Flipping Physics Lecture Notes:

Introduction to Kinetic Energy with Example Problem

Kinetic Energy, KE, is the energy associated with the motion of an object: $\boxed{KE = \frac{1}{2}mv^2}$

m = mass of the object and v = the velocity of the object.

$$KE = \frac{1}{2}mv^2 \Rightarrow (kg)\left(\frac{m}{s}\right)^2 = \frac{kg \cdot m^2}{s^2} = \left(\frac{kg \cdot m}{s^2}\right)(m) = N \cdot m = J$$

Note: Kinetic Energy can*not* be negative. Mass can't be negative and even if velocity is negative, it is square and the square of a negative number is positive.

Example: $m_{prius} = 1400\,kg;\ m_{bike} = 86\,kg;\ v_{bike} = 25\frac{mi}{hr};\ v_{prius} = ?$

$$KE_{bike} = KE_{prius} \Rightarrow \frac{1}{2}m_{bike}\left(v_{bike}\right)^2 = \frac{1}{2}m_{prius}\left(v_{prius}\right)^2 \Rightarrow m_{bike}\left(v_{bike}\right)^2 = m_{prius}\left(v_{prius}\right)^2$$

$$\Rightarrow \left(v_{prius}\right)^2 = \frac{m_{bike}\left(v_{bike}\right)^2}{m_{prius}} \Rightarrow v_{prius} = v_{bike}\sqrt{\frac{m_{bike}}{m_{prius}}} = 25\frac{mi}{hr}\sqrt{\frac{86\,kg}{1400\,kg}} = 6.1962 \approx \boxed{6\frac{mi}{hr}}$$