

Unit 4: Cause of change

Essential Questions

What is energy?

How do we know that things have energy?

What happens to the energy in a system — where does this energy come from, how is it transferred within the system, and where does it ultimately go?

How can energy be transferred from one material to another?

What can be concluded about the total amount of energy in a system?

Instructional Goals

By the end of this unit, you should be able to do the following:

1. View energy interactions in terms of transfer and storage
Develop concept of relationship among kinetic (E_k), gravitational potential (E_g), elastic potential (E_{el}) & internal energies, such as thermal energy (E_{th}) and chemical (E_{ch}), as modes of energy storage
System schema are used to represent the relationship between energy transfer and storage.
Emphasis on pie charts to represent energy storage
Apply conservation of energy to mechanical systems
2. Identify working, heating and radiating as energy transfer mechanisms. Working is the transfer of energy into or out of a system by means of an external force

Sequence

1. Activity 1 - Stations
2. Discuss storage and transfer mechanisms, include a discussion of representational tools (system schema and pie charts).
3. Exercise 1 – Qualitative Analysis with energy pie charts
4. Activity 2 – PhET – Energy Skate Park
5. Exercise 2 – Practice with energy pie charts
6. Exercise 3 – Energy transfer through force
7. Quiz