

Explore

How Is Kinetic Energy Transformed into Potential Energy?

Potential energy is the energy stored in an object when work is done on it. You can compare the potential energy stored in an object to the energy stored in a rubber band that you have stretched out. You do work on the rubber band to stretch it. Even though you are holding the stretched rubber band at rest, you know that when you release it, it will snap back to its original shape. The stretched rubber band has the potential to move when it is released. This is potential energy. As you can see from this example, the potential energy of the rubber band can quickly be transformed into **kinetic energy** when the rubber band snaps back to its original shape.

Just as potential energy can be transformed into kinetic energy, kinetic energy can be transformed into potential energy. This happens when you throw a ball straight up into the air. Initially, all the energy of the ball is kinetic energy. However, as the ball travels up into the air, it slows down, losing kinetic energy. This kinetic energy is transformed into gravitational potential energy. At the highest point in its path, the ball comes to a stop and has zero kinetic energy. At this point, all of the kinetic energy has been transformed into potential energy. Then, as the ball begins to fall back down, it loses potential energy, speeds up, and gains kinetic energy. A ball bouncing on the ground, a roller coaster moving up and down along the track, and a spring bouncing back and forth are all examples of kinetic and potential energy transformations.



Potential vs. Kinetic Energy

A trampoline can help you learn a lot about physics! What happens to the kinetic energy and the potential energy of this boy as he is launched into the air?

While kinetic energy can be transformed into potential energy, and vice versa, the total energy in a system always remains constant. This is because of the law of conservation of energy, which states that energy is never created or destroyed. Energy can only change from one form to another. For example, when a **mass** on a spring is stretched and then released, it oscillates back and forth. The potential energy of the mass is at a maximum when it is stretched to its farthest length. At this point, the kinetic energy is zero. When the mass passes through the equilibrium point of the spring, the potential energy is zero. Its kinetic energy is at a maximum. The sum of the kinetic and potential energy at any moment is always the same value. In this example, the maximum

potential energy of the stretched mass is equal in value to the maximum kinetic energy of the mass as it shoots through the equilibrium point.

EXPLORATION**Moving On**

In this Exploration, you will investigate the relationship between the potential and kinetic energy of a bouncing ball. Does the total energy of an object ever change, and if so, why?

Student's Guide Level 1

VIDEO SEGMENT**Potential and Kinetic Energy**

As an object alternates between motion and rest, its kinetic energy and potential energy change. How do these related forms of energy transform from one to the other?

Kinetic and Potential Energy

Complete this question online.

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