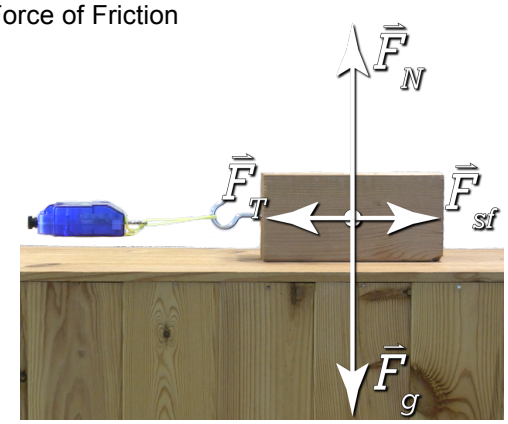
Flipping Physics Lecture Notes:
Experimentally Graphing the Force of Friction

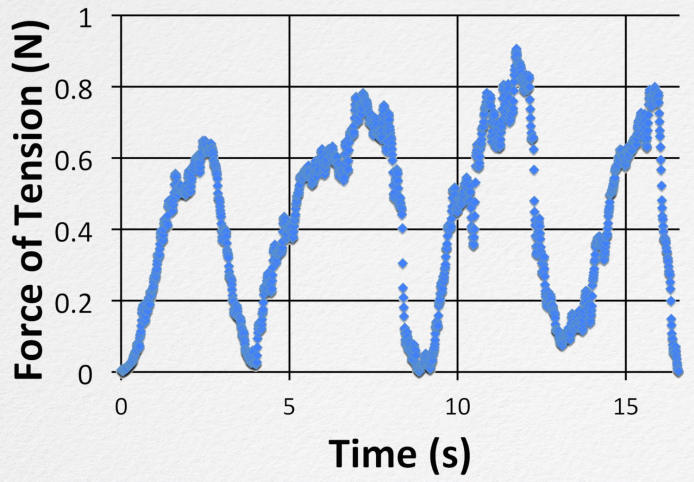


First we draw the Free Body Diagram.
Then we sum the forces in the x-direction.

$$\sum F_x = F_{sf} - F_T = ma_x = m(0) = 0 \Rightarrow F_{sf} = F_T$$

Which shows that, as long as the block isn't accelerating, the Force of Static Friction and the Force of Tension are equal in magnitude.

Graph when the block doesn't move.



Now I pull until the block moves. The first part is all static friction, when the block is stationary and the force of tension equals the force of static friction. This means the maximum force of static friction is also the force of tension. Then the block starts to move and the friction switches to kinetic. After the block starts to move, the force of tension decreases, because the coefficient of static friction is greater than the coefficient of kinetic friction: $\mu_s > \mu_k$. This graph shows it is harder to put an object in motion than it is to keep something moving.