

Activity—Rolling Along

Standard III

Students will understand the relationship between an applied force and the resulting motion of an 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 Attitudes and Interests
3. Understand Science Concepts and Principles
4. Communicate Effectively Using Science Language and Reasoning

Standard III

Objective 2

Connections

Background Information

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, by putting a wheel and axle under them.

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.

Instructional Procedures

Prior to the activity

Have the students make a vehicle body at home or at school.

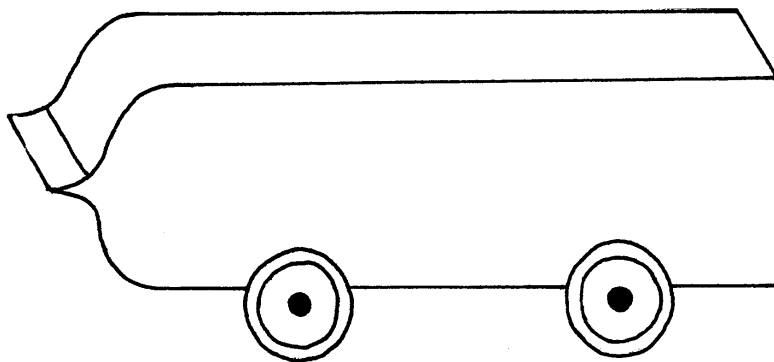
Activity

1. Instruct the students to push their vehicle body without wheels along the table or smooth counter top. Observe and record the distance traveled.
2. 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 onto the bottom of the vehicles.

Materials

- ❑ Homework assignment sheet for Wheels and Axles (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 one in diameter) (per student)
- ❑ Hot glue gun
- ❑ Glue sticks

- 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.
3. 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.
 4. Discuss the results of the experiment and how the wheels reduced the amount of rubbing. Relate this to principle to everyday life.
 5. Sing the wheels verse, followed by the chorus, of the Simple Machines Song.



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.

Possible Extensions/Adaptations

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.

Assessment Suggestion

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

Websites

<http://www.fi.edu/qu97/spotlight3/spotlight3.html>

<http://www.ed.uri.edu/SMART96/ELEMSC/SMARTmachines/machine.html>

<http://www.stemnet.nf.ca/CITE/machinessimple.htm>

<http://www.mikids.com/Smachines.htm>

<http://www.mos.org/sln/Leonardo/InventorsToolbox.html>

<http://www.san-marino.k12.ca.us/~summer1/machines/simplmachines.html>

<http://www.northcanton.sparcc.org/~greentown/simpmach.htm>

Homework & Family Connections

Rolling Along (worksheet)

Have the students identify and illustrate six objects in their home, garage, carport, and/or shed that have wheels.

Homework Assignment for Wheels and Axles

Our class is studying force and motion in science. We have learned that simple machines help us to do more work with less force. Next _____, _____, we will be experimenting with wheels and axles. Please help your student make a vehicle body to bring to school that day. You may use the milk cartons provided or use your own building materials. The bottom of the vehicles cannot be wider than 6 inches.

I need three to four parents who are willing to hot glue the wheels and axles onto the vehicles between _____ a.m./p.m. _____ a.m./p.m. I would like to meet with these volunteers and show them what to do and give them the equipment needed at _____ a.m./p.m. You may either stay at school or take the vehicles home to complete the task. I have two hot glue guns that can be used, so it would be helpful if at least two of the volunteers also had hot glue guns that could be used.

Please write in your child's planner if you are able to help with this project. THANKS!



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Name: _____

Rolling Along

Draw a picture of six objects in your home, garage, carport, or shed that has wheels.
