Flipping Physics Lecture Notes:
Introduction to Newton's First Law of Motion

Sir Issac Newton's (1642 – 1726) First Law of Motion:

> **An object at rest will remain at rest and an object in motion will remain at a constant velocity unless acted upon by a net external force.**

Case #1: An object at rest will remain at rest unless acted upon by a net external force. Therefore and object that remains at rest will have a net external force of zero acting on it. This does not mean there are no forces acting on it; it simply means that when you add up all the forces you get a value of zero.

Case #2: An object in motion will maintain a constant velocity unless acted upon by a net external force. This means, because velocity is a vector, that an object in motion will maintain a constant speed and direction unless acted upon by a net external force. Again, this does not mean there are no forces acting on the object, it means the sum of the external forces is zero.

Newton's 1st Law of Motion is often called the Law of Inertia. Inertia is the tendency of an object to resist a change in state of motion. So Newton's first law is about how an object maintains its state of motion.

The two most common mistakes students make are underlined here: An object at rest will remain at rest and an object in motion will remain at a constant velocity unless acted upon by a net external force. Students will often say that on object in motion will remain in motion, which is not correct. And students will often leave of the "net external".