

Stars, Galaxies, and the Universe

- I. The Universe
 - A. Astronomers have discovered evidence that the universe is expanding
 - B. The material that we see today was once all together
 - C. Big Bang Theory – the theory that all of the matter of the universe was once concentrated into a single point of matter that began to expand rapidly forming the universe
 - D. Scientists believe the universe is 13.7 billion years old – however this figure may change (increase)
- II. Stars
 - A. The distance to stars is usually measured in a **light year** – the distance light travels in a year (about 6 trillion miles)
 - B. Classifying stars
 - 1. Size – supergiant, giant, medium, white dwarf, neutron star
 - 2. Color (determined by surface temperature) – from coolest to hottest are red, orange, yellow, blue, white
 - 3. Brightness (also called magnitude)
 - 4. Our star is a yellow, medium star
 - C. Lives of Stars
 - 1. They have a life cycle – form, use up fuel, and eventually die
 - 2. Stages in a star's life cycle
 - a. Protostar – when the star begins to form from nebula material
 - b. Main sequence – makes up most of the star's life; it is stable and producing energy by nuclear fusion
 - c. As small to medium stars die, it becomes a red giant then a white dwarf
 - d. As a large star dies, it becomes a supergiant then it explodes (supernova) and collapses into a neutron star
 - e. When the most massive star dies, it becomes a supergiant, supernovas, and then collapses to form a black hole
- III. Star Systems and Galaxies
 - A. Stars are found in large groups called galaxies
 - 1. Spiral galaxies – shaped like a pinwheel
 - 2. Elliptical galaxies – round or oval shaped
 - 3. Irregular galaxies – no special shape
 - B. Our galaxy:
 - 1. the Milky Way
 - 2. A spiral galaxy
 - 3. Is made up of stars, black holes, and nebulas
 - 4. We are 2/3 of the way out from the center on one of the “arms” of the pinwheel
 - 5. Supermassive black hole at the center of the galaxy
- IV. Where are we in the universe (or our galactic address)?
 - A. Earth, (sometimes called Sol 3)

- B. Sun, (sometimes called Sol)
- C. Orion Arm of the Galactic Disk (2/3 out from the center of the milky way on one of the spiral “arms”)
- D. Milky Way Galaxy
- E. Local Group of Galaxies
- F. Virgo Supercluster of Galaxies

Energy Resources

- I. Most of the energy on Earth comes directly or indirectly from the sun
 - A. Renewable resources – naturally replaced in a short time
 - 1. Solar energy – sunlight for energy
 - 2. Tidal energy – using moving of the ocean water to produce electricity
 - 3. Wind energy – using moving air to produce electricity
 - 4. Geothermal energy – using heat from magma for energy
 - 5. Hydroelectric power – using rushing water from dams to provide electricity
 - 6. These are also called alternative energy sources because they are not the usual ways we get energy from the Earth
 - B. Nonrenewable resources – not easily replaced by nature
 - 1. We are very dependent on these resources
 - 2. Most of them are fossil fuels like oil, natural gas, and coal
 - 3. They can also include metallic minerals like gold and nonmetallic minerals like diamonds
- II. Conservation – saving our resources by using less
 - A. Reduce – don’t use as much
 - B. Reuse – use it again
 - C. Recycle – put in the recycle bin!