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Kinetic Energy

Reading Material to Accompany Activity

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Kinetic Energy

Kinetic energy is the energy of motion. An object which has motion - whether it be vertical or horizontal motion - has kinetic energy. There are many forms of kinetic energy - vibrational (the energy due to vibrational motion), rotational (the energy due to rotational motion), and translational (the energy due to motion from one location to another). To keep matters simple, we will focus upon translational kinetic energy. The amount of translational kinetic energy (from here on, the phrase kinetic energy will refer to translational kinetic energy) which an object has depends upon two variables: the mass (m) of the object and the speed (v) of the object. The following equation is used to represent the kinetic energy (KE) of an object.

$$KE = \frac{1}{2} * m * v^2$$

where m = mass of object

v = speed of object

This equation reveals that the kinetic energy of an object is directly proportional to the square of its speed. That means that for a twofold increase in speed, the kinetic energy will increase by a factor of four; for a threefold increase in speed, the kinetic energy will increase by a factor of nine; and for a fourfold increase in speed, the kinetic energy will increase by a factor of sixteen. The kinetic energy is dependent upon the square of the speed. As it is often said, an equation is not merely a recipe for algebraic problem-solving, but also a guide to thinking about the relationship between quantities.

Kinetic energy is a scalar quantity; it does not have a direction. Unlike velocity, acceleration, force, and momentum, the kinetic energy of an object is completely described by magnitude alone. Like work and potential energy, the standard metric units of measurement for kinetic energy is the Joule. As might be implied by the above equation, 1 Joule is equivalent to 1 kg*(m/s)^2.

$$1\ Joule = 1\ kg * \frac{m^2}{s^2}$$