59. Preparing for Earthquakes

Classroom Activity: Design and build a freestanding structure that would remain intact when shaken by a moderate earthquake.

Grade(s): 7

Strand (s): Understanding Structures and Mechanisms

This task addresses the following overall expectations:

- design and construct a variety of structures, and investigate the relationship between the design and function of these structures and the forces that act on them;
- demonstrate an understanding of the relationship between structural forms and the forces that act on and within them.

and the following specific expectations:

- follow established safety procedures for using tools and handling materials;
- design, construct, and use physical models to investigate the effects of various forces on structures;
- investigate the factors that determine the ability of a structure to support a load;
- use technological problem-solving skills to determine the most efficient way for a structure to support a given load;
- investigate methods used by engineers to ensure structural safety;
- use appropriate science and technology vocabulary, including truss, beam, ergonomics, shear, and torsion, in oral and written communication;
- use a variety of forms (e.g., oral, written, graphic, multimedia) to communicate with different audiences and for a variety of purposes;
- identify the magnitude, direction, point of application, and plane of application of the forces applied to a structure;
- distinguish between external forces and internal forces acting on a structure;
- identify the factors that determine the suitability of materials for use in manufacturing a product.

Assessment Categories:

- Knowledge and Understanding
- Thinking and Investigation
- Communication
- Application
- Teambuilding skills

Type of Activity: Classroom

Preparation:

Planning Time: 8 hours

Time needed to complete the task: 1 week

Materials/Resources for students:

1 m of masking tape

3 balls (3cm in diameter) of modeling clay

100 toothpicks

30 thin wood sticks (meat skewers or Popsicle sticks)

Plywood base (20cm x20cm) containing holes in each corner for bolts

Activity Description:

The class is broken into teams, with each team including a designer, materials manager, builder and public relations person. The structures must be at least 30 cm high, and be less than 20 cm in width and 20 in length. The structure must allow for bolts to be placed in the corner holes.

An electro-mechanical shaker will be used to test the structures under various vibrations. Observations will be made to determine which structure best withstands an "earthquake".

One can also examine the cost effectiveness of the structures by following the costs of material below:

Masking tape - $0.50 per 50 cm

Modeling Clay - $1 per ball

Toothpicks - $0.10 per toothpick

Thin wood sticks - $0.50 per stick

Wooden Base - Free