

# Investigation Seven – Rubbing Objects Together

<b>Standard V</b> Students will understand that the sun is the main source of heat and light for things living on Earth. They will also understand that the motion of rubbing objects together may produce heat.
<b>Objective 3</b> Demonstrate that heat may be produced when objects are rubbed against one another.
<b>Intended Learning Outcomes</b> 1. Use science process and thinking skills 4. Communicate effectively using science language and reasoning

**Standard V**

**Objective 3**

## Background Information

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.

## 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 Procedure

1. Predict what will happen when you rub hands together vigorously.
2. Rub your hands together. Do your hands feel warmer?
3. 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?
4. 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.
5. 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 face. Can they feel the difference in temperature on their face?
6. Feel a paper clip. Then rub it vigorously on the rug a minute. Feel it again.

### Materials

- Lotion
- Squiggly eyes
- Sandpaper
- Balloon
- Tongue depressor
- Heat sensor
- Orange and yellow construction paper
- A machine with lubrication oil

7. Blow up two balloons. Rub them together until one of them pops.
8. Fill out worksheet by drawing in six examples of creating heat by rubbing.

## Curriculum 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 sandpaper 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)*

1. Instruct the students to push their vehicle body without wheels along the table or smooth countertop. 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 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.
3. Once the wheels have been attached, instruct the students to push their vehicle with wheels along the table or smooth countertop 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 principles 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.

## Assessment Suggestions

Check student's worksheet for understanding of the objective.

## 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

### *Web sites:*

- <http://www.scholastic.com/magicschoolbus/games/teacher/forces/index.htm>

## 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 four mill would be an informative field trip. While there, ask the manager for information about the frequency that machinery needs oiling.

Name: \_\_\_\_\_

## Heat with Rubbing

Draw 6 examples


## Sources of Heat

**Tune: “My Bonnie Lies Over the Ocean”**

Oh, we can make heat with rubbing,  
And heat from machines can be fun...  
A hot tub will help us keep cozy,  
But most of our heat's from the sun.



Chorus:  
Heat and light can warm us.  
Heat from the sun will help plants to grow.  
Sunlight helps are creatures  
That live on the Earth, and below.

Mechanical machines are helpful  
They work without electric power,  
Like biking and cutting, and mowing,  
They produce some heat and some power.



Electrical machines are common,  
Like everything that has a cord,  
A lamp, stove, TV, or heater,  
And battery-powered toys.



Rubbing two things together  
Will create a little heat  
Like sticks, hands, balloons, and paper.  
I really think rubbing is neat.

Words by Vicke Ahlstrom