Notes for Teachers:

Grade 3 Virtual Program - Shapes and Structures

In this virtual, pre-recorded program, students think like engineers to discover how shapes and materials work together to build structures. From the basic shapes of triangle, square and cylinder, students are challenged to build progressively larger structures, solving problems as they go.

We value feedback from teachers. Let us know how we did through a short survey at museum.novascotia.ca/survey

Curriculum Outcomes:

Grade 3 Science:

- Learners will construct a structure in response to a design challenge.

Grade 3 Math:

- Students will be expected to describe 3-D objects according to the shape of the faces and the number of edges and vertices.
- Students will be expected to name, describe, compare, create, sort regular and irregular polygons, including triangles, quadrilaterals, pentagons, hexagons, and octagons according to the number of sides.

Materials:

Estimate per class of 25 students:

- Pipe cleaners: 510
- 8-inch plastic or paper "Jumbo" milkshake straws: 500 (available in boxes of 250 or more at restaurant supply stores such as TRA or through Costco or Amazon)

Minimum, per student (Activities 1 and 2):

- Cube: 12 straws, 8 pipe cleaners Tetrahedron: 6 straws, 4 pipe cleaners

Other Materials: scissors, ruler, tape

General Notes:

- Teachers may pause the video at any time to allow students sufficient time to complete activities.
- The two Activities and Challenge 1: Stronger Squares can be completed by students working individually.
- Challenge 2: Build Giant Tetras and Challenge 3: Build a Tower require group work. Teachers must therefore judge whether these challenges can be appropriately completed within the requirements of social distancing.
- Do not use bendable straws. Straws must be large enough to hold a doubled pipe cleaner. Jumbo milkshake straws are recommended.
- Structures can be dismantled, and materials re-used, if students complete several challenges.
- Materials may be conserved by cutting both straws and pipe cleaners in half. This may affect how well the structures hold together.

Video Program Outline:

Time: Segment:

00:00 Introduction

02:27 Building Connectors (Suggested time: 10 minutes)
Demonstrates how to use pipe cleaners to make the Y-shaped connectors used in the program.

04:02 Activity 1: Build Squares and Triangles (Suggested time: 15 minutes)
Demonstrates how to build squares and triangles using straws and Y-connectors and introduces triangles as a more stable structure than squares. For Activity 1 and Activity 2, each student will require a total of 18 straws and 12 pipe cleaners

07:57 Activity 2: Build Cubes and Tetrahedrons (Suggested time: 15 minutes)
Demonstrates the construction of cubes and tetrahedrons from squares and triangles and expands on the relative strength and stability of these shapes.

11:40 Challenge 1: Stronger Cubes (Suggested time: 30 minutes)
Students explore strategies to strengthen their cube to make it less flexible. This challenge can be completed by students working individually. It will require each student to have scissors, tape, and additional straws.

15:30 Challenge 2: Build Giant Tetras (Suggested time: 30 minutes)
Students work together to join small tetrahedrons and build successively larger tetrahedrons. To build the XXL tetrahedron, each student will have to build two or three small tetras, for a total of 64 small tetras. Each larger tetrahedron is made from four of the next smaller tetrahedrons. Materials required as follows:

Structure	Straws	Pipe cleaners	Total Small Tetras
Small tetrahedron	6	6	1
Large tetrahedron	24 (4 x 6)	30 (4 x 6 + 6)	4
XL tetrahedron	96 (4 x 24)	126 (4 x 30 + 6)	16
XXL tetrahedron	384 (4 x 96)	510 (4 x 126 + 6)	64

21:44 Challenge 3: Build a Tower (Suggested time: 30 minutes)
Working in groups of four or five, students are challenged to use provided materials to build the tallest tower they can, which will stand up on its own. Each group should have at least 100 straws. Part of this challenge will be to solve the problem of building a structure taller than the students themselves are. Solutions may include adding components to the bottom of the tower rather than the top or building the tower on its side and then standing it upright. Students may not stand on chairs or tables or give each other piggybacks. Teachers can set additional rules as appropriate. If students are to complete this challenge individually, extra materials will have to be purchased.

23:54 Conclusion

26:07 End