

Kinetic and Potential Energy

Chapter 10: Work and Energy · Topic 2

Key Concept

The Law of Conservation of Energy states that energy cannot be created or destroyed, only converted from one form to another — a ball at the top of a hill has maximum potential energy and zero kinetic energy; as it rolls down, potential energy converts progressively into kinetic energy, reaching maximum kinetic energy (and zero potential energy relative to the bottom) just before it stops rolling. This interplay between kinetic and potential energy explains the motion of pendulums, roller coasters, and falling objects.

Quick Revision Notes

- Kinetic energy (KE) = $\frac{1}{2}mv^2$ — energy due to motion.
- Potential energy (PE) = mgh — energy due to position (height), commonly gravitational.
- Law of Conservation of Energy: energy is neither created nor destroyed, only converted between forms.
- A ball rolling downhill converts potential energy into kinetic energy.

Practice Questions

- 1 Calculate the potential energy of a 2kg object at a height of 5m ($g=9.8 \text{ m/s}^2$).
- 2 Explain how energy converts between potential and kinetic forms as a ball rolls down a hill.
- 3 State the Law of Conservation of Energy in your own words.