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- Comparing Strength of Polyhedrons (science/math, tech) . . . 180-270 minutes*
- Calculating Polyhedron Efficiency (math/tech) . . . . . 45 minutes*
- Designing and Building a Structure (tech/science, math) . . . 180-270 minutes*

*Times are estimates and will vary with class size.

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- Investigating Size and Strength (science/math, tech) . . . . . 180-270 minutes*
- Comparing Repeating Polyhedrons (math/science, tech) . . . . . 90-180 minutes*
- Building a Tall, Thin Structure (tech/math, science, LA) . . . . . 90-180 minutes*

*Times are estimates and will vary with class size.

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QuickView

Students use a set amount of resources to design and build the tallest tower in the time allocated.

Standards Addressed

NSTA 5-8
Students develop abilities for technological design.

- Students identify appropriate problems for technological design.
- Students design a solution or product.
- Students implement a proposed design.

NCTM 6-8
Students understand measurable attributes of objects and the units, systems, and processes of measurement.

- Students understand both metric and customary systems of measurement.

ITEA 6-9
Students develop an understanding of the attributes of design.

- Students learn that design is a creative planning process that leads to useful products and systems.

Students develop an understanding of engineering design.

- Students learn that design involves a set of steps, which can be performed in different sequences and repeated as needed.
- Students learn that modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions.

Students develop the abilities to apply the design process.

- Students learn to apply a design process to solve problems in and beyond the laboratory-classroom.
- Students learn to specify criteria and constraints for the design.
- Students learn to make two-dimensional and three-dimensional representations of the designed solution.
- Students learn to make a product or system and document the solution.

Students develop the abilities to assess the impact of products and systems.

- Students learn to design and use instruments to gather data.

Time Required

180-270 minutes (will vary with class size)

Content Areas

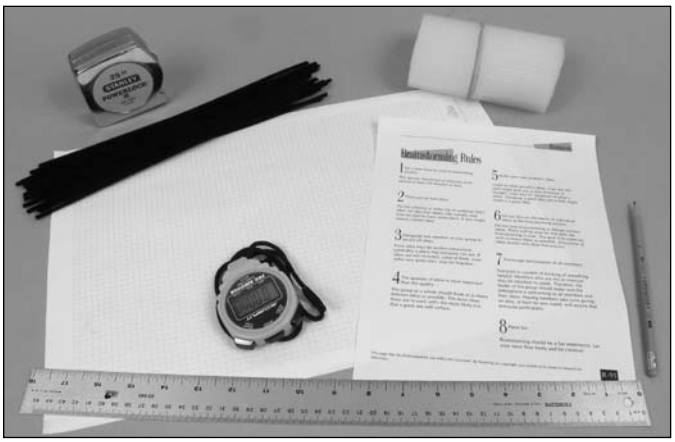
Primary: Technology
Secondary: Science, math

Vocabulary

- brainstorm
- design
- sketch

Materials

- 75 straws with 1/8-inch inside diameter
- 50 pipe cleaners
- Tape measure
- Ruler
- Grid paper
- Pencil
- Stopwatch
- "Brainstorming Rules" resource page



Procedure

1 This activity must be completed with teams of two to four students.

Groups of three or four are best to demonstrate the importance of communication.

2 Using the materials provided, your team is assigned to design and construct the tallest structure in 40 minutes or less. You must spend 20 of the 40 minutes designing the tower.

3 Read the "Brainstorming Rules" resource page. Of the 20 design minutes, spend five minutes brainstorming design ideas. Follow the rules of brainstorming. Do not finalize any design ideas during this time. This time is for the purpose of brainstorming only.

Make sure the students understand that no ideas should be rejected during the brainstorming stage.

4 After the brainstorming is complete, spend the other 15 minutes finalizing the design for the structure. Part of the design should include a sketch and description of your design. The design should be detailed enough that someone outside your team could construct the tower without your assistance.

It is best if the students do not know that they will not be allowed to speak after the design process is finished. You may want to create a copy of the student version without the last two paragraphs. If you do this, pass out the first version and then after 20 minutes pass out the final two paragraphs.

5 After the design time is concluded, you may begin constructing your tower. However, you are not allowed to talk to your teammates or write instructions during the construction process. You have 20 minutes to complete the construction of your tower.

Closely monitor the students for illegal communications.

6 After your tower is constructed, use the tape measure to measure its height.

You may choose to measure all the towers if the students are competing. A scoring rubric can be developed based on the height of the tallest structure the class produces, the effectiveness of the written design, and the teamwork displayed.

QuickView

Use a set amount of resources to design and build the tallest tower in the time allocated.

Materials

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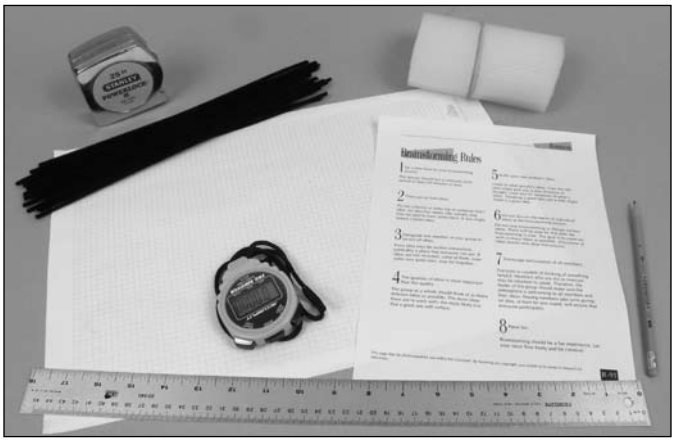
- 50 pipe cleaners
- Tape measure
- Ruler
- Grid paper
- Pencil
- Stopwatch
- "Brainstorming Rules" resource page



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5 After the design time is concluded, you may begin constructing your tower. However, you are not allowed to talk to your teammates or write instructions during the construction process. You have 20 minutes to complete the construction of your tower.

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