Investigation One – Push and Pull

Standard III Students will understand the relationship between the force applied to an object and resulting motion of the object.
Objective 1 Demonstrate how forces cause changes in speed or direction of objects.
Intended Learning Outcomes 1. Use science process and thinking skills 2. Manifest scientific concepts and principles 3. Understand science concepts and principles 4. Communicate effectively using science and language and reasoning

Standard III

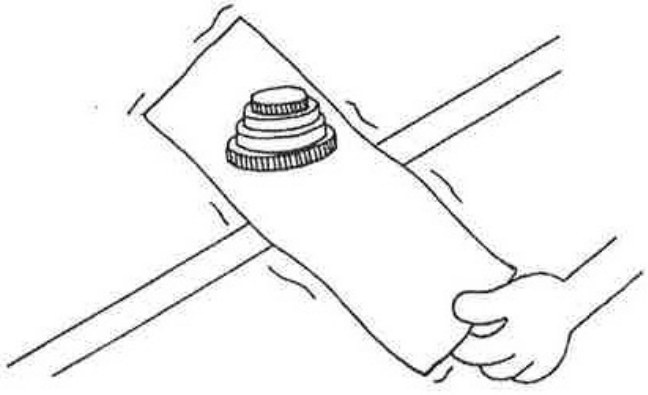
Objective 1

Background Information

Force, which is simply a push or pull, is all around us. Objects at rest will remain at rest unless acted upon by a force. Objects in motion will remain in motion unless acted upon by a force (push or pull).

Pre-Assessment/Invitation to Learn

1. Place the paper on the edge of a table or countertop with most of the paper off the surface.
2. Stack the washers on top of the paper.
3. Hold onto the loose edge of the paper and quickly pull down on the paper.
4. Observe what happens to the stack of washers.



Materials
- 5 washers
- 4 pieces of paper (2” x 5 ½ “

If you pulled quickly enough, the stack of washers will stay stacked on the table. The washers are at rest on top of the table or countertop. When the paper is quickly pulled out from underneath them, they stay put.

Instructional Procedure

Materials

- Music for "Here We Go Round the Mulberry Bush"

1. Brainstorm with the students daily activities at school, at home, and at play that require a push and/or pull.
2. Define "force" as a push or pull.
3. Play the game Charades. Students take turns acting out an activity that involves some kind of a force – either a push or a pull. The rest of the class guesses what actions was portrayed and then tells whether the force used was a push or a pull.
4. After each dramatization, use the action portrayed as new words for the song, "here We Go Round the Mulberry Bush." Each time the students come to the last phrase in the song, end with the words "with a push or a pull in the morning." For example: "This is the way we put up the flag, put up the flag, put up the flag. This is the way we put up the flag, with a push or a pull in the morning."

Curriculum Extensions

Art –

- Have students fold a white paper into fourths. Mark each side with push on one side and pull on the other. Have the students draw four pictures of push with captions on the side and draw four pictures of pull on the other with captions. (*Standard IV, Objective 3)*

Language Arts –

- Have students find some books about sports and/or outside games. Make graphic organizers of the pushes and pulls that happen in the activities.

Science –

- Whip a tablecloth out from under dishes. This bothers the tablecloth, but not the dishes. Hints: No hem on the tablecloth. Pull smoothly, quickly, and straight down. Use old and heavy dishes. (*ILO 1*)
- Place a coin on your forearm. Drop your arm and catch the coin with your hand without dropping it. The coin will remain in place for a moment after your arm is removed. Now put two or more coins in a straight line on your forearm and try the experiment again. You can also make a pile of coins and try it again. (*ILO 1*)
- Stack 6 wooden blocks on the countertop. Lightly hit the top block with a ruler and observe what happens. Now try hitting the bottom block in the stack. Hit it hard and straight on, following through with the ruler after impact. Observe what happens. (*ILO 1*)

Assessment Suggestions

- Question the students about the difference between a push and a pull.
- Name some common tools the students know about. Have them write down if they would push or pull that tool.
- Name some activities the students play outside. Have them write down if they would push or pull during that activity.

Resources

Books:

- *Awesome Experiments in Force and Motion,* Michael DiSpezio Sterling Publishing Co., Inc. ISBN 0-8069-9821-0
- *Forces*, Karen Bryant Mole, Rigby Interactive Library, 1997 ISBN 1-57572-108-2.
- *Forces and Motion,* Harcourt School Publishers, 2002. ISBN 0-15-32921-7
- *Forces and Motion,* Teacher Created Materials, Inc. 2001 ISBN 1-55734-625-9
- *Magic School Bus Plays Ball,* Scholastic Inc. 1997 ISBN 0-590-92240-8
- *Push and Pull,* by Patricia J. Murphy Scholastic Library Publishing).
- *Pushing and Pulling* (*Science For Fun*), by Gary Gibson (Copper Beach Books).

Laser Discs:

- Windows on Science, Primary Vol. 3, Force and Motion Lessons 1-3, 5, 9-13
- Windows on Science, Primary Vol. 3, Simple Machines Lessons 4-10
- Windows on Science, Primary Vol. 3, Work and Machines Lesson 1-3

Videos: (Available from Jordan School District)

- *Forces: The Law of Motion* (Disney, Bill Nye) #13027 26 minutes
- *Motion and Force: Play Ball* (321 Contact) #10972 15 minutes
- *Force and Motion: Newton's Three Laws* #07351 18 minutes

Web sites:

- http://www.enc.org/weblingks/science/0.1578.1%2DForces.00shtm
- http://www.enc.org/weblinks/science/0.1578.1%2DMotion.00shtm
- www.spacelink.nasa.gov/Instruction_Materials/

Materials

- Worksheet: "Finding Forces" (one per student)

Homework & Family Connections

Have the students observe and list ten different activities performed by Various family members in the first column. In the second column, students categorize the force used as a push and/or pull.

Name _____

Finding Forces

Identify ten different activities performed by family members in the first column. In the second column, categorize the force used as a push, a pull, or both.

Activity	Force Used
Example: Opening the drapes	Pulling
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	