

Cement Columns

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Algebra/Geometry

One Class Period

Scenario:

You are a contractor who needs enough concrete to construct 10 round support columns. Each column must be 10 feet tall with diameter of 4 feet. A civil engineer has determined that each column requires 12 1-inch diameter reinforcing steel bars that extend from the top of the column to the base of the column. How many feet of 1" diameter steel reinforcements do you need for all ten columns? What is the ratio of the steel volume to the concrete volume in each column?

Objectives:

I. Algebra/Geometry Skills

- √ Students will connect geometric diagrams with algebraic representations. Students will integrate construction such as segments and angles, segment bisectors, perpendiculars, angle bisectors, parallel lines, circles, arcs, and polygons.
- √ Students will describe draw, and construct 2-dimensional and 3 dimensional figures.

II. Career Technology Skills

III. Communication Skills

IV. Problem Solving Skills

Materials:

Pipe cleaners or dowel rods, construction paper aluminum foil or wax paper, 5 pounds plaster of paris, plastic cups, mixing bowls, spoons, water

Activities:

1. Divide class in groups giving dimensions to construct 4 model columns
2. Calculate the volume of cylinders, calculate the volume of steel bars, determine ratio of volumes, and determine how many feet of 1 " diameter steel reinforcements are needed for 10 columns.
3. Write steps for solving problem.
4. Show math steps and work.

5. Construct a cylinder column made of construction paper and use pipe cleaners, dowel rods, or wire to represent steel reinforcement. Then construct a cylinder column without using any reinforcement.
6. Present calculations and exhibit models.
7. Use weights to test strength of columns with reinforcements and without reinforcements.
8. Evaluate project and peer evaluation.

Evaluation:

- √ Authentic assessment, models rubric
- √ Grade project
- √ Teacher observations
- √ Quiz
- √ Written report summarizing project from beginning to the end in sequential order
- √ Compare and contrast strength integrity of columns with and without reinforcements (materials, cost, strength, etc)

*This project courtesy of the East Ridge High School Construction Career Academy
Chattanooga, Tennessee*