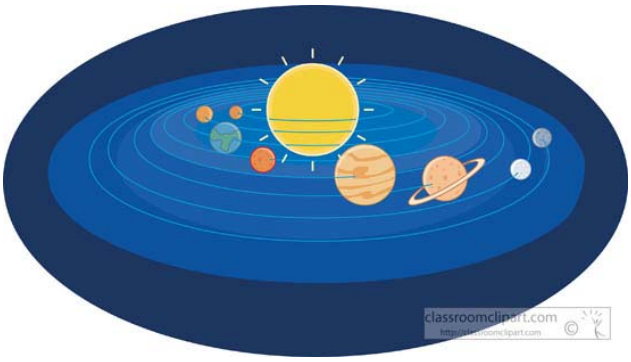
Name _____

The Mighty Sun: Our Stellar Neighbor



The Sun, a dazzling ball of fiery energy, is the center of our solar system and a source of fascination for astronomers and curious minds alike.

The Sun is primarily composed of two gases: hydrogen and helium. These elements make up nearly 99% of its mass. Hydrogen, in particular, is the most abundant element in the universe, and the Sun's immense gravity pulls and fuses hydrogen atoms together in its core to produce helium. This process, called nuclear fusion, releases an enormous amount of energy in the form of light and heat.

The Sun's Structure

The Sun consists of several layers, each with distinct characteristics. The innermost layer is the core, where nuclear fusion occurs, and temperatures reach a staggering 15 million degrees Celsius (27 million degrees Fahrenheit). Surrounding the core is the radiative zone, where energy generated in the core gradually makes its way outward, bouncing between atoms. Above the radiative zone lies the convective zone, where energy is transported through rising and sinking currents of hot gas. The outermost layer is the Sun's visible surface, known as the photosphere, which emits the light and heat that reach Earth.

Sunspots and Solar Activity

The Sun's surface is not always calm and uniform. Dark patches known as sunspots periodically appear on the photosphere. These sunspots are cooler areas caused by magnetic activity, and they can vary in size and number. Sunspots are often associated with solar flares and coronal mass ejections, which are powerful bursts of energy and particles that can impact our planet's magnetic field and cause phenomena like the Northern Lights.

The Sun's Energy

The Sun's energy output is colossal. It radiates energy in all directions, and a small fraction of it reaches Earth, providing the light and heat essential for life. This energy is crucial for driving weather patterns, photosynthesis in plants, and the overall climate on our planet. It also powers solar panels to generate electricity and fuels the entire food chain.

The Sun's Lifespan and Future

The Sun, like all stars, has a finite lifespan. It is currently about 4.6 billion years old and is expected to continue shining for another 5 billion years or so. As it ages, the Sun will eventually exhaust its hydrogen fuel, causing it to expand into a red giant and then collapse into a dense, Earth-sized remnant known as a white dwarf. This transition will have profound effects on the solar system, potentially engulfing some of the inner planets.