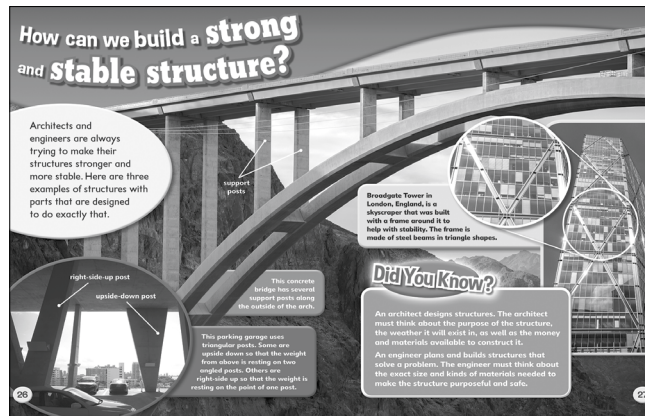


Design Challenge: Build a Structure



Focus: Students use the design process to build a strong and stable structure.

Specific Curriculum Outcomes

Students will be expected to:

- 29.0 identify materials and suggest a plan for how they will be used [GCO 2]
- 30.0 respond to the ideas and actions of others and acknowledge their ideas and contributions [GCO 2]
- 31.0 estimate measurements [GCO 2]
- 32.0 follow safety procedures and rules [GCO 2]

Performance Indicators

Students who achieve these outcomes will be able to:

- use the design process
- use a variety of sources for ideas
- acknowledge and respond to other people's ideas
- estimate measurements
- build a structure that will satisfy a set of given criteria

NOTES:

Attitude Outcome Statements

Encourage students to:

- show concern for their safety and that of others in carrying out activities and using materials [GCO 4]
- appreciate the importance of accuracy [GCO 4]

Cross-Curricular Connections

Math

It is expected that students will:

- demonstrate an understanding of measuring length (cm, m) by estimating length, using referents [3SS3]

English Language Arts

Students will be expected to:

- interpret, select, and combine information using a variety of strategies, resources, and technologies [GCO 5]

Getting Organized

Components	Materials	Before You Begin	Vocabulary
• Student Magazine pages 26–27 • IWB Activity 8 • <i>What Is the Design Process?</i> poster • BLM <i>Isometric Grid Paper</i>	• students' Science Journals • various building materials (e.g., cardboard boxes, paper towel rolls, newspaper, construction paper, card stock, chicken wire, fabric, plastic tubs) • various fasteners (e.g., different kinds of glue, different kinds of tape, staples, twist ties, pipe cleaners, string, modelling clay, brass fasteners, Velcro, elastic bands) • various tools (e.g., hand-held fans, scissors, hole-punches, staplers, glue guns, utility knives) • aprons and goggles for all students (optional)	• Ensure that the Reading Centre is stocked with several books about materials and structures. You may wish to cue tablets or computers to approved Websites showing various designs.	• design • construct

Safety

- You may choose to have students wear aprons and goggles while they are working with materials and tools.

Science Background

- Structural design criteria usually focus on the ability of a structure to support a certain load, withstand a certain amount of vibration, and withstand wind up to a certain speed.

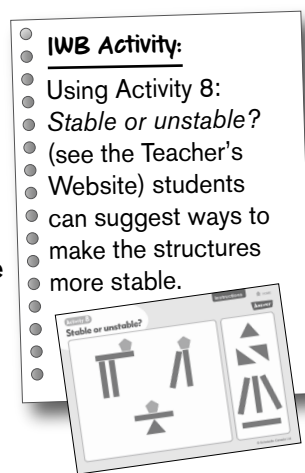
ACTIVATE



Adding Strength and Stability

Give students time to read the text and examine the images on pages 26–27 of the Student Magazine. Discuss the different methods used to ensure that these structures were strong and stable. Prompts for discussion might include:

- What functions do different parts of the structure have?
- Which shapes and forms are providing strength and stability to the structure?
- Are the materials used suited to the purpose of the structure?



CONNECT

Build a Structure

Tell students that they are going to design and construct their own structure. It can be a bridge, a tower, a skyscraper, a castle, a piece of furniture, or whatever else they can think of including structures related to the local Indigenous culture or an Indigenous culture elsewhere in the province. The challenge is that their structure must also be strong and stable. Ask students how they will determine if their structures are strong and stable then allow them time to set specific criteria for their structure (e.g., their structure will hold a certain load, or remain stable when shaken a certain number of times, etc.).

Display the *What Is the Design Process?* poster and review the steps with students. You can also use this time to review safety procedures for working with various tools.

Step 1: Identify a problem. Think of a solution. Make a plan.

Have students form small groups and begin the design process. Give groups time to brainstorm and discuss their design and to gather information and ideas. Sources could include books from the Reading Centre or elsewhere in the classroom, as well as approved Websites. Students should use their Science Journals to make notes (e.g., noting the problems they must solve with their design, listing the materials they will need). Emphasize the need for students to listen to and acknowledge every group member's ideas and contributions. Once each group has decided on a design, ask them to sketch their structure in their Science Journals.



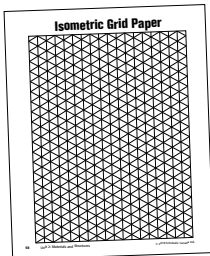
CONSOLIDATE

Build a Structure (continued)

Step 2: Gather materials. Build your solution.

Groups can now decide on the materials, fasteners, and tools they will need to build their structure. They can estimate the measurements of their structure to determine how much of each material and how many fasteners they will need. They can then gather the items from a central location, trying to take only the amounts they need. Materials may include cardboard boxes, paper towel rolls, newspaper, construction paper, card stock, chicken wire, fabric, and plastic tubs. Fasteners may include different kinds of glue, different kinds of tape, staples, twist ties, pipe cleaners, string, modelling clay, brass fasteners, Velcro, and elastic bands. Tools may include hand-held fans, scissors, hole-punches, staplers, glue guns, and utility knives. As each group gathers the tools it will need, encourage students to repeat any safety rules associated with the tools. Give students time to build the first version of their structure.

EXPLORE MORE



Isometric Sketches

If possible, have students watch the Isometric Sketching video at <http://pbskids.org/designsquad/video/what-isometric-sketching/>. Provide students with copies of BLM *Isometric Grid Paper* and have them do their best to make an isometric sketch (a 3-D drawing) of their designed structure.

Isometric Grid Paper

