

**Project FOCUS
Best Lessons
FOURTH GRADE**

Title of Lesson: Pulleys

Theme: Physical Science

Unit Number: **Unit Title:** Sound and Light

Performance Standard(s) Covered (enter codes):

S4P3

Enduring Standards (objectives of activity):

Habits of Mind

- Asks questions
- Uses numbers to quantify
- Works in a group
- Uses tools to measure and view
- Looks at how parts of things are needed
- Describes and compares using physical attributes
- Observes using senses
- Draws and describes observations

Content (key terms and topics covered):

Pulley, Simple Machine, Force, Motion

Learning Activity (Description in Steps)

Abstract (limit 100 characters): Students will understand the components of a pulley and how it works.

Details: The purpose of this experiment is to show students that pulleys are made of at least two wheels with groves for holding a rope or cable. By using the pulley that they have constructed, students will see first-hand how a pulley makes work easier by lessening the force needed to lift or move a load. Finally, as a review of previous lessons on simple machines, students will be able to match examples of all the simple machines to their correct category.

In the weeks that preceded this lesson, the students completed an activity with each of the other simple machines (with the exception of the pulley). They understood how the other machines worked and could give examples of each type. At the beginning of this activity, I gave a short lesson and demonstration on the parts of the pulley and what this simple machine is used for. This activity should be saved for the end of the lesson on simple machines.

Divide the class up into two groups and tell them that they are going to participate in a competition to identify the simple machines that they have learned about. Each group will construct a pulley using two plastic spools with a pipe cleaner through the middle of each spool. Students will wind string from one spool to the other thereby constructing a pulley (clothesline-style). The teacher may need to help students in the construction part of the activity. Once both

groups have finished making their pulleys, students will take turns holding the pipe cleaners on either end so that the string and spools can move freely. Now, tell the students that they must pull each picture individually across their pulley to the other side of the room and place it in the correct space on the board with the names of the simple machines. Teachers should now attach hooks to each pulley and have the groups begin (at the same time) to move their pictures across the room. Since the pictures are made of paper, students can simply poke a hole in the corner of each picture to attach it to the hook. Students must rotate positions so that the same students are not placing the pictures on the board every time. The first group to move all their pictures across the pulley and put them in the correct category wins the competition.

Possible Discussion Questions Include: What materials do you think would make the pulley easier or harder to use? What direction did you have to pull to make your load (the pictures) move in the right direction? Which way did you wind the string and how did this affect your pulley? Did you change anything about your pulley during the activity? If so, did this help your group improve?

The board of pictures serves as a great review at the end of this lesson for simple machines. I went through each board and discussed with the class how each picture was an example of that particular simple machine. If any of the pictures were in the wrong place, we discussed why it didn't belong there. For example, we discussed why a wheelbarrow should go in the lever category instead of the wheel and axle category. The physical part of the lesson was great because it allowed all students to become involved and those who don't like to speak out in class were still able to contribute by taking turns placing the simple machine pictures in the right category.

Materials Needed (Type and Quantity):

Four plastic spools

Four pipe cleaners

String

Two hooks (or bent paper clips)

Two identical sets of at least 15 pictures of various simple machines (examples include gears, bicycle wheel, seesaw, wheelbarrow, handicap ramp, axe, nail, jar lids, drill, flagpole, windmill, water well, corkscrew, truck ramp)

Two large construction papers boards labeled "Lever," "Pulley," "Wedge," "Inclined Plane," "Screw," and "Wheel and Axle"

Notes and Tips (suggested changes, alternative methods, cautions):

Students became very competitive during this activity and also created a bit of noise. Each team began to chant and cheer as they moved their loads across the pulley. I would recommend doing this activity in an area where you will not disturb other classrooms. Additionally, if you choose to reward the winning team in this activity, I would recommend allowing all students who participated to receive an award but perhaps letting the winning team decide what the award will

be (i.e. cupcakes, cookies, donuts, etc). The one other problem that I encountered was getting students to rotate their positions along the pulley. All students wanted to hold the ends and we had to constantly remind them to take turns.

Sources/References:

- 1)**
- 2)**
- 3)**