

37. Roller Coaster Competition

Classroom Activity: To build a roller coaster using a fixed length of pipe insulation for the track and straws for the supporting structures. A marble will serve as the car. The fastest roller coaster wins.

Grade (s): 7, 11 and 12

Strand (s): Understanding Structures and Mechanisms (Grade 7)

This task addresses the following grade 7 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 grade 7 specific expectations:

- 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
- classify structures as solid structures, frame structures, or shell structures
- describe ways in which the centre of gravity of a structure affects the structure's stability
- 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
- describe the role of symmetry in structures
- identify and describe factors that can cause a structure to fail
- identify the factors that determine the suitability of materials for use in manufacturing a product

Course(s) and Strand(s): Science



Physics, Grade 11 University

C. Forces

Physics, Grade 12 University

B. Dynamics

Physics, Grade 12 College

B. Motion and its Applications

See supplementary document Ontario Curriculum Alignment for Engineer-in-Residence Secondary Classroom Activities: Science and Technological Education for relevant overall and specific expectations.

Assessment Categories:

- Knowledge and Understanding
- Thinking and Investigation
- Communication
- Team-building skills

Type of Activity: Classroom/Lab

Preparation: 2-3 hours

Assemble and prepare materials for students

Time needed to complete the task: 75 minutes (Students are expected to research the subject outside class)

Materials and Resources for Teachers:

Stopwatch Funderstanding – Roller Coaster Simulator

<http://www.funderstanding.com/k12/coaster/>

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Materials and Resources for Students:

2 lengths of track made of pipe insulation
a marble
straws (limited quantity)
paper clips (limited quantity)
twist ties (limited quantity)
duct tape (limited quantity)
student chair

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Activity Description:

Outline the task and divide students into teams.

Using only the materials provided. Students are asked to build a roller coaster that has at least two hills and one curve in the track. The pipe insulation provided cannot be cut. The initial launch platform will be no higher than the backrest of a student chair. A marble will serve as car. The winner is the team whose marble successfully completes the course, touching the target located beneath the launch point.

Follow-up Activities:

An alternate design/competition is to have the marble jump one or more breaks in the track and land in a designated container.