**Guided Notes: Sun’s Layers**

Like all stars, the sun is composed of \_\_\_\_\_\_\_\_\_\_\_\_\_\_, a type of super-heated \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in which the particles are \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Streams of these particles, called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ wind, \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the solar system. Most of the sun’s properties are generated by processes in its complex \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Key Terms:**

* Define plasma: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Define nucleus: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Define nuclear fusion: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Define electromagnetic radiation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Define aurora: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Key Concepts:**

* Using advanced techniques such as \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and X-ray astronomy, scientists have been able to identify \_\_\_\_\_\_\_\_\_\_\_\_\_\_ layers that make up the sun.
* These layers, arranged from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ outward, each show distinct characteristics we are only beginning to understand.
* Because of the sun’s intense \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_, astronomers and astrophysicists cannot explore the layers directly.
* Instead, they \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the arrangement and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of these \_\_\_\_\_\_\_\_\_\_\_\_\_\_ by combining known facts with theoretical models of the sun’s composition.



* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ layers of the sun extend outward from the center like a series of nested spheres. The first three layers—\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_ zone, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ zone—compose the sun’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_ structure.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the innermost layer where the sun’s energy is produced by fusion reactions.
* The energy travels slowly through the dense second layer, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ zone.
* In the third layer, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ zone, huge currents form and bubbles of hot \_\_\_\_\_\_\_\_\_\_\_\_\_\_ rise to the surface.
* The sun’s three \_\_\_\_\_\_\_\_\_\_\_\_\_\_ layers—\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_, and corona—form its \_\_\_\_\_\_\_\_\_\_\_\_\_\_, the part we see from Earth.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ at the surface is where visible \_\_\_\_\_\_\_\_\_\_\_\_\_\_ appears.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ above it emits a bright \_\_\_\_\_\_\_\_\_\_\_\_\_\_ glow as \_\_\_\_\_\_\_\_\_\_\_\_\_\_ burns off.
* The final layer, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_, surrounds the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ like a crown of light and helps \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the sun’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_ into space.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ are visible to the naked eye only during a total solar eclipse.
* The temperatures of these \_\_\_\_\_\_\_\_\_\_\_\_\_\_ layers vary widely and reach levels that are hard to imagine.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_, where energy is generated, is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ layer, with a temperature of several \_\_\_\_\_\_\_\_\_\_\_\_\_\_ degrees.
* Temperatures then decrease through the radiative and conduction zones until they reach “only” 5,800 K (10,000°F) in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Temperatures then rise again through the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_, which is the hottest \_\_\_\_\_\_\_\_\_\_\_\_\_\_ layer. Scientists have yet to understand why the sun’s outer atmosphere is several million degrees \_\_\_\_\_\_\_\_\_\_\_\_\_\_ than its \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The sun, like all stars, emits large amounts of \_\_\_\_\_\_\_\_\_\_\_\_\_\_. Because the total amount of matter and energy is \_\_\_\_\_\_\_\_\_\_\_\_\_\_, this energy has its origin in matter and forces deep within the \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The sun has \_\_\_\_\_\_\_\_\_\_\_\_\_\_ that transfer energy from its \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Eventually, some of this energy is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to Earth through different processes. Evidence for this energy \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the energy that enters Earth’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_, the plants that \_\_\_\_\_\_\_\_\_\_\_\_\_\_ that energy, and the animals to which it is transferred. Some effects of changes in activity on the sun’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_ can be felt on \_\_\_\_\_\_\_\_\_\_\_\_\_\_.



* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the element that \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the sun, and the center of each hydrogen atom is its \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Most of the energy that the sun emits is released when a strong \_\_\_\_\_\_\_\_\_\_\_\_\_\_ attraction between hydrogen \_\_\_\_\_\_\_\_\_\_\_\_\_\_ squeezes the hydrogen \_\_\_\_\_\_\_\_\_\_\_\_\_\_ together.
* With enough pressure, four \_\_\_\_\_\_\_\_\_\_\_\_\_\_ atoms can undergo \_\_\_\_\_\_\_\_\_\_\_\_\_\_ fusion and form a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ atom, with the release of tremendous amounts of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy.
* The rest of the energy \_\_\_\_\_\_\_\_\_\_\_\_\_\_ by the sun comes from \_\_\_\_\_\_\_\_\_\_\_\_\_\_ reactions involving other types of \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Once this energy is released, it is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ through the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the sun and eventually through \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to Earth.
* Solar energy \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in all directions from the sun’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_ as \_\_\_\_\_\_\_\_\_\_\_\_\_\_ radiation. It travels at the speed of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and reaches Earth’s surface in about \_\_\_\_\_\_\_\_\_\_\_\_\_\_ minutes.
* The surface of the sun is a very \_\_\_\_\_\_\_\_\_\_\_\_\_\_, high-energy place. This release of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ but not always \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* When electrically charged \_\_\_\_\_\_\_\_\_\_\_\_\_\_ move, they produce \_\_\_\_\_\_\_\_\_\_\_\_\_\_ fields that are in \_\_\_\_\_\_\_\_\_\_\_\_\_\_ motion. Depending on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ fields, \_\_\_\_\_\_\_\_\_\_\_\_\_\_ intense \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of energy and matter occur.