

II-10 CHAIR FRICTION LAB

Application

Problem

How can you use frictional forces to predict a student's weight?

Materials

Chair with metal coasters, spring scales or bathroom scale, strong string, level smooth floor surface, waxed paper, blocks of wood, wax blocks.

Procedure

1. How can you measure the weight of a person by using several spring balances? A mathematical relationship exists between the force needed to slide a chair and weight of the chair. Use a spring balance to measure the weight of the chair. If one balance is not sufficient could two or more help? If so, how would you arrange them?
2. Now measure the frictional force needed to slide an upright chair at a constant velocity. The balance must be attached near the bottom of the chair and pulled horizontally.
3. How can you reduce the frictional force between the chair and the floor? Repeat procedure 2 using some material to reduce the friction. You may try several ways. (optional)
4. With a student sitting in the chair, use the spring balances to slide the chair at a constant velocity. Repeat the procedure with the other materials used in procedure 3.
5. How can you calculate the weight of the student plus chair?
6. Now find the weight of just the student. Convert the student's weight from Newtons to pounds. (1 lb = 4.45 N)
7. Repeat for each person in your lab group.

Summing Up

1. Develop a data table to display the data and results in a neat and logical way.
2. Draw a free body diagram for each situation (3 of them) and write the net force equations for each diagram.
3. What did you learn about using two or more spring balances?
4. Which materials are better for reducing friction for non-skid chairs? Why?