Chapter 8 Notes

Chapter 8 Section 1: Stars

The color of a star indicates the star's temperature. Red stars are cooler and Blue stars are hotter.

The light from a star produces a **spectrum** (band of colors) when it passes through a **spectrograph** (prism). By studying the star's **absorption spectrum**, scientist can tell what elements make up the atmosphere and the core of the star. The elements that are present in a star's atmosphere (the same elements that also make up the star) absorb specific wavelengths of light (colors of light). These absorbed wavelengths (colors) show up as **dark emission lines** in the star's absorption spectrum. See figure 3 on p.222.

Stars are mainly classified by their temperature and magnitude (brightness) (H-R Diagram). Positive numbers represent dimmer stars and negative numbers represent brighter stars.

The brightness that a star appears to have, as seen from Earth, is the star's **apparent magnitude** (determined by distance from Earth). By determining the brightness that a star would have, if the star were 32.6 light years from Earth, is the star's **absolute magnitude**. A **light year** is the distance that light travels in a year, about 9.5 trillion kilometers.

Stars do move in outer space and this is known as the **actual motion** of stars. However, when we observe stars following a circular path in the night sky, this is due to the Earth's rotation and is only the **apparent motion** of stars.

Also, as the Earth revolves around the sun, it appears that the stars have shifted position in our night sky from one season to the next. But this is due only to the location of the Earth that has changed. This is known as **parallax**.

*What are stars made of?*_____
*How do stars differ from one another?*_____
*Do stars move?*_____
*How do you identify a star's composition?*_____
Black lines appear in the spectrum where wavelengths(colors) are _____.
*Name the 7 colors of the spectrum*_____,_____,_____,_____,_____
_____,_____
What color of star is hottest? _____ What color of star is coolest? _____
Stars with the same absolute magnitude, but different apparent magnitudes must be at different _____ from Earth.
Scientist classify stars according to their _____ and _____.
Which magnitude identifies the brightest star?_____; dimmest star?_____
(-3, 0, +3, -0.11)

Chapter 8 Section 2: The Life Cycle of Stars

A **nebula** is a cloud of dust and gas.

Gravity pulls the dust and gases together into a sphere, known as the **protostar**, and nuclear fusion begins.

Nuclear fusion is the process of turning hydrogen into helium.

With an unlimited supply of hydrogen, the Protostar enters the second and longest stage of a star's lifecycle called the **Main Sequence Star**.

Eventually, main sequence stars begin to run out of hydrogen. The star's core begins to collapse as nuclear fusion slows down and the atmosphere swells as heat is transferred from the core to the atmosphere. This third stage of a star's life cycle is called the **Red Giant Star**.

The Red Giant finally runs out of hydrogen completely and its atmosphere is lost leaving a small, dim, **White Dwarf**, the final stage of a star's life cycle.

Really massive stars form **Super Red Giants** and do not become White Dwarfs. Super Red Giants eventually explode in a **Supernova**. The outer layers of the star are thrown out into space and the core collapses into a **Neutrons Star** or **Pulsar** (spinning neutron star). However the most massive stars completely collapse under their own gravity and become Black Holes. **Black Holes** are objects that are so dense and their gravity so great that not even light can escape.

Scientists use the **H-R Diagram** as a tool for studying stars. The **Absolute Magnitude** (actual brightness) of a star is compared with its surface temperature. Look at the H-R Diagram below and be familiar with how to read it.

What relationship does the HR Diagram make? _____
*What is a Supernova?*_____
*What is a neutron star?*_____
What is a pulsar? _____
Our sun is a _____. *A star begins as a ball of gas and dust pulled together by* _____.
The majority of the stars in our universe are _____.
An object that is so massive and dense that not even light can escape its gravitational pull is a _____.

Chapter 8 Section 3: Galaxies

Galaxies are composed (made) of stars, dust and gas (the dust and gas are nebulas). Galaxies also have **globular clusters** around the outside of spiral galaxies and within elliptical galaxies that contain millions of stars. **Open clusters** are thousands of stars that are grouped together in the spiral disks of spiral galaxies.

Edwin Hubble named the types of galaxies based on their shape. See Figure 1 p234/235.

Spiral Galaxies have a bright bulge surrounded by flattened spiral arms. The spiral arms contain nebulas and younger stars. The **Milky Way** is an example of a spiral galaxy. There are few globular clusters around spiral galaxies.

Elliptical Galaxies are round to oval and are very bright with few nebulas. Because there is little dust and gas, their stars are older. M87 is an example of an elliptical galaxy. Many globular clusters make up the elliptical galaxies.

Irregular Galaxies have no definite shape and are sometimes called the leftover galaxies.

Quasars are very distant star like sources of light very, very, very far away. They are thought to be associated with black holes.

*What are the materials to make stars?*_____
*How are stars assembled?*_____
_____ *is a large cloud of dust and gas in space.*
A distant star like source of light is a _____.

Chapter 8 Section 4: Formation of the Universe

Cosmology is the study of the beginning (origin), formation and development of the universe.

The **Big Bang Theory** is a theory suggesting that the universe began with a tremendous explosion 13.7 billion years ago. The **cosmic radiation** that is detected from all directions is speculated to be from the big bang. Scientists think that the universe is expanding and that it will expand forever.

The universe appears to have objects that are part of larger systems and that this is loosely repeated over and over again to make up the universe. (moon → Earth→solar system→spiral arm of galaxy→galaxy→group of galaxies etc.)

Scientists calculate the age of the universe in two ways. They can calculate the distance from Earth to various galaxies and they can calculate the age of the oldest stars.

*What is cosmic background radiation?*_____
Supposedly how long ago did the Big Bang occur? _____
Every object in space is part of a _____ *and this is loosely repeated over and over to form the* _____.

Chapter 8 Notes

What are two ways that scientists calculate the age of the universe?

_____

What is the study of the origin, structure, development and future of the universe called?_____

Scientists believe that the universe will _____ forever.