# Kinetic energy facts simple

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Translational kinetic energy of a body is equal to one-half the product of its mass, m, and the square of its velocity, v, or 1/2mv2. For a rotating body the moment of inertia, I, corresponds to mass, and the angular velocity (omega), o, corresponds to linear, or translational, velocity. Accordingly, rotational kinetic energy is equal to one-half the product of the moment of inertia and the square of the angular velocity, or 1/2Io2.

For everyday objects the energy unit in the metre-kilogram-second system is the joule. A 2-kg mass (4.4 pounds on Earth) moving at a speed of one metre per second (slightly more than two miles per hour) has a kinetic energy of one joule. The unit in the centimetre-gram-second system is the erg, 10-7 joule, equivalent to the kinetic energy of a mosquito in flight. The electron volt is used on the atomic and subatomic scales.

Potential and kinetic energy are the two major types of energy. Here is a look at kinetic energy, including its definition, examples, units, formula, and how to calculate it.

In physics, kinetic energy is the energy an object has due to its motion. It is defined as the work required to accelerate a body of a given mass from rest to a certain velocity. Once the mass reaches the velocity, its kinetic energy remains unchanged unless its speed changes. However, velocity and thus kinetic energy depend on the frame of reference. In other words, an object’s kinetic energy is not invariant.

The SI unit of kinetic energy is the joule (J), which is a kg?m2?s-2. The English unit of kinetic energy is the foot-pound (ft?lb). Kinetic energy is a scalar quantity. It has magnitude, but no direction.

Because mass is always a positive value and the square of any value is a positive number, kinetic energy is always positive. Also, this means the maximum kinetic energy occurs when velocity is greatest, regardless of the direction of motion.

From the kinetic energy equation, you can see an object’s velocity matters more than its mass. So, even a small object has a lot of kinetic energy if it’s moving quickly.

The key to solving kinetic energy problems is to remember that 1 joule equals 1 kg?m2?s-2. Speed is the magnitude of velocity, so you can use it in the kinetic energy equation. Otherwise, watch your units in fractions. For example, (1)/(400 m2/s2) is the same as (1/400) s2/m2.

A frictionless roller coaster is a good example of the interplay between kinetic and potential energy. At the top of the track, the roller coaster has maximum potential energy, but minimum kinetic energy (zero). As the cart goes down the track, its velocity increases. At the bottom of the track, the potential energy is at its minimum (zero), while the kinetic energy is at its maximum.

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Kinetic energy is the energy that an object has because of its motion. This energy can be converted into other kinds, such as gravitational or electric potential energy, which is the energy that an object has because of its position in a gravitational or electric field.