Astronomy_Part 3 Notes

Properties of Stars

What are Stars?

Hot balls of _____ that shine because nuclear fusion (hydrogen to helium) is happening at their cores. They create their own _____.

Have different _____ which allow many different 'varieties' of stars to exist

Variations in _____ and _____

- Red
- Yellow
- Blue

Characteristics of Stars:

_____-How bright a star is.

_____ _____-How bright a star appears on Earth.

Stars can appear to be the same brightness to us on Earth even though they may not be (one may be farther away from us than the other).

_____ _____ – the actual brightness of a star.

Stars that are as bright as our Sun have a luminosity of 1
If a star has a luminosity of 50, it is 50 times brighter than our Sun

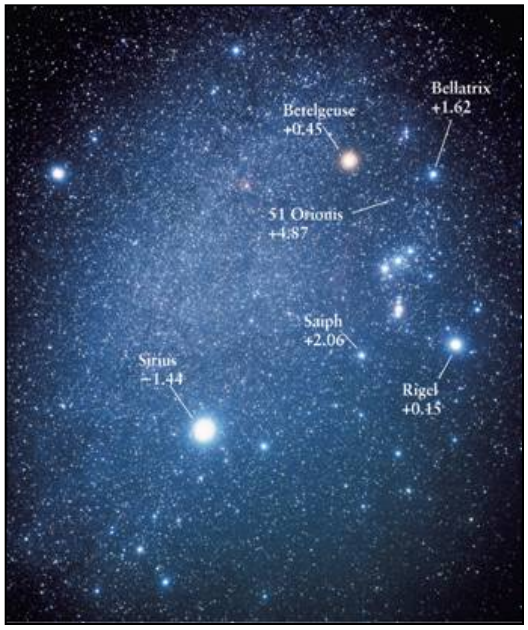
Apparent Magnitude:

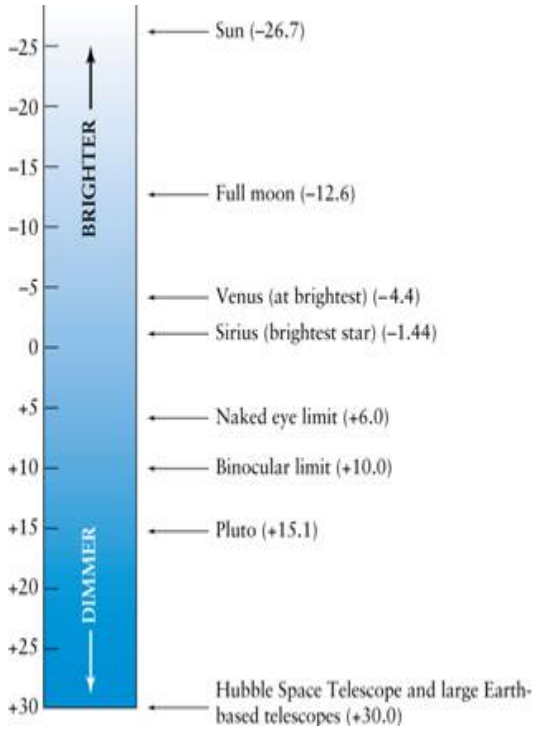
Brightness of stars, as seen from _____.

Several stars in and around The constellation Orion, labeled With their names and apparent magnitudes (See below).

Astronomers give the brightness of objects in the sky by apparent Magnitudes. Stars visible to the naked eye have magnitudes between -1.44 and 6.

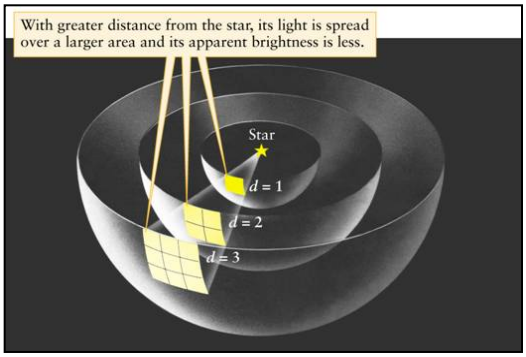
Rate Your Understanding: 





The Inverse-Square Law:

The farther a star is from Earth, the _____ it looks to us. Doubling the distance makes the star look one-fourth as bright. Tripling the distance decreases the star's brightness by a factor of 9.



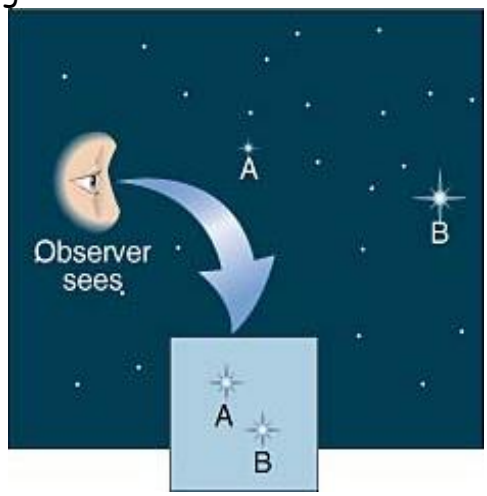
Absolute Magnitude:

How bright the star actually is, no matter how far from _____ it is.

Do the headlights ever change actual brightness?

Rate Your Understanding:

Absolute vs. Apparent Magnitude:



Color:

The _____ of a star determines the color.

-Hottest- Blue Color

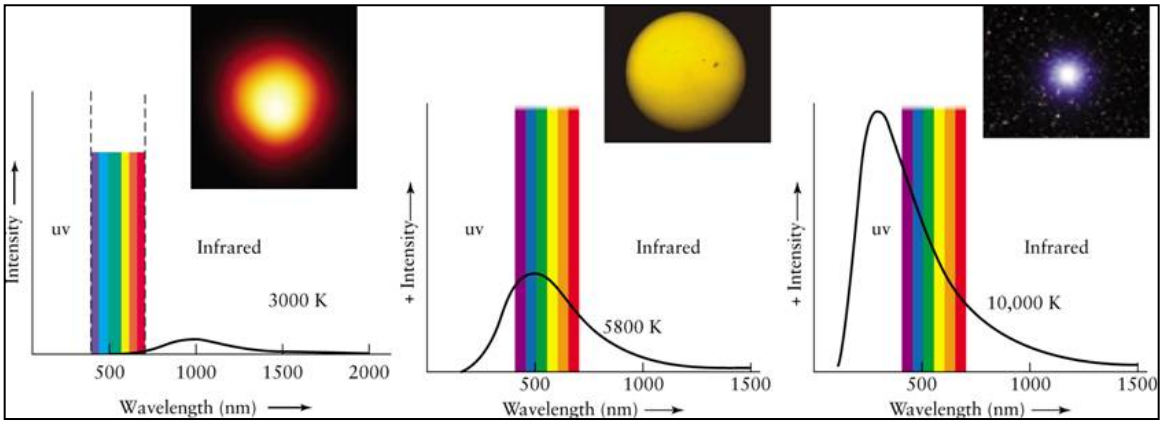
-Medium-Orange/Yellow

-Coolest-Red

Determined by _____ of visible light emitted.

-Shortest Wavelength-Violet

-Longest Wavelength-Red



Rate Your Understanding:

Electromagnetic Waves:

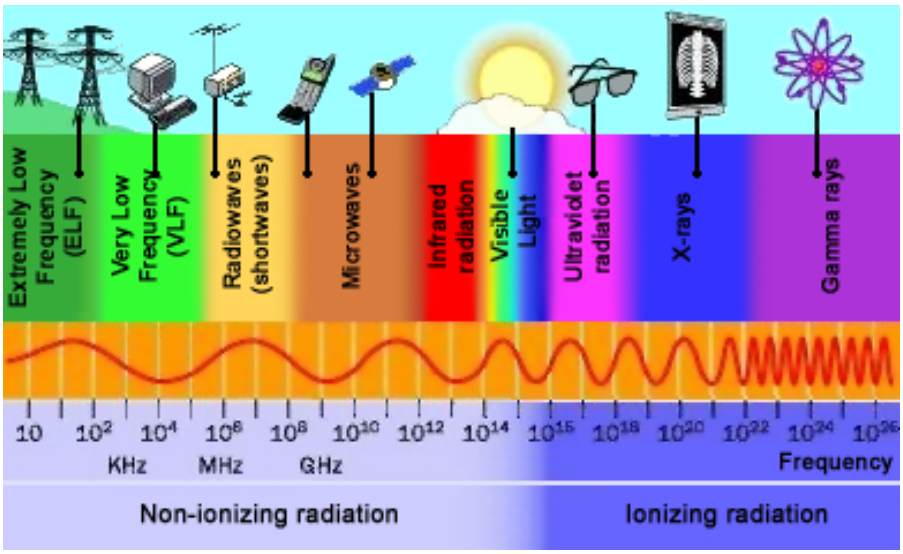
-Formed by changing _____ fields and _____ fields.

-Do not require a _____to propagate.

-This means that electromagnetic waves can travel not only through air and solid materials, but also through the vacuum of _____.

Electromagnetic Spectrum:

-Covers all energies of electromagnetic waves, from low-energy radio waves and microwaves, to infrared, to optical light, to ultraviolet, to high energy X-rays and Gamma Rays.



Visible Light Spectrum:

-Very _____ portion of the Electromagnetic Spectrum

-_____ light can be split up into individual colors easily, forming the rainbow.

-Continuous spectrum shows different _____ of visible light.

Visible Light Spectrum and Chemistry:

-Each element in the Periodic Table can appear in gaseous form and will produce a series of bright lines _____ to that element.

-Hydrogen will not look like Helium, which will not look like Iron, etc.

-Astronomers can then identify what kinds of stuff are in stars from the lines they find in the star's _____.

Rate Your Understanding: 

Color and Temperature:

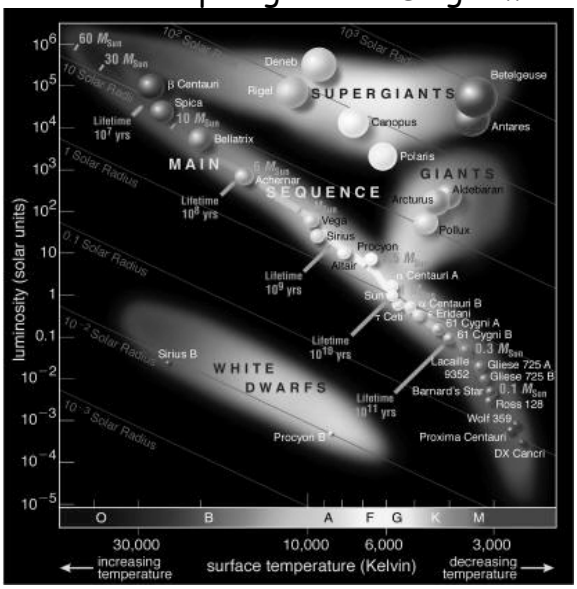
From _____ _____, scientists can determine not only the element, but the density and temperature of an element in the star.

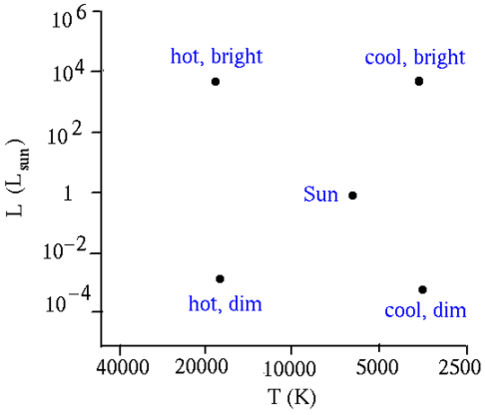
TABLE 11-1 The Spectral Sequence

Spectral class	Color	Temperature (K)	Spectral lines	Examples
O	Blue-violet	30,000–50,000	Ionized atoms, especially helium	Naos (ζ Puppis), Mintaka (δ Orionis)
B	Blue-white	11,000–30,000	Neutral helium, some hydrogen	Spica (α Virginis), Rigel (β Orionis)
A	White	7500–11,000	Strong hydrogen, some ionized metals	Sirius (α Canis Majoris), Vega (α Lyrae)
F	Yellow-white	5900–7500	Hydrogen and ionized metals such as calcium and iron	Canopus (α Carinae), Procyon (α Canis Minoris)
G	Yellow	5200–5900	Both neutral and ionized metals, especially ionized calcium	Sun, Capella (α Aurigae)
K	Orange	3900-5200	Neutral metals	Arcturus (α Boötis), Aldebaran (α Tauri)
M	Red-orange	2500-3900	Strong titanium oxide and some neutral calcium	Antares (α Scorpii), Betelgeuse (α Orionis)

Relationship between Characteristics of Stars:

Hertzsprung-Russel Diagram:





H-R Diagram:

-Star brightness is plotted against star _____ types. (color/temperature).

-Brightness and spectral type are _____.

-Main-sequence stars (fusing hydrogen to helium) fall along red curve.

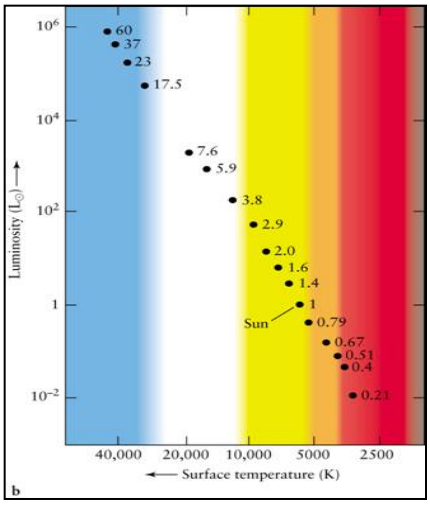
Rate Your Understanding:

-Giants are to the upper right, and super giants are on top.
-White dwarfs are below the main sequence.

-Hotter stars are _____ than cooler stars (at the same size).
-Bigger stars are _____ than smaller stars (of the same temperature).
-So the brightest stars are the biggest and hottest ones.
-$L=R^2T^4$ (L=brightness, R=radius, T=temperature)

Mass-Temperature-Brightness

-Each dot represents a main-sequence star.
-The dot's number is the mass of that star in solar masses (Sun = 1)
-Mass, brightness, and temperature of main sequence stars _____from lower right to upper left.



Temperature and Color	Luminosity and Color	Size and Luminosity
Blue stars are hotter	Brighter stars are blue	Bigger stars are bright
Red stars are cooler	Dimmer stars are red	Smaller stars are dimmer

"The Main Sequence"

-Band of stars that stretches from the top left to the bottom right of the HR diagram
-Contains stars that are in the stable, main part of their life cycle, e.g. – our Sun

•Stars that are not part of the Main Sequence are near the end of their lives

-Ex. White Dwarfs – they are white (so they are hot) but dim because they are small --- are cooling and will become black
-Ex. Red Giants – they are red (so they are cool) but bright because they are large --- will eventually explode

Rate Your Understanding: 

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