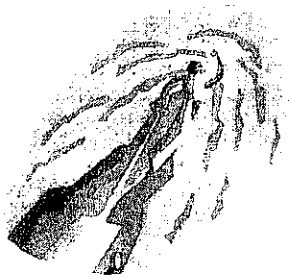
Name Date Block

Lab 3.1 Friction

Lab Preview:

1. What measuring device do you use to measure weight?

2. What is a force?



Introduction: *How does surface area affect the force of friction?* Friction is the force that resists the sliding or rolling of one substance over the surface of another substance. Dry friction is due mainly to the irregularities of microscopic projections in the two surfaces in contact. The coefficient of friction between two surfaces is the ratio of the force needed to overcome friction (force of friction) to the force of gravity (weight).

Apparatus and Materials: spring scale, block of wood, 500g mass, waxed paper.

Trials 1-3

Trials 4-6

Procedure:

1. Determine the zero of the spring scale and correct the spring scale reading for zero. The weight of the block and the 500 g-wt. should be measured with a spring scale.
2. Trial 1—Lay the block flat (largest surface area down) and determine the force needed to drag the block across the table, pulling at a uniform rate. Read the scale while the block is in motion. Record in your data table under "force of friction". The weight of the block is recorded under "weight".
3. Trial 2—Do the same as trial 1, except place the 500 g-wt. on top of the block. Record the weight of both block and weight, then record the reading of the scale when it is pulled across the table.
4. Trial 3—Now take the block and the 500 g-wt. and place them on a material of your choosing and repeat the above procedure. Record in the data table.
5. Trial 4—Take the block and place it on its side. Drag it across the table. Measure the force of friction. Record in the data table.

6. Trial 5—Place the 500 g-wt. on top of the block and drag it across the table. Record the spring scale force in the data table.
7. Trial 6—Repeat trial 5 with your material. Record data.

Trial	Weight (N)	Force of Friction (N)	Coefficient of Friction
1			
2			
3			
4			
5			
6			

Coefficient of Friction = $\frac{\text{force of friction}}{\text{weight}}$

weight of block =

weight of 500 g-wt. =

Analyze:

1. The coefficient of sliding friction (decreases, increases, remains the same) as the weight increases.

2. The coefficient of sliding friction (decreases, increases, remains the same) as the surface area decreases.

3. When a book being pulled by a spring scale first starts to move, the spring scale reading is higher than when the block is moving at a uniform rate. This is due to inertia and the force of (sliding, static, rolling, fluid) friction.

4. Define coefficient of friction:

5. Friction between two surfaces in contact may be lessened by (decreasing, increasing) the surfaces in contact.

6. If a force of 25 lb is needed to pull a 500-lb weight across a tabletop, what is the coefficient of friction between the surface of the weight and that of the tabletop?