Name:_____ Date:_____ Band:_____
Geometry PBA Project Ms. Lozada

Finding your "Triangle" Center

You have a wealth of knowledge about triangle centers. Now it is time to apply it!

Project Overview: For this project, you are going to choose three locations on a map that are important to you and call them A, B, and C. You will use these locations to create ΔABC. You will then explore different scenarios and create the best point of concurrency of your triangle that best fits the scenario. You will also prove the special properties of each point of concurrency. Use a new, clean map for each part.

Due Date:_____

Special Notes

1. You can obtain maps at http://maps.google.com. Choose a scale that makes your triangle as large as possible on the page.
2. Please complete each part of the project on a separate page. Type your explanations in Times New Roman 12-point font double-spaced, 1-inch margins.
3. Your project must be STAPLED *in order* **before class begins**. (You will automatically lose 10 points from your project grade if you try to staple your project during class.)
4. **NO LATE PROJECTS WILL BE ACCEPTED! YOU HAVE BEEN WARNED.**
5. Clearly label all parts of your project.
6. All constructions must be done with a straightedge and a compass. Do NOT erase compass marks!
7. Presentation (organization, neatness, décor, spelling, and grammar) will be graded!
8. You will need to do some research and write about your findings *in your own words. In your own words* does NOT mean copy and paste, which is known as plagiarism. Plagiarism is a grave offense and you will be severely penalized if you do it. You will receive a ZERO for this project and be referred to administration.

Part 1: Coffee Cart Entrepreneur

You are a coffee cart entrepreneur! You want to place your coffee cart so that is equidistant from each of your three locations.

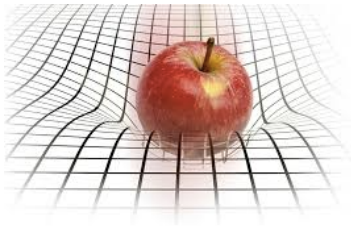
1. What point of concurrency best fits your coffee cart aspirations? Why did you choose this point of concurrency?
2. Construct this point of concurrency on your map using a compass and a straightedge and label it K.
3. What are the approximate cross streets of your point of concurrency, K?
4. Prove (using math work) that your point of concurrency, K, is equidistant from each of your three locations.

Part 2: Fountain Philanthropist

You are a mega wealthy philanthropist! What better way to spend your money than to build a lavish fountain equidistant from the paths between your three locations (i.e. the sides of ΔABC).

1. What point of concurrency best fits your extravagant fountain plans? Why did you choose this point of concurrency?
2. Construct this point of concurrency on your map using a compass and a straightedge and label it F.
3. What are the approximate cross streets of your point of concurrency, F?
4. Prove (using math work) that your point of concurrency, F, is equidistant from each of the paths between your three locations.

Part 3: Gravity Guru



You are a talented applied mathematician sometimes referred to as the "Gravity Guru" for your superior knowledge of physics! You want to locate the "center of gravity" of your three locations. You need to construct a special point of concurrency to locate this "center of gravity."

1. What point of concurrency would give you the location of the "center of gravity" of your three locations? How do you know? (Hint: You may want to do a little research into this idea and CITE the source you referenced.)
2. Construct this point of concurrency on your map using a compass and a straightedge and label it G.
3. What are the approximate cross streets of your point of concurrency, G?
4. What are the special properties of this point of concurrency, G? Prove (using math work) these special properties of this point of concurrency, G.

Part 4: Ortho-yougladthisisthelastconstruction

Just joking! You have two more parts to go after this one but since there is no cute scenario to go with this point of concurrency, I will just be "ortho" with you (get it…because ortho means straight in Greek).

1. Construct the orthocenter of ΔABC and label it H.
2. What are the approximate cross streets of the orthocenter, H?

Part 5: Orthocenter of an Obtuse Triangle

Using the Part 5 map provided for you, construct the orthocenter of ΔABC using a compass and straight edge and label it O. Detach this map from this packet and include it in your final project packet that your turn in for a grade.

Part 6: Ceva's Theorem

1. Research Ceva's Theorem and describe the theorem *in your own words* (make sure you CITE any sources you referenced!).
2. Using the Part 6 map provided for you, measure $AH_B, H_BC, CH_A, H_AB, BH_C$, and H_CA in centimeters. Use these measurements to verify Ceva's Theorem: $\frac{AH_B}{H_BC} \cdot \frac{CH_A}{H_AB} \cdot \frac{BH_C}{H_CA} = 1$
3. Detach this map from this packet and include it in your final project packet that you turn in for a grade.

Part 7: Nine-Point Circle

1. Use a new copy of your map and redraw ΔABC.
2. Construct the circumcenter K, centroid G, and orthocenter H of ΔABC.
3. Erase the medians and perpendicular bisectors, but NOT the altitudes.
4. Find the nine-point center of ΔABC and label it N. (Hint: You may want to do a little research into the nine-point center and how to locate it.)
5. What are the approximate cross streets of the nine-point center?
6. Draw in the nine-point circle.
7. Show that K, G, H, and N are collinear by drawing in the Euler line $\overleftrightarrow{KH}$. (Hint: You may want to do a little research into the Euler line and how to locate it.)
8. Measure $\overline{KH}, \overline{KN}, \overline{GK}$, and $\overline{NG}$ in centimeters. Show that $KN = \frac{1}{2}KZ, GK = \frac{1}{3}KH$, and $NG = \frac{1}{6}KH$.
9. Explain why the nine-point center is special *in your own words*. (You are going to want to do some research and CITE the sources you reference.)

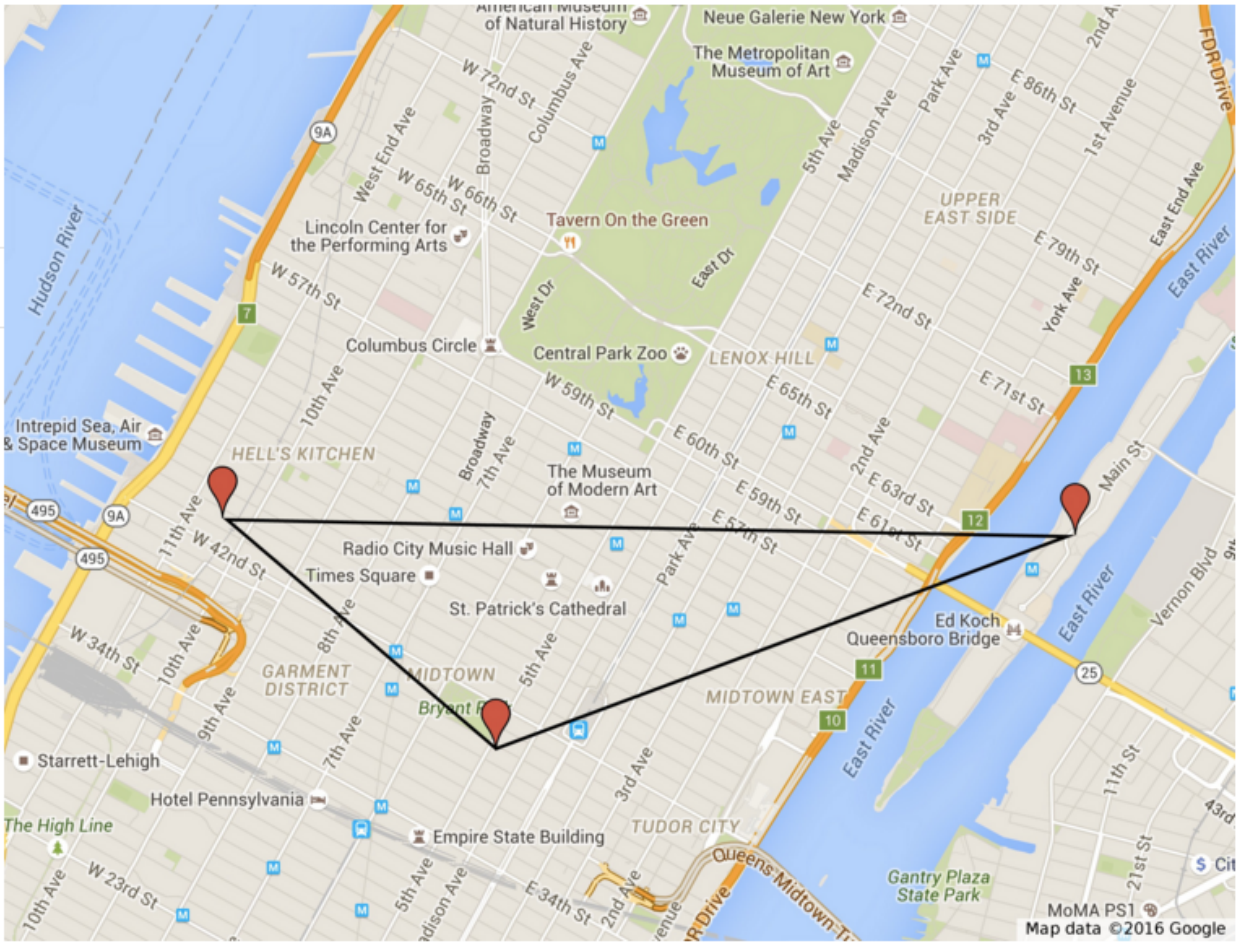
PUTTING THE PARTS OF YOUR PROJECT TOGETHER

STAPLE BEFORE CLASS all of these parts in this order.

1. Title Page (include your name and band)
2. Table of Contents
3. Part 1: Coffee Cart Entrepreneur
4. Part 2: Fountain Philanthropist
5. Part 3: Gravity Guru
6. Part 4: Ortho-yougladthisisthelastconstruction
7. Part 5: Orthocenter of an Obtuse Triangle
8. Part 6: Ceva's Theorem
9. Part 7: Nine-Point Circle
10. Triangle Centers Rubric (detach from this packet)

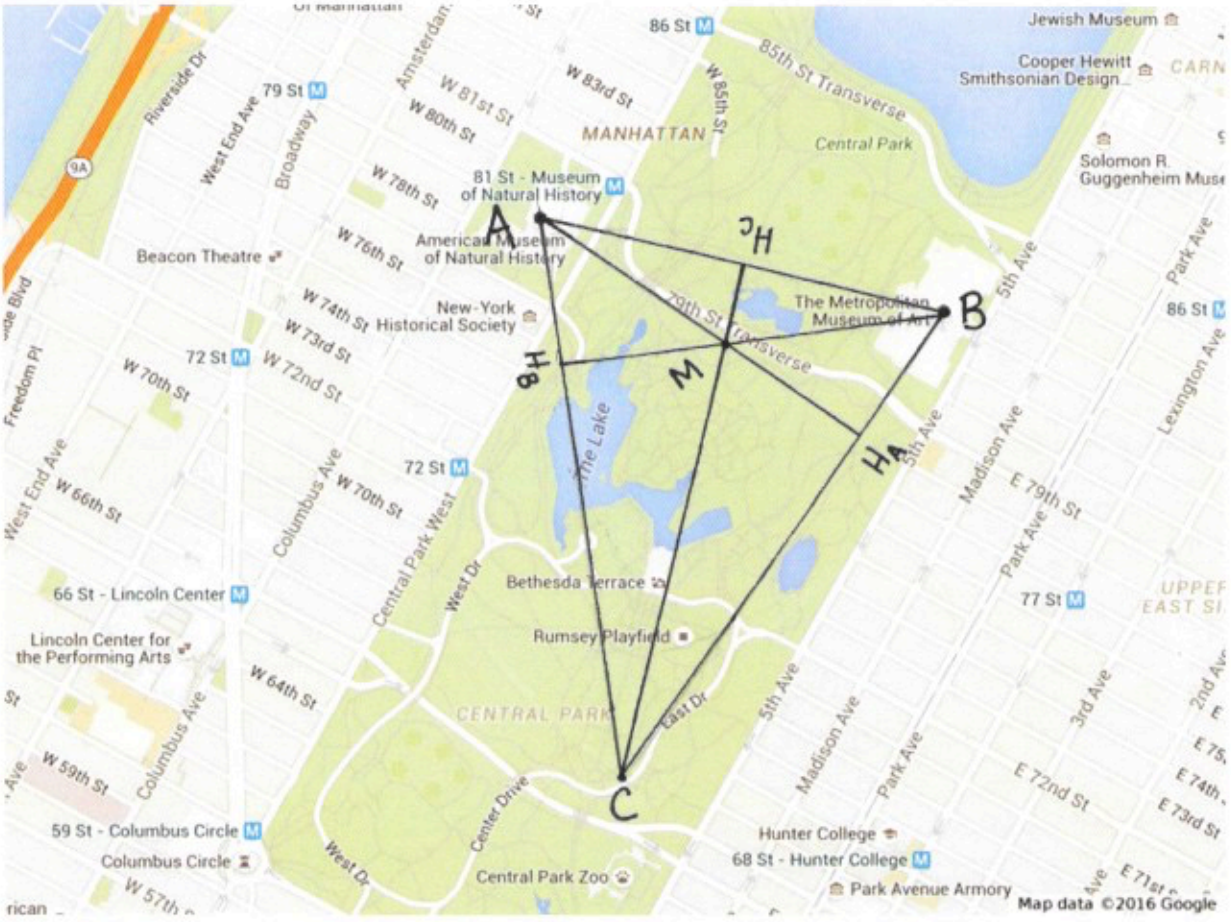
Part 5: Orthocenter of an Obtuse Triangle Map

Locations: The Beacon School, New York Public Library, Roosevelt Island



Part 6: Ceva's Theorem Map

Locations: American Museum of Natural History, The Metropolitan Museum of Art, Central Park



Triangle Centers Rubric

Title Page/Table of Contents/Presentation											/9
(organization, neatness, décor, spelling, and grammar)	9	8	7	6	5	4	3	2	1	0	
Part 1: Coffee Cart Entrepreneur											/15
Construction/Labels					5	4	3	2	1	0	
Explanation							3	2	1	0	
Cross Streets								2	1	0	
Proof Demonstration					5	4	3	2	1	0	
Part 2: Fountain Philanthropist											/15
Construction/Labels					5	4	3	2	1	0	
Explanation							3	2	1	0	
Cross Streets								2	1	0	
Proof Demonstration					5	4	3	2	1	0	
Part 3: Gravity Guru											/15
Construction/Labels					5	4	3	2	1	0	
Explanation							3	2	1	0	
Cross Streets								2	1	0	
Proof Demonstration					5	4	3	2	1	0	
Part 4: Ortho-yougladthisisthelastconstruction											/15
Construction/Labels					5	4	3	2	1	0	
Explanation							3	2	1	0	
Cross Streets								2	1	0	
Proof Demonstration					5	4	3	2	1	0	
Part 5: Orthocenter of an Obtuse Triangle											/4
Construction/Labels					4		3	2	1	0	
Part 6: Ceva's Theorem											/12
Research				5	4	3	2	1	0		
Theorem Demonstration		7	6	5	4	3	2	1	0		
Part 7: Nine-Point Circle											/15
Constructions/Labels						4	3	2	1	0	
Cross Streets									1	0	
Nine-Point Circle									1	0	
Euler Line									1	0	
Proof Demonstration							3	2	1	0	
Explanation				5	4	3	2	1	0		

Comments:

Grade:_____/100