

TRB 3:5 - Investigation 7 - Rubbing Objects Together

Summary

Classroom activities help students understand that heat may be produced when objects are rubbed together.

Group Size

Large Groups

Materials

- lotion
- squiggly eyes
- sandpaper
- balloons
- tongue depressors
- heat sensor
- orange and yellow construction paper
- a machine with lubrication oil
- [Heat with Rubbing worksheet](#) (pdf)
- [Sources of Heat song](#) (pdf)

Additional Resources

Books:

Science for Fun-Experiments by Gary Gibson (Copper Beech Books)
The Magic School Bus Plays Ball: A Book About Forces and Friction
Tolman, Marvin N., Hands-on Physical Science Activities, What Happens When You Rub Your hands Together? p. 188, and Friction p. 189-193, Parker Publishing Co., ISBN 0-13-230178-4

Videos:

Magic School Bus Plays Ball, VH. Catalog Number 14335

Background for Teachers

When objects are rubbed against one another, heat may be produced. When hands are rubbed together, the resulting heat will vary depending on how dry the hands are. The amount of moisture, perspiration, and/or oil on the skin will vary. You will observe that hands with recently applied lotion warm up less quickly.

Intended Learning Outcomes

1. Use a Science Process and Thinking Skills
4. Communicate Effectively Using Science Language and Reasoning

Instructional Procedures

Pre-Assessment/Invitation to Learn

Review what it was like to be in a dark, cold cave. What was the best way to keep your hands warm?

Instructional Procedures

Predict what will happen when you rub hands together vigorously.

Rub your hands together. Do your hands feel warmer?

Rub your hands together again only faster and longer. Put your hands on your face. How do your hands feel? Run water on your hands and see if it rubs the same. Now add lotion to dry hands and rub them again. Do you feel a difference in the amount of heat?

Show a piece of equipment like a sewing machine. Put a drop of oil where it needs lubrication. Tell the students that maintenance workers in large factories use oil to reduce the rubbing of machinery. This cuts down on wear and tear of the machine by reducing the amount of rubbing. Predict what will happen when you rub sand paper on a tongue depressor. The sand paper in your hand, and the hand holding it, will become warm. Have one or two students touch the heat sensor with their hands until it changes color. Time how long it took. Then have them try to rub the sandpaper with their hands for a minute, then try the heat sensor again. Now how long did it take? Was it quicker? Have all students rub with sandpaper, then put their hands on their faces. Can they feel the difference in temperature on their faces? Feel a paper clip. Then rub it vigorously on the rug a minute. Feel it again. Blow up two balloons. Rub them together until one of them pops. Fill out the [Heat with Rubbing worksheet](#) (pdf) by drawing in six examples of creating heat by rubbing.

Extensions

Language Arts -

Write collaboratively and respond to the writing of others. (*Standard VIII, Objective 6*)

Divide the class into groups and brainstorm a list of examples of heat being produced when objects rub together. Combine these lists into a class list. Assign student pairs to write mini-reports on these heat producers and combine these into a class booklet. (*Standard VIII, Objective 6*)

Assign students to create a cartoon strip with conversation bubbles, explaining an activity they have just completed. Have them get into groups and share their writings. (*Standard VIII, Objective 6*)

Science-

Find other things to rub sand paper on. Try cloth, wood blocks, and metal. Does it have the same effect as when rubbed on the tongue depressor? Turn the tongue depressor into a sunshine by cutting a sun shape out of yellow construction paper. Then glue on squiggly eyes and draw a mouth. (*ILO 1*)

Art/Science-

Rolling Along - Prior to the activity, have the students make a vehicle body at home or at school. If you teach in an area with little parental support, you may want to make the vehicle bodies in class with materials you provide. (*Standard III, Objectives 1, 2*)

Activity- (*Science: ILOs 1, 3*)

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 onto the bottom of the vehicle.

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 to principle of everyday life. Without wheels, your car can't move or moves very little. There's too much rubbing between it and the ground. Wheels reduce the amount of

rubbing or friction. You can move a heavy object, using less force, by putting a wheel and axle under it.

Homework & Family Connections

Look around the house for machines that need lubrication. Ask parents when was the last time the car was taken in for an oil change. A visit to a flourmill would be an informative field trip. While there, ask the manager for information about the frequency that machinery needs oiling.

Assessment Plan

Check student's worksheet for understanding of objective.

Authors

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