LAB 2 Laboratory Activity

Causing Friction

When you kick a soccer ball along the ground, you know that when you stop kicking the ball will eventually roll to a stop. What happens to the kinetic energy of the ball as it slows down? The law of conservation of energy states that energy cannot be created or destroyed. Therefore, the kinetic energy of the soccer ball does not just disappear; it changes form. As the ball rolls over the ground, friction causes some of its kinetic energy to change into thermal energy. Friction between the ball and the ground causes the ball to slow down and eventually stop. In this experiment, you will examine how different types of surfaces affect the amount of friction produced.

Strategy

You will predict what types of surfaces produce the least friction.
You will observe how friction affects the kinetic energy of a toy car.

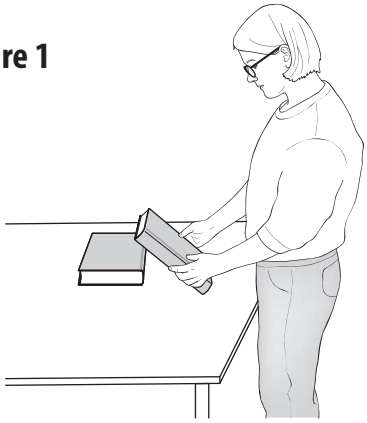
Materials

books (2)
meterstick
toy car
masking tape
coarse sandpaper (3 sheets)
strip of rough carpeting
pillowcase

Procedure

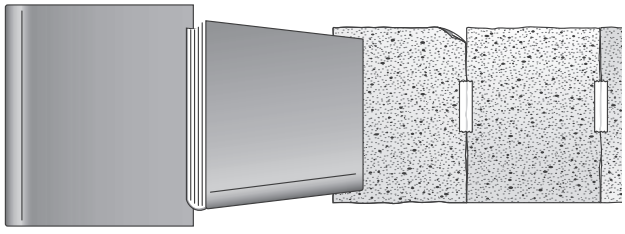
1. Place a book on top of a smooth, hard surface such as a table or an uncarpeted floor. Lean a second book against the first to form a ramp.

Figure 1



2. Use the meterstick to measure the height of the ramp. See Figure 1. Record the height in the Data and Observations section.
3. Do you think hard surfaces or soft surfaces will reduce the kinetic energy of a toy car more quickly? Rough surfaces or smooth surfaces? Record your predictions in the Data and Observations section.
4. Place the car at the top of the ramp and release it. Measure the distance between the bottom of the ramp and the spot where the car stopped moving. Record this distance in the table in the Data and Observations section. Repeat this step two more times. Use the meterstick to make sure that you release the car from the same height each time.
5. Tape the pieces of sandpaper together into a strip. Place the strip at the bottom of your ramp. See Figure 2. Repeat Step 4.

Figure 2



Laboratory Activity 2 (continued)

6. Use your fingers to brush ridges into the carpet's surface. Remove the sandpaper from the bottom of your ramp and replace it with the carpeting. Repeat Step 4.
7. Fold the pillowcase lengthwise into thirds. Place it on top of the carpeting at the bottom of your ramp.
   Smooth out any wrinkles in the fabric with your hands. Repeat Step 4.
8. Calculate the average distance the car traveled on each surface. Record your calculations in the Data Table.

Data and Observations

Height of ramp: _____

Predict what type of surfaces—hard or soft, smooth or rough—will reduce the kinetic energy of the car the quickest?

_____

Surface	Distance Moved by Car (cm)			Distance Moved by Car (cm)
	Trial 1	Trial 2	Trial 3	
Floor or table (hard, smooth)				
Floor or table (hard, rough)				
Floor or table (soft, rough)				
Pillowcase (soft, smooth)				

Questions and Conclusions

1. What type of surface (hard or soft, smooth or rough) provided the greatest amount of friction? Explain how you know.

_____

_____

2. What type of surface provided the least amount of friction?

_____

_____

Laboratory Activity 2 (continued)

3. What happened to the kinetic energy of the car after the car left the ramp?

4. Why was it important that the ramp be the same height in each trial?

5. Describe how you could determine the gravitational potential energy of the car at the top of the ramp.

6. Examine the data in your table. Than predict the distance the car would move if you placed a layer of gravel at the bottom of your ramp. Explain how the data helped you make your prediction.

7. Predict whether a hockey puck would move a greater distance over smooth ice or over rough ice. Explain how you used the data in your table to make your prediction.

Strategy Check

_____ Can you predict what types of surfaces will produce the least friction?

_____ Can you observe how friction affects kinetic energy?