

25. Technology Olympiad

Classroom Activity: Solve a nuclear waste disposal problem by designing and building an insulated container with a hinged closure, a crane to lift the container from the "waste site" onto a vehicle for transport, a transport vehicle powered by two "c" batteries to move the "waste" to a new location, and a lever device to unload the waste. Students must also prepare a design booklet with clear drawings of the design process.

Grade(s): 4 and 7

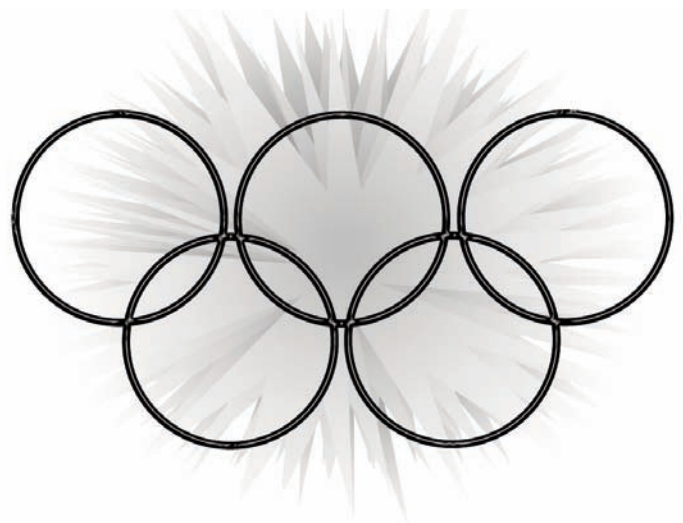
Strand(s): Understanding Structures and Mechanisms (Grades 4 and 7)

This task addresses the following grade 4 overall expectations:

- evaluate the impact of pulleys and gears on society and the environment;
- investigate ways in which pulleys and gears modify the speed and direction of, and the force exerted on, moving objects;
- demonstrate an understanding of the basic principles and functions of pulley systems and gear systems.

and the following grade 4 specific expectations:

- assess the impact of pulley systems and gear systems on daily life;
- assess the environmental impact of using machines with pulleys and gears, taking different perspectives into account and suggest ways to minimize negative impacts and maximize positive impacts;
- follow established safety procedures for working with machinery;
- use scientific inquiry/experimentation skills to investigate changes in force, distance, speed, and direction in pulley and gear systems;
- use technological problem-solving skills to design, build, and test a pulley or gear system that performs a specific task;
- use appropriate science and technology vocabulary, including pulley, gear, force, and speed, 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 the purposes of pulley systems and gear systems;
- describe how rotary motion in one system or its components is transferred to another system or component in the same structure.

This task addresses the following grade 7 overall expectations:

- analyse personal, social, economic, and environmental factors that need to be considered in designing and building structures and devices;
- 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:

- evaluate the importance for individuals, society, the economy, and the environment of factors that should be considered in designing and building structures and devices to meet specific needs;
- evaluate the impact of ergonomic design on the

25. Science Olympiad (continued)

safety and efficiency of workplaces, tools, and everyday objects and describe changes that could be made in personal spaces and activities on the basis of this information;

- follow established safety procedures for using tools and handling materials;
- 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 acting on a structure;
- identify and describe factors that can cause a structure to fail.

Assessment Categories:

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

Type of Activity: Classroom - small group work

Preparation time: varies

Teachers need to prepare the materials and instructions for the Olympiad, and assemble a panel of judges.

Materials and Resources Teachers:

No additional resources required.

Materials and Resources for Students:

wood
cardboard
elastic bands

styrofoam
wheels
popsicle sticks
glue
nails
pins
tape
hammer
drinking straws
wire
saw
safety glasses
string
glue
gun

Activity Description:

Students assemble in the gym. They are divided into teams of three with one student from each grade. They are provided with a pre-prepared bin of materials and written instructions for the task. Each team must work together to solve a nuclear waste disposal problem by designing and building:

- an insulated container with a hinged closure
- a crane to lift the container from the "waste site" onto a vehicle for transport
- a transport vehicle powered by two "c" batteries
- a lever device to unload the waste

Students must also prepare a design booklet with clear drawings of their design process. The Olympiad is a day-long activity with the morning devoted to building and the afternoon to testing and judging. The inventions are judged on functionality and originality.

Tips:

- Students in higher grades can act as advisors to the design teams.
- Students may use Corel presentation software to prepare part of their design booklets.
- If time permits, the Olympiad can be preceded by a day where students take part in hands-on activities to reinforce the skills they will need for the Olympiad.