BRICK by BRICK

LEGO Certified Professional

Adam Reed Tucker

TEACHER RESOURCE PACKET

museum of science+industry chicago

ABOUT *BRICK BY BRICK*

This exhibit, developed and created by the Museum of Science and Industry, explores the power of play as a gateway to building engineering marvels. *Brick by Brick* features more than a dozen giant LEGO®-built structures constructed by LEGO Certified Professional and Chicago native Adam Reed Tucker, including a 60-foot-long Golden Gate Bridge, the International Space Station, Hoover Dam and Roman Colosseum.

These cool constructions are paired with hands-on building challenges that reinforce principles of engineering, construction and architecture—and encourage creativity. Test your building skills at an interactive seismic table, design buildings to withstand earthquakes and wind forces, and walk across I-beams in a compellingly real-to-life high-rise construction site. Science and engineering go hand-in-hand with boundless creativity, powered by the accessible and universal LEGO brick. Come away feeling fired-up about your own abilities, and the possibilities the future holds.

EXHIBIT EXPERIENCES AND IDEAS

Guests visiting *Brick by Brick* can:

- Discover and play with the hidden forces all builders use.
- Build anything you can imagine, in a variety of materials.
- Harness technology to predict and protect against the forces of nature: gravity, wind and seismic events.
- Build your own custom LEGO creation and see it magnified on a giant screen.
- Get your hands on physical interactives about tension, compression, torsion and other forces. Share and test your ideas for making things stronger.
- Build and share your visions of the great cities of the future.
- Sweep through time-lapse visions of great architectural creations: both real and LEGO-based.

The central ideas of *Brick by Brick* are:

- The LEGO brick is the perfect tool for exploring the ideas of architecture and engineering, using your hands and your imagination together.
- *Brick by Brick* is a hands-on experience that will allow you to explore the ideas and principles of architecture and engineering with the LEGO brick.
- Get a feeling for the built environment by building it yourself—and then share your ideas with the world.

NEXT GENERATION SCIENCE STANDARDS

Brick by Brick is aligned with the following Next Generation Science Standards.

Science and Engineering Practices:

- Asking questions and defining problems
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations and designing solutions
- Obtaining, evaluating and communicating information

Crosscutting Concepts:

- Patterns
- Cause and effect
- Scale, proportion and quantity
- Structure and function

Disciplinary Core Ideas:

- PS3: Energy
- ETS1: Engineering design
- ETS 2: Links among engineering, technology, science and society

CLASSROOM LESSONS

To enhance a *Brick by Brick* field trip, teachers can use free classroom lessons before and after their visit.

Architectural Design
Explore architectural design and act as architects to create a floor plan of a redesigned classroom.

Forces
Explore the various forces at work in a structure. What kinds of forces act upon a building? How can we demonstrate these forces?

Newspaper Tent
Become an engineer as you build a tent from newspapers and learn what shapes make structures strong.

Straw Bridges
Work in engineering teams to design, build and test model bridges and determine how shapes affect the strength of structures.

Dynamic Skyscrapers
Design, build and test model skyscrapers as you learn about forces that affect real skyscrapers.

In addition, the ***Brick by Brick* Structure and Function Exploration Guide** lesson focuses your field trip visit. Students use a worksheet to record their observations and experiences in the exhibit then complete a follow-up

BRICK BY BRICK ADDITIONAL RESOURCES

WEBSITES

Architecture: It's elementary
http://www.k5architecture.org/

ArchKIDtecture: Architecture for children
http://archkidecture.org/

Building Big
http://www.pbs.org/wgbh/buildingbig/

Discover Design
http://www.discoverdesign.org/

Engineering is Elementary
http://www.mos.org/eie/index.php

Future City Competition
http://www.futurecity.org

Marvels of Inca Engineering
http://www.pbs.org/wgbh/nova/ancient/wright-inca-engineering.html

Math-Kitecture
http://www.math-kitecture.com

Skyscraper Center
http://www.skyscrapercenter.com/

Teach Engineering
https://www.teachengineering.org/index.php

BOOKS

The Art of Construction: Projects and Principals for Beginning Engineers and Architects
Mario Salvadori

Building Big Companion Book
David Macaulay

Career Ideas for Teens in Architecture and Construction
Diane Lindsey Reeves

Frank Lloyd Wright for Kids: His Life and Ideas, 21 Activities
Kathleen Thorne-Thomsen

Joe and the Skyscraper: The Empire State Building in New York City (Adventures in Architecture)
Dietrich Neumann

The Little Skyscraper
Scott Santoro

Skyscrapers! Super Structures to Design and Build
Carol A. Johmann