Science 10 Name:_____

Mr. Korbutt Blk:_____ Date:_____

THE BIG BANG

CONCEPTS:

- The big bang theory is based on two main sets of evidence: _____ and _____ _____ _____
- The big bang theory helps us describe how the components of the universe _____ and have _____ over time
- There is much about the universe that we still cannot explain

A DAY WITHOUT YESTERDAY

- Around 14 billion years ago there was absolutely _____ in the universe
- There was not even a _____
- Except for an infinitely small, extremely hot point
- So small it occupied no space and was nearly infinitely dense
- This point is called the _____
- Then it exploded in what is known as the _____ _____

BIG BANG THEORY

- A theory which describes the process by which our universe originated and evolved
- Proposed in 1927 by Belgian priest & physicist _____ _____
- Later Edwin Hubble found evidence to support Lemaitre's theory.

Timeline of the Big Bang

- See Fig 4.43
- The universe begins ~13.7 billion years ago as a violent explosion
- 0 to 10^{-43}s
    - Proposed that all four fundamental forces are all have the same strength and are possibly unified into one fundamental force
- 10^{-43} to 10^{-36}s
    - _____ appears as a separate force
    - first _____ particles appear (quarks, leptons, etc)
- 10^{-36} to 10^{-12}s
    - Strong Nuclear Force, Weak Nuclear Force and Electromagnetic Force appear as separate forces
    - Universe undergoes extremely rapid expansion called _____ _____.
- 10^{-12} to 10^{-6}s
    - Universe cools below 10 quadrillion degrees, quarks, electrons and neutrinos form in large numbers
    - Quarks and antiquarks annihilate each other. Fortunately for every billion antiquarks there are a billion and one quarks. Surplus quarks combine to form matter.
- 10^{-6} to 1 second
    - Universe cools to about a trillion degrees
    - _____, _____and _____form
- 1 second to 20 minutes - _____
    - temperature falls to about a billion degrees and hydrogen, helium, and lithium atomic nuclei form
- 20 minutes to 300,000 years

- temperature falls to around 3,000 (about same a surface of the Sun). Universe is a fog consisting 75% H, 25% He, trace amounts of lithium

• 300,000 to 150 million years - _____
  - after the formation of the first atoms but before the first stars

• 150 million to 500 million years onwards - age of _____
  - _____ amplifies slight regulates in the density of primordial gas. Gas clouds become increasingly more dense and collapse under their own gravity eventually getting hot enough for nuclear _____, creating the first stars.
  - larger volumes of mater collapse to form _____

• 4.6 billion years ago (~9 billion years after the Big Bang)
  - Our Solar Systems forms

Your Mission

- Read Topic 4.4 Concept 2 p. 360-361
- Start Workbook Questions Topic 4.4
- Read Investigation 4D The Age of the Universe p.366/367 for tomorrow