The Strongest Paper Structure

Lesson Skill/Math Concept: Teambuilding, Measuring

Academic Vocabulary:

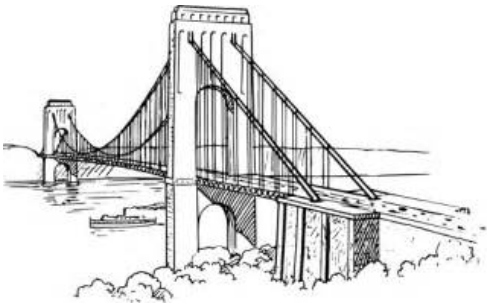
- **Structure:** The manner in which something is constructed
- **Materials:** The substance of which something is made
- **Substitution:** To put in the place of another
- **Form:** Shape
- **Engineering:** Use of science and mathematics to design a structure

Estimated Time: *30 minutes.*

Materials List

Class materials:

- 60 Sheets of paper
- transparent or masking tape
- measuring tape
- multiple copies of a common book or other "weight"



Each team: (2-3 Students)

- three pieces of 8 1/2 x 11-inch paper per student
- one foot of tape
- scissors
- pencil

Background Knowledge: Teacher can discuss forms used in engineering structures.
The strength of a building material can depend on how it is used. Pleating or rolling paper can increase its stiffness and strength. Fold a sheet of paper in three parts making a triangular column, fold another sheet in four parts making a square-shaped column, roll one sheet of paper to make a circular column. Ask students to predict which column they believe is the strongest. Use some light weight books to test the strength of all columns.

Explain that the students' challenge is to build the strongest free-standing structure they can using only three sheets of paper and the given tape.

Before they begin, they should brainstorm all the ways they can alter the paper for best strength. Getting ideas from other groups is okay; this is not a competition, but rather a chance to learn from others' discoveries.

RULES:

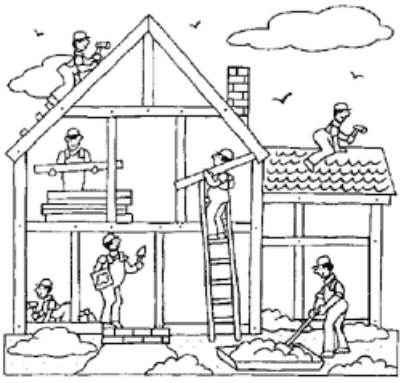
1. Each structure must be constructed from the paper and tape supplied by the teacher. No other materials or substitutions are allowed.
2. Contestants have a 30-minute period in which to construct their towers. Any modifications made to the structure after the allotted 30-minute period will disqualify it.
3. Each structure must be at least 11" tall, free-standing; it must not be attached to, or lean against any other surface (e.g. floor, wall, desk, etc.)
4. The strength of the structure will be measured by stacking books, or any other weight available, on top of it.

Extensions

1. Allow students to modify their design and build a second structure by taking the best elements from the structures presented.

2. Modify the amount of materials allowed: more sheets of paper, more tape, or not use any tape.

3. Structure must be taller than $11\frac{1}{2}$ in.



Tem Member Names

_____ _____

_____ _____

Strongest Paper Structure Worksheet

First Design

Team #	# of books
1	
2	
3	
4	
5	

Design 2

Team #	# of books
6	
7	
8	
9	
10	

Strongest Paper Structure Activity Questions

1. To what extent was your team successful in building the structure? How many books was your structure able to support?

2. What was the most difficult part of building a strong free standing structure? How did you address/solve that problem?

3. What changes did you make after beginning construction?

4. What changes would you make in building a new structure?