STRUCTURE AND FUNCTION—PRE-VISIT MATERIALS

Thank you for scheduling a field trip with the Long Island Children's Museum! To help you get the most out of your visit, we have created pre-and post-visit activities for you to do with your class. The pre-visit activities are designed to prepare and excite your students about the field trip, and to spur them to ask questions. After your visit to the museum, the post-visit activities (separate downloadable file) will help you to reinforce the concepts that the children explored while they were here.

School visit theme: Structure and Function

Appropriate for grades: K- 6th

Exhibits: Bubbles, Changes and Challenges, Bricks and Sticks, and It's Alive!

Learning standards addressed:
Math, Science, Technology: 1, 3, 4, 5, 6
Health/Family Sciences: 1, 2
English Language Arts: 1, 2
Social Studies: 3

Pre-Visit Discussion Suggestions:
Begin with a class discussion about what students know and think about museums: What are museums? What is their purpose? How many different kinds of museums are there (Art, science, children's, history, culture)? Which museums have your visited? How are you supposed to act in a museum? How is a hands-on (children's museum, science center) museum different from other types of museums? This talk will help students begin to think about their trip and prepare for what they'll be doing in the museum. Remind students that in a children's museum, they will get to touch, try and explore with their senses.

Pre-Visit Activities

1). Index Card Bridges

Activity goal: Children will experiment with different ways to create a bridge to see how much weight different structures made of the same material can hold.

Activity time: 30-45 minutes

Materials:
For each team of 2-4 students:
Four large books (old text books work well)
4-6 index cards
300-600 pennies per team (Ask kids to bring in their penny rolls)

Procedure:
Pass out the materials, leaving the majority of the pennies rolled (they may need to break one or two of the rolls to test out their theories). Have students make two stacks of books, about four inches apart. These stacks should be the same height. Lay one file card over the gap between the books. About ½ inch of the card should be resting at each end. How many pennies do they think the 'bridge' will hold before it falls into the gap? Have students record their hypotheses and then test out their theories. How close were the guesses?
Now ask students what they might do to make their 'bridges' stronger – without adding anything to the card. How could you change it to make it stiffer? What happens if you fold it in half? If you create an arch? What if they fold it back and forth into pleats like a fan? What if you make a rectangular 'beam'?

Let kids explore different bridge building techniques, folding or changing their cards to see what works best for their team. Ask them to record what they did to the card, and how many pennies each bridge held.

Have all of the teams compare their findings, and see what design held the most pennies. Discuss why the students think that one design works better than another.

Background
A flat bridge is called a **beam span** bridge – it relies on the stiffness of the material that's been used for the bridge to hold it up. A log that crosses over a stream is a beam span bridge. An **arch span** bridge uses the strength of an arch (much stronger than a flat piece of material) to hold up more weight. Though you can't make it with a file card, a **suspension span** bridge relies on cable or rope to hold up the bridge, and is typically stronger than both beam and arch bridges. The Golden Gate Bridge in San Francisco is a suspension bridge.

Vocabulary:
Beam span
Arch span
Suspension span

Extensions: Encourage children to test different bridges in the *Bricks and Sticks* gallery when you visit LICM. Can they make a beam span or an arch span bridge?

2). The Power of Soap

Activity goal: Students will explore the phenomenon of surface tension by powering a 'boat' with soap.

Activity time: 15 – 20 minutes

Materials:
For each team of two students:
One index card
Scissors
A shallow baking dish or container that is at least 6 inches long, with about 1 inch of water in it.
Liquid dish detergent

Procedure:
Ask students to draw and cut a boat shape like the one in the picture, making sure to add the notch in the back of the boat. Each boat should be about 3 inches long and two inches wide.
Place the boat gently in the water at one end of the dish. Now carefully pour a little of the detergent into the notch at the end of the boat.
What happens?
The boat should move across the water like it was pushed. Water **molecules** like to stick close together – especially at the surface where air is pushing down on it. This creates a "skin" on top of the water that we call **surface tension**. The soap breaks the bonds and the surface tension breaks with them – making the boat go forward.

Vocabulary:
Surface tension
Molecule

Extensions: While you're on your LICM trip, ask students if they can put their hand through a bubble without breaking it! This can be accomplished (shhh!) by getting the hand all covered in bubble solution. When a wet hand passes through a bubble, it won't dry it out and break the surface tension!

Resources:

Books:
Twizzlers, Shapes and Patterns by Jerry Pallotta. Available from Amazon.com for $5.99
Building Big by David Macaulay. Available from Amazon.com for $20.40
Everyday Structures from A to Z by Robbie Kalman. Available from Amazon.com for $7.95

Websites (for teachers):
http://www.exploratorium.edu/ronh/bubbles/bubbles.html
http://www.bubbles.org
http://www.geocities.com/bwhendrickson/history.html