**Astronomy 10 Universe Notes**

**The Big Bang Theory**

* **Definition:** The prevailing cosmological model for the observable universe from the earliest known periods through its subsequent \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The Big Bang is the starting point of the universe. Imagine everything squished into a super tiny, hot dot. Then, it exploded and started getting bigger. As it expanded, it cooled down, making stars, galaxies, and all the stuff we see in space.
* The evidence supporting this idea comes from things like the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of leftover heat \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the early universe and the way galaxies are spread out.
* Proposed by Georges Lemaître and supported by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Lemaître suggested an expanding universe, and Hubble's observations confirmed it.
* Fundamental concept: Space itself is expanding.
* Galaxies move away from each other, evidenced by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Redshift**

* Light Waves and Colors:
  + Light travels in waves, and different colors correspond to different wavelengths.
  + Think of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ where red has longer waves, and blue has shorter waves.
* Moving Away Means Redshift:
  + When an object (like a star or galaxy) moves away from us, the light waves it emits get stretched.
  + This stretching makes the waves longer, and the light appears more toward the red side of the\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:
  + This shift in color is due to the Doppler Effect, like the sound of a passing car changes as it moves away.
  + If something is moving away, the light shifts to the red end; if it's moving closer, it shifts toward the blue end.
* Expansion of the Universe:
  + In astronomy, we observe redshift in light from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + The more redshift, the faster the galaxy is moving away, suggesting that the universe is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Redshift is like a cosmic speedometer telling us that objects in the universe are moving away from us, providing important evidence for the Big Bang and the idea that the universe is getting bigger.

**Expansion**

* Around \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_years ago, this singularity rapidly expanded, initiating the universe's expansion.
* It's important to note that the term "Big Bang" can be a bit misleading. It doesn't describe an explosion in a pre-existing space but rather the sudden emergence and expansion of space itself.

**Big Bang Timeline**

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The Big Bang Theory is currently the most widely accepted explanation for the origin and evolution of the universe. However, it's important to note that our understanding of the early moments of the universe is still an active area of research, and scientists continue to refine and expand our knowledge through observations and experiments.

1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:**
   * Galaxies are enormous systems containing billions or even trillions of stars, along with gas, dust, and dark matter, all bound together by gravity.
   * The Milky Way is the galaxy to which our solar system belongs.
2. **Stars:**
   * Stars are luminous celestial objects primarily composed of hydrogen and helium undergoing nuclear fusion, producing light and heat.
3. **Planets:**
   * Planets are celestial bodies that orbit stars. They range from small, rocky planets like Earth to gas giants like Jupiter.
   * Our solar system has \_\_\_\_\_\_\_\_\_\_\_ planets.
4. **Moons:**
   * Moons are natural satellites that orbit planets. Earth's moon is an example.
5. **Asteroids and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:**
   * Asteroids are rocky objects that orbit the Sun, mostly found in the asteroid belt between Mars and Jupiter.
   * Comets are icy bodies that also orbit the Sun but have distinct tails when they approach it.
6. **Nebulae:**
   * Nebulae are vast clouds of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_where stars are born. They can be nurseries for new stars and planetary systems.
7. **Black Holes:**
   * Black holes are regions of spacetime with extremely strong gravitational forces, so intense that nothing, not even light, can escape.
   * They form when massive stars collapse under their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
8. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:**
   * These are mysterious components that make up a significant portion of the universe. Dark matter doesn't emit, absorb, or reflect light and interacts with regular matter only through gravity. Dark energy is a form of energy thought to be responsible for the accelerating expansion of the universe.
9. **Interstellar Medium:**
   * The interstellar medium is the matter (mostly gas and dust) that exists in the space between stars within a galaxy.