Grade 2 Design Challenge Quick Guide: Design a Bridge– Cycle 2

Lesson Objective(s): Students will design a bridge to demonstrate how combining materials can do things they cannot do by themselves.

Materials:

For teams of 2-3 students

- Book in English, *Three Billy Goats Gruff* by Paul Gadone o
- Book in Spanish, *Los Tres Chivitos Gruff* by Mary Finch
- Building blocks for abutments
- A pretend "river," blue paper is suggested
- Cups are suggested to represent boats
- Centimeter cubes to make billy goat representations
- Index cards for bridge building material (5"x8" index cards suggested)
- 1 meter of masking tape per team
- 21 Century Skills rubric for project grading

- Handouts
  - "Bridge"
  - "Math Connection Pictograph"

- Website
  - http://www.pbs.org/wgbh/buildingbig/bridge/index.html

- Optional Materials
  - fan for "hurricane"
  - art materials for making creative billy goats
  - string, books, and ruler
  - design logs to record written reflections

TEKS:

Science

SCI.2.5C Demonstrate that things can be done to materials to change their physical properties such as cutting, folding, sanding, and melting.

*****SCI 2.5D Combine materials that when put together can do things that they cannot do by themselves such as building a tower or a bridge and justify the selection of those materials based on their physical properties.

Math

MATH.2.4D Generate and solve problem situations for a given mathematical number sentence involving addition and subtraction of whole numbers within 1,000.

MATH 2.10B Organize a collection of data with up to four categories using pictographs and bar graphs with intervals of one or more.

ELPS	CCRS Science	CCRS Math	CCRS Cross-Disciplinary
C1A, C1E	5C1F, 8A5	2D1, 10A2	1C1A, 1E2C

Engineering Design Loop: *For more details, refer to the overview page.*

Identify the Need: Teams of students will be challenged to design a bridge.

Research the Problem: Teams will conduct research on bridges using kid-friendly websites, handouts, and modeling exercises.

Develop Possible Solutions: Teams will use their research to decide on two possible bridge designs.

Select the Most Promising Solution: Teams will decide which one of their bridge designs to build and use for testing.

Construct a Prototype: Teams will build their final bridge according to their established procedures.

Test & Evaluate (Math Connection): Teams will collect and record data to test their design.

Communicate their Design: Teams will share their bridge design and details of their design process in a presentation.

Math Connection: Teams will use their bridge data to write and solve problems, and complete a graphing activity.

Redesign: Teams will generate ideas of design changes to improve their bridges.