Newton's Law 1st of Inertia Applied to Geologic Processes

There are cracks in the Earth's crust, called faults. The plates of the Earth move at a rate of inches/year. The problem is that the Earth on the two sides of the fault line aren't necessarily moving at the same speed, or even the same direction. If there were no friction, this wouldn't be a problem. You would just see your neighbors on the other side of the fault line move as the years went by. However, because of friction, the Earth on the two sides can't move, because the net force is not strong enough to overcome friction.

So what happens? The Earth is still trying to move, but is unable. This is in accordance to Newton's First Law of Motion which states that an object at rest will remain at rest until acted on by an unbalanced force. As the Earth gets compressed and potential energy (pressure) increases, the force on the fault increases. Finally, the force becomes so great, that the whole Earth moves. This is an example of potential energy transforming into kinetic energy. The net force overcomes the force of friction, and the Earth moves at a rate of feet per second, as opposed to inches per year.

Newton's 2nd Law of Force and Acceleration Applied to Geologic Processes

This is an application of Newton's Second Law of Motion: $F = ma$. Since the sum of the forces built up before an earthquake is enormous, the acceleration is so substantial that we often read or hear about this catastrophe on the news or in newspapers.

Newton's 3rd Law of Action - Reaction Applied to Geologic Processes

Newton's Third Law of Motion states for every action there is an opposite but equal reaction. The third law occurs everywhere in an earthquake. If some part of the ground pushes (a push is a force) on another part, the other part pushes back. The faults have been building up pressure (potential energy), and the force from the first earthquake is enough to get those faults to slip (kinetic energy). These faults push back on the original one. This is the reason for aftershocks (which go on for weeks after a large earthquake). The same goes for buildings, one part pushes on another, and the other pushes back. This action/reaction creates all sorts of unusual stresses, which is why buildings with a flaw can fall apart.