How Mass Changes with Velocity and Energy? LIANXI MA, Blinn College — It is well known that mass of an object m can increase with its speed v, which is one reason that we believe that the speed of light c is the ultimate limit for all objects. As the v is approaching to the speed of light, the m becomes larger and larger so the acceleration becomes more and more difficult. It is also well known that m is related to the energy E. Energy is released in the nuclear reaction while the mass is lost and this has been the theoretical basis for nuclear fission and fusion reactions. However, argument exists over how to interpret the relationship between mass and velocity and energy. In the text, we don't want to discuss if the use of relativistic mass is appropriate. Instead, we discuss two examples that seem to be confusing in the teaching of special relativity. A harmonic spring oscillator and a proton accelerated in an electric field are chosen as examples to discuss the mass change with energy and velocity. We show that the two equations $m = \gamma m_0$ and $m = \frac{E}{c^2}$ agree each other if potential energy and related mass are properly considered.

Lianxi Ma
Blinn College