frequency the number of cycles or vibrations per unit of time; also the number of waves produced per unit of time (p. 376)

fundamental frequency the lowest frequency of vibration of a standing wave (p. 422)

G

generator a machine that converts mechanical energy into electrical energy (p. 716)

gravitational force the mutual force of attraction between particles of matter (p. 240)

gravitational potential energy the potential energy stored in the gravitational fields of interacting bodies (p. 169)

ground state the lowest energy state of a quantized system (p. 926)

H

half-life the time needed for half of the original nuclei of a sample of a radioactive substance to undergo radioactive decay (p. 803)

harmonic series a series of frequencies that includes the fundamental frequency and integral multiples of the fundamental frequency (p. 423)

heat the energy transferred between objects because of a difference in their temperatures; energy is always transferred from higher-temperature objects to lower-temperature objects until thermal equilibrium is reached (p. 305)

hole an energy level that is not occupied by an electron in a solid (p. 927)

hypothesis an explanation that is based on prior scientific research or observations and that can be tested (p. 8)

I

ideal fluid a fluid that has no internal friction or viscosity and is incompressible (p. 284)

impulse the product of the force and the time over which the force acts on an object (p. 200)

index of refraction the ratio of the speed of light in a vacuum to the speed of light in a given transparent medium (p. 490)

induction the process of charging a conductor by bringing it near another charged object and grounding the conductor (p. 562)

inertia the tendency of an object to resist being moved or, if the object is moving, to resist a change in speed or direction (p. 125)

instantaneous velocity the velocity of an object at some instant or at a specific point in the object's path (p. 46)

intensity the rate at which energy flows through a unit area perpendicular to the direction of wave motion (p. 414)

internal energy the energy of a substance due to both the random motions of its particles and to the potential energy that results from the distances and alignments between the particles (p. 299)

isothermal process a thermodynamic process that takes place at constant temperature (p. 340)

isotope an atom that has the same number of protons (or the same atomic number) as other atoms of the same element do but that has a different number of neutrons (and thus a different atomic mass) (p. 791)

isovolumetric process a thermodynamic process that takes place at constant volume so that no work is done on or by the system (p. 339)

K

kinetic energy the energy of an object that is due to the object's motion (p. 164)

kinetic friction the force that opposes the movement of two surfaces that are in contact and are sliding over each other (p. 137)

L

laser a device that produces coherent light of only one wavelength (p. 541)

latent heat the energy per unit mass that is transferred during a phase change of a substance (p. 318)

lens a transparent object that refracts light waves such that they converge or diverge to create an image (p. 494)

lever arm the perpendicular distance from the axis of rotation to a line drawn along the direction of the force (p. 255)

linear polarization the alignment of electromagnetic waves in such a way that the vibrations of the electric fields in each of the waves are parallel to each other (p. 472)

longitudinal wave a wave whose particles vibrate parallel to the direction the wave is traveling (p. 385)

M

magnetic domain a region composed of a group of atoms whose magnetic fields are aligned in the same direction (p. 679)