12-5 How can friction be changed?

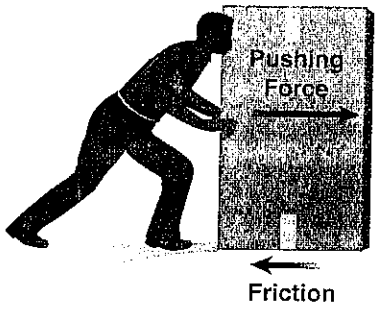
Objective

Describe some ways to change friction.

Key Term

lubricants (LOO-brih-kuhnts): materials that reduce friction

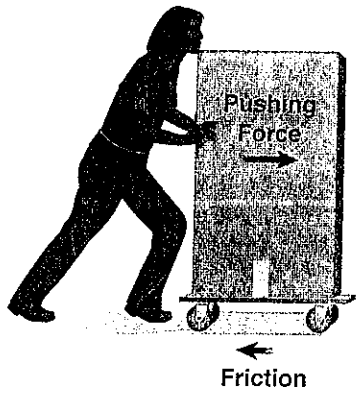
Moving Against Friction Friction makes it hard to move objects. Force is needed to overcome the force of friction. Suppose you wanted to push a heavy wooden box across the floor. As you push against the box, sliding friction equal to a force of 5 N pushes in the opposite direction. This means that it will take a total force greater than 5 N to push the box.



▲ **Figure 12-17** Overcoming sliding friction

1 **CALCULATE:** If the force of friction is 16 N, how much force is needed to move the object?

Using Rolling Friction Reducing friction makes it easier to move an object. One way to reduce friction is to change sliding friction to rolling friction. When you try to push a wooden box across a floor, you have to overcome sliding friction. The size of this frictional force depends on the types of surfaces in contact with each other. In this case, the bottom of the box is in contact with the floor. If you put the box on a wheeled cart, there will be much less friction. Rolling friction is always less than sliding friction. With the box on wheels, you use less force to push the box.



▲ **Figure 12-18** Using rolling friction

2 **EXPLAIN:** Why must you reduce friction in order to move certain objects?

Using Lubricants You can also reduce friction b using lubricants. **Lubricants** are materials tha reduce friction. For example, in a car's engin metal parts called pistons are in contact with othe metal parts. When two pieces of metal touch, ther is a lot of friction. Oil is used to reduce the frictio between the metal parts. Oil is a lubricant. I separates the metal parts from one anothe Without the oil, the metal parts would scrap against one another. This would make the engin overheat and wear out more quickly.

3 **IDENTIFY:** When would it be helpful to use a lubricant?

Not Enough Friction Have you ever slipped o an icy sidewalk or seen a car skid out of control These things happen when there is not enoug friction between surfaces such as your feet and th ice or the tires and the road. In such cases, it i necessary to increase friction. This can be done b spreading sand on an icy surface or using tire with a deeper tread.

Athletes often wear special footwear to increas friction between their feet and the surfaces ove which they move. Basketball players wear shoes with soles designed not to slip on a hardwood floor. In several sports, players wear shoes with spiked soles to give their feet a better grip on the ground.

Name KEY Class _____ Date _____

12-5 How can friction be changed?

Lesson Review

Circle the term or phrase in parentheses that best completes each statement.

1. The oil in a car's engine (increases / decreases) friction. - lubricant
2. Rolling friction is (greater / less) than sliding friction. - adding wheels dec. friction
3. There is (more / less) resistance when walking on an icy road than on a dry road. - less friction = less resist.
4. Shoes with spiked soles have (more / less) friction with the ground than normal shoes do. - more grip
5. Oil (is / is not) an example of a lubricant. - reduces friction
6. Sand is often put on icy driveways to (increase / decrease) the amount of friction. - to create more grip
7. (Increasing / Reducing) friction makes it easier to move an object. less grip = easier movement
8. The size of a frictional force (depends / does not depend) on the types of surfaces in contact with each other. - Surface and mass are two of the most important factors in friction

Skill Challenge

Skills: *analyzing, identifying, diagramming*

Complete the following.

You need to move a box full of books across a tile floor. Identify three ways in which you could reduce the amount of friction in order to move the box easily. Diagram each method.

Method 1

Put it on rollers (wheels)

Method 2

Add a lubricant to the floor (wax the floor)

Method 3

Dec the mass of the box (take books out)