

Physics

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Energy Conservation

Summary Concepts

Energy Laws

1st Law: Energy can be neither created nor destroyed. Energy can only be converted from one form to another by the process of work.

2nd Law: In any system the total amount of energy must be conserved; neither increasing nor decreasing in its total amount.

***Note:** The term “lost” refers to an amount of mechanical energy being transformed/converted to other non-mechanical energy forms.

Energy Cases

When applying energy principles to a system, determine which of the energy cases below is involved. This will determine which form of the energy conservation equation to use.

Terms on the left side of the equation represent initial energy quantities while terms on the right side of the equation represent final energy quantities.

In each case total energy is conserved.

Case I: Only conservative forces act. Total mechanical energy is conserved. Total energy is conserved

$$E_k + E_g + E_e = E_k + E_g + E_e$$

Case II: Non conservative forces act. Total mechanical energy is not conserved. Total mechanical energy will either increase or decrease. Total energy is conserved.

$$E_k + E_g + E_e = E_k + E_g + E_e + E_{\text{Non-Mech}}$$

***Note:** E_{Th} is equal to the work done by the non-conservative forces acting on the object. This work is seen as thermal energy or other non-mechanical energies like sound or light.