

Pushing and Pulling **Grades 2 to 4**

Design a Pulley System - Post

Assessment	model
Cross-curricular	

Big Ideas

50 minutes

Movement is a change in position of an object.

Simple machines help objects to move.

Mechanisms are made up of one or more simple machines.

Pulleys and gears change speed, direction, and motion of, and force exerted on, moving objects.

Pulleys and gears make it possible for a small input force to generate a large output force.

Specific Expectations

1. Investigate the structure and function of simple machines (2.3 - grade 2)
2. Use technological problem-solving skills to design, build, and test:
 - a. a mechanism that includes one or more simple machine (2.4 - grade 2)
 - b. devices that use forces to create controlled movements (2.4 - grade 3)
 - c. a pulley system that performs a specific task (2.3 - grade 4)
3. Describe the purposes of pulley systems (3.1 - grade 4)
4. Identify pulley systems that are used in daily life (3.6)

Description

Using simple tools and materials, students design and create their own pulley system to complete a task.

Materials

Building Materials (Including, but not limited to):

- straws, spools, toilet paper tubes, wooden skewers, wooden craft sticks, clothespins, paperclips, pencils, plastic or paper cups, boxes, cardboard, craft foam or construction paper
- string, scissors, tape and glue

Introduction

1. Recap discussion on structure and function of pulleys;
2. Discuss differences between simple fixed, simple mobile, and compound pulleys
3. Discuss examples of pulleys that we see and use everyday and what tasks they help us to accomplish.

Action

1. Have students brainstorm a design for a pulley system that will accomplish a simple task (moving an object of their choice up or down or horizontally). Younger students may be assigned their challenge goal. For grade 4, students should include at least one mobile and one fixed pulley (for younger grades this challenge is optional). Have them sketch their design ideas.
2. The students' build and test their designs using only materials provided in the classroom. If their tested design doesn't work, they can make changes to their design.

Consolidation/Extension

1. Have students talk about their design and demonstrate it in action.
2. Recap that pulleys, like all simple machines, help humans do work and help make life easier.

In grades 2 and 3, students learn about simple machines and using simple machines to create movement. In grade 4 students focus specifically on assessing pulley systems and their use in daily life. All three grades include a curriculum component that encourages students to design, build, and test pulley mechanisms. Adding pulleys makes it easier to lift a load. However, you have to pull the rope across a greater distance when using two or more pulleys. With each additional pulley, you have to pull the rope even farther.