Flipping Physics Lecture Notes:
Introduction to Equilibrium

An object is in equilibrium if the net force acting on the object is zero. $\sum \vec{F} = 0$

In other words, if you add up all of the forces acting on an object they add up to zero.

Put one more way, all the forces acting on the object balance out or cancel one another.

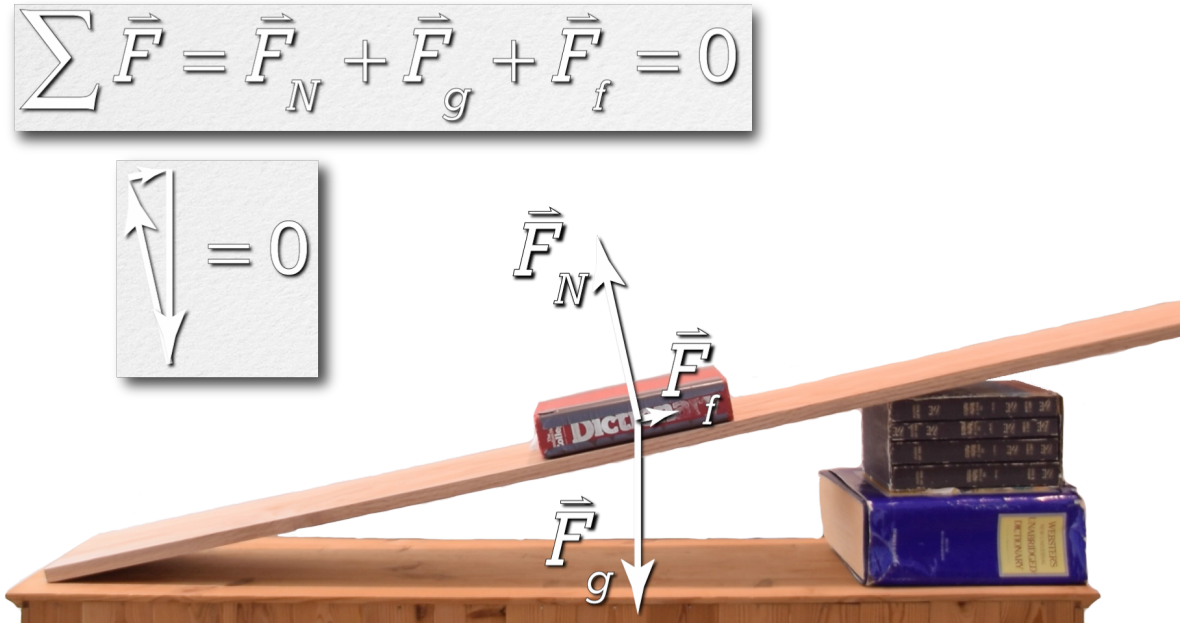
Because the net force, according to Newton's Second Law, equals mass times acceleration, the acceleration of the object must be zero. Because acceleration equals change in velocity over change in time, the change in velocity of the object is zero. Therefore an object in equilibrium is either at rest or moving at a constant velocity.

$$\sum \vec{F} = 0 = m\vec{a} \Rightarrow \vec{a} = 0 = \frac{\Delta \vec{v}}{\Delta t} \Rightarrow \Delta \vec{v} = 0$$

More specifically, this type of equilibrium is called *Translational* Equilibrium. This means the is non-rotational equilibrium

Examples:

Book at rest on an incline.



Vehicle moving at a constant velocity