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Field Trip to the Eiffel Tower

WebQuest Description: This webquest provides the opportunity for students to put their new knowledge of geometry to practice by calculating distances and building a to-scale model, all while visiting the Eiffel Tower!
Grade Level: 9-12
Curriculum: Math
Keywords: Geometry, Field trip, Similar Triangles, Pythagorean Theorem
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Introduction

Bonjour Classe! Today we will be traveling across the world to see the Eiffel Tower! This impressive structure that people travel from all over the world to see is not only beautiful, but also, FULL of geometric shapes and principles. Today we will learn some history of the Eiffel tower, then will put our knowledge of parallel lines, the Pythagorean Theorem, and similar triangles to practice!

Tasks

The first item on our agenda is to take a quick tour of the Eiffel tower and learn about some of its history. Then we will watch a video that explains some of the process of actually building such a tall structure. As we watch this video, we will consider how our knowledge of parallel lines could be used to ensure that each leg of the Eiffel tower is the same height. Next, we will use the Pythagorean Theorem to calculate how far away we must stand from the base of tower, in order to be a certain distance from the top. But wait!! We can't end our trip without first picking out a souvenir! Well, in our case building a souvenir. We will conclude our trip by watching a video discussing the proportionality of the Eiffel Tower and a smaller model, and will use our knowledge of similar triangles to create our own model (to-scale) out of pipe cleaners.

Process

First, watch this video to learn some of the history of the Eiffel Tower and familiarize yourself with it.   Virtual Tour of the TowerWatch this video and write a short paragraph about how we could use angle measurements to make sure each leg is the same height (consider the fact that if each level is horizontal, then it is parallel to the ground). Draw a simple diagram to go with your paragraph.   Building the Eiffel TowerSuppose I want to be exactly 2000 meters from the tip of the Eiffel Tower. Use the Pythagorean Theorem to calculate where (on the ground) I need to stand. (Note: you will have to look up the height of the Eiffel tower). Download this picture and add a triangle to demonstrate how you got your answer.   Eiffel Tower PictureNow watch this video of a gentleman who compares the ratios of his small model to the actual Eiffel Tower. Use the measurements he gives of the actual tower to create an isosceles triangle with the height equaling the height of the tower, and the base equaling the length of the base of the actual tower. Next draw a similar triangle where the base is between 8-12 cm. (note: neither of the triangles that you draw will be "to scale." The purpose of them is to help you calculate the dimensions of your smaller model. Once you get your dimensions, create your own model of the Eiffel Tower to remember our trip! (Note: This model will be more of a tall pyramid at first, but feel free to use your knowledge of similar shapes and ratios to include more detail! Consider other similar triangles that may be helpful.) Model of the Eiffel Tower… Determining the Scale (as a Ratio)Before we leave, write a short journal entry that summarizes what you have learned during our trip to the Eiffel tower. Include examples of how you might be able to use similar math techniques in your own life.

Evaluation

Here you will find the rubric that will be used to grade each step of this assignment. Make sure you look over it to receive full credit.

Category and Score	0	1	2	3	Score
Research	The student did not watch any of the videos.	The student only watched one video.	The student watched all but one video.	The student watched all videos.	25
Writing exercises	Does not complete writing exercises after each video.	Completes some, but not all writing exercises.	Completes all writing exercises but does not use theorems.	Completes all writing exercises while correctly using theorems.	30

Category and Score	0	1	2	3	Score
Hands-on Activity	Student does not complete hands on activity.	Completes model, but does not include evidence of mathematical work.	Completes model, but does the bare minimum.	Student accurately creates to-scale model of the Eiffel Tower, and demonstrates multiple uses of similar triangles.	35
Summary	Student does not attempt summary of project.	Student's summary is not complete.	Student completes summary of trip, but does not include examples.	Student completes summary of trip and provides examples of how this math can be used in their own life.	10
				Total Score	100

Conclusion

I hope you enjoyed our class trip, and saw how many of the concepts you are learning now are used in real-life! MY challenge to you now is that you continue to look for ways that people are using different geometrical concepts in their jobs every day! Maybe this will even inspire you to become an architect or engineer one day!

Teacher Page

This webquest is designed to take 2-3, 50 minute class periods. Students should be familiar with parallel line theorems, the Pythagorean Theorem, Similar triangles, and rations before completing this webquests. This project also requires students to have paper, pens, and pipe cleaners.

Standards

Virginia SOL's: G.2, G.7, G.8, G.14National Standards:â€¢ Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationshipsâ€¢ draw and construct representations of two- and three-dimensional geometric objects using a variety of tools;â€¢ use geometric ideas to solve problems in, and gain insights into, other disciplines and other areas of interest such as art and architecture.

Credits

Pictures:https://www.youtube.com/watch?v=GdY3jpB22xIhttp://www.planetware.com/paris/eiffel-tower-f-p-et.htmhttps://www.rd.com/culture/eiffel-tower-facts/https://www.sciencebuddies.org/science-fair-projects/project-ideas/Math_p026/pure-mathematics/measuring-height-altitude-with-inclinometer

Other