Rolling Along

Summary

Classroom and homework activities illustrate how wheels and axles help with force and motion.

Group Size

Large Groups

Materials

- Note Home (pdf)
  (one per student)
  Vehicle body (made at home or provide materials at school)
  4 wooden wheels (per student)
  2 straws (one smaller than the other in diameter) (per student)
  Hot glue gun
  Glue sticks
- Simple Machines Song (pdf)

Background for Teachers

When things rub together, it causes heat and makes them slow down. Without wheels, your vehicle cannot move or moves very little. There's too much rubbing between it and the ground. Wheels reduce the amount of rubbing. You can move a heavy object using less force, but putting a wheel and axle under them.

Intended Learning Outcomes

1. Use a Science Process and Thinking Skills
2. Manifest Science Interests and Attitudes
3. Understand Science Concepts and Principles
4. Communicate Effectively Using Science Language and Reasoning

Instructional Procedures

Invitation to Learn
Have the students rub their hands together quickly. Ask them "What did you observe happening?"
Tell them that when things rub together, it causes heat and makes them slow down.
Prior to the activity
Have the students make a vehicle body at home or at school.
Activity

Instruct the students to push their vehicle body without wheels along the table or smooth counter top. Observe and record the distance traveled.
Arrange for parent volunteers to attach the wheel and axle units to the vehicles.

Cut 2 pieces of the large diameter straw the length of the width of the vehicle body.
Glue them to the bottom of the vehicles.
Cut 2 pieces of the smaller diameter straw 1" longer than the width of the vehicle body.
Slide the smaller diameter straws through each larger diameter straw.
Glue a wheel on each end of the smaller diameter straws and allow to dry.

Once the wheels have been attached, instruct the students to push their vehicle with wheels along the table or smooth counter top with the same amount of force used when the vehicle had no wheels. Observe and record the distance traveled.

Discuss the results of the experiment and how the wheels reduced the amount of rubbing. Relate this principle to everyday life.
Sing the wheels verse, followed by the chorus, of the Simple Machines Song (pdf).

What's Happening?
Without wheels, your car can't move or moves very little. There's too much friction (rubbing) between it and the ground. Wheels reduce the amount of friction. You can move a heavy object, using less force, by putting a wheel and axle under it.
Curriculum Integration
Math/Science
Objective 4: Use appropriate techniques and tools to determine measurement.
1. Measure and record the distance the vehicle traveled with and without wheels.

Extensions

Extension:
Have the students pretend that they are the cavemen who invented the wheel. Instruct them to make a cave drawing advertisement trying to sell the advantage of their new invention to other cavemen.
Adaptation: If you teach in an area with little parental support, you may want to make the vehicle bodies in class with materials that you provide.
Homework & Family Connections
Materials

- Rolling Along Homework (worksheet) (pdf)

Have the students identify and illustrate six objects in their home, garage, carport, and/or shed that have wheels.
Possible Resources
Books:
How Do You Lift a Lion? by Robert E. Wells (Albert Whitman and Company)
The Way Things Work by David Macauley (Dorling Kindersley)
Simple Machines by Deborah Hodge (Ontario Science Center)
Machines -Spectacular Science Projects by Janice Van Cleave (John Wiley and Sons, Inc.)
Physics Lab in the Hardware Store by Bob Friedhoffer (Franklin Watts)
Playground Physics - Simple Machines by Bob DeWeese (Evan-Moor)
Science Experiments with Simple Machines by Sally Nanivell-Aston (Franklin Watts)
Videos:
Science Alliance #3, Machines
Laser Discs:
Windows on Science, Primary Vol. 3, Work and Machines Lessons 2-10

Assessment Plan

Have the students explain (written or orally) why the vehicle with wheels travels farther than the vehicle without wheels.

Authors

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