Activity: One Solution for Pollution . . .Machines!

Overview

Pollution is waste materials or harmful chemicals discharged into the water, soil, or atmosphere. This contamination affects everyone and everything it contacts. Current technology is being developed to use machines to remove or contain contaminated materials. Through an awareness of the consequences of pollution and the means to prevent it, students will develop a desire and responsibility to keep their world clean.

Objectives

Students will be able to

1. define pollution and describe its origins;
2. list the negative effects of pollution on our environment;
3. list the six simple machines: lever, pulley, wheel and axle, inclined plane, screw, and wedge; and explain the difference between simple and compound machines;
4. visualize and illustrate a machine that could potentially clean up pollution;
5. explain and demonstrate a caring, responsible attitude about cleaning up pollution.

Background

Machines are mechanisms or tools that help people accomplish a task. Simple machines such as the lever, pulley, wheel and axle, inclined plane, screw, and wedge were created to make work easier. A compound machine is a combination of two or more simple machines. Over time, machines have become very complex. Today, people depend on a wide variety of machines to make life easier. However, there can be negative consequences from using machines. For example, machines that burn fossil fuels (coal, oil, and gas) are major contributors to pollution.

Most types of pollution can cause some type of harm. Some pollutants can make people sick! As the world population continues to increase, more complex, technologically advanced machines will be developed to make life better, but they may also cause new environmental problems. Everything people do has the potential to cause some type of pollution if we are not careful. However, with a lot of thought and

SCIENCE: Resources; Force, Motion, and Energy – Simple Machines; Living Systems

CHARACTER: Responsibility, Caring

GRADE LEVEL
3rd and 4th Grades

VIRGINIA STANDARDS OF LEARNING
Science: 3.2, 3.10, 4.5
English: 3.2, 3.7, 4.2, 4.7

LENGTH/DURATION
2-3 weeks

MATERIALS
world, national, or state map; sketch pad or drawing paper; construction materials, e.g., blocks and building toys that interlock, buttons, corrugated cardboard, paper tubes, various examples of simple and compound machines; pictures, slides, and videos showing different types of pollution; books on pollution

VOCABULARY
pollution, simple machines, compound machines, lever, wheel and axle, pulley, inclined plane, wedge, screw, resource, responsibility, caring

creativity, new machines can be created to reduce, contain, or control pollution.

As children become more aware of the causes and negative effects of pollution, they may seek ways to prevent or reduce it. Teaching children to be accountable for their actions and to be responsible, caring citizens will be a beginning step toward a healthier world.

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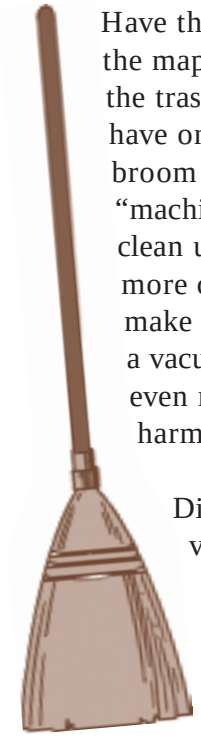
LESSON

Motivational Activity

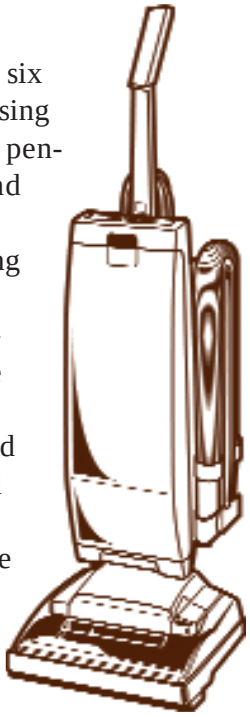
Discuss pollution and introduce various types of pollution using pictures, slides, or videos. What is pollution and where does it come from? Discuss the harmful effects pollution has on our world. What impact does it have on wildlife, water, air, plants, and human health and enjoyment? Read books on pollution to understand the harmful effects that can impact all living things. Do machines contribute to pollution?

Take a "pollution walk" around the school grounds. Observe and record any type of pollution found in the surrounding air, land, or water. In the classroom, place a world, national, or state map on the floor. Have the children throw litter on the map. Discuss their feelings about the trash and the effects it would have on the world. Bring out a broom as an example of a simple "machine" that can be used to clean up the trash. Ask if there is a more complex machine that would make the cleanup easier. Bring out a vacuum cleaner. Would this be even more efficient? Might it harm or destroy the map?



Discuss the possibilities and value of machinery that could be used to eliminate or contain pollution. Reflect on the types of litter and trash found on the "pollution walk." Ask the students what simple tools or machines could be used to clean up the pollution they observed. If possible, have the students clean up the school grounds.

Activities



1. Have the children learn the six types of simple machines, using classroom materials such as pencils, rulers, books, string, and weights. Discuss the definitions and their use in helping people to accomplish work. Compare these with a compound machine, such as the vacuum cleaner. What are the advantages of compound machines? Is the compound machine more efficient? Would there be any negative consequences of using these more complex compound machines? (The energy source for the machines may consume a lot of natural resources and operating the machine could cause pollution.)

2. Discuss why preventing and reducing pollution is important to the community and the environment. Why should people care? Ask the students, "If machines are contributors to pollution, can machines be used to clean up pollution?" Have the students work in small groups to brainstorm types of machines that are used to clean up or prevent pollution. Ask the students to name the character traits that are represented in their concern for reducing pollution.

3. Visit or study a national park. Have students determine the significant

resources the national park protects. Is the park primarily a natural area that protects wildlife, forests, rivers and streams, and scenery? Or is the park primarily an historic area that preserves the memory of historic events or people and protects historic buildings, battlefields, and memorials? What kinds of pollution would impact the national park? What are the sources of the pollution? Could the pollution damage the resources the park is trying to protect? Are the same kinds of pollution found in the national park and on the "pollution walk" around the school grounds? What does the national park do to reduce the effects of pollution? How can park visitors help reduce or prevent pollution?

4. Have each student design and sketch an imaginary machine that might be used to help reduce pollution in a national park or in their community. Then give the machine a creative name such as "Smoke Sucker-Upper," "River Skimmer," or "Trash Picker-Upper." Provide the materials to create models of the machines. Each student should write a brief summary to explain his/her machine, how it would work, and how it would reduce or clean up pollution.

5. Have students create props and present plays, either individually or in small groups, to demonstrate the use and effects of their machines to help improve the environment. They should explain why it

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is important to not pollute and to express and demonstrate the character traits of responsibility and caring in resolving real-life scenarios.

Assessments

1. Students should be able to list the six simple machines, give examples of each, and differentiate between simple and compound machines.

2. Base the evaluation of the machine sketches on the student's thinking process and the level of commitment and effort, not on the product itself.

3. Assessment of the plays should be based upon the students' abilities to demonstrate an understanding of what pollution is and how it affects our world. Actors should illustrate how their simple machines would help reduce pollution and the responsible behavior individuals might use to minimize pollution's negative effects.

4. A written summary by each individual student should indicate how his/her simple machine could reduce pollution, which type of simple machine it represents, and how it can help to responsibly take care of the Earth. Evaluation should include creativity, effort, organization, and editing skills.

5. Students should be able to list reasons why pollution is harmful, what causes it, and express the personal desire and specific responsible behaviors he/she can exhibit to prevent pollution or help clean it up.

Going Further

1. Have students research types of pollution and write reports about the negative effects on the environment and how pollution could be prevented or reduced.

2. Combine some of the simple machines to create compound machines. Have the children rename them and describe how the compound machines would reduce pollution.

3. Use the activity of charades to have the children BE the machine they created. Their actions should indicate the machine's impact on pollution.

4. Have the children make a class book with sketches of their simple machines. Have them type a summary that gives the reader information on each "pollution reducer."

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Related Subject Activities

1. Science – Research worldwide effects of pollution and the way machines have contributed and/or are used to combat or contain it.
2. Language Arts – Write stories and short reports about pollution and machines, write letters to companies to ask how they minimize pollution, research future projections for pollutant control techniques.

Resources and References

Ranger Rick's Nature Scope. Pollution: Problems and Solutions. Braus, J., Editor. Washington, D.C.: National Wildlife Federation, 1990.

Project Learning Tree. Washington, D.C.: American Forest Foundation, 2003 Edition.
"Pollution Search." 114-117.
"Talking Trash, Not!" 119-121.

Pollution Solutions: Litter and Pollution Prevention Activities for Virginia Teachers. Virginia Resource-Use Education Council, Virginia Department of Environmental Quality, 2001 Edition.
www.deq.state.va.us/education/polsol.html