Important Concepts Solar System and Universe 6-8 Level	Alaska Science Content Standards **D3** Students develop an understanding of the cyclical changes controlled by energy from the sun and by Earth's position and motion in our solar system. (partially addressed) **D4** Students develop an understanding of the theories regarding the evolution of the universe.

Grade Level Expectations:

The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by:
[8] SD3.1 recognizing the relationship between the seasons and Earth's tilt relative to the sun and describing the day/night cycle as caused by the rotation of the Earth every 24 hours

The student demonstrates an understanding of the theories regarding the origin and evolution of the universe by:
[6] SD4.1 contrasting characteristics of planets and stars
(i.e., light reflecting, light emitting, orbiting, orbited, composition)
[6] SD4.2 defining a light year
[7] SD4.1 comparing and contrasting characteristics of planets and stars (i.e., light reflecting, light emitting, orbiting, orbited, composition)
[7] SD4.2 using light years to describe distances between objects in the universe
[8] SD4.1 creating models of the solar system illustrating size, location/position, composition, moons/rings, and conditions (**L**)
[8] SD4.2 comparing the brightness of a star to its distance and size

According to AAAS's Benchmarks for Science Literacy*, some of the things that students should know and understand by the end of eighth grade are:
Earth is the only body in the solar system that appears able to support life. The other planets have compositions and conditions very different from the earth's.
· Everything on or anywhere near the earth is pulled toward the earth's center by gravitational force.
· The moon's orbit around the earth once in about 28 days changes what part of the moon is lighted by the sun and how much of that part can be seen from the earth- the phases of the moon.
· The sun is a medium-sized star located near the edge of a disc-shaped galaxy of stars, part of which can be seen as a glowing band of light that spans the sky on a very clear night.
· The universe contains many billions of galaxies, and each galaxy contains many billions of stars. To the naked eye, even the closest of these galaxies is no more than a dim, fuzzy spot.
· The sun is many thousands of times closer to the earth than any other star. Light from the sun takes a few minutes to reach the earth, but light from the next nearest star takes a few years to arrive. The trip to that star would take the fastest rocket thousands of years.

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

· Some distant galaxies are so far away that their light takes several billion years to reach the earth. People on earth, therefore, see them as they were that long ago in the past.
· Nine planets of very different size, composition, and surface features move around the sun in nearly circular orbits. Some planets have a variety of moons and even flat rings of rock and ice particles orbiting around them. Some of these planets and moons show evidence of geologic activity. The earth is orbited by one moon, many artificial satellites, and debris.
· Many chunks of rock orbit the sun. Those that meet the earth glow and disintegrate from friction as they plunge through the atmosphere—and sometimes impact the ground. Other chunks of rock mixed with ice have long, off-center orbits that carry them close to the sun, where the sun's radiation (of light and particles) boils off frozen materials from their surfaces and pushes it into a long, illuminated tail.

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