The Ideal Town

Based on research the students will design a small town with a pre-determined population, assuring there is enough living space, parking spaces, and a sufficient water supply.

Grade Level: 9 - 11th  
Subject: Math  
Length of Time: About 2 Hours

Common Core Alignment

CCSS.MATH.CONTENT.HSG.MG.A.2 - Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

Objectives & Outcomes

The students will be able to apply concepts of density based on area and volume in creating the model of a small town with a pre-determined population.

Materials Needed

- graph paper  
- pencils  
- calculators  
- area/volume formulas  
- Internet access

Prepare ahead of time: Teacher will need to research various sizes of cities and the population per square mile, handout with directions

Procedure

Opening to Lesson

- Display several statistics related to cities throughout the country  
- Ask students to explain the differences between the various cities  
- Discuss their responses, guide students to think about what an ideal number would be for each category  
- Ask this question: What if you were able to design the perfect-sized town? What would it look like?

Body of Lesson
Modeling
- Tell students they will design a town for a pre-determined population (Decide this number in advance.)
- Distribute the handout with the directions for the model
- Tell students they must focus on four areas: density of people (number per square foot), house/land size, parking spaces for x number of cars, and what size water wells will be needed for each house, and the water tower for the town.

Guided Practice
- The students will use the Internet to research the amount of ideal space for a person, and other information to assist them in creating the “model” town.
- The students will gather all of the information to use prior to designing the town
- The students will use the graph paper to draw to the scale a diagram of their towns
- On separate graph paper the students will design an ideal home based on their research
- Students are to include homes for various sizes of families, consider sizes of space, etc.
- On another sheet of graph paper they will design a round well for water
- The students will continue working on the design until all areas of focus are covered in the small town
- Each student will write a report explaining the process involved, the difficulties, and the justification for their choices
- The students will take turns presenting their designs to their peers in one-on-one sessions

Independent Practice
- Commercial or teacher-created work sheet with numerous problems for students to solve. The teacher will collect and assess the student’s problem solving skills

Closing
Ask students to discuss which areas of focus caused them the most difficulty and how they solved the issue. Discuss with students the amount of density in large cities versus rural areas.

Assessment & Evaluation
Teacher-created or commercial worksheet with numerous problems for students to solve using basic geometry formulas including area and volume.

Modification & Differentiation
Students may work in pairs. Create 3D models to scale using craft sticks. Include other requirements such as school size and parks for children, number of streetlights needed for roads, farmland for the towns food needs, etc.
Related Lesson Plans

**Natural Disaster Planning and Equations**

For a natural disaster there are many variables to be accounted for when planning help for an area. This lesson will give students the opportunity to create a natural disaster plan for a part of their country.

**Ice Cream Cones, Baseballs, and Cans**

Students will work in pairs to practice finding the volume of cones, cylinders, and spheres using everyday objects.

**Box Geometry**

Students will learn about using the formulas for the area of squares, rectangles, and triangles to determine how much paint and carpet to purchase for a room. In addition, they will learn about scale measurements.

**Charity Begins at School**

Pairs of students will design, plan, and create an imaginary fundraiser for a charitable organization.