

10. Humpty Dumpty - The Egg-Drop Challenge

Classroom Activity: Build a device or come up with a method of dropping/releasing an egg from a height of about 3.5 meters without breaking it. Students research, design and build their own devices.

Grade(s): 7, 9 to 12

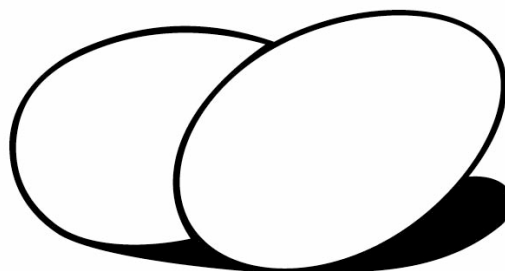
Strand(s): Understanding Structures and Mechanisms, Grade 7

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:

- 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;
- 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;
- 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 (tension, compression, shear, and torsion)



- acting on a structure;
- identify and describe factors that can cause a structure to fail.

Course (s) and Strand(s): Technological Education

Exploring Technologies, Grade 9 Open

- A. Technology Fundamentals
- B. Technological Skills

Technological Design, Grade 10 Open

- A. Technological Design Fundamentals

Technological Design, Grade 11 University/College

- A. Technological Design Fundamentals

Technological Design, Grade 12 University/College

- A. Technological Design Fundamentals

Course (s) and Strand(s): Science

Physics, Grade 11 University

- B. Kinematics
- C. Forces

Physics, Grade 12 University

- C. Energy and Momentum

Physics, Grade 12 College

- B. Motion and its Applications
- E. Energy Transformations

10. Humpty Dumpty - The Egg-Drop Challenge (continued)

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
- Application

Type of Activity: classroom (small group work)/extra-curricular

Preparation: varies

Time needed to complete the activity: varies

Materials/Resources for teachers:

fresh eggs

a safe 3.5 meter height from which students can drop the eggs (e.g. bleachers)

Materials/Resources for students:

Students will use "found" materials of their choice

Activity Description:

The problem is posed to the students.

As a class discuss:

- Various methods of "dropping" the egg
- Materials that might be used
- How this problem relates to the real world

Divide the students into teams. Humpty Dumpty can be an extra-curricular activity or students can be given class time over several weeks. Teachers and engineers should be available to discuss the projects and offer help and suggestions.

On the appointed day, students bring their devices to class and they are tested. Before demonstrating their method/device students should give a brief presentation on how they came up with the idea.

Tips:

- Safety considerations are paramount. Students should be carefully supervised.
- A variation on this activity would be to provide all the teams with an identical pre-prepared package of materials.