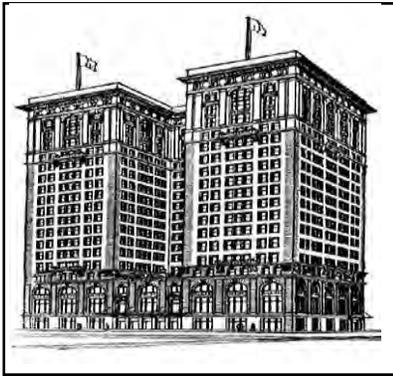




# inquiry Lab

TEACHER ENRICHMENT RESOURCE PACKET



## Structural Engineering

*Our world is made up of many different structures. All kinds of scientists are involved in the creation of these structures. Explore concepts about structure strength, stability and emergent properties of materials as they change shape.*

Learning Objectives:

- Learn about different types of structures and the different materials used to construct them.
- Explore how the combination of shapes and materials affects the strength of a structure.
- Practice teamwork skills in collaborating on building projects.

Think it.  
Try it.  
Explorit.

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Thank you for choosing Explorit Science Center's *Inquiry Lab* program to supplement your ongoing science curriculum. Whether you use the program to kick off a new unit, wrap up a nearly completed unit, or purely to excite and interest your students in the wonderful world of science, advance preparation and follow up with your students are critical to achieving the greatest educational benefit from this unique science experience.

Explorit provides two resources to help prepare you and your students for the *Inquiry Lab*. First, simple logistics of the program are detailed in the confirmation letter. Second, this Teacher Enrichment Resource Packet outlines appropriate science content and processes to help you:

- successfully prepare your students prior to visiting Explorit;
- participate fully in the *Inquiry Lab* yourself; and
- follow-up with your students back in the classroom.

## Background Information

### "Structural Engineering"

Structures are all around us. Humans have been building different structures for a variety of purposes throughout history. The Pyramids at Giza in Egypt, the Parthenon in Greece, and the Great Wall of China are famous examples of ancient structures that civilizations used for very different reasons. Highways, factories, and houses are contemporary structures that we depend on today. Some structures, like the Eiffel Tower in Paris or the Space Needle in Seattle, are best known for their artistic appeal. The Golden Gate Bridge in San Francisco is a structure that is prized for its beauty as well as its function. From a row of corn silos on a farm to a cityscape of skyscrapers and bridges, life as most of us know it is dependent on a variety of structures.

A finished structure is the result of the collaboration of many types of scientists. Social scientists help to determine the need for a type of structure in a community. Engineers work to design the structure itself, drawing on knowledge of physics and geology to ensure that the structure will be sound in the environment in which it is to be built. Biology and chemistry are also involved in the acquisition and creation of the materials necessary to build the structure.

Scientists continue to work together to design new technologies for structures that we can all benefit from. Understanding properties of earthquakes allows structural engineers to construct safer buildings. The development of new lightweight materials allows for easier portability and set-up of tents used for camping and outdoor events. "Green" materials and building designs are increasingly becoming more popular with the growing awareness of our effect on the world around us. Scientists will continue to improve the quality of life with their creation of new structures.



## Classroom Activity #1

### ACTIVITY #1 Groundshaking & Structures

Background: The materials used in building a structure and the shapes they are built into are key factors in determining a building's strength.

Materials: Building blocks, craft sticks, cardboard pieces, a table.

Instructions: Students will construct a structure out of the available materials. Can their structures withstand an earthquake simulated by shaking the table?

Follow up: Have students brainstorm materials, shapes, and other factors that would make a building less (or more) susceptible to earthquake damage.

### ACTIVITY #2 Wind & Structures

Background: Challenge students to construct a house that will prevent their feather from blowing away.

Materials: Desk fans of varying speeds, building blocks, craft sticks, cardboard pieces, feathers.

Follow up: Have students brainstorm what other weather phenomena structural engineers must consider when designing structures. How do structures found in different climates reflect these weather patterns?

### ACTIVITY #3 Structure Scavenger Hunt

Background: How many structures can you identify in the world around you? What are the different materials used to make these structures? What shapes are most common and why?

Materials: Paper, pencils.

Follow up: Discuss with students the different uses of the structures they identify. Challenge them to think of alternative structures. Would they have built something differently?

Information written and compiled by Jessica Younker, Education Specialist, and Explorit Science Center Staff.



## Classroom Activity #2

## Classroom Activity #3

## Science Standards

### CA STANDARDS

Physical Science (K-1a; 2-1ae; 4-1ag)

Investigation and Experimentation (K-4bcde; 1-4abd; 2-4acg; 3-5bde; 4-6abcd; 5-6bh; 6-7ae)

### NATIONAL STANDARDS

K-4: A, B, E, G; 5-8: A.

## Explorit Programs for Schools and Groups

### At Explorit's Sites

#### **Discovery Lessons & Inquiry Labs** **Nature Safaris & Labs**

Visit one or more of the Changing Exhibitions throughout the year  
Fall and Spring visits to Explorit's outdoor spaces at Mace Ranch Park

### Explorit in Your Classroom

**Classroom Adventures** Science Investigations for Grades K-6  
**Young Scientist Series** Science investigations through multiple visits

### For the Whole School

**Health in Your World** Learn about keeping your body and the world healthy and safe  
**Science in Your World** The ultimate family science night  
**Science Assembly** A multi-media presentation for the whole school

**Reservations required.**  
**For information please call**  
**530.756.0191**

#### HOW TO CONTACT US



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