vibrations

wave motion

light

9-12

Cyclic change is commonly found when there are feedback effects in a system -- as, for example, when a change in any direction gives rise to forces or influences that oppose the change.

The observed wavelength of a wave depends upon the relative motion of the source and the observer. If either is moving toward the other, the observed wavelength is shorter; if either is moving away, the wavelength is longer.

Accelerating electric charges produce electromagnetic waves around them. A great variety of radiations are electromagnetic waves: radio waves, microwaves, radiant heat, visible light, ultraviolet radiation, x rays, and gamma rays.

All motion is relative to whatever frame of reference is chosen, for there is no motionless frame from which to judge all motion.

Waves can superpose on one another, bend around corners, reflect off surfaces, be absorbed by materials they enter, and change direction when entering a new material. All these effects vary with wavelength.

The energy of waves (like any form of energy) can be changed into other forms of energy.

6-8

Human eyes respond to only a narrow range of wavelengths of electromagnetic radiation--visible light. Differences of wavelength within that range are perceived as differences in color.

Wave behavior can be described in terms of how fast the disturbance spreads, and in terms of the distance between successive peaks of the disturbance (the wavelength).

Light from the sun is made up of a mixture of many different colors of light, even though to the eye the light looks almost white. Other things that give off or reflect light have a different mix of colors.

Something can be "seen" when light waves emitted or reflected by it enter the eye.

Light acts like a wave in many ways. And waves can explain how light behaves.

Vibrations in materials set up wavelike disturbances that spread away from the source. Sound and earthquake waves are examples. These and other waves move at different speeds in different materials.

3-5

Light travels and tends to maintain its direction of motion until it interacts with an object or material. Light can be absorbed, redirected, bounced back, or allowed to pass through.

One way to think about something is to compare it to something more familiar.

How fast things move differs greatly.

K-2

Things that make sound vibrate.

Things move in many different ways, such as straight, zigzag, round and round, back and forth, and fast and slow.