Lesson Title	How big is the country we live in?
Length of Lesson	50 minutes
Created By	Shane A. Irvin
Subject	Geometry
Grade Level	9^{th}-12^{th}
State Standards	4b. Solve real world applications and mathematical problems to find missing measurements in right triangles by applying special right triangle relationships, geometric means, or trigonometric functions.
DOK Level	DOK 2
DOK Application	Missing objects, Inquiry, Relationships, Connections
National Standards	Use visualization, spatial reasoning, and geometric modeling to solve problems.
Graduate Research Element	Sizing objects by spatial view to determine if a linear distance helps the graduate student determine specific distances from one test point to another without prior knowledge.

Student Learning Goal:
This lesson can be broadened and made more difficult through establishing specific requirements on learning scale ratio and how to go from a map of a city and use that scale to determine ideas about the map of the state. This is done by figuring out the ratio of linear distance on a map. The students will be asked how wide and tall they think the state of Mississippi is, and how tall and wide they think the United States are. This will allow them to get focused as well as assess inquiry in the lesson. The students will be taught how to determine linear measurement on a map from the closest distance.
The students will be required to figure out linear distance and perimeters for the state and the United States. Students who advance on the subject will be allowed to see if they can determine the ratios of each map to figure out other states. The students will be asked specific measurements to see if they did the calculations wrong as well as why they think the perimeters are greater or lesser than they originally thought.

If they do not have the correct answers or cannot determine why their original guesses were off, the students did not actually learn anything. The assessment of how well they did on the worksheet will provide the teacher with specific calculation for each student at that time. Further work can be assigned if the student does not master the skill.

Materials Needed (supplies, hand-outs, resources):
Map of the United States, map of Mississippi, computer, Google Earth, writing utensil

Lesson Performance Task/Assessment:
The lesson's goal is to allow the students to use what they know about perimeter measurements and apply them to find missing components of a map, such as rivers and lakes which are sometimes hard to linearly measure.

The following questions will be asked to the students in an activity sheet.

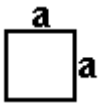
1. What is the perimeter of Mississippi?

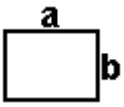
2. What is the perimeter of Lowndes County?

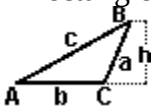
3. Using the perimeter of Mississippi given, figure out what the more accurate measurement of Mississippi is.

4. How far did the Marine in the article actually walk? What is the perimeter of the US?

5. Find three objects around the room and get the perimeter of those objects. Here are some formulas to help.

square = 4a 

rectangle = 2a + 2b 

triangle = a + b + c 

circle = *2pi* r 

or circle = *pi* d (where d is the diameter)

Lesson Relevance to Performance Task and Students:
The students are currently prepping for the study and teaching of area in geometry. Perimeter is an important building block to area and needs to be discussed before the break for the holidays since the students will start area when they return in January.

Anticipatory Set/Capture Interest:
The students will be asked how wide and tall they think the state of Mississippi is, and how tall and wide they think the united states are. This will allow them to get focused as well as assess inquiry in the lesson. They will also be showing how many relative distances (size of Columbus) can fit inside Mississippi, giving the student perspective.

Officially at the start of the activity sheet this article will be shown to the studnets http://www.marines.mil/unit/basecamppendleton/Pages/News/2010/WalkAroundAmerica.aspx#.Tt0ygWNFunB

Guided Practice:
The students will be taught how to determine linear measurement on a map from the closest distance. The idea of perimeter will be taught to the student including all of the formulas found on the activity sheet, whether they use it or not. The students will be given a chance to ask questions on the formula. The students will then get started on the attached activity sheet.

Another reference to the article:
http://www.marines.mil/unit/basecamppendleton/Pages/News/2010/WalkAroundAmerica.aspx#.Tt0ygWNFunB

Independent Practice:
The students will be required to figure out linear distance and perimeters for the state and the United States. Students who advance on the subject will be allowed to see if they can determine the ratios of each map to figure out other states. The students will be asked specific measurements to see if they did the calculations wrong as well as why they think the perimeters are greater or lesser than they originally thought.

If they do not have the correct answers or cannot determine why their original guesses were off, the students did not actually learn anything. The assessment of how well they did on the worksheet will provide the teacher with specific assessment for each student at that time. Further work can be assigned if the student does not master the skill.

The students will then work through the Perimeter Activity Sheet attached with this lesson.

Remediation and/or Enrichment:
Remediation:
In situations that remediation is needed the student can see the instructor for one on one tutoring. The student can also be paired with a high performing student with full understanding of the lesson.

Enrichment/Extension:
All of these extensions depend on the students' ability and knowledge of the subject matter. The student will have the opportunity to get more specific with finding objects that do not meet the given formulas as well as figuring in the error in the measurements of the United States.

Check(s) for Understanding:
If they do not have the correct answers or cannot determine why their original guesses were off, the students did not actually learn anything. The assessment of how well they did on the worksheet will provide the teacher with specific assessment for each student at that time. Further work can be assigned if the student does not master the skill.

Closure:
The lesson will be closed in teaching the importance of perimeter in the graduate student's research. The GS will explain the correlation with the research conducted and perimeter by giving examples of its importance, such as identifying a proper Area of Interest (AOI) in aerial mapping.

Possible Alternate Subject Integrations:
This lesson can be taught in any mathematics class and prior to learning the lesson of area. It is a good way to lead into the discussion of area.

Teacher Notes:
The lesson is sustainable without the graduate student's research. The closure can be turned into reemphasizing the questions on the activity sheet.