

17. Gears and Pulleys

Classroom Activity: Design two machines, one that includes pulleys and another that uses gears.

Grade: 4

Strand(s): Understanding Structures and Mechanisms

This task addresses the following 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 addresses the following specific expectations:

- assess the impact of pulley systems and gear systems on daily life;
- 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;
- describe how one type of motion can be transformed into another type of motion using pulleys or gears.

Assessment Categories:

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

Type of Task: Classroom

Preparation: (approx. 60 minutes)

Make materials available to students

Time needed to complete the task: (approx. 360 minutes)

Materials and Resources for Teachers:

No additional resources required

Materials and Resources for Students:

K'Nex or other building systems

Activity Description:

Explain the function and theories behind gears and pulleys. As a class discuss how they are used in everyday objects. Set the task: Design and build an exercise machine that uses pulleys and weights, and an eggbeater or food mixer that uses gears.

Divide the students into small groups to design and build their machines. The teacher and EIR should be available for consultation.

Students demonstrate their completed machines to the class.

Tips:

Mathematics and technology can be interwoven to make the former more attractive and relevant. Students can be given homework to determine the gear ratios of their bicycles or other appliances where the gears are visible.

