

Important Concepts Forces and Motion 6-8 Level	Alaska Science Content Standard B4 Students develop an understanding of motions, forces, their characteristics and relationships, and natural forces and their effects.
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Grade Level Expectations:

The student demonstrates an understanding of motions, forces, their characteristics, relationships, and effects by:

- [6] **SB4.2** stating that every object exerts gravitational force on every other object
- [6] **SB4.3** making waves move through a variety of media (**L**)
- [7] **SB4.1** illustrating that unbalanced forces will cause an object to accelerate
- [7] **SB4.2** recognizing that electric currents and magnets can exert a force on each other
- [7] **SB4.3** describing the characteristics of a wave (i.e., amplitude, wavelength, and frequency)
- [8] **SB4.1** demonstrating (**L**) and explaining circular motion
- [8] **SB4.2** describing the interactions between charges

According to AAAS's Benchmarks for Science Literacy*, some of the things that students should know and understand by the end of the eighth grade are:

An unbalanced force acting on an object changes its speed or direction of motion, or both. If a force acts towards a single center, the object's path may curve into an orbit around the center. 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.

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).

Every object exerts gravitational force on every other object. The force depends on how much mass the objects have and on how far apart they are. The force is hard to detect unless at least one of the objects has a lot of mass.

The sun's gravitational pull holds the earth and other planets in their orbits, just as the planets' gravitational pull keeps their moons in orbit around them.

Electric currents and magnets can exert a force on each other.

Electrical circuits require a complete loop through which an electrical current can pass.

A charged object can be charged in one of two ways, which we call either positively charged or negatively charged. Two objects that are charged in the same manner exert a force of repulsion on each other, while oppositely charged objects exert a force of attraction on each other.

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.

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

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

*Project 2061, American Association for the Advancement of Science, Benchmarks for Science Literacy. New York: Oxford University Press, 1993.

There are a great variety of electromagnetic waves: radio waves, microwaves, infrared waves, visible light, ultraviolet rays, X-rays and gamma rays. These wavelengths vary from radio waves, the longest, to gamma rays, the shortest.