What is the Law of Conservation of Energy?

Worksheet

Total mechanical energy is conserved: E_total = KE + PE = constant. As an object falls, potential energy converts into kinetic energy, and their sum never changes (ignoring friction and air resistance).

$$E_{total} = KE + PE = const$$

Questions

1. In an isolated system, total mechanical energy
A) Increases over time
B) Decreases over time
C) Stays constant
D) Becomes zero

2. As a ball falls freely, its potential energy
A) Increases while kinetic energy decreases
B) Decreases while kinetic energy increases
C) Both increase
D) Both decrease

3. The law of conservation of energy states that energy
A) Can be created from nothing
B) Can be destroyed completely
C) Cannot be created or destroyed, only transformed
D) Always increases over time

4. In real systems with friction, why does mechanical energy seem to decrease?
A) Energy is truly destroyed
B) It converts to heat and sound, not lost overall
C) Gravity weakens over time
D) Mass decreases

5. A ball is dropped from 20 m (g = 9.8 m/s). Find its speed just before hitting the ground, ignoring air resistance.

6. A roller coaster starts from rest at the top of a 30 m hill. Find its speed at the bottom.

7. A pendulum is released from a height of 0.2 m. Find its maximum speed at the bottom of the swing.

8. Define: What does the law of conservation of energy state?

9. Define: What is the formula for total mechanical energy?

10. Define: What happens to energy in a closed system?

Answer Key

1. C) Stays constant - With no external forces like friction, E_total = KE + PE is conserved.

2. B) Decreases while kinetic energy increases - Height decreases (PE falls) while speed increases (KE rises); their sum stays constant.

3. C) Cannot be created or destroyed, only transformed - Energy only changes form; the total amount never changes.

4. B) It converts to heat and sound, not lost overall - Friction converts mechanical energy into thermal and sound energy; total energy is still conserved.

5. mgh = mv v = (2gh) = (29.820) v = 392 19.8 m/s

6. mgh = mv v = (2gh) = (29.830) v = 588 24.2 m/s

7. mgh = mv v = (2gh) = (29.80.2) v = 3.92 1.98 m/s

8. Energy cannot be created or destroyed, only converted from one form to another.

9. E_total = KE + PE, and this sum stays constant in an isolated system.

10. It stays constant in total - it just transforms between forms like kinetic and potential.