Getting A Grip

**main ideas**

- Friction is the resistance encountered when one object moves over the surface of another.
- Friction can help things start to move.
- Friction can help things stop moving.

**related ideas**

- Lubricants reduce friction so things move more easily.
- Snakes use friction to help them move.
- Friction can make things heat up.

**background information**

Friction is a force that can start things moving, slow things down, and even stop things altogether. The friction between a moving object and the surface it’s moving on causes the object to slow down. The two things that affect the amount of friction are roughness of the surface and weight of the object.

Lubricants like oil reduce friction by filling in rough areas and smoothing out the surface an object moves on. But sometimes friction is needed, and a surface can be too smooth. For example, if you can’t push off because a surface is too slippery, you can’t move. You need the force of friction to help you move. Treads on tires and shoes create friction so cars and people can “get a grip.”

**PROGRAM SYNOPSIS**

**SCENE 1 “Frictional” Characters 1:00**
What do bobsleds, roller coasters, motorcycles, skis, cars, planes, and people all have in common? They all need friction to get ‘em going and to slow ‘em down. A musical introduction includes film clips that demonstrate friction—or the lack of it—in action.

**SCENE 2 Grease-’n’-Go 1:30**
Cast members Stephanie and Kennan struggle to move a heavy box. Because there’s too much friction between the box and the floor, the kids can barely get the box moving. When they grease the floor they discover it’s a lot easier to move the box.

**SCENE 3 Ice Is Nice 4:30**
Cast member Miguel is in an iceboat skimming across a frozen lake. Reduced friction makes the boat whiz across the frozen water at up to 100 miles per hour. Iceboaters explain how friction between the blade and the ice melts ice under the boat’s narrow runner. So an iceboat really races on water!

**SCENE 4 Get a Grip 1:15**
Back to our story. When we left Stephanie and Kennan, they’d just greased the floor to cut down the friction. But now they discover there’s not enough friction between their feet and the floor! In order to get a grip on the floor, the kids use some super treads to increase friction.

**SCENE 5 Snake Shake 5:00**
Watch a snake move. It uses the weight of its body and the scales on its underbelly to create friction between its body and the ground. This enables the snake to move.

**vocabulary:** friction, lubricant, treads
BEFORE-VIEWING DEMONSTRATION

MATERIALS:
• bath mat with rubber on the bottom
• small cloth rug
• small basket
• 4-5 heavy textbooks

1. Ask students if they’ve ever tried to push a heavy object, such as a trunk or a toy box, across the floor. Was it difficult? Why? Explain to students that friction—one thing rubbing against another—is a force that works against you as you push; the more friction, the harder it is to push.

2. Invite kids to feel the texture of the rubber-bottomed mat and the cloth rug. Ask what conclusions kids can draw about the texture of each item, the amount of friction it might have with the floor, and its ease of motion.

3. Clear off the top of your desk. Place the rubber-bottomed mat on it. Now fill the basket with books and place it on the mat. Ask a student to push the basket AND mat across the desk. (The mat doesn’t move. Friction between mat and desk holds the mat still; the basket may tip over or lurch ahead.)

4. Place the basket on the cloth rug. Have the same student repeat the experiment and tell classmates which was easier: pushing the basket/mat, pushing the basket/rug. (basket/rug) Why? (There was less friction between the cloth-bottomed rug and the desk.)

5. Allow other kids to try the experiment. Or let them do it at the end of today’s lesson.

TUNING IN

Kids have seen how friction stops things from moving, but can friction help things start to move? Ask kids which would make it easier to walk across a slick, waxed floor: smooth-soled shoes, or sneakers? Why? Can kids think of an animal that has “natural” sneakers? (snake) Tell kids to watch the video and raise their hands when they see one. Pause the tape at that point and discuss how the snake’s body creates friction to help it move even on smooth glass. Then resume viewing the tape.

AFTER-VIEWING ACTIVITY

MATERIALS:
• hand lotion

1. Tell students to put their hands together and rub briskly for 10 seconds. What do they feel?

2. Pour or squeeze a little hand lotion into the palms of students’ hands, then repeat the experiment. Why was it easier to rub their hands the second time? (smoother surface) Why was there less heat? (less friction)

3. Ask students to name some ways lubricants, such as oil, are used. (in car engines and gears; on squeaky door hinges; etc.) Ask kids if it would be a good idea to oil the brakes of a car. Why not?

4. Let kids wearing sneakers compare tread designs. Do any look like snake’s scales? Which treads would give the best traction?
LESLESLESLESLESLESON TWO

PURPOSE
To help students understand that different surfaces either increase or decrease the amount of friction.

MATERIALS:
(per group of 3 students)
• 24” strip plastic wrap
• 24” strip wax paper
• 24” strip aluminum foil
• heavy textbook
• long stretchy rubber band
• masking tape
• metric ruler
• 2 pencils

WHAT TO DO:
1. Divide the class into groups of 3. Distribute the materials and activity sheet, “Friction Facts.”
2. Have kids smooth out and tape their wax paper, aluminum foil, and plastic side-by-side on a desk top. Ask them to run their hands over the materials, then write a description of how each feels on their activity sheets. (Part 1) Which material do kids think will produce the most friction if something moves across it? the least?
3. Have one group member open the book to the middle and pull a rubber band around the binding as shown. (A)
4. Let one group member place the book on foil and move the book across the surface by pulling on the rubber band, a second member measure how many centimeters the rubber band stretches before the book moves, and a third record the data in Part 2 of each activity sheet.
5. Repeat Step 4 with plastic wrap and wax paper. Tell kids to take turns so each group member has a turn to pull, to measure, and to record. Which surface produced the most friction? the least? Were kids’ predictions accurate?
6. Ask each group to place its book on two pencils. (B) Have kids repeat the book-pulling experiment on all three surfaces, then record the information on their activity sheets.

Ask students if there was more friction or less friction when the books were on pencils. (less) Why? (Only the pencils touch the surface therefore, there is less friction.) What works like the pencils to help move objects? (sled runners)

CURRICULUM CONNECTIONS

LANGUAGE ARTS

Give students practice both in writing descriptions and in inferring and visualizing. Have each student choose some sort of mystery surface to describe—a brick wall, a tile floor, a stained-glass window, a stucco wall, a wooden door, a satin shirt, a gravel driveway, a thick carpet, a woolen scarf, etc. Include as many details as possible. Allow time to complete the writing assignment, then let each student read her/his description to the class. Have classmates figure out what surface each writer is describing. Ask students which written details best helped them visualize the surface described. Would the surface create a lot of friction or a little if you tried to move something across it?
FRICITION FACTS

PART 1:

PLASTIC WRAP

WAX PAPER

ALUMINUM FOIL

PART 2:

CENTIMETER STRETCH

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<thead>
<tr>
<th>Rubber Band Pull</th>
<th>Pencil Slide</th>
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<td>Plastic Wrap</td>
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