*Key Vocabulary ES 13 – Origin and Evolution of the Universe*

**Cosmology** – The study of how the Universe formed and how it has changed over time.

**The Universe** – All matter and energy. It makes up everything we can detect. All the galaxies are within the Universe.

**The Big Bang Theory** – An explanation for how matter and energy formed and became grouped into the galaxies we see today. The Big Bang theory states that the universe formed from a singularity 14 billion years ago. It started off very hot and dense, then expanded. The universe is still expanding from that singularity.

**Galaxy** – a collection of billions of stars, gas and dust.

**Milky Way** – the spiral-shaped galaxy that contains our solar system.

**Solar System** – the sun and the things that orbit the sun, like the planets and asteroids. The sun is a star. There are billions of stars in the Milky Way. Many stars have their own planets orbiting them.

**The Solar Nebular Theory** – An explanation for how the solar system formed (including Earth). The Solar Nebular theory states that the sun formed from a giant cloud of gas and dust. The planets formed at the same time from leftover gas and dust that didn’t make it into the sun.

**Finite Lifetime** – Living for a limited number of years. Stars are finite, meaning throughout the history of the universe, stars are “born,” live their lives, and then “die.” No, they are not really alive like us.

**Stellar Nebula** – A huge, thick cloud of gas and dust.

**Interstellar Gas and Dust** – Any gas and dust floating in space.

**Condensation** – Stars form through condensation – meaning stars take gas and dust from a nebula and condense (collect) them into a ball.

**Gravitational Compression** – Part of forming a star, it is when the condensed gas and dust squeezes down under its own force of gravity.

**Hertzsprung-Russell (HR) Diagram** – A Diagram that graphs the temperature and brightness of stars. The HR Diagram shows the way stars change as they get older.

**Absolute Magnitude** – A measure of how bright a star would be at a set distance from us. On this scale, negative numbers are brighter than positive numbers.

Example: -1 is brighter than 10.

**Main Sequence Stars** – Stars that take hydrogen atoms and smash them together to make helium.

**Blue Giant Star** – A very large, very hot star that fuses hydrogen to helium very quickly. It lasts for a few million years and gives off deadly radiation. Blue giants explode as supernovas when they die.

**The Sun** – A medium sized star that fuses hydrogen to helium more slowly than a blue giant. It will last for billions of years and has less harmful radiation. The sun will not explode when it dies. It will just burn out.

**Fusion** – The process of taking atoms and combining them to make a larger/heavier atom. This results in a large release of energy. Main Sequence stars fuse hydrogen into helium.

**Fusion Products** – Heavier elements that form as a result of fusion. Large stars like Blue Giants are the only stars that can make elements heavier than carbon. The iron, calcium, gold, etc. in Earth and in our bodies came from an ancient Blue Giant star.

**Ultra Massive Black Holes** – Very large black holes that are found in the middle of galaxies – including our Milky Way. They formed when all the matter was coming together to make the galaxy. These black holes actually help stabilize and keep the galaxy together.

**Light Year** – The distance light travels in a year. Distance between stars is measured in light years. This is the most common measurement used in astronomy.

**Electromagnetic Spectrum** – All the different wavelengths of light. Long waves are radio waves. Short waves are x-rays and gamma rays. Light we can see (red, orange, yellow, and so on) are medium waves. Astronomy studies ALL waves of the electromagnetic spectrum.

**Ground-Based Observations** – Using your eyes or using telescopes on the surface of Earth to study space. This is how astronomy was done before we could send things out into space.

**Lander** – A spacecraft that can land on a planet, moon, or other object.

**Orbiter** – A spacecraft that studies a planet, moon, etc. by orbiting it.