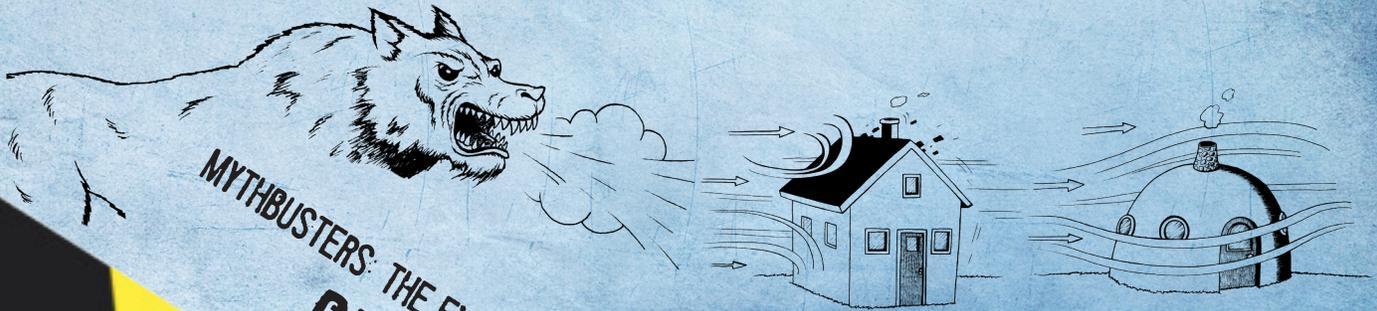


ACTIVITY #2

STABLE STRUCTURES



MYTHBUSTERS: THE EXPLOSIVE EXHIBITION COMPONENT:
BIG BAD WOLF

MYTHBUSTERS
THE EXPLOSIVE EXHIBITION.

 **Discovery**
EDUCATION

WONDER

Can you build a structure to withstand the elements? What's the strongest shape?

RESEARCH

When designing a building or structure, architects and engineers consider many factors, including all of the outside forces - the pushes and pulls that the structure may encounter. Weather and other natural forces such as earthquakes can apply stress to structures. Certain shapes, such as rectangles, circles, squares and triangles are stronger than others, depending on how these forces affect them. A shape that equally distributes a force along all of its sides is especially stable.

TEST AND DISCOVER

MATERIALS

- Toothpicks
- Mini marshmallows
- Paper plates
- Pennies, washers or some other small items to use as weights

Note – to maintain consistency, all students should use the same type of weight

SAFETY FIRST!

Stepping into the shoes of a MythBuster should not mean sacrificing your safety. Keep these guidelines in mind for each activity:

1. Read or listen carefully to all the directions before you start the experiment.
2. Use the equipment and materials only as instructed.
3. Keep your work area clean and organized.
4. Take care when using scissors, or restrict their use to adults.
5. Use plastic instead of glass wherever possible.

Special Notes: Consider student allergies when working with marshmallows.

Toothpicks and other small items may pose a choking hazard for younger children.

PROCEDURE

1. Stick the toothpicks into the marshmallow and construct some basic shapes. Can you make a cube? A pyramid?
2. Place a paper plate on top of your cube. How many weights can you add to the plate before the cube collapses? Record the number of weights on your Blueprint.
3. Poke a hole in the center of a paper plate so that you can balance it on your pyramid shape. How many weights can you add to this shape before it collapses? Record the number of weights on your Blueprint.
4. Construct additional shapes (or modify those you already tried by adding more toothpicks and marshmallows), and test them for how much weight they can hold.
5. As you test different shapes, sketch or describe the design, record how much weight each shape can hold and explain why you think it either supported the weight or failed on your Blueprint.

THINK ABOUT IT

- Which shape is strongest? Why?
- Is it better to have more or less sides to make a structure strong?
- What types of structures need to be strong? Why?
- What outside forces need to be considered when building a structure?
- What types of structures are shaped similar to the ones that you built? Why?

RESULTS

In this experiment, gravity is the primary force acting on the structures you built. With real structures however (and in the Big Bad Wolf exhibit in Mythbusters: The Explosive Exhibition), forces such as wind, weather and even earthquakes can impact the stability of a structure. Triangles are the strongest shape because any added force is evenly spread through all three sides. Look closely at your pyramid – it's made of triangles! Squares or cubes can be strengthened by adding a diagonal piece across the middle, making it two triangles linked together. Join a series of triangles together creates a truss. Look around you – trusses are used in buildings, houses and bridges.

KEEP DISCOVERING!

- Use the marshmallows and toothpicks to build different types of polygons (a shapes with straight sides that are all connected together). Which shapes are strongest?
- How can you simulate the effect of different conditions, such as wind and earthquakes, on the stability of your structures? Construct your own experiment.
- Try building with different types of materials to see how the stability changes. Use straws, paperclips, gumdrops – anything you have – to experiment.
- Challenge your family and friends to a contest! Build bridges between two tables or chairs and test them by seeing whose can hold the most weight.

WANT TO LEARN MORE?

TEACHERS - BUILD SKY-HIGH SKYSCRAPERS WITH YOUR STUDENTS!

<http://www.discoveryeducation.com/teachers/free-lesson-plans/higher-and-higher-amazing-skyscrapers.cfm>

COOL SCIENCE JOBS: ARCHITECT

<http://science.discovery.com/videos/head-rush-cool-jobs-in-science-danny-forster.html>

COOL SCIENCE JOBS: WIND SCIENTIST

<http://science.discovery.com/videos/head-rush-cool-jobs-in-science-heather-dohan.html>

WHERE DOES WIND COME FROM?

<http://player.discoveryeducation.com/index.cfm?guidAssetId=0E6453F2-01DE-4A55-B5A8-543048F61273&lnFromSearch=1&productcode=US>

TEACHERS – CHECK OUT THIS LESSON PLAN ON WITHSTANDING ANOTHER POWERFUL FORCE – EARTHQUAKES!

<http://www.discoveryeducation.com/teachers/free-lesson-plans/constructing-earthquake-proof-buildings.cfm>

NATIONAL SCIENCE EDUCATION STANDARDS

- Grades 5-8, Standard A: Abilities necessary to do scientific inquiry
- Grades 5-8, Standard A: Understandings about scientific inquiry
- Grades 5-8, Standard B: Motions and forces
- Grades 5-8, Standard E: Abilities of technological design
- Grades 5-8, Standard E: Understanding about science and technology
- Grades 5-8, Standard F: Natural hazards
- Grades 5-8, Standard F: Risks and Benefits
- Grades 5-8, Standard F: Science and technology in society
- Grades 5-8, Standard G: Science as a human endeavor
- Grades 5-8, Standard G: Nature of science

This guide has been developed for use by educators, group leaders and families for use in connection with "Mythbusters: The Explosive Exhibition" (the "Educators"). The activities described in this guide are potentially dangerous and could result in injury or damage. This guide is provided on an "AS IS" basis and the Museum of Science and Industry disclaims all warranties, express or implied, regarding the guide. Use of this guide is done at the risk of the Educators. By using this guide, you release the Museum of Science and Industry, its officers, employees, directors, trustees, agents and volunteers from and against any and all liability, claims, actions, costs, expenses, damages, attorney fees, breach of contract actions and all causes of actions whatsoever, that you may now have or may acquire in the future, arising out of or relating to any loss, damage or injury that may be sustained by you, the people you are educating, or to any property belonging to you or the people you are educating, as a result of the use of the guide.



Geoffrey M. Curley + Associates, LLC
Exhibition and Theatrical Consultation and Design



TRIAL 1

SKETCH OR DESCRIBE YOUR STRUCTURE.

HOW MUCH WEIGHT DID IT HOLD?

WHY DO YOU THINK YOUR STRUCTURE
SUPPORTED THE WEIGHT OR COLLAPSED?

**BLUEPRINT:
STABLE STRUCTURES**



MYTHBUSTERS
THE EXPLOSIVE EXHIBITION

TRIAL 2

SKETCH OR DESCRIBE YOUR STRUCTURE.

HOW MUCH WEIGHT DID IT HOLD?

WHY DO YOU THINK YOUR STRUCTURE
SUPPORTED THE WEIGHT OR COLLAPSED?

**BLUEPRINT:
STABLE STRUCTURES**



MYTHBUSTERS
THE EXPLOSIVE EXHIBITION

TRIAL 3

SKETCH OR DESCRIBE YOUR STRUCTURE.

HOW MUCH WEIGHT DID IT HOLD?

WHY DO YOU THINK YOUR STRUCTURE
SUPPORTED THE WEIGHT OR COLLAPSED?

**BLUEPRINT:
STABLE STRUCTURES**



MYTHBUSTERS
THE EXPLOSIVE EXHIBITION