

Unit # - 3 – Energy – Transformation and Sources

Standards Addressed	Student Learning Objectives for this Unit	Content Skills and Knowledge	Learning Activities and Instructional Strategies
<p>NSES Standards: Transfer of Energy</p> <p>NSES Standards: Conservation of Energy</p> <p>PA STEE Standards: 3.1.7.A (system) 3.1.7.B (models) 3.1.7.E (change) 3.2.7.A (app k) 3.2.7.B (int obs) 3.4.7.B (energy) 4.2.7.A raw mat 4.2.7.B ren res 4.2.7.C res distr</p> <p>1.2 read crit 1.4 writing 1.8 presentation</p>	<p>Students will be able to...</p> <p>Part 1</p> <p>A. Understand the definition of energy and it's relationship to the concept of work.</p> <ul style="list-style-type: none"> ▪ Mechanical Energy (Kinetic and Potential) ▪ Other Forms of Energy <ul style="list-style-type: none"> ○ Thermal Energy ○ Chemical Energy ○ Electrical Energy ○ Sound Energy ○ Light Energy ○ Nuclear Energy <p>B. Know that an energy transfer often leads to an energy conversion, a change from one form of energy into another. Examples would include:</p> <ul style="list-style-type: none"> ▪ Conversions involving chemical energy (esp. sun) ▪ Conversions involving electrical energy ▪ Conversions involving machines <p>C. Understand the conservation of energy.</p> <p>D. Analyze and compare the different energy resources, such as...</p> <ul style="list-style-type: none"> ▪ Nonrenewable Resources: fossil fuels (electricity from fossil fuels) and nuclear energy ▪ Renewable Resources: solar energy, energy from water, wind energy, geothermal energy, biomass. <p>Part 2</p> <p>A. Know the concepts of temperature and heat.</p>	<p>Part 1</p> <p>Knowledge</p> <ul style="list-style-type: none"> ▪ Energy ▪ Kinetic Energy, Speed, Mass ▪ Potential Energy ▪ Mechanical Energy ▪ Forms of Energy: Thermal, Chemical, Electrical, Sound, Light, and Nuclear ▪ Energy Conversions ▪ Machines ▪ Renewable and Nonrenewable resources <p>Skills</p> <ul style="list-style-type: none"> ▪ Analyze and describe common energy conversions ▪ Recognize the advantages and disadvantages of renewable and nonrenewable sources <p>Part 2</p> <p>Knowledge</p> <ul style="list-style-type: none"> ▪ Temperature, Heat ▪ Thermometer ▪ Absolute zero ▪ Conduction, Convection and Radiation <p>Skills</p> <ul style="list-style-type: none"> ▪ Research the limitations of both renewable and non-renewable sources of energy 	<p>Part 1:</p> <p>Lab or Demonstration: A Bicycle Trip (H) Energy of a Pendulum (H) Pendulum Peril (tchr led) (H)</p> <p>Reading: The Nature of Energy (PH) Energy Conversion and Conservation (PH) Energy Conversions and Fossil Fuels (PH)</p> <p>Worksheet: The Nature of Energy (PH) Energy Conversions and Fossil Fuels (Review and Reinf) (PH) See What I Saw (Pot vs Kin) (H)</p> <p>Technology: Simple Pendulum http://www.walter-fendt.de/ph11e/pendulum.htm</p> <p>Part 2:</p> <p>Lab or Demonstration: Rates of Heat Loss (PH)</p> <p>Reading: Temperature & Thermal E (PH) The Nature of Heat (PH)</p> <p>Worksheet: Temp & Thermal E Review (PH) Feel the Heat (H)</p> <p>Technology:</p>

Unit Modifications

Power Packed Peanuts (H)
 Pendulum Peril (H)
 The Nature of Energy (PH)
 Energy Conversions and Fossil Fuels (PH)
 The Energy We Use (PH)

Unit Enrichments

The Come-Back Can (PH)
 Orbits, Ellipses, and Energy (PH)
 The Energy We Use (PH)
 The Armchair Enviro-Challenge (H)
 Wrong Way Roller (Inquiry) (H)
 Try and Try Again (H)

Suggested Assessment Techniques for Unit

Core 3: Energy Unit Common Standards Assessment
 (district common)

Materials/Technology for Unit

Simple Pendulum Simulations
<http://www.walter-fendt.de/ph11e/pendulum.htm>

Electrolysis Demonstration
http://www.tryscience.org/experiments/experiments_electrolysis_online.html