32370 Friction Block

Purpose:
This block is designed to demonstrate differences in friction between moving surfaces.

Required Accessories:
Spring Scale
Weights

Optional Accessories:
Inclined surface, stand, clamps, protractor

Procedure:

Place the block on any flat surface with the hook pointing in the direction you intend to pull it. Secure some weights to the top of the block. Attach spring scale to the hook. Begin pulling block. The moment the block begins to move read and record the force needed. Be attentive that the direction of the pulling motion is parallel to the surface the block is placed on. The force needed to cause the block to begin moving is called *static friction force*. Continue pulling the block along at a constant speed and notice the force needed to keep it moving is less than the force needed to cause the block to begin moving. This is called *kinetic friction force*. Record the total weight of the block and weights. Using the following formula, calculate the *coefficient of friction*:

μ = Coefficient of Friction
F = Force needed to just keep the block moving
N = Normal force, if the surface is horizontal, this is the total weight of block and weights

The normal (N) always acts perpendicular to the surface. Therefore, if an inclined surface is used, the normal will be a component of the weight of block and added weights and therefore is less than the total weight. Other coefficients of friction can be determined by changing the surface the block is pulled along. Following is a list of some approximate coefficients of friction.

Material	Static Coefficient	Kinetic Coefficient
Wood on wood	0.70	0.40
Steel on steel	0.15	0.09
Metal on leather	0.60	0.50
Wood on leather	0.50	0.40
Rubber on concrete	0.90	0.70

Alternative Procedure:

If the friction block is to be used on an inclined surface, an alternative method can be used. The incline needs to be supported in a way that the angle of inclination can be easily changed. By finding the angle where the block will not slide down by itself, but

will continue to slide at a constant rate once it is started, one finds the "limiting angle of repose." The coefficient of friction can then be found by a simple calculation:

μ = tan function of the limiting angle of repose

Time Allocation:

No prior assembly is required for this product itself. Individual experiment times will vary depending on the needs of students and methods of instruction, but normally will not exceed one class period.

Feedback:

If you have a question, a comment, or a suggestion that would improve this product, you may call our toll free number.