takes approximately 10 minutes. It will take 5 minutes after you have done it a couple times.
- It should be explained to the students, prior to beginning play, that each division of the 12 inch tiles represents a unit.
- The teacher should also predetermine which students will belong to which groups. Ideally, there should be three or four groups.

# Rules of The Coordinate Plane Floor Game

- A student answering a question must walk, dance or strut to the required location and or perform the required function or operation (Teachers should make the necessary accommodations for students who have physical challenges).
- ***The teacher should always encourage the student to begin at the origin. Stressing that a coordinate gets its location based on or relative to the origin helps to introduce the abstract concept of relativity.)
- No assistance is allowed from team members during the initial individual questions that are posed to each student.
- However, students can confer among themselves in the event they get an opportunity to steal the question (answer after another has responded incorrectly).
- If a student answers a question correctly, her group is awarded 2 points.
- The next question is then posed to the next group.
- If a question is answered incorrectly, one of the other groups is allowed to steal (answer) the question for 1 point.
- However, if the second group responds incorrectly to an already incorrectly answered question, 1 point is deducted from their score.
- The teacher should always be prepared to explain unanswered questions.
- Questions with multiple parts, like the construction of a polygon, have a 5 point bonus attached to them.
- Bonus questions must be answered with precision. (For example: In the case of a quadrilateral, if the answer is a rhombus, an answer of parallelogram should not be accepted; encourage precision).
- Wildcard questions can be randomly posed by the teacher to encourage participation and deeper conceptual understanding. These questions are also awarded 5 points. Wildcards gives the teacher an opportunity to highlight specific concepts and address known student deficiencies. They should be specifically designed to give understanding to obscure and difficult concepts. These questions do not provide an opportunity to steal; the teacher explains if an incorrect answer is given. Points are not deducted for incorrect wildcard answers.
- Each group should be given an equal amount of wildcard opportunities.
- The group with the most points at the end is declared the winner.
- There should always be additional questions in the event of a tie. Additionally, each student should have an opportunity to answer at least one question.
- The entire 6th Grade at Everglades K-8 Center participated in a competitive game during our homeroom lockdown in May. The homeroom that accumulated the most points was given a pizza party. So, if possible, provide some incentives.

- It seems exhaustive, but a complete game can be completed in about 30 minutes.
  6.

**Sample Coordinate Plane Grid**



# An actual Coordinate Plane Floor game with sample questions

| Team #1 | Team #2 | Team #3 | Team #4 |
|---|---|---|---|
| Gala | Liennys | Angelina | Raphael |
| Sophia | Carys | Barbara | Angel |
| Cynthia | Ethan .S | Yordiel | Daniela |
| Valentino | Eduardo | Maryam | Isabella |
| Ethan | Laura | Kevin | Ana |
| Nicole | Alyla | Lauren | Miller |
| | Daniela | | |

Question #1a (For group #1 Gala)

Locate coordinate (3,7)

***Students are directed to always begin at the origin and then walk the horizontal and the vertical distance or vice versa.

- Gala locates the coordinate correctly (she must remain there): 2 points awarded to group #1

Question #1b (For group #2 Liennys)

Locate coordinate (7,1)

- Liennys does not locate the coordinate correctly

The first person that raises their hand from any group, except her group, is allowed to direct Liennys to the correct coordinate (Miller from group 4 raises his hand and he directs her to the correct coordinate. Liennys must remain there): 1 point is awarded to Miller's group.

Question #1 c (For group #3 Angelina) (The other two previous students are still standing on the coordinate plane)
--Locate coordinate (1,1)

- Angelina responds correctly (she remains at the coordinate): 2 points are awarded to group 3

Question #1 d (For group #4 Raphael)
Locate coordinate (9,7)

- Raphael responds incorrectly
- Sophia from group #1 attempts to direct him: her direction is also incorrect. As a result her team loses 1 point.
- Liennys from group #2 directs Raphael to the correct coordinate: Group 2 steals the question and is awarded 1 point. (Allow only two chances to steal a question).

***At this point the four students have constructed a particular polygon. The teacher then asks the groups to identify the polygon that was constructed. The student, from any group, that raises his/her hand first gets to respond. The response must be very specific; the general category is not acceptable. (Make sure that the students that have made the polygon are facing the same direction and are standing straight).

Question #1 e (For any student)
Specifically identify the polygon that the four students have constructed, and justify your conclusion.

- Raphael from group #4, although he is a part of the polygon, raises his hand first. He then correctly identifies the polygon as a rhombus and also justifies his conclusion: Team 4 is awarded 5 bonus points.

***The average time taken to complete this question is between 2 and 3 minutes. Note that as the students become more skilled, the time will be greatly reduced.



Score after Round 1

| | Team #1 | Team #2 | Team #3 | Team #4 |
|---|---|---|---|---|
| | **2 (Gala)**<br>**-1(Sophia)** | **0 (Liennys)**<br>**1 (Liennys)** | **2 (Angelina)** | **0 (Raphael)**<br>**1 (Miller)**<br>**5 (Raphael)** |
| Totals | 1 | 1 | 2 | 6 |

Round 2

Question #2 a (For group #1 Sophia)

Locate coordinate (-4, 1)

- Sophia responds correctly by starting at the origin, moving 4 units left and then 1 unit up. Group #1 is awarded 2 points.

Question #2 b (For group #2 Carys)

Locate coordinate (-4, -4)

- Carys easily finds coordinate (-4,-4). Group 2 is awarded 2 points.

Question #2 c is a wildcard question for a student whose name is randomly selected from a bag that contains all of the students names.

--What is the name and the correct spelling of the point where two sides of a polygon meet? Then explain whether or not a circle is a polygon?

- The question is posed to Barabara (Group 3), she answers correctly. (Group 3 is awarded 5 points)

Question #2 c (For group # 3 Yordiel)

Locate coordinate (1, -4)

- Yordiel confuses the coordinate pair; he moves 1 unit up from the origin and then 4 units to the left.
- The correction comes from Isabella (Group 4) who directs him to the right coordinate location. (Group 4 is awarded 1 point)

Question #2 d (For group #4 Angel)

What is the distance from Sophia(-4, 1) to Carys (-4, -4)

- Angel explains that since the X values are the same so they can be ignored. Then he explained that since the Y values are in different. 10.

- coordinates so they should be subtracted from each other and then the absolute value of the result should be taken. His answer is 5 units, which is correct. (Group 4 is awarded 2 points)

Question #2 e (For group #1 Cynthia)

What is the distance from Carys (-4, -4) to Yordiel (1, -4)

- Cynthia correctly ignores the Y coordinates. She then adds the X coordinates and takes the absolute value of the result. Her response was 3 units; this was incorrect.
- Angel from group 4 correctly responds with a proper explanation of the distance (5 units). (Group 4 is awarded 1 point)

Bonus Question #2 (For Group #1)

Specifically name the polygon that has been constructed using all of its key features.

- Cynthia from group 1 raises her hand first. She notices the following about the polygon: it has 3 sides; two sides have the same length; and it has a right angle. She responds that it must be an isosceles right triangle; she is correct. (5 points are awarded to group 1)

Score after 2 rounds

| **Team #1** | **Team #2** | **Team #3** | **Team #4** |
|---|---|---|---|
| **2 (Gala)**<br>**-1(Sophia)**<br>**2 (Sophia)**<br>**5 (Cynthia)** | **0 (Liennys)**<br>**1 (Liennys)**<br>**2(Carys)** | **2 (Angelina)**<br>**5 (Barbara)** | **0 (Raphael)**<br>**1 (Miller)**<br>**5 (Raphael)**<br>**1 (isabella)**<br>**2(Angel)**<br>**1(Angel)** |

| | | | | |
|---|---|---|---|---|
| Totals | 8 | 3 | 7 | 10 |



Round 3

Question #3 a (Group #2 Ethan)

If coordinate (-1,1) is reflected over the Y-Axis, what would be its new location? (Student must walk to the original coordinate and then show how he arrived at the point of reflection).

- Ethan identifies the original coordinate, but struggles with the reflection; his reflections takes him to location (-1,-1).
- Lauren from group #3 attempts to steal. She redirects Ethan back to the original coordinate (-1,1). Lauren then explains that the Y-axis acts as a mirror and that he should be on the opposite side of it, and the same distance from it. She directs Ethan to location (1,1). Laren's answer is correct (Group 3 is awarded 1 point for).

Question #3 b (Group 2 Wildcard Question Laura)

Ethan performed an incorrect operation. What did he reflect the point (-1,1) over? And what is the fundamental rule of reflection over the axes?

- Laura indicates that Ethan reflected the the point over the X axis and thus arrived at (-1, -1). She further stated that a rule of thumb should be to change the sign of the x value if the reflection is a across the Y-axis, and change the sign of y value if the reflection is across the X-axis. (Group 2 is awarded 5 wildcard points)

Question #3 c (Group #3 Maryam)

If coordinate (3, -3) is reflected across the X-axis what would be its new location?

- Maryam begins at the origin and moves 3 units right and then 3 units down. She then turns around and counts 3 units back to the X-axis. Finally she continues and counts 3 more units. Her final destination is (3, 3). (Group 3 is awarded 2 points)

Question #3 d (Group #4 Daniela)

Find the new location if (-10, 1) is reflected over the Y-Axis

Daniela may not have been paying attention to the previous reflection response. She is able to find the location (-10,1) but she doesn't know how to reflect it across the Y-axis.

- Valentino from group 1 eagerly steals the questions. He instructs Daniela to move 10 units towards the Y-axis. Then he instructs her to continue going for 10 more units. Daniela ends up at location (10,1). (Group# 1 is awarded 1 point).

Question #3e (Group #1 Ethan Q)
If (-7, -3) is reflected through the origin what will be the new location (This concept was briefly discussed in class, so Ethan is allowed to collaborate with his teammates).

- Ethan and his teammates are unable to draw a conclusion.
- Daniela from group #4 raises her hand; she responds that the new coordinate will be (7, 3). She is correct and group #4 is awarded 1 point.

***Daniela further explains that a reflection through the origin requires both coordinate values (x,y) to be changed to (-x, -y).
***Teacher explanation: multiply both coordinates (x, y) by -1 so that they become (-x, -y). For example: (1,3) becomes (-1,-3) (multiply both by -1). Also, (-2, 1) becomes (2, -1) (multiply both by -1).

Question #3 f(Group#2 Bonus)
The four students that are on the coordinate plane forms which particular polygon?

- Eduardo responds that the quadrilateral is specifically a trapezoid. He stated that it fits the characteristics of a trapezoid because it had four sides and two of the four sides were parallel to each other. (Group 2 was awarded 5 points)

Score after round 3

| **Team #1** | **Team #2** | **Team #3** | **Team #4** |
|---|---|---|---|
| **2 (Gala)**<br>**-1(Sophia)**<br>**2 (Sophia)**<br>**5 (Cynthia)**<br>**1(Valentino)** | **0 (Liennys)**<br>**1 (Liennys)**<br>**2(Carys)**<br>**5(Laura)** | **2 (Angelina)**<br>**5 (Barbara)**<br>**1 (Lauren)**<br>**2 (Maryam)**<br>**5 (Eduardo)** | **0 (Raphael)**<br>**1 (Miller)**<br>**5 (Raphael)**<br>**1 (isabella)**<br>**2(Angel)**<br>**1(Angel)**<br>**1(Daniela)** |

| | | | | |
|---|---|---|---|---|
| Totals | 9 | 8 | 15 | 11 |

**At this point team 3 would be the clear winner.

Question # 4 (Question 4 is a motion question that we did use in our game, but it's not used here.)

a). One monster truck is located at (-1, 4)(facing east)

b). Another monster truck is at (3,0) Facing North(2)

c). If they accelerate at the same rate, at the same time, and in straight lines, are they likely to crash?

If so, where?

***Have the students walk towards each other to demonstrate the physics of the problem.

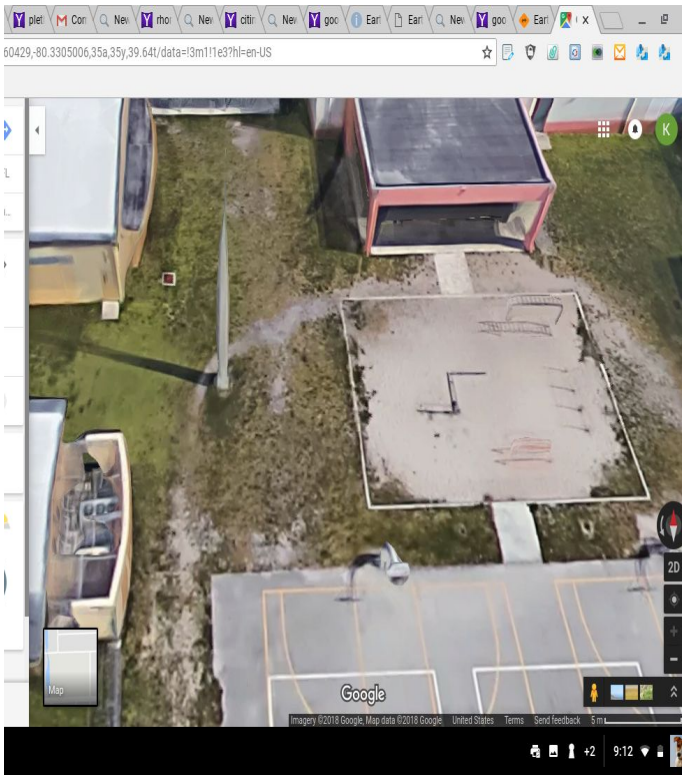
***You can also inform them at this that there is also a 3 dimensional coordinate system that adds height (dept) (Z) to the two dimensional XY plane. These 3-D systems can be used to identify an object's location in space.

***Here I talked about The United State's Missile defence system that is designed to locate and intercept missiles and aircrafts in space and destroy them.

# The Google Earth Challenge

**Julia Tuttle at Bayfront Park Center**

**Miami, Florida**




**Communication Obelisk at Everglades K-8**

**Westchester, Florida**

## The Google Earth Challenge

There is an obelisk-like structure located near the northwest corner of the Middle Learning Center's basketball courts. 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. Use the Google Earth technology to locate both objects.

For the purposes of this project, Miami Dade-County will be the coordinate plane and the Everglades K-8 Obelisk will be the origin (use the obelisk at your school). Students will use the Google Earth Software to identify the landmarks, to perform measurements and to answer questions based on their findings.

# Google Earth Challenge Worksheet

- **Keep the same groups from The Coordinate Plane Challenge.**
- **Assign a value to each correct answer (I used 5 points).**
- **Each group should turn in 1 packet (Work must be shown where necessary)**
- **The combined scores from The Floor Game and this challenge determines the winning group.**
- **At Everglades we made it a grade wide (6th Grade) challenge and the winning homeroom won a pizza party.**

**#1**

1a. Locate the obelisk and the Tuttle statute. What is the distance in miles from the base of the obelisk to the base of Mrs Tuttle's bronze statue? (Use technology to determine the distance)
(This obelisk-like structure is on most school campuses; use yours)

1b. Use the measuring tool in the digital technology to confirm the height of the Everglades Obelisk (right click the mouse and the menu appears).
**** Here I encouraged the students to use the shadow of the obelisk and then use the Pythagorean theorem to determine its height.

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 (Tuttle), what is the length of this line in feet? (use the tool in the program to draw the line) (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) ***Students can use the coordinate plane from the floor game to discuss possibilities. However, they must turn in an actual diagram on paper.
***This particular question is extremely critical because the students will discover how to model a 3-dimensional system in a 2-dimensional plane.

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).

16.

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 you were told that Mr. Henry Flagler's statue, another city pioneer, is located at the point where Julia Tuttle's statue is reflected through the origin. In what quadrant will Mr. Flagler's statue be located? What would be the coordinates of his location (Use the coordinate locations from Google Earth).

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

Part #2

1. What is the distance from Everglades K-8 Center to The White House (Washington, D.C)?

2. What quadrant will the White House be in?

3a. What is the total distance if you travel from Everglades to FIU, then to Kendall Regional Center, then to the Bird Bowl and then back to Everglades?

3b. Sketch and label the distance travel. Indicate the type of polygon that the connected lines make. Is the polygon regular or irregular?

# Lesson Plan
# The Coordinate Plane Floor Game

| | | |
|---|---|---|
| | | |

**Subject:** Math 6th Grade

**Benchmark:** MAFS.6.NS.6a; MAFS.6.NS.6b; MAFS.6.NS.6c; MAFS.6.G.1.1; MAFS.6.G.1.3; MAFS.6.NS.3.8

**Learning Objective:**

- To understand that a person (Rene Decartes) actually conceptualized and invented the Coordinate Plane, and that students can do likewise.
- To understand how the principles of the coordinate plane connect the disciplines of geometry and algebra.
- To understand how the coordinate plane principles have been integrated into past and current human products and systems.
- To anticipate possible future applications that will use coordinate plane principles.
- To promote the factual idea that mathematics is constantly all around us.

**Materials needed:**
-Dollar store masking tape.
-Clean classroom floor.

**Background Knowledge:**

- What is a number line?
- What is a coordinate plane made up of (two number lines)?
- What are the coordinates?
- What are ordered pairs?
- How do I find specific locations in the plane?
- How do I measure distances between points?
- How do I translate and reflect points?

**Vocabulary:** number line; origin; coordinate; coordinate pair; translation; reflection; polygon; quadrilateral; trapezoid; rectangle; rhombus; vertex; absolute value; axis; units

**D.I.** Students will work and collaborate in small groups. The regular environment and the process of instruction will be disrupted (in a positive way) with this exercise. The classroom floor literally becomes a gigantic coordinate plane where students will engage in discovery through a fun activity. They will dance, laugh and earn a deeper appreciation for and understanding of coordinate plane principles.

| |
|---|
| **Assessment:** Students can be assessed through a homework packet or a quiz that is based on questions that are similar to the those presented during The Floor Game (see sample game). |



# Lesson Plan
# The Google Earth Challenge

| | | |
|---|---|---|
| | | |
| **Subject:** Math 6th Grade | | |
| **Benchmark:** MAFS.6.NS.6a; MAFS.6.NS.6b; MAFS.6.NS.6c; MAFS.6.G.1.1; MAFS.6.G.1.3; MAFS.6.NS.3.8 | | |
| **Learning Objective:**<br>● To understand that coordinate plane principles are the foundation of many products and systems that we currently use.<br>● To further develop a deeper understanding of coordinate plane principles.<br>● To show the clear link between algebra and geometry.<br>● To reinforce the omnipresence of mathematics in real life.<br>● To use technology for academic purposes in a fun way.<br>. | | |
| **Materials needed:**<br>-Computer that can run Google Earth. | **Background Knowledge:**<br>● How to find locations using Google Earth?<br>● How to use the basic features of Google Earth? | |
| | **Vocabulary:** Cardinal directions; latitude; longitude; Obelisk; Global Positioning System; Pixel; Pythagorean Theorem | |
| **D.I.** Students will work and collaborate in small groups. Technology will be used to reinforce the idea that mathematical concepts are imbedded in many of our products and processes. Students will be able to discuss all aspects of the challenge in a collaborative manner in an effort to arrive at consensus responses. | | |
| **Assessment:** Students can be assessed through a homework packet that mirrors the questions presented in the challenge packet.(see sample packet). | | |

## Resources

http://www.cpalms.org/Public/previewstandard/preview/5443

https://www.flickr.com/photos/southbeachcars/7749652500

https://www.google.com/search?q=smiley+face+clip+art&rlz=1CADEAF_enUS792US793&oq=smil&aqs=chrome.1.69i57j0l3j35i39j0.4030j1j4&sourceid=chrome&ie=UTF-8

https://images.search.yahoo.com/search/images?p=coordinate+plane+quadrants&fr=yfp-t-s&imgurl=http%3A%2F%2Fwww.aplustopper.com%2Fwp-content%2Fuploads%2F2016%2F10%2Fcoordinate-plane-quadrants.jpg#id=0&iurl=http%3A%2F%2Fwww.aplustopper.com%2Fwp-content%2Fuploads%2F2016%2F10%2Fcoordinate-plane-quadrants.jpg&action=click

## Appendix I

Coordinate Plane Game Score Sheet

| Question # | Point Total | Grand Total |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |

| | | |
|---|---|---|
| 7 | | |
| | | 21. |

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