

Friction Lab What a drag!

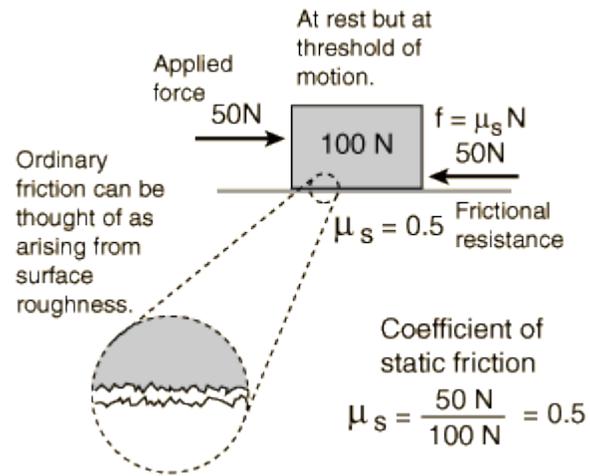
The objective of this lab is twofold: you are to determine the factors that affect the quantity of friction experienced between objects and, secondly, you are to determine the coefficient of friction between several everyday substances and compare the numbers you get to numbers from <http://www.engineershandbook.com/Tables/frictioncoefficients.htm>

The following questions are to serve as a guide. The lab report will be in standard format.

1. Does the surface area of an object affect the force of friction between said object and another?

Approach: Attach a string to a piece of wood. Pull on string with spring scale. How much force is required to break it free, that is, to start it sliding? This is the force of static friction. Calculate μ_s . How much force is required to keep it sliding at a constant speed? This is the force required to overcome kinetic friction. If the motion of the object is constant the forces are in equilibrium; the force of the pull is equal to the force of friction. Calculate μ_k . Turn the wood so that it is on its side. Compare the surface area it now rests on to the surface area you initially rested it upon. Repeat experiment. Compare coefficients of friction. Did they change? Does μ depend upon surface area?

2. Does weight (mg) affect the force of friction? Find the weight of the wood block, and place an equal amount of weight on top of the block. You have now doubled the weight pushing down from the block. Find the force of friction required to start it sliding as well as the force required to keep it sliding, as in procedure 1. Did you need more force to start it sliding with the additional weight? How much more? Can you say that the force of friction is proportional to weight? Find the coefficients of static and kinetic friction. Compare to numbers in procedure 1.
3. You now have numbers for wood sliding on wood. The final step is to repeat the experiment for rubber on concrete. (If the concrete outside is wet you will determine the coefficients of friction between wet concrete and rubber only). Have a volunteer take off a sneaker. Find the weight of the sneaker and add a 1 kg mass to it by placing it inside. Attach a string and a spring to the sneaker and repeat procedure #1 for the sneaker and the concrete. If the concrete is dry perform the experiment on the dry concrete. Once you have μ_s and μ_k for dry concrete take some water outside and wet a patch of concrete. Repeat experiment. Determine μ_s and μ_k for wet concrete.
4. Compare your coefficients of friction to those published on <http://www.engineershandbook.com/Tables/frictioncoefficients.htm>



This picture is from <http://www.howe.k12.ok.us/~jimaskew/friction.htm>