DO NOW:

1) Which is the hottest of the following layers of the sun: photosphere, chromosphere, corona

2) How long is the entire sun cycle of sun spots?

3) What heats the plasma in corona to make it so hot?

Today's Objectives:

- Understand parallax and it's limits
- Know how the magnitude system works (and its querks)
- Learn about the classification of stars and the system used to do so
- Understand the H-R Diagram and where our Sun falls on the diagram

HW:

Page 381 #12-16

Parallax activity & homework!

Luminosity

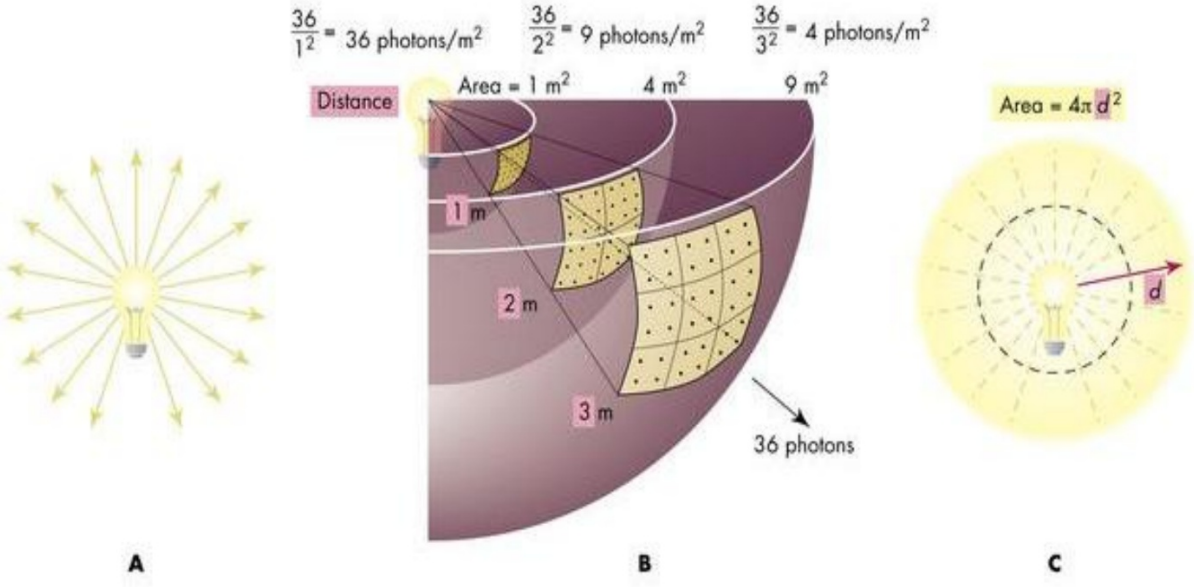
The amount of energy radiated each second (L)

Light Bulb - 100 watts

Parking lot light - 1500 watts

Sun - 4 x 10^{26} watts

Inverse Square Law



Magnitudes of Brightness

Book page 360 - Read "The Magnitude System"

1) Write down the three "confusing properties" of magnitude and *why* they are the way they are

1) The scale is "backward" - bright stars have low magnitudes, dim stars have large magnitudes

2) Difference correspond to brightness ratios

For example: a first magnitude is **100 times brighter** than a sixth magnitude.

2.512^x

Each magnitude is about 2.512 times brighter than the last (1^{st} is 6.31 times brighter than 3^{rd})

How much brighter is 2^{nd} than 6^{th}?

3) "absolute magnitude" vs "apparent magnitude"... to solve the issue a standard was created... 10 parsecs distance

Why? - Hipparchus measured apparent magnitudes, and they were never really changed....

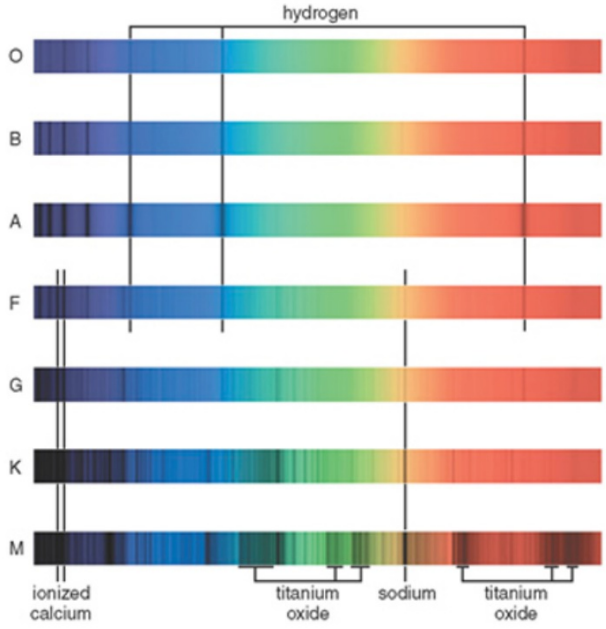
Star Visual	Apparent Magnitude	Distance(pc)	Absolute Magnitude	Luminosity (rel. to Sun)
Sun	-26.74	4.84813×10^{-6}	4.83	1
Sirius	-1.44	2.6371	1.45	22.5
Arcturus	-0.05	11.25	-0.31	114
Vega	0.03	7.7561	0.58	50.1
Spica	0.98	80.39	-3.55	2250
Barnard's Star	9.54	1.8215	13.24	1/2310
Proxima Centauri	11.01	1.2948	15.45	1/17700

Spectral Type of Stars

TABLE 11.1 *The Spectral Sequence*

Spectral Type	*Example(s)*	*Temperature Range*	*Key Absorption Line Features*	*Brightest Wavelength (color)*
O	Stars of Orion's Belt	7 30,000 K	Lines of ionized helium, weak hydrogen lines	6 97 nm (ultraviolet)*
B	Rigel	30,000 K–10,000 K	Lines of neutral helium, moderate hydrogen lines	97–290 nm (ultraviolet)*
A	Sirius	10,000 K–7,500 K	Very strong hydrogen lines	290–390 nm (violet)*
F	Polaris	7,500 K–6,000 K	Moderate hydrogen lines, moderate lines of ionized calcium	390–480 nm (blue)*
G	Sun, Alpha Centauri A	6,000 K–5,000 K	Weak hydrogen lines, strong lines of ionized calcium	480–580 nm (yellow)
K	Arcturus	5,000 K–3,500 K	Lines of neutral and singly ionized metals, some molecules	580–830 nm (red)
M	Betelgeuse, Proxima Centauri	6 3,500 K	Molecular lines strong	7 830 nm (infrared)

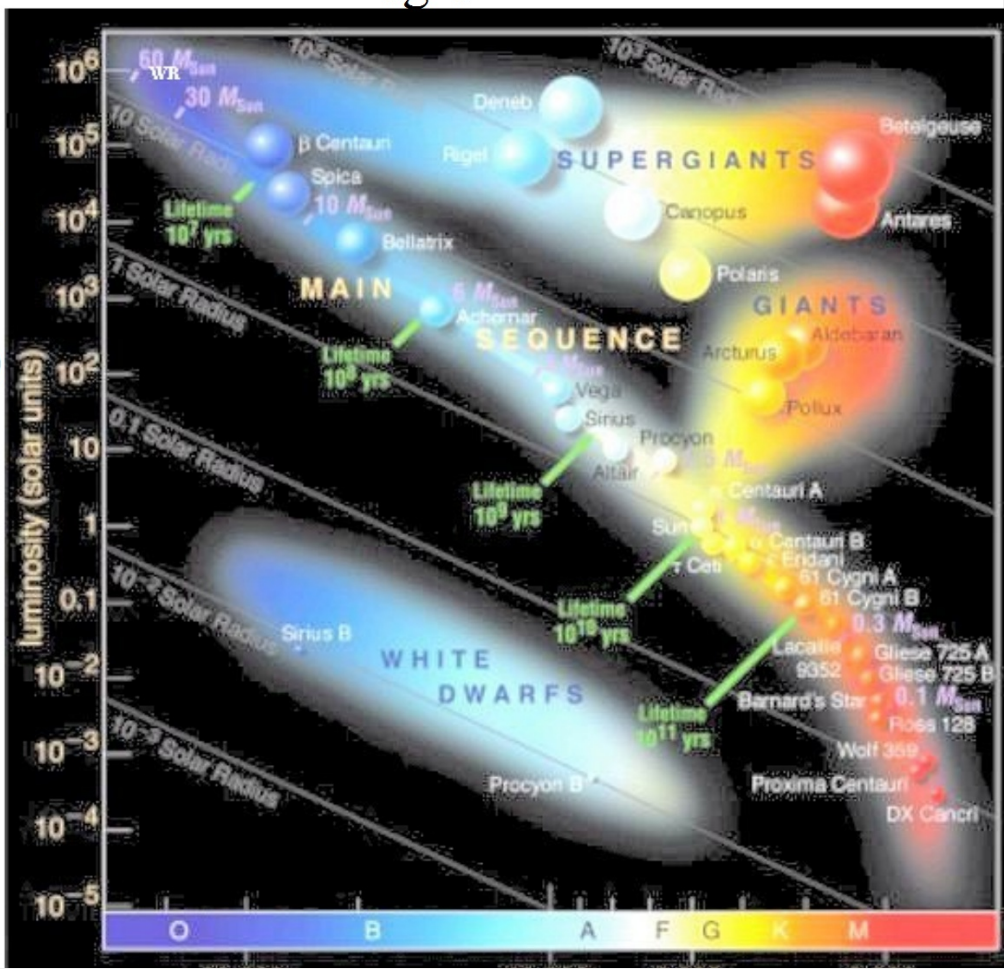
Typical Spectrum

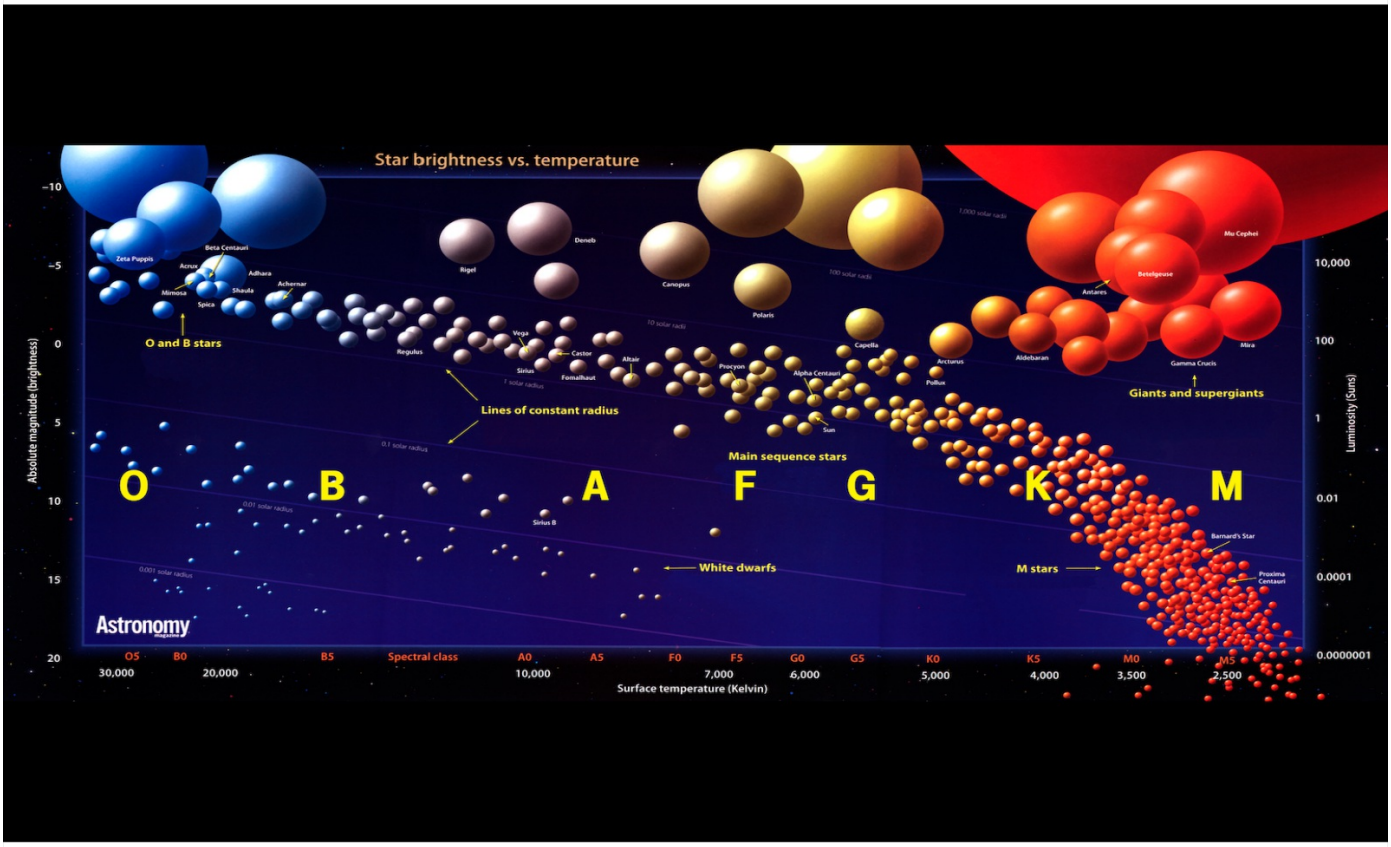


* All stars above 6,000 K look more or less white to the human eye because they emit plenty of radiation at all visible wavelengths.

H-R Diagram

Comparing luminosity to star classification (aka temperature)




Star brightness vs. temperature
Absolute magnitude (brightness)
Luminosity (Suns)
Zeta Puppis
Beta Centauri
Acrux
Adhara
Mimosa
Spica
Shaula
Achernar
O and B stars
Rigel
Deneb
Canopus
Polaris
Regulus
Vega
Castor
Sirius
Fomalhaut
Altair
Procyon
Capella
Alpha Centauri
Arcturus
Pollux
Sun
Aldebaran
Antares
Betelgeuse
Mu Cephei
Gamma Crucis
Mira
Giants and supergiants
Lines of constant radius
Main sequence stars
O
B
A
F
G
K
M
Sirius B
White dwarfs
M stars
Barnard's Star
Proxima Centauri
Astronomy
Spectral class
Surface temperature (Kelvin)