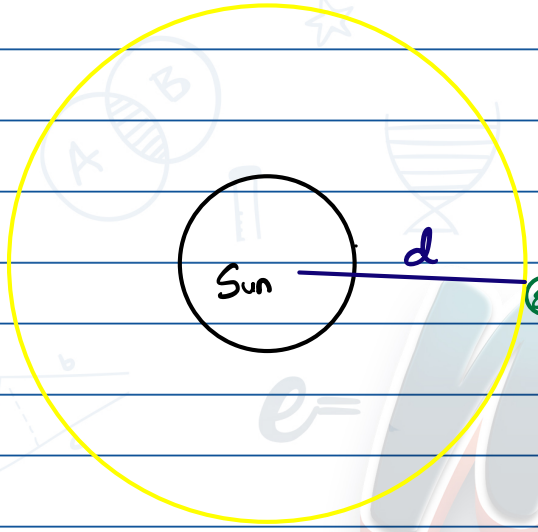
TOPICS: _____ DATE: _____

Luminosity: Total power delivered by a star

Radiant flux density (F) It is the observed amount of Intensity / on earth.

It is the amount of power acting normally through a surface, per unit area on the earth.



S.A of sphere $= 4\pi r^2$

$$F = I = \frac{P}{A}$$

$$F = \frac{L}{4\pi d^2}$$

Astronomical unit (A_0) $= 1.5 \times 10^{11}$

It is the average distance b/w sun and the earth.

Light year: Distance travelled by light in one year.

$$v = \frac{d}{t} \qquad 3.0 \times 10^8 = \frac{d}{365 \times 24 \times 60 \times 60}$$

$$d = 9.46 \times 10^{15}\ m$$

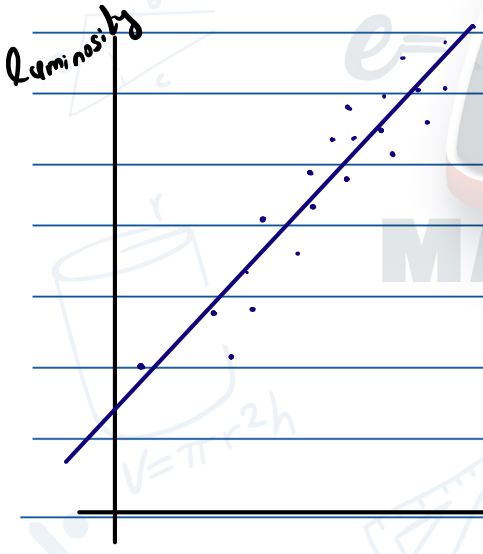
TOPICS: _____ DATE: _____

Age of the Universe.

Cosmic Distance ladder: It is succession of steps/methods by which we determine distance b/w celestrial objects.

Standard candle: These astronomical object have known luminosity. due to a characteristic quality possessed by that class of object.

1) Cepheid Variable:- It is defined as a type of star having a periodic pulsing brightness varying in both temperature and diameter with a well defined amplitude



Henritta Swan leawitt

By measuring timeperiod because of direct relationship we can work out the luminosity.

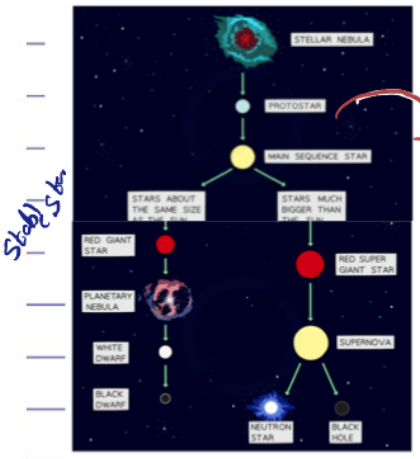
TOPICS: _____ DATE: _____

Type 1A supernova.

→ As massive stars fuse hydrogen and other light Elements into iron they use up there fuel and continue burning and keep propelling outwards and so the star collapse on its own and then explode.

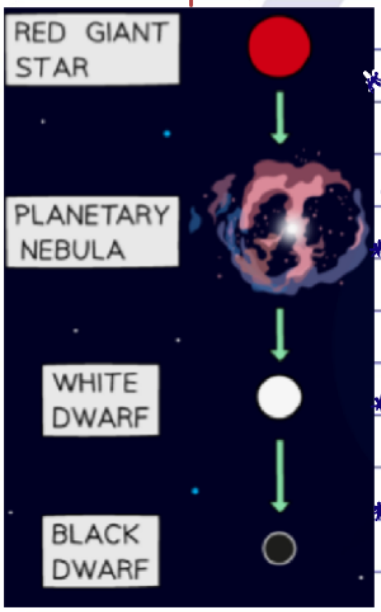
life cycle of Stars.

Formation of Star.



* A large cloud of gas and dust collapse unde its own gravitational field.
* It results in formation of protostar.
* Collision continues until temperature rise is large enough to cause a fusion reaction.
* This is the point where hydrogen turns to helium.
* After fusion begn star stops collapsing and heat produce through fusion causes enough pressure from inside to balance the gravitational force from the outside.

When star begins to run out of hydrogen after millions of years the outward expansion force is insufficient to counte gravitational force.



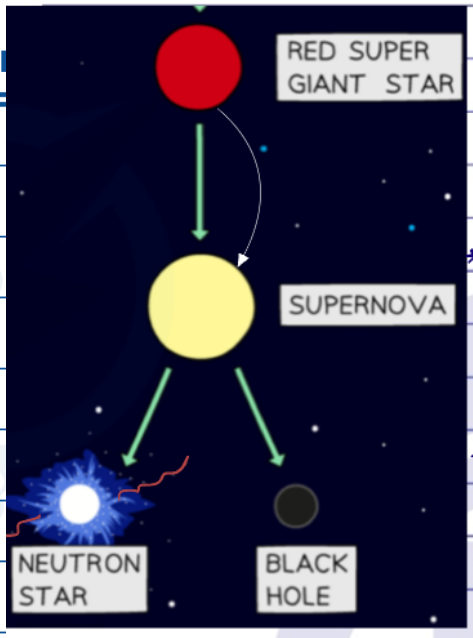
For A medium star (Our Sun)

* Core of star gets denser and uses up outer layer of hydrogen and main sequence star becomes redgiant.
* Now the star's heat causes expansion and outer layers of gases are shed and becomes a planetary nebula
* After this it becomes a white dwarf just the core of star remains that emit light.
* last it becomes a black dwarf emitting no heat or light.

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

Note:

No fusion takes place in white dwarf.



For A massive Star.

Core of star gets denser and uses up outer layer of hydrogen and main sequence star becomes Red super giant.

* Now the star's heat causes expansion and outer layer explodes causing a supernova. (from The energy is much much higher)

This fuse elements even havier then Iron.

For a massive Star

* It becomes a neutron star.

For a gigantic Star.

* It be comes a black Hole
* It has extreme gravity it even attracts light.

→ White dwarf an collide with a massive star and explode.

TOPICS: _____ DATE: _____

Wein's Displacment Law: Color of star depends on its surface temperature.

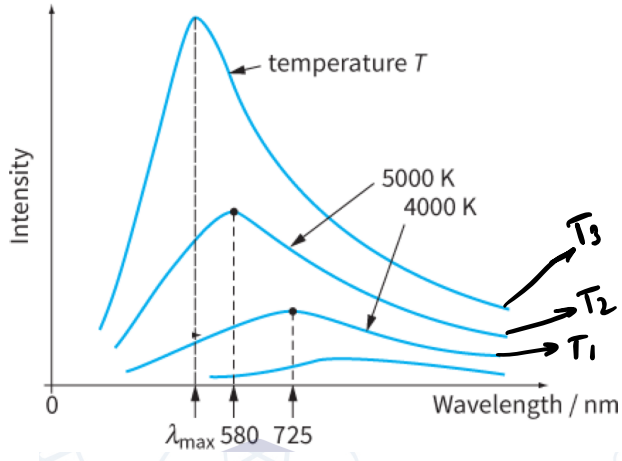
Colour of star	Surface temperature of star / K
blue	Greater than 33 000
blue to blue-white	10 000 – 30 000
white	7500 – 10 000
yellowish white	6000 – 7500
yellow	5200 – 6000
orange	3700 – 5200
red	Less than 3700

Temperature increases ↓

λ (wavelength decreases) ↓

Wein's displacment law

$$\lambda \propto \frac{1}{T} \qquad \lambda T = \text{Constant} \approx \lambda_1 T_1 = \lambda_2 T_2$$



Black body Radiator: An ideal thermal Radiators

Stars are also called Black body Radiator.

TOPICS: DATE:

Stephen's boltzman's law.

The luminosity of a star depends on two factors:

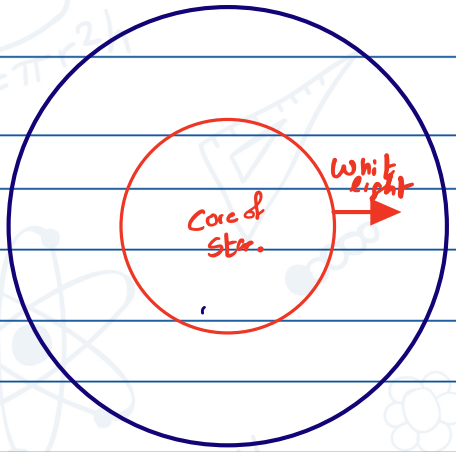
- its surface thermodynamic temperature *T*
- its radius *r*.

$\sigma = 5.67 \times 10^{-6}$

$L \propto r^2$ $L \propto T^4$

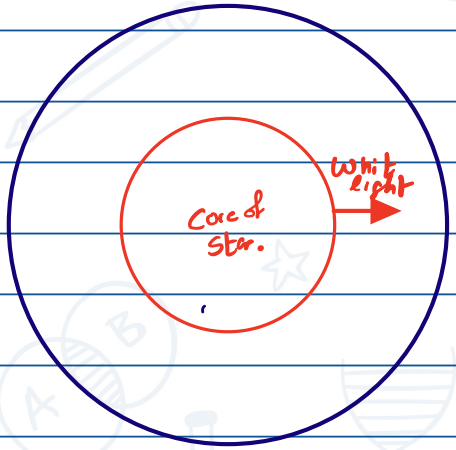
$$L = 4\pi\sigma r^2 T^4$$

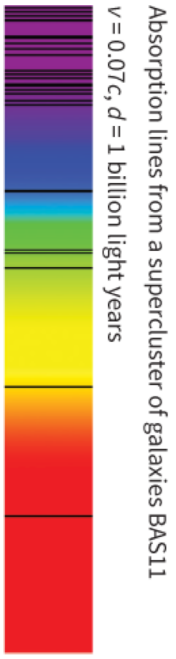
Hubble's work:- Core emits white light since cool hydrogen is in the surrounding we got exact same absorption spectrum as for hydrogen



TOPICS: _____ DATE: _____

Star very far away.





Doppler's Effect:

Change in observed frequency.

In case of seperation observed frequency ↓ and wavelength ↑

$$\frac{\Delta\lambda}{\lambda} = \frac{\Delta f}{f} = \frac{v}{c}$$

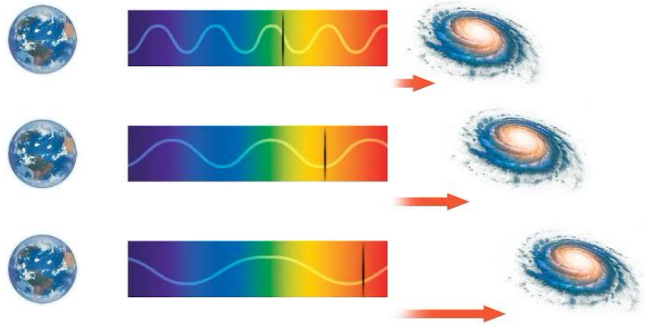
v = recessional velocity

Δλ = change in wavelength

Δf = change in frequency

f = frequency

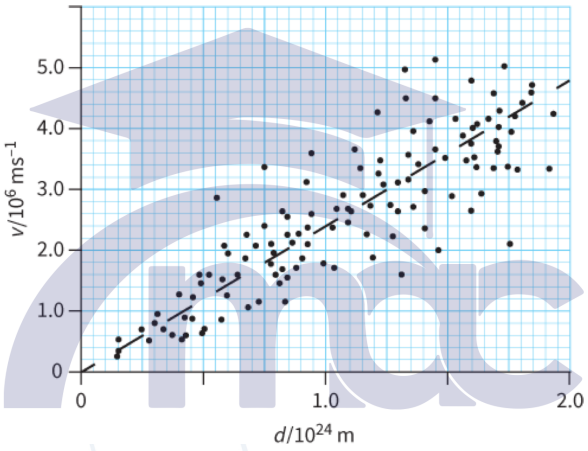
λ = wavelength



Galaxies that are more distant travels faster and away from us compared to galaxies that are close to us.

Hubbles law

$V = H_o d$



recessional velocity is directly proportional to distance.

$H_o = 2.21 \times 10^{-18}$

There may be some causes for error

* Galaxies may have rotational motion
* Galaxies velocity may vary due to other galaxies.
* May be motion of galaxy is not in the line of sight.

TOPICS: _____ DATE: _____

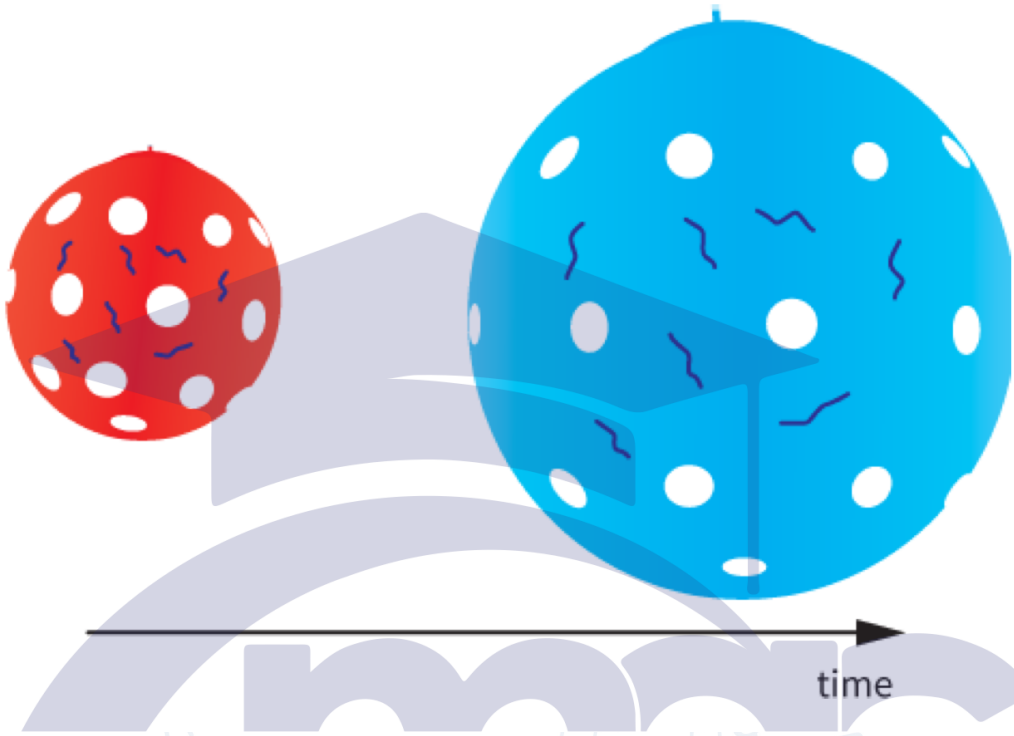
Big Bang theory. Galaxies that are far away are moving away from us hence, they would have be closer at some point

If we go back in to time everything will move inwards.

Big bang theory stats that universe was originated from a infinetly dense point known as Singularity. and is expanding ever since.

Evidence for the Big Bang

All galaxies in the Universe are moving away (receding) from each other, and not from the Earth. An observer in another galaxy will reach the same conclusion. The galaxies have motion because space itself is stretching. This is quite difficult to visualise. The best we can do is to imagine the galaxies as dots on the surface of an ever-expanding balloon (see Figure 31.9).



TOPICS: _____ DATE: _____

Age of the Universe

$V = H_0 d$

3.0×10^8

$c = H_0 d$

time of age of universe

$c \times t = d$

$c = \frac{d}{t}$

$\not{c} = H_0(\not{c} \times t)$

$\frac{1}{H_0} = t$ = Age of universe $\frac{1}{2.21 \times 10^{-18}}$

$= 4.52488 \times 10^{17}$

$\frac{4.52481 \times 10^{17}}{60 \times 60 \times 24 \times 365}$

14.3 billion years, Age of Universe

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com

TOPICS: _____ **DATE:** _____

+92 309 2656780 Mahad Amer mahad.amer.754 mahadamerchaudhry@gmail.com