

Energy

is a video that defines and describes five types of energy. Dr. Science thoroughly explains heat energy, how it moves, what substances conduct heat energy, and its relationship to temperature. The wave model is presented as it relates to the movement of energy. The Law of conservation of energy is discussed. Dr. Science uses demonstrations that can be adapted to the classroom and easily done along with the film.

Vocabulary:

Energy: The ability to do work. (Work is to cause a change).

Potential Energy: The ability to move because of its position. (stored energy).

Kinetic Energy: The energy that a moving object has due to its motion.

Mechanical Energy: Energy associated with motion.

Heat Energy: The internal motion of particles in matter.

Chemical Energy: The force which bonds or holds atoms together.

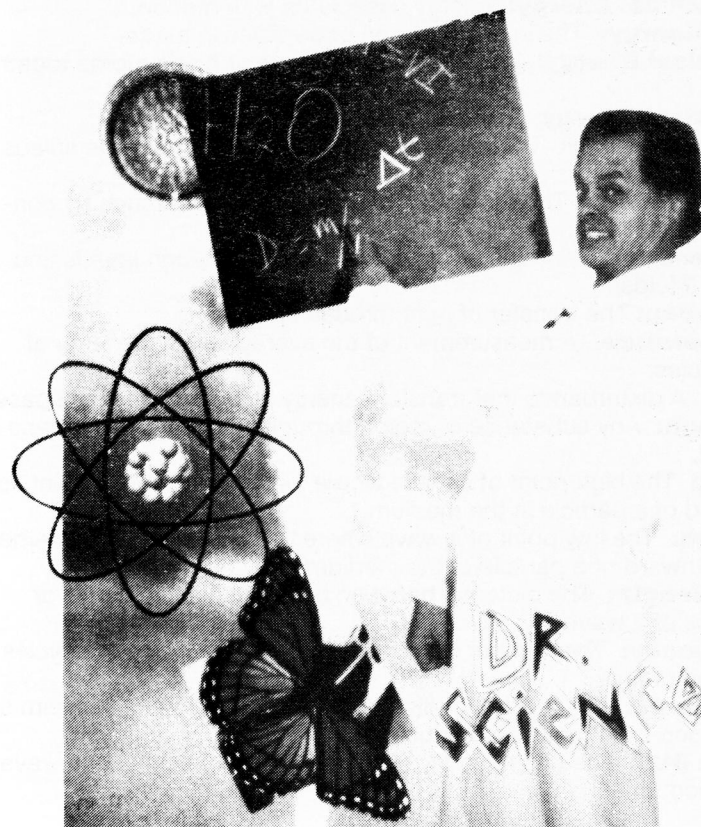
Electrical Energy: The movement of electrical charges.

Nuclear Energy: The breaking apart of the protons in the nucleus of an atom.

Heat Transfer: The moving of heat through a substance by contact of molecules.

Teacher's Guide

VOL. 3 Energy



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Heat Transfer: The moving of heat through a substance by contact of molecules.

Convection: The transfer of heat in currents through liquids and gases (Fluids).

Radiation: The transfer of heat through space.

Temperature: A measurement of the average kinetic energy of molecules.

Wave: A disturbance that transfers energy through matter or space.

Medium: Any substance or region through which a wave is transmitted.

Crest: The high point of a wave where maximum displacement is upward of a particle in the medium.

Trough: The low point of a wave where the maximum displacement is downward of a particle of the medium.

Wavelength: The distance between two consecutive crests or troughs of a wave.

Frequency: The number of complete waves, or complete cycles, per unit of time.

Amplitude: The maximum distance the molecules of a medium are displaced from their rest position.

Hertz (Hz): The unit used to measure wave frequency, one wave per second.

Reflection: The bouncing back of a wave after it strikes a barrier that does not absorb the wave's energy.

Incident wave: The incoming wave before it is reflected.

Angle of incidence: The angle formed by the incident ray and a line perpendicular to the barrier.

Angle of reflection: The angle formed by a line perpendicular to the barrier and the reflected ray.

Refraction: The bending of waves due to a change in speed.

Electromagnetic energy: The energy produced by moving electric charges.

Electricity: Energy associated with the movement of electrons from one place to another.

Law of conservation of energy: The law states that energy can be neither created nor destroyed by ordinary means. It may change forms.

Preview or review questions:

- Why does all matter contain energy? (Matter has the ability to do work. Matter is made of particles that are always in motion so there is always kinetic energy).
- What are the five forms of energy? (Mechanical, heat, chemical, electromagnetic, and nuclear.)
- What is kinetic energy? Potential energy? (Kinetic energy is energy of motion; potential energy is energy of position.)
- Describe the conversion between potential energy and kinetic energy of a ball dropping to the ground and bouncing back. (Before the ball drops all the energy is potential energy. As it falls, the potential energy is converted into kinetic energy. When it hits the ground, its kinetic energy is at its maximum and as it bounces up the kinetic energy is converted into potential energy).
- In the film ice is placed into a beaker and begins to melt. Explain why the ice melts. (Heat is being transferred by the air to the ice, increasing the energy of the ice molecules).
- What is temperature? (A measure of the average kinetic energy of molecules.)
- What is insulation? What is its purpose? (Insulation is a material that does not conduct heat. It is used for keeping homes cool in the summer and warm in the winter.)
- Why are some materials better conductors than others? (Materials that have molecules very close together can transfer energy very quickly. Therefore, they are good conductors.)
- What are the charged particles in an atom? (Protons, which are positive charged and Electrons, which are negative charged particles).
- What is the rule of electric charges? (Like charges repel and unlike charges attract).