5.01 Recall the definition of **theory**:

Hypothesis that is supported by the results of experimentation and observation

5.02 Describe main points raised during the video "Beyond the Big Bang."

* Big Bang attempts to explain HOW, not WHY: the universe

expands and how the universe began (cosmic evolution)

* The term "Big Bang" is inaccurate: coined by Hoyle as a

joke! It’s a misnomer because there was no “bang” since

sound waves need air to travel thru and there’s no “big” as

theory postulates that the universe started as a bubble

smaller than an atom

* A 'new way' to look at gravity: Gravity isn’t really a force

that works in just one direction. It’s more like a “fabric” of space and time. Time and space are curved by the mass of matter and orbiting objects are held in a continuously falling curved trajectory. The greater an object’s mass, the greater it’s gravitational influence.

5.03 Describe how the Big Bang theory accounts for the current formation of the universe.

* Main Idea: The universe is a dynamic, expanding universe (not static or steady)
* Misconceptions:

~no beginning/no end

~started “big” (actually started as atomically small)

~no proof of where elements originated (H and He must have been present before the initial “bang”, but the rest of the elements on the periodic table were created by fusion in the stars)

* Evidence:
	+ Cosmic Microwave Background Radiation: the “smoking gun” to support the Big Bang theory over “Steady State”.

~Stars are constantly giving off this “heat” (radiation) which is remnant radiation from the big bang

* + Abundance of light elements (H, He)

this also matched observations and further supported big bang…high temps created H and He as well as the rest of the heavier elements by fusion in starts…all of the elements needed for life came from the stars

* + Hubble's Law/Cosmological Redshift

All stars moving outwards

5.04 Contrast **Cosmological** red shift with ***Doppler*** red shift

expanding stretching universe shorter or longer wavelengths(sound/light)

 based on close movement of objects

5.05 Scale of the Universe (Powers of 10)

 Make 2 quality observations while viewing *Powers of 10*

5.06 Describe the major stages in the evolution of a **smaller** star:

1. Nebula

birth place of new stars; cloud of cool gas and dust formed from nearby stars throwing off their gas/dust

1. Protostar

gravity pulls gas and dust (stellar material) together/contracts and spins; creates a flattened disk shape; early solar system surrounds protostar

1. Main Sequence

temps in core rise to over 10 million degrees and FUSION begins. (H>He); longest stage of a star’s cycle; the more massive stars burn/die faster

1. Red Giant

finishes H fusion, begins Helium>carbon fusion; core collapses and outer layer puffs out and cools (red); very bright and low temp

1. Planetary Nebula

outer layers eject, form cooler gas/dust shell; very dim

1. White Dwarf

hot, dense core of star that remains after its atmosphere is lost; as it cools, becomes dimmer;

1. Nova

if white dwarf has enough mass (usually when it “steals” gases from a companion star), as it cools and contracts (gravity) pressure will heat the core up again until it explodes. The star will look 1 million times brighter for a few days.

1. Black Dwarf

If white dwarf is small, it won’t explode, it will just eventually stop emitting any energy and become a black dwarf

5.07 Describe the major stages of a **LARGER** star **after leaving main sequence:**

1. Red Supergiant

Similar to a red giant but much larger and burns much faster (shorter life)

1. Supernova

core gets extremely small, outer layers explode b/c gravity no longer holds together

1. Neutron Star

small core left after supernova; some spin and release radio waves(pulsars)

1. Black Hole

gravity causes the very highest mass stars to continue fusion until the core is mostly iron. Then the highly dense core collapses and creates a “hole” in space-not even light can escape

5.08 Galaxy: large group of stars bound

together by same gravit’l force

 Describe 3 types of galaxies astronomers observe.
spiral: elliptical: irregular:

5.09 Describe how the Hertzsprung-Russell (HR) diagram helps astronomers classify stars.

 plots heat and luminosity