

Name: _____

Date: _____ Period: _____

The Universe

CLASS NOTES

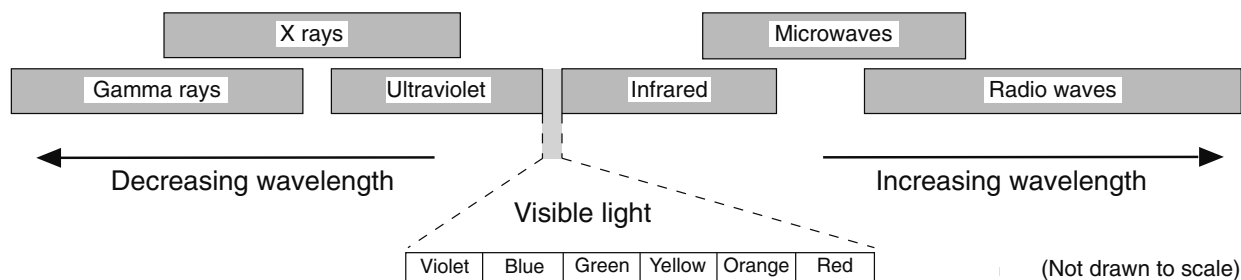
- Universe - _____

 - Came into existence approximately _____ billion years ago with the Big Bang
- Big Bang - _____

- Evidence of the Big Bang:
 1. Background Radiation - _____

 - Scientists have found evidence of long wave radiation [microwaves] that come from all directions in the Universe
 2. Doppler Effect - _____

- Electromagnetic Energy - _____



Earth Science Reference Tables - Electromagnetic Spectrum

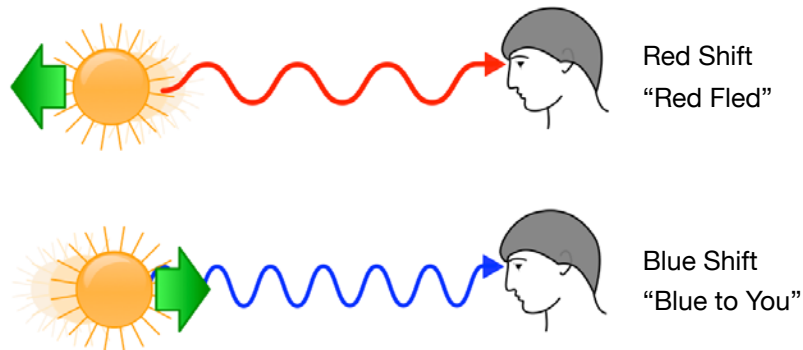
The Universe

- Each element gives off an electromagnetic spectral line [signature]



Spectral Line for Hydrogen

- When scientists study energy coming off a celestial object they can infer:
 - _____
 - _____
- Positions of the colored lines [spectral lines] shift as they studied stars and galaxies
 - Blue Shift - when Earth and the celestial object are _____ the spectral lines move towards the _____ wavelength
 - Red Shift - when Earth and the celestial object are moving _____ the spectral lines move _____ the red wavelength



- Example of a "Red Shift"

Spectral Lines for Hydrogen in a Laboratory



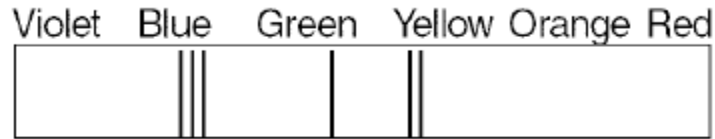
Spectral Lines for Hydrogen from a Distant Star



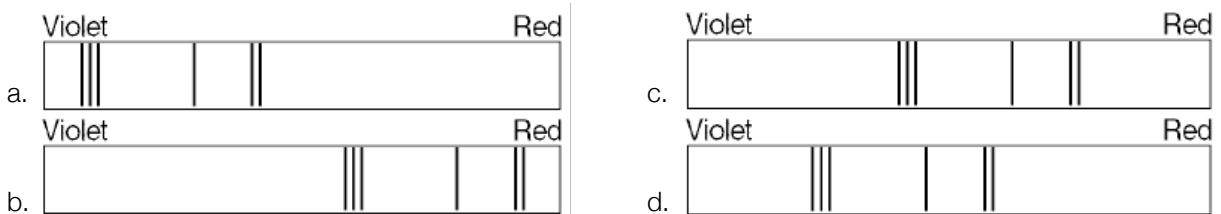
The Universe

PART I QUESTIONS: MULTIPLE CHOICE

The diagram below shows the standard dark-line spectrum for an element. The spectral lines of the same element are observed in light from four distant galaxies.



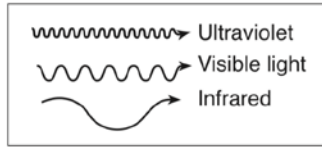
1. Which spectral lines most likely represent the galaxy farthest from the Earth?



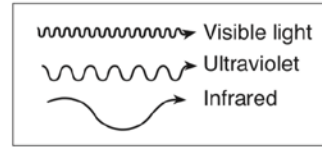
2. Based on the red-shift data on galaxies, most astronomers infer that the universe is currently
- fixed and stationary
 - moving randomly
 - contracting
 - expanding
3. Background radiation detected in space is believed to be evidence that
- the Universe is contracting
 - galaxies are evenly spaced throughout the Universe
 - the Universe began with a primeval explosion
 - all matter in the Universe is stationary
4. A comparison of the age of the Earth obtained from radioactive dating and the age of the Universe based on galactic Doppler shifts suggests that
- the Earth was formed after the Universe began
 - the Earth is immeasurably older than the Universe
 - the two dating methods contradict one another
 - the Earth is about the same age as the Universe
5. In which group are the parts listed in order from oldest to youngest?
- universe, Milky Way, solar system
 - solar system, Milky Way, universe
 - universe, solar system, Milky Way
 - Milky Way, solar system, universe

The Universe

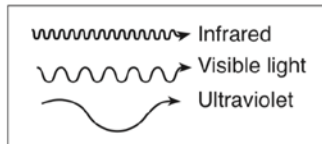
6. Which diagram represents the wavelengths of visible light, ultraviolet energy, and infrared energy?



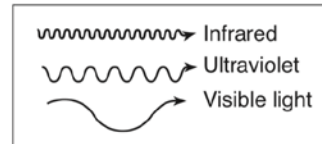
a.



c.



b.



d.

7. The red shift of light from distant galaxies provides evidence that these galaxies are
- decreasing in size
 - increasing in size
 - decreasing in distance from Earth
 - increasing in distance from Earth
8. Scientists infer that the Big Bang occurred approximately
- 4.6 billion years ago
 - 7 billion years ago
 - 9 billion years ago
 - 13.8 billion years ago
9. Evidence that the universe is expanding is best supported by the observation that the wavelengths of light from distant galaxies are shifted toward the
- red end of the spectrum because they are shortened
 - red end of the spectrum because they are lengthened
 - blue end of the spectrum because they are shortened
 - blue end of the spectrum because they are lengthened
10. Based on the red-shift data on galaxies, most astronomers infer that the universe is currently
- fixed and stationary
 - moving randomly
 - contracting
 - expanding
11. Which evidence best supports scientists' inferences about the origin and age of the universe?
- the existence of planets
 - cosmic background radiation
 - formation of star constellations
 - similar composition of Earth and the Moon