**ASTRONOMY: Unit 1/The Big Bang Theory/Formation of Galaxies/Our Place in the Universe**

**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Block:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**The Big Bang Theory:**

Scientists have evidence that the universe is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ years old.

* States that all matter and energy started out concentrated in a small area, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* After Gigantic Explosion, matter organized itself into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and later atoms
* ****The first atoms to form were \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question:** What needed to change in order for atoms to form (combining of electrons, protons and neutrons)?

**Where is our evidence for this Theory?**

1. Energy created by this explosion \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ along with the matter.

 This radiation has been traveling \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_in the \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ over billions of years, but can still be measured and observed.

This original radiation is called: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(CMB) which is long-wave \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ radiation that appears to be coming from everywhere in the universe!

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Exhibited by observing the spectrum of distant galaxies and stars over time.

pg. 14 of your ESRT displays the electromagnetic spectrum, or all energy produced by the sun.

If we focus on visible light, Which colors have the longest and shortest wavelength?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_= longest wavelength

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_= shortest wavelength

* Each **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**in the universe emits energy in **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* The human eye observes **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of visible light in the form of **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* We can look at the spectral signatures of stars and infer 2 things:

1.)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:which elements they are composed of

2.) If they are moving \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_from us (if the spectral lines shift position with time)

**The Doppler Effect:**

* The position of wavelengths (spectral lines), are shifted to either the
1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Because the universe is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, objects that are moving \_\_\_\_\_\_\_\_\_\_\_\_ from one another will cause the wavelengths of energy to \_\_\_\_\_\_\_\_\_\_\_\_\_\_ or become \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, causing what’s known as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* ****MOST GALAXIES SHOW A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_will merge with ours in the future
	+ It’s spectra is thus \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with time
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ : States the Universe is Expanding!
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ it’s expanding, the greater the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (further the spectral lines are shifted in the spectrum)!

**PART II: Galaxies**

**A Galaxy is**:

* Stars and gases are held together by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* An Average galaxy will have over \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_stars
	+ Each star (or two) with its own \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Estimated to be over \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ galaxies in the universe!

**The three types of galaxies are:**

1. Elliptical:
2. Spiral:
3. Irregular:

Our Galaxy: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* We are a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_located on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of one of the galactic arms!