

Titan Learning Center
Science ACT Prep
Week 4

A physicist is investigating the effect that different conditions have on the force of friction. The material used is an ordinary brick, with a mass of 1.8 kg. It is pulled across the surface of a wooden table. Friction is measured by pulling the brick with a string attached to a spring scale, calibrated in newtons (N). When the brick is pulled at constant speed, the reading on the scale is equal to the force of friction between the brick and the table top.

Experiment 1

The brick is placed on the table in three different positions. First, it is allowed to rest on its broad face (area = 180 cm²), then on its side (area = 130 cm²), and finally on its end (area = 56 cm²).

Table 1

Area (cm ²)	Friction (N)
180	7.1
130	7.3
56	7.2

Experiment 2

A wooden block of mass 0.6 kg is made to the same dimensions as the brick, and the experiment is repeated.

Table 2

Area (cm ²)	Friction (N)
180	1.2
130	1.1
56	1.2

Experiment 3

This time, the wooden block is loaded by adding 1.2 kg of extra mass on top of it, to give it the same weight as the brick.

Table 3

Area (cm ²)	Friction (N)
180	3.5
130	3.6
56	3.7

- From Experiment 1, it would be reasonable to hypothesize that:
 - the surface area of contact does not affect the amount of friction.
 - friction is large in a brick-to-wood contact.
 - the amount of friction depends on the way the weight of the object is distributed.
 - heavy objects have more friction than light ones.
- Which combination of experiments shows that the amount of friction depends on the weight of the object?
 - Experiment 1 and Experiment 2
 - Experiment 1 and Experiment 3
 - Experiment 2 and Experiment 3
 - Experiment 1, Experiment 2, and Experiment 3

3. In doing Experiment 3, what was the purpose of adding enough weight to the wooden block to make its weight equal to that of the brick?
- A. To test the hypothesis that adding weight increases friction
 - B. To find the relationship between surface area of contact and friction.
 - C. To find out whether the density of the material influences the amount of friction
 - D. To control other factors and test the effect of the nature of the materials in contact
4. The experimenter repeated the experiment with the unloaded wooden block mounted on three tiny wooden points, which were the only contact with the table top. If the results of all these experiments hold good for extreme values of the experimental variables, about how much would the friction be?
- F. About 0.4 N
 - G. Substantially less than 1.2 N
 - H. About 1.2 N
 - J. Substantially more than 1.2 N
5. Common experience indicates that it is much harder to slide some boxes across a floor than others. Which of the following reasons why this is true is demonstrated in these experiments?
- A. Friction is greater if there is more surface in contact.
 - B. A heavy box will have more friction against the floor than a light one.
 - C. Objects of irregular shape have more friction because they dig into the floor.
 - D. The amount of friction depends on how the weight of the object is distributed.
6. The results of these experiments suggest that, if three bricks were piled up and pulled along as before, the amount of friction would be about:
- F. 3.6 N.
 - G. 7.2 N.
 - H. 14.4 N.
 - J. 22.6 N.

TLC Stamp

