SMOOTH RUNNING

You saw in the last project how friction can be a useful force, providing machines with the grip to climb a slope. However, friction is not always useful. Sometimes it gets in the way, especially if you are trying to get from one place to another as quickly and as easily as possible. Friction makes this harder and means you have to use more energy when travelling. See how the effects of friction can be reduced with this project.

SLIP SLIDING

1. Make two small boxes and glue one on top of the other to make a car shape, as shown here. Make another shallow box that is no deeper than the width of a straw.
2. Place the car body on a ramp (see page 24 for how to make a ramp). You will see that it does not slide down. Tilt the ramp until it does slide. You will have to tilt the ramp a long way.
3. Ask an adult to cut lengths of drinking straw so that they fit inside the shallow box you made.
4. Place the shallow box upside down on the ramp and put the car body on top. Tilt the ramp until the car begins to move. You will need to tilt the ramp a lot less than when the car did not have the straws.
5. Make two narrow trays which are big enough to hold a line of marbles.

ROUGHING IT UP

Try covering your ramp with different materials, such as sandpaper or a piece of carpet. Does your car move down the slope as easily this time?

Why It Works

The car body on its own does not slide because the friction between itself and the ramp is too great. Using straws or marbles as wheels reduces friction because their round shape reduces the area of contact between the car and the ramp. Marbles reduce friction more because there is less contact between them and the ramp.

6. Carefully place the marble trays on the ramp and place the car body on top. You should not have to tilt the ramp much before the car moves down the slope.