Elasticity and Hooke's Law If a force is exerted on an object, such as the vertically suspended metal rod shown in Figure 3.1, the length of the object changes Experiments show that Al is proportional to the force exerted on the object. If the object is stretched beyond the elastic limit, o It enters the plastic region: it does not return to the original length upon removal of the external force, but remains permanently deformed o The maximum elongation is reached at the breaking point. Figure 3.2 shows a typical graph of applied force versus elongation.: o Up to a point called the proportional limit, Eq. 3.1 is a good approximation for many materials, and the curve is a straight line. For if the force is too great, the object stretches excessively and eventually breaks.