INVESTIGATING FRICTION
Pre-Lab Questions

1. Describe the four types of friction.
2. List two factors that influence friction and explain whether each factor increases or decreases friction.
3. What unit is used to measure force?

Name _____ Date _____ Period _____

INVESTIGATING FRICTION

BACKGROUND: One of the forces you have studied is friction. Friction is retarding force. This means it lessens the effect of other forces. Friction, therefore, causes a "loss" of useful energy in many mechanical devices. This energy, of course, is not really lost but is transferred to heat energy at the point of contact.

In this investigation you will explain why the movement of one object over another produces heat and how changes in design can reduce friction. You will also learn how surface area, texture, and weight influence friction.

PROBLEM: What are some factors that affect friction?

_____

_____

MATERIALS:

- Spring balance
- Rectangular block of wood fitted with a metal eye
- Large piece of sandpaper

PROCEDURE

1. Suspend a block of wood from the spring balance and obtain its weight in newtons. Record the weight below.

   Weight of block _____

2. Place the block on the lab table with its larger surface (side A) downward. See Figure 1.

3. Keep the spring scale level with the table and pull the block along the table. In Data Table 1 record the force indicated on the spring scale needed to start the block moving. Also record the force indicated on the spring scale once the block is sliding evenly along the lab table.

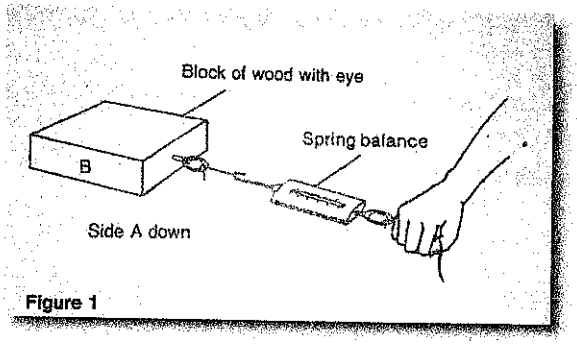

Figure 1

4. Repeat step 3 twice, recording your readings in Data Table 1. Calculate the average for the starting friction and the sliding friction.

5. Calculate the surface area for side A (area = length x width), and record it in the space provided.
6. Place the block on the lab table with its smaller surface (side B) downward. See Figure 2.
7. Repeat steps 3 and 4. Record your readings in Data Table 1.
8. Calculate the area for side B and record it in the space provided.

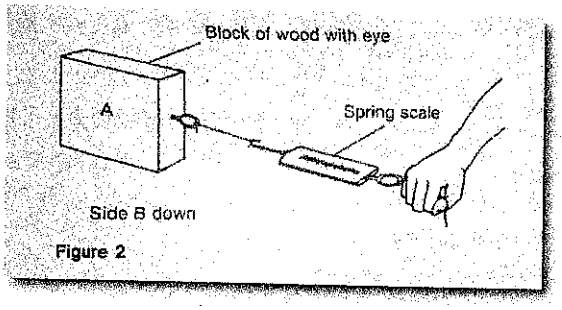

Figure 2

9. Repeat steps 1 through 8, sliding the surfaces of the block over a piece of sandpaper. Record your readings in the Data Table 2 for side A and side B.
10. Obtain a block of wood from a classmate, along with the data on its weight. Place it on top of your block so that the original A side is facing down. Record the weight of the two blocks and the sliding force required to move them across the lab table.

Weight of two blocks _____ Average sliding force _____

If time permits, borrow a third block and repeat.

Weight of two blocks _____ Average sliding force _____

OBSERVATIONS:

DATA TABLE 1

Surface Area of SIDE A _____ cm^2

Trial	Starting Friction (N)	Sliding Friction (N)
1		
2		
3		
Average		

Surface Area of SIDE B _____ cm^2

Trial	Starting Friction (N)	Sliding Friction (N)
1		
2		
3		
Average		

DATA TABLE 2

SIDE A

Trial	Starting Friction (N)	Sliding Friction (N)
1		
2		
3		
Average		

SIDE B

Trial	Starting Friction (N)	Sliding Friction (N)
1		
2		
3		
Average		

How did the starting friction compare with the sliding friction?

_____

ANALYSIS/CONCLUSIONS:

1. What do you think accounts for the difference between the starting friction and the sliding friction?

   _____

   _____

2. Based on your data, how does the surface area influence the sliding force of friction?

   _____

   _____

   _____

3. Based on your data, how does texture influence the sliding force of friction?

   _____

   _____

   _____

4. How does weight influence the sliding force of friction?

CRITICAL THINKING AND APPLICATION:

1. List two situations in which friction can be helpful.

2. List two ways you could reduce the friction between two or more surfaces.

3. Why do wheels reduce the force of friction?

4. Which task would require more effort, pushing a 1-kg box across an ordinary floor or pushing a 2000-kg box across a frictionless floor? Explain your answer.