Structures

Big Science Little Hands II: Community Connections

Together, the Nanaimo Science and Sustainability Society (NS3) and Science World BC worked with Early Childhood Educators to complement the original *Big Science for Little Hands* activity book, with additional hands-on science resource materials. Our goal is to make science fun, hands-on, accessible to educators and to provide examples on how to link science concepts to the local community. We hope that these resource materials complement what you are already doing and offer additional ideas for making local connections.

The activities described in this book were designed with the help of nine Early Childhood Educators on Vancouver Island. Activities were tested at 54 pilot programs with 484 young children.

Support for program development was provided by the Vancouver Foundation, Woodgrove Chrysler, Nanaimo Insurance Brokers and VMAC.

Special thanks to Lorna McCrae, Barb Mjolsness, Jen Borzel, Sheila Grieve, Shawna Hassard, Odette Herr, Chris Peters, Melissa Burke, Corinne Dunn, Carly Foster, Becky Manson and the staff at Ladysmith Friends and Family, for allowing the NS3 to test 54 pilot programs at their early childhood education centres and gather student feedback! Their participation was invaluable!

For more ideas and activities check out scienceworld.ca/bslh

Introductions—Introduction activities are low-preparation, low-mess activities that can set the stage for the topic to be explored and work well for large groups.

Explorations—Explorations are an opportunity to discover, explore and get little hands dirty. Explorations involve open-ended activities that are appropriate for smaller groups and have questions associated with them for enhanced learning.

Make This—Children take their experiences home for further exploration, with this make-and-take activity.

Community Connections—Connect your explorations to the environment around you! Community Connections provide guides on how to connect these activities to the world around you.

All Together—This group activity makes a great wrap up to your topic of exploration.

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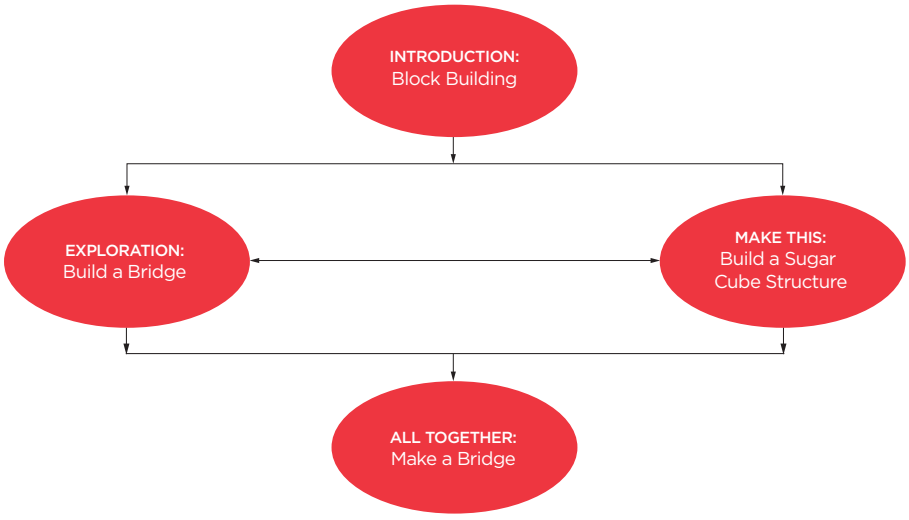
A path through Structures

Here's one possible way to put the activities in this resource together:

- Do an *Introduction* at circle time in a large group.
- Have the children try out the *Explorations* and *Make This* in smaller groups at stations around the room.
- Try *All Together* just before the end of the school day, or at the end of a few days on the topic.



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Big Science for Little Hands supports the learning goals outlined in the British Columbia Early Learning Framework, particularly those in the area of Exploration and Creativity.

To promote exploration and creativity, adults provide an environment where young children can do the following:

- Explore the world using their bodies and all their senses
- Build, create and design using different materials and techniques
- Actively explore, think and reason
- Identify and try possible solutions to problems in meaningful contexts and situations
- Be creative and expressive in various ways
- Develop a sense of wonder for natural environments
- Express a zest for living and learning.

(BC Early Learning Framework: bced.gov.bc.ca/early_learning/)

Share with us!

Help us to improve Big Science for Little Hands by submitting feedback:
scienceworld.ca/bslh/feedback

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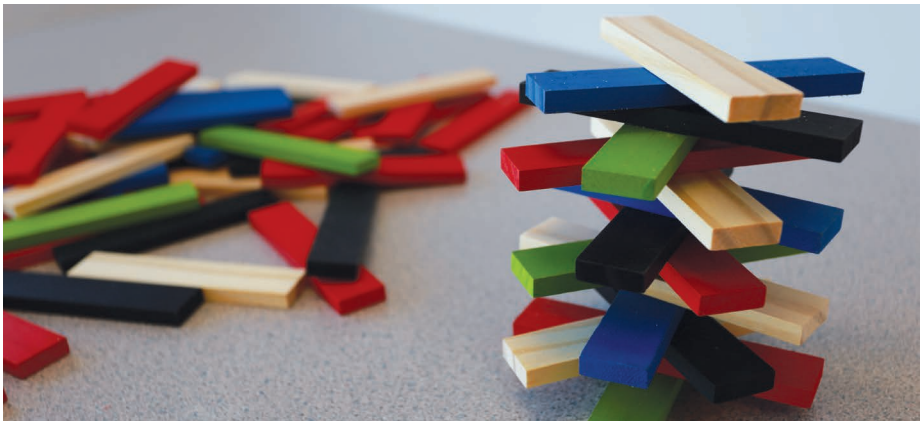

Block Building

A structure is something that stands up by itself and has a defined shape. A rope isn't a structure (although it could be part of a structure). A tower of blocks is a structure. Create block structures to explore what makes them strong and stable.

What you need

- Wooden blocks

Hands on

1. Take two blocks and see how many different ways you can stack them.
2. Try using different sides of the blocks to stack.
3. Use 3–5 blocks to make a variety of structures. Check their stability by blowing on them gently or poking them.
4. With a partner, use many blocks to create a larger structure. Check its stability.

Questions to ask

1. Which way was the easiest for stacking? Why?
2. Which structures are more stable? Why do some structures fall?
3. Does a big structure fall more easily than a small structure?
4. How can you make a large structure more stable?

Where to next?

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What's next?

- Draw the structure that you built.
- Build a structure that can support a book or small toy.
- Use sponges instead of blocks. Cut them in a variety of sizes and use them wet and dry.
- Build a structure with cut pool noodles.
- Use cereal boxes and duct tape to make a very large structure. Challenge children, by asking them to create a plan of their structure beforehand.

Community connections: Bring in photos of buildings in your community. Look at the different types of shapes, supports and building materials. Visit a building supply store for a tour of building materials and discover what they are used for.

Vocabulary: structure, stable, support, balance

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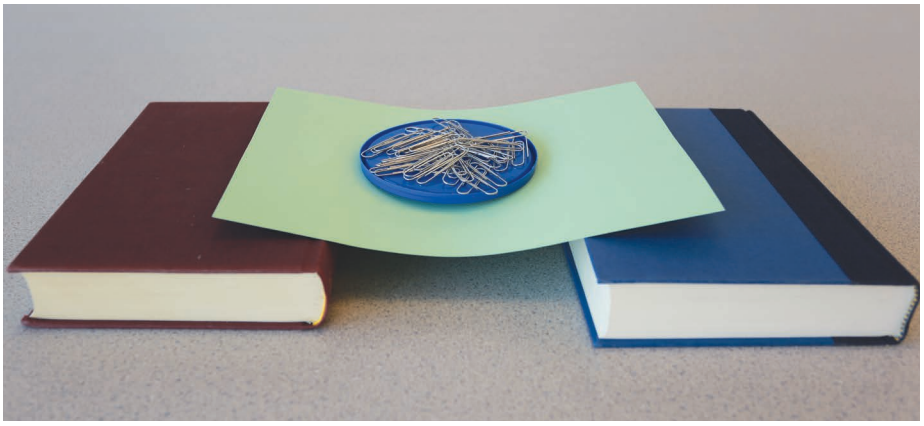

Build a Bridge

Demonstrate the strength of an arch by comparing two bridge structures.

What you need

- 2 heavy books of the same thickness (or two identical heavy boxes)
- Cardstock (approximately the size of the book)
- Plastic lid from a jar
- Paperclips

Hands on

1. Place two books about 15cm apart.
2. Put the cardstock across the gap between the books to create a bridge.
3. Put the lid in the middle of the bridge on top of the cardstock.
4. Add paperclips to the lid. Count how many paperclips you added before the bridge began to sag. Try other small objects to test the stability.
5. Make the second bridge by bending the paper and wedging it between the books to create an arch.
6. Place the lid back on top of the bridge and continue adding paperclips until it starts to collapse.
7. Compare the number of paperclips added to each bridge.

Where to next?

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EXPLORATION
Build a Bridge

MAKE THIS
Build a Sugar Cube Structure

ALL TOGETHER
Make a Bridge

MORE IDEAS

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Questions to ask

1. Which bridge do you think will be stronger? Why?
2. Was your prediction correct? Why? Why not?

What's next?

- Use different thicknesses of paper to build a bridge (e.g. tissue paper, newspaper and cardboard).
- Create a graphic representation of how much weight each bridge can hold.
- Share images of different bridges, such as the bridges painted by Monet. Use these bridges as inspiration for an art extension.

Community connections: Find a bridge in your area. What shapes do you see in the bridge? How is it supported? Take a walk over a bridge and look at the parts. Draw what you saw, when you return home.

Vocabulary: bridge, support, arch, strong, weak, collapse, balance

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Build a Sugar Cube Structure

Test to see if the stickiness of damp sugar cubes can help build a larger tower than if the cubes were dry.

What you need

- White or brown sugar cubes
- Paper plate
- Water
- Cotton swabs

Hands on

1. Place a paper plate on the table.
2. Gather your sugar cubes.
3. Make a tower.
4. Build a second tower, but while building add water to each cube with the cotton swabs.
5. Test each tower to see which is stronger.

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Questions to ask

1. Why is one tower stronger than the other?

What's next?

- Think of other edible items you could build with, such as marshmallows or candies. Before you build, predict how stable you think your building will be.
- Read the story of *The Three Little Pigs* together.
- Can you build a house using sticks (pretzels) and bricks (graham crackers)? Which will stand the best and longest? Experiment with royal icing (wilton.com/recipe/Royal-Icing) or other edible "glue" to hold your house together.

Vocabulary: sticky, adhere, dissolve

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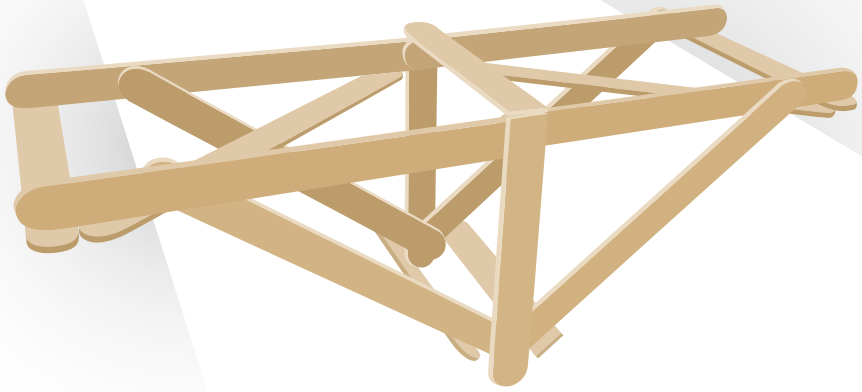


Make a Bridge

Using a couple of bridges built by an adult, make and test predictions about which is stronger.

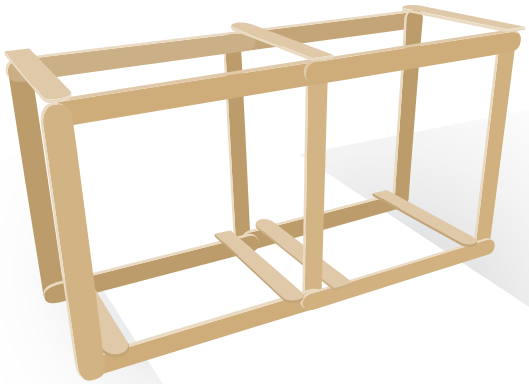
Hint: This activity is appropriate for 4–6 year olds.

What you need

- Popsicle sticks or tongue depressors
- Wood glue or regular white glue
- Recycled cardboard or cardstock to build on
- Washers, coins or nuts and bolts to use as weights
- Paper cup (or plastic/Styrofoam™)
- String
- Nail or scissor

Preparation

1. Using the diagrams as guides, build at least 2 different bridges.
2. Use a nail or scissors to poke two holes into opposite sides of the cup, near the top.
3. Thread the string through the holes and then tie onto the bridge so that the cup hangs beneath the bridge.



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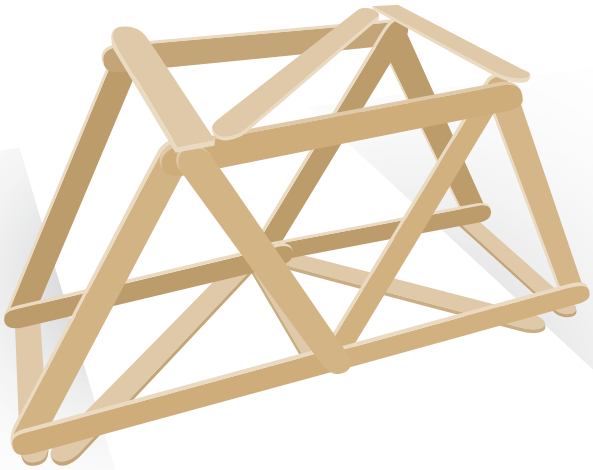
Structures
All Together



Hands on

1. Put equally weighted items in each of the 2 cups.
2. Keep adding items until the bridges collapse.

Questions to ask

1. Which bridge do you think is the strongest? Why?
2. Was your prediction correct? Why? Why not?

What's next?

- Older children may enjoy making their own popsicle stick bridges.

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Structures
More Ideas

Teacher Resources

- *Let's Build!* by Jane Chapman
- *Let's Build a Playground* by Michael Rosen
- *Let's Build a Clubhouse* by Marilyn Singer
- *Let's Build a House* by Mick Manning
- *The Three Little Pigs: An Architectural Tale* by Steven Guarnaccia
- *Iggy Peck, Architect* by Andrea Beaty
- *Roberto: the Insect Architect* by Nina Laden
- *Wendel's Workshop* by Chris Riddell
- *Look at that Building! A First Book of Structures* by Scot Ritchie
- *Building Structures with Young Children* by Ingrid Chalufour and Karen Worth
- *Block Book (3rd Ed)* by Elisabeth S. Hirsch
- *Block Play (Pb)* by Sharon MacDonald and Katheryn Davis

Literature for Children

- *When I Build with Blocks* by Niki Alling
- *The Three Little Pigs*
- *Bob the Builder*

Online Resources

- Make homes for a variety of garden bugs with instructions and video of children explaining the activity at *Peep and the Big Wide World*, "Making Homes for Creatures" (peepandthebigwideworld.com/en/parents/activities/57/making-homes-for-creatures/).
- Instructions for an one-hour activity on bridges and towers from *Peep and the Big Wide World*. Find under "Exploring Structures." (peepandthebigwideworld.com/en/educators/event-kit/).
- Animated Bob the Builder game where children go through 5 steps to build a playground (bobthebuilder.com/ca/english/projects_playground.asp).
- There are multiple interactive building games from PBS Kids such as:
  - pbskids.org/thomasandfriends/games/track-builder/
  - pbskids.org/rogers/buildANeighborhood.html
  - pbskids.org/caillou/immersivegames/?gameID=2

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See What I Built Today

Tune: *Mary Had a Little Lamb*

I just love to hammer wood,
Hammer wood, hammer wood,
I just love to hammer wood,
See what I built today!

I just love to saw the wood,
Saw the wood, saw the wood,
I just love to saw the wood,
See what I built today!

I just love to sand the wood,
Sand the wood, sand the wood,
I just love to sand the wood,
See what I built today!

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