

Physics: Energy
Whole unit overview

Learning Outcomes		Suggested Teaching Activities	Resources
1.6 (a)	<p>Demonstrate an understanding that an object may have energy due to its motion or its position, and that energy may be transferred and stored.</p> <p>Give examples of energy in different forms, including kinetic, gravitational, chemical, strain, nuclear, internal, electrical, light and sound.</p> <p>Give examples of the conversion of energy from one form to another and of its transfer from one place to another.</p> <p>Apply the principle of energy conservation to simple examples.</p>	A number of devices which convert energy from one form to another e.g. loudspeaker, steam engine, solar-powered motor, candle etc. can be used. A circus of simple experiments can be set up for students to identify the energy conversions.	<p>Some unusual and fun energy change experiments http://littleshop.physics.colostate.edu/</p> <p>click on ideas for teachers</p> <p>changes in energy</p> <p>Download .pdf document now</p>
	<p>Use the terms kinetic and potential energy in context.</p> <p>Recall and use the expressions $k.e. = \frac{1}{2}mv^2$ and $p.e. = mgh$.</p>		

1.6 (b)	<p>Describe how electricity or other useful forms of energy may be obtained from</p> <p>(i) chemical energy stored in fuel</p> <p>(ii) water, including the energy stored in waves, in tides and in water behind hydroelectric dams</p> <p>(iii) geothermal resources</p> <p>(iv) nuclear fission</p> <p>(v) heat and light from the Sun.</p>	<p>Important discussions here to consolidate the students' understanding of energy processes both in physical and environmental impact terms.</p>	<p>This site provides a useful investigation into alternative energy. http://ericir.syr.edu/ Click on 'Lesson Plans', physical sciences, Solar Hot Box.</p> <p>This site gives much interesting information about different types of power stations and includes a virtual tour of a power station. http://www.ergon.com.au/ Click on EnergyEd, EnergyEd</p> <p>An excellent site.</p>
	<p>Show an understanding that energy is released by nuclear fusion in the Sun</p> <p>Show a qualitative understanding of efficiency.</p>		
2.3 (a)	<p>Describe experiments to demonstrate the properties of good and bad conductors of heat.</p>	<p>Simple experiments to compare thermal conductivity e.g. using metal conductivity rods.</p>	
	<p>Give a simple molecular account of the heat transfer in solids.</p>	<p>Extend to a molecular account – a row of students can be used to model the idea of increased vibration of particles as the process of conduction.</p>	
2.3 (b)	<p>Relate convection in fluids to density changes and describe experiments to illustrate convection.</p>	<p>Use simple experiments to illustrate convection e.g. dissolving a crystal of potassium manganate VII at the bottom of a large beaker that is heated by a candle flame. Show convection in air using, for example, a mine ventilation model.</p>	

2.3 (c)	Identify infra-red radiation as part of the electromagnetic spectrum.		
	Describe experiments to show the properties of good and bad emitters and good and bad absorbers of infra-red radiation.	<p>Leslie's cube type experiments show the effect of the colour of a surface on the emission of radiation. A thick (3 – 5 mm) sheet of copper, covered with lamp-black (powdered carbon) on one side, if heated strongly with a Bunsen Burner on the other side, will emit noticeably more heat from the blackened side when the Bunsen burner is removed.</p> <p>Absorption of infra-red can be easily shown by arranging two thermometers at equal distances from a working 12V headlamp bulb. One thermometer has a blackened bulb (use a felt-tipped pen or poster paint)</p>	
2.3 (d)	Identify and explain some of the everyday applications and consequences of conduction, convection and radiation.	<p>A good opportunity to carry out some investigative experiments involving rate of cooling and insulation. Discussion of the vacuum flask is a useful way to revise conduction, convection and radiation as is discussion of the domestic refrigerator.</p>	