



Drexel-SDP GK-12 ACTIVITY

Activity: Paper Skyscrapers

Subject Area(s) Problem solving
Associated Unit Engineering, module 3
Associated Lesson
Activity Title Paper Skyscrapers
Grade Level 6 (3-8)
Activity Dependency None
Time Required 50 minutes
Group Size 2
Expendable Cost per Group None

Summary

Students will explore the technology behind skyscrapers and towers by constructing their own paper towers. This activity is intended to be inquiry-based activity.

Engineering Connection

Ever consider how your school was actually built? How your home was built? An architect designs the building, then a civil engineer helps with the actual construction. Civil engineers choose appropriate building materials and then how to use them. Civil engineers design bridges, buildings, tunnels, highways, dams, just about any large-scale structure you can imagine requires civil engineers.

What are some issues you think a civil engineer would have to consider when choosing a building material? (load-bearing (weight), shear forces (wind), permeability (water), erosion (water, wind)).

Keywords

Engineering, buildings, skyscrapers, civil engineering

Educational Standards

Pennsylvania Standards

3.2.7 Inquiry and Design

3.2.7.B. Apply process knowledge to make and interpret observations.

3.7 Technological Devices

Pre-Requisite Knowledge

None.

Learning Objectives

- Have students explore and brainstorm design possibilities for their towers before actually constructing it – i.e. planning.
- Have students describe characteristics of successful tower design.
- Introduce the concepts of center of gravity and form and function.

Materials List

- Newspaper
- 12 inches of scotch tape
- Scissors
- Rulers

Introduction / Motivation

Ever consider how your school was actually built? How your home was built? An architect designs the building, then a civil engineer helps with the actual construction. Civil engineers choose appropriate building materials and then how to use them. Civil engineers design bridges, buildings, tunnels, highways, dams, just about any large-scale structure you can imagine requires civil engineers.

What are some issues you think a civil engineer would have to consider when choosing a building material? (load-bearing (weight), shear forces (wind), permeability (water), erosion (water, wind)).

(Students will explore the technology behind skyscrapers and towers by constructing their own paper towers. This activity is intended to be inquiry-based activity.)

Review the background material with the students, discuss the vocabulary, then begin the activity.)

Vocabulary / Definitions

Word	Definition
Civil Engineer	An engineer trained to design and construct and maintain public works (bridges, tunnels) and buildings.

Procedure

Background

This activity is designed for students to discover the technology behind skyscrapers and towers through a simple classroom activity. The center of gravity of the structures will be explored, as well as the relationship between form and function. The skyscrapers of Philadelphia and possibly the Washington monument will serve as examples during the discussion at the end of the activity

Before the Activity

Collect and distribute materials.

With the Students

Procedure:

1. Divide the students into groups of three or four.
2. Explain the rules – treat this activity as a challenge competition. The challenge is to build the tallest tower that will resist being blown over by the teacher from an arm's length away. The rules include: the students can only use the materials given to them, tape can only be used to attach paper to paper – the tower cannot be attached to the floor, paper can be measured, cut, torn, and folded in ANY way, and they are given a time limit of 20 minutes (though flexible).
3. Measure the height of the towers before the blow test.
4. Test the towers by having the teacher stand an arm's length away and blow or use a blow dryer.
5. Record observations from watching all of the towers being tested. The students should be focusing on features or characteristics of the tower that did or did not work.
6. After the tests are complete, the teacher should lead a class discussion. The following questions should be addressed:
 - a. How did the towers resist the wind?
 - b. Why was your tower successful/ unsuccessful?
 - c. How would you improve your tower design?
7. With student's input, create a list of Successful Engineering Principles for Paper Tower Design.

Safety Issues

- None.

Troubleshooting Tips

- Perform a demonstration of how the activity should be performed before turning it over to the students.

Investigating Questions

Have student groups complete the following worksheet.

Assessment

Pre-Activity Assessment

None

Activity Embedded Assessment

Have the student groups write up a report of their experience and what they would do differently next time.

Post-Activity Assessment

The students can write up a lab report based on the activity, or complete a response essay on aspects of successful paper tower design.

Activity Extensions

Turn the activity into a competition.

Owner

Drexel University GK-12 Program

Contributors

Theresa Andrejack

Copyright

Copyright 2007 Drexel University GK12 Program. Reproduction permission is granted for non-profit educational use

Version: Mar 2007