



The Life Cycle of a Star

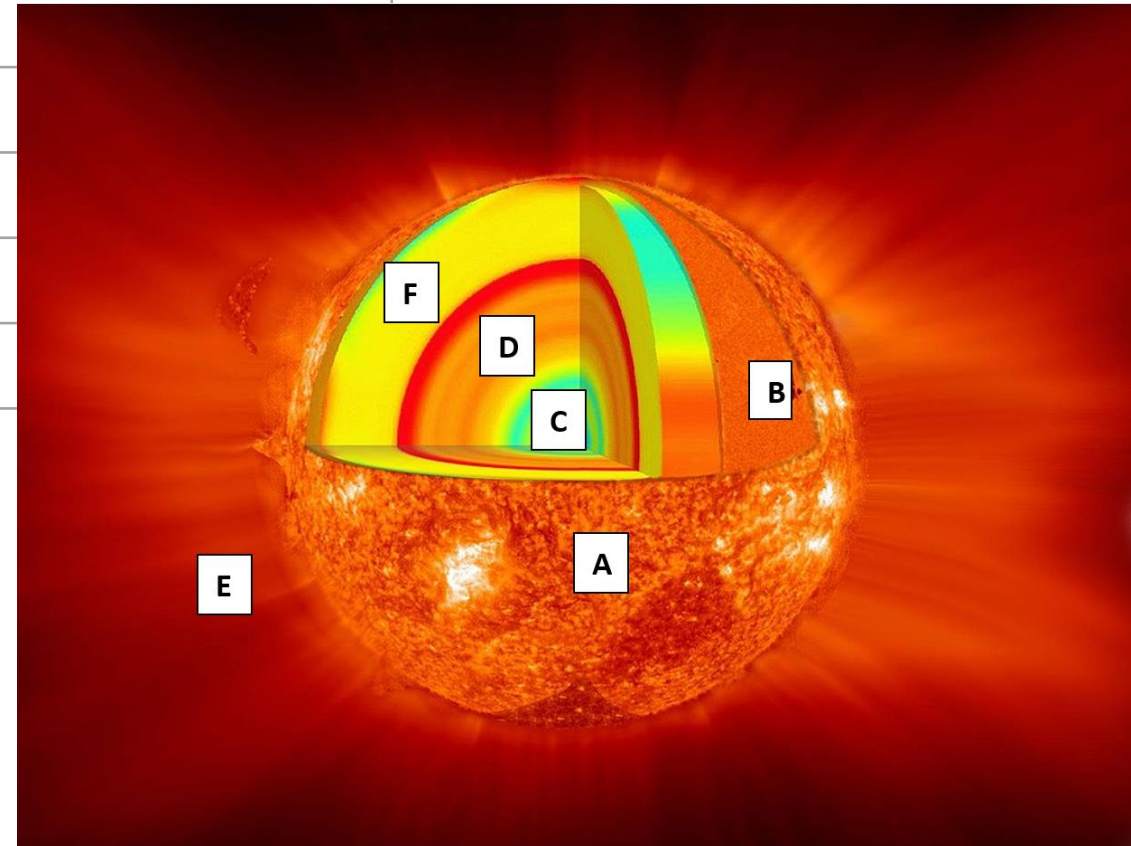
Happy Tuesday! 2-4-2020




Bell Ringer:

Label the layers of the sun on the diagram and describe what you know about each layer

Letter	Name	What you know about it
	Core	
	Radiation Zone	
	Convection Zone	
	Photosphere	
	Chromosphere	
	Corona	





2-4-2020

- Today's Agenda:
 - Bell Ringer
 - Finish Sun Model and Questions (20 minutes)
 - Grade Model together (7 minutes)
 - Stellar Evolution- Questions and Article
 - Exit Questions



A) _____



B) _____



C) _____



D) _____



E) _____



F) _____



G) _____



H) _____



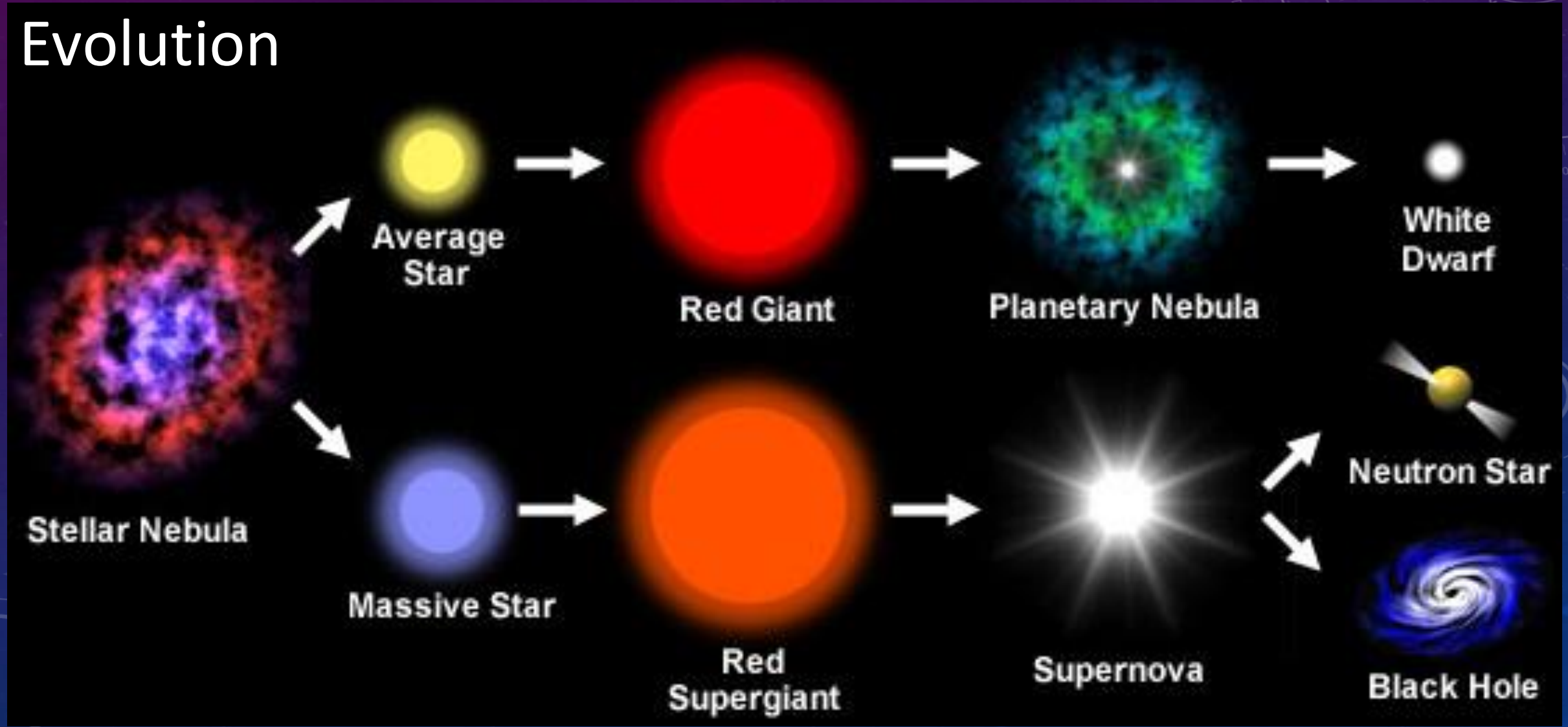
I) _____

Imagine you are an alien visiting Earth, can you tell the life cycle of humans?

- Which stage do humans spend the most amount of time?
 - How do you know?
- Which stage comes first?
 - How do you know?
- Which is last?
 - How do you know?

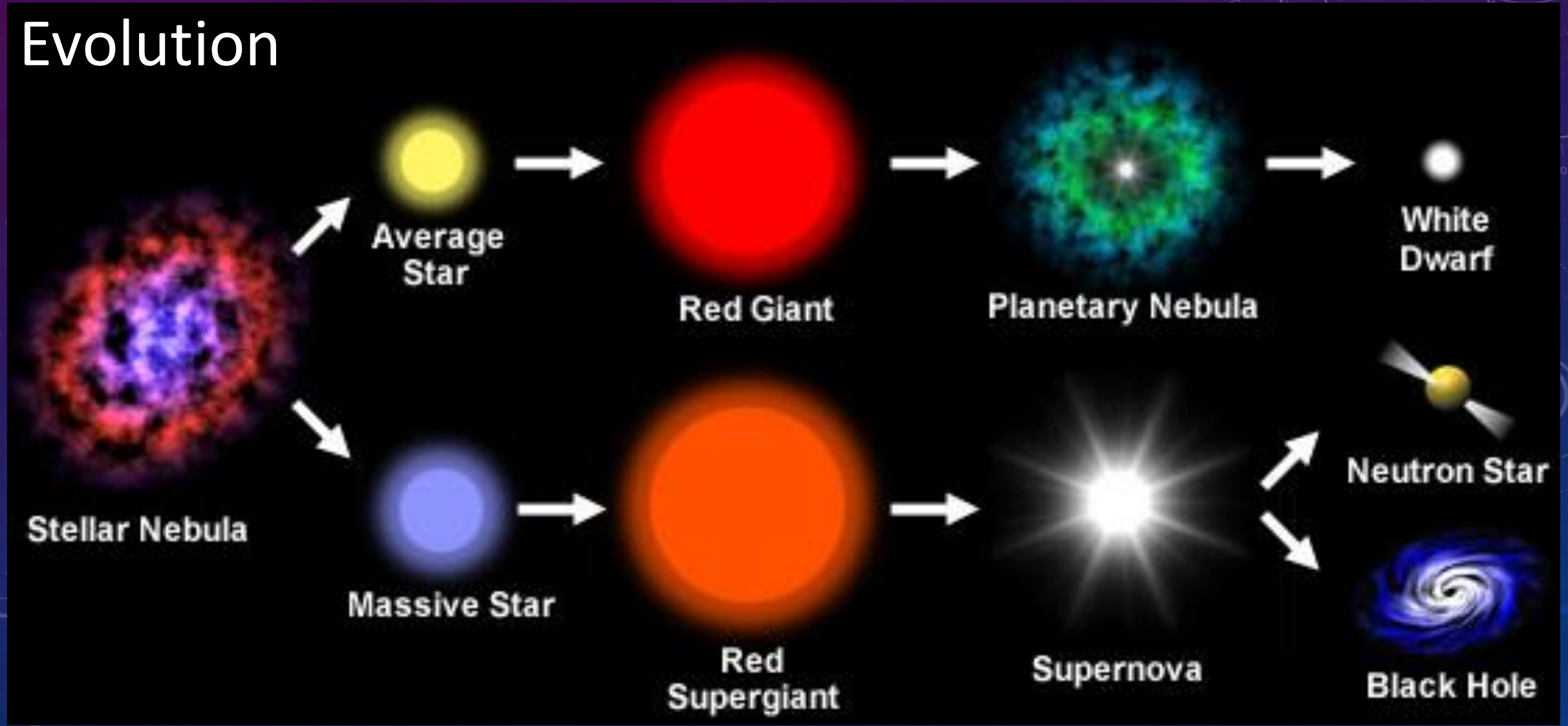
Life Cycle of Stars – Stellar Evolution

What are 5 questions you have about this diagram?
Write them down with your table partners on the sticky notes, they should all be filled!



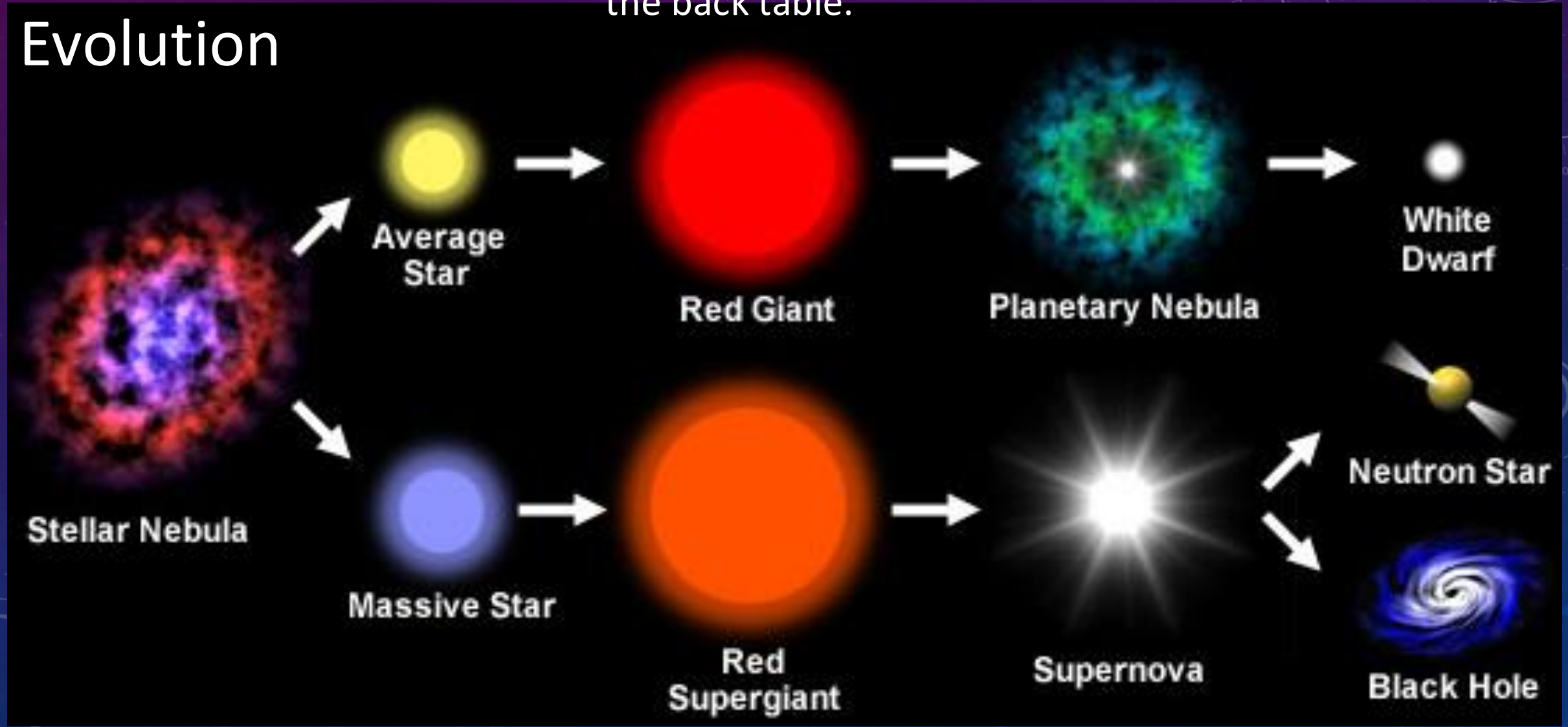
Life Cycle of Stars – Stellar Evolution

Rotate tables with your group, read the next groups questions, which are the top two questions. Put the other 3 questions on the table in the back.



Life Cycle of Stars – Stellar Evolution

Last rotation, which question do you think is the most important question? Send one person to write the main question on the board, the other piece of paper goes on the back table.

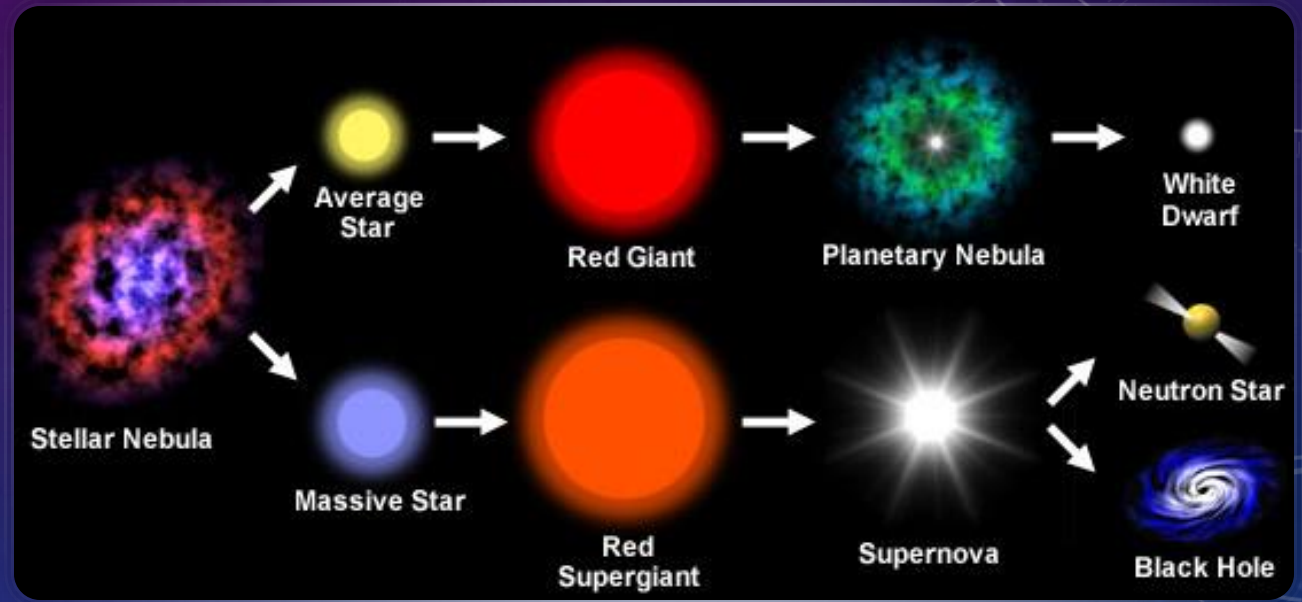


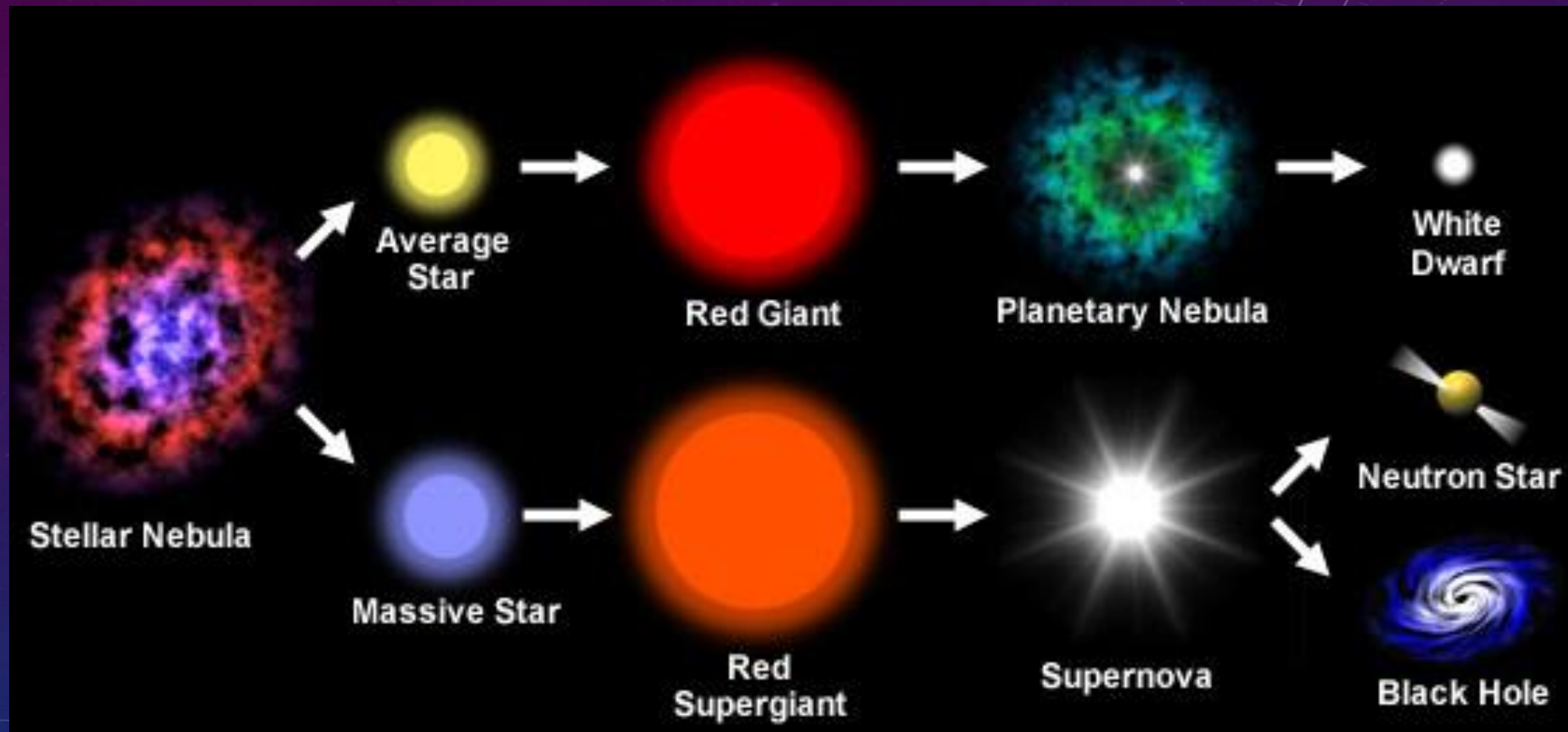
EXIT QUESTION

- On one more sticky note write down the stage you think our star is currently at in its life cycle.
- "Always." -Mrs. G when asked if it must be in a full sentence.

WEDNESDAY! 2-5-2020

- Bell Ringer: Use the diagram to the right, what is the first stage of a star's life? What will our star become next?
- Today's Agenda:
 - [Bell Ringer](#)
 - How Stars form and evolve article
 - Notes
 - Exit Question



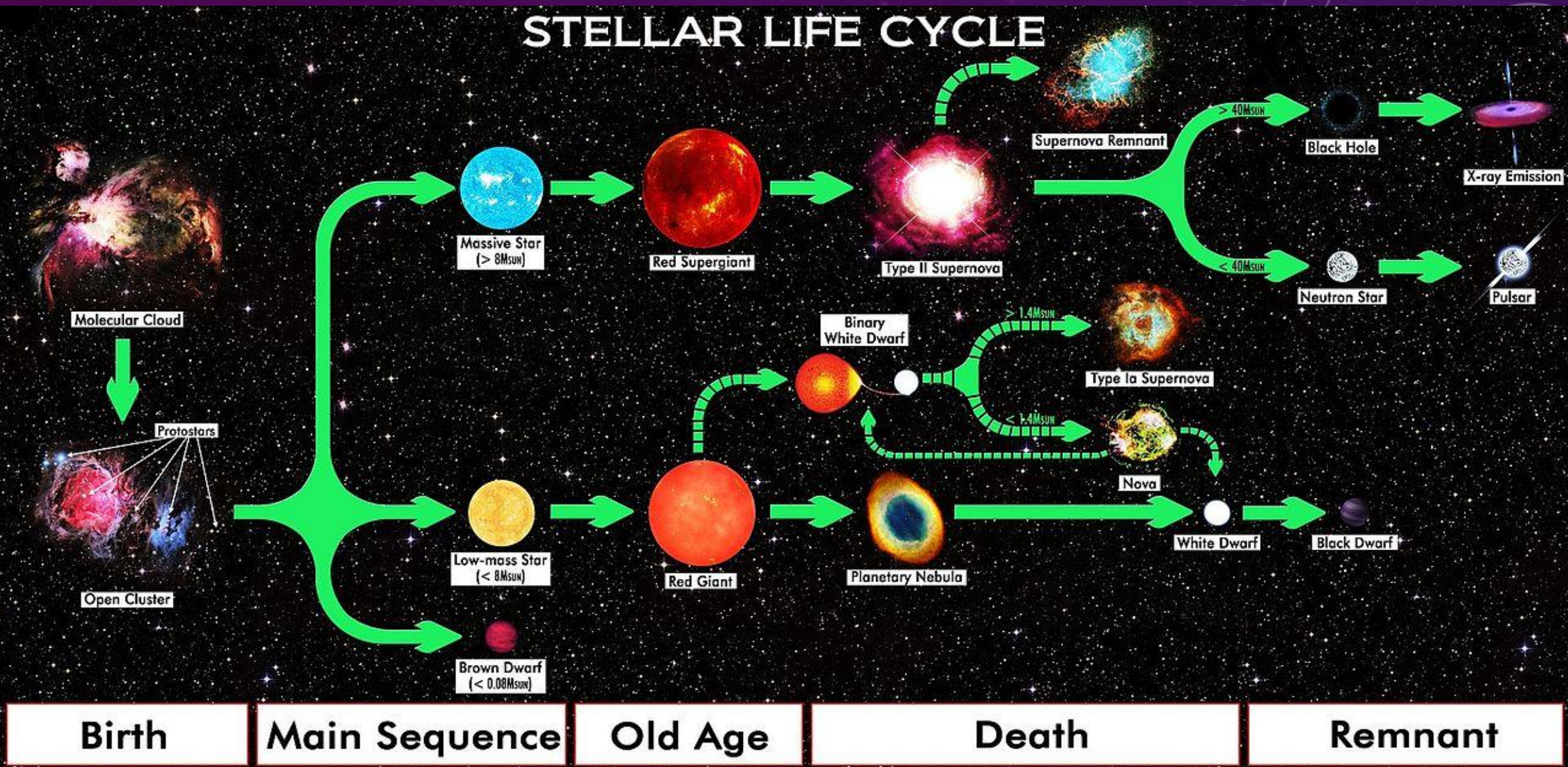


IT'S ALMOST FRIDAY!
2-6-2020

- Bell Ringer: How does a star form?
- Today's Agenda:
 - Bell Ringer
 - Finish Article Notes/Mrs. G talks about stars
 - Prep our H-R Diagrams on Paper
- Learning Objective:
 - I can model the life cycle of stars

MORE DETAIL!

STELLAR LIFE CYCLE



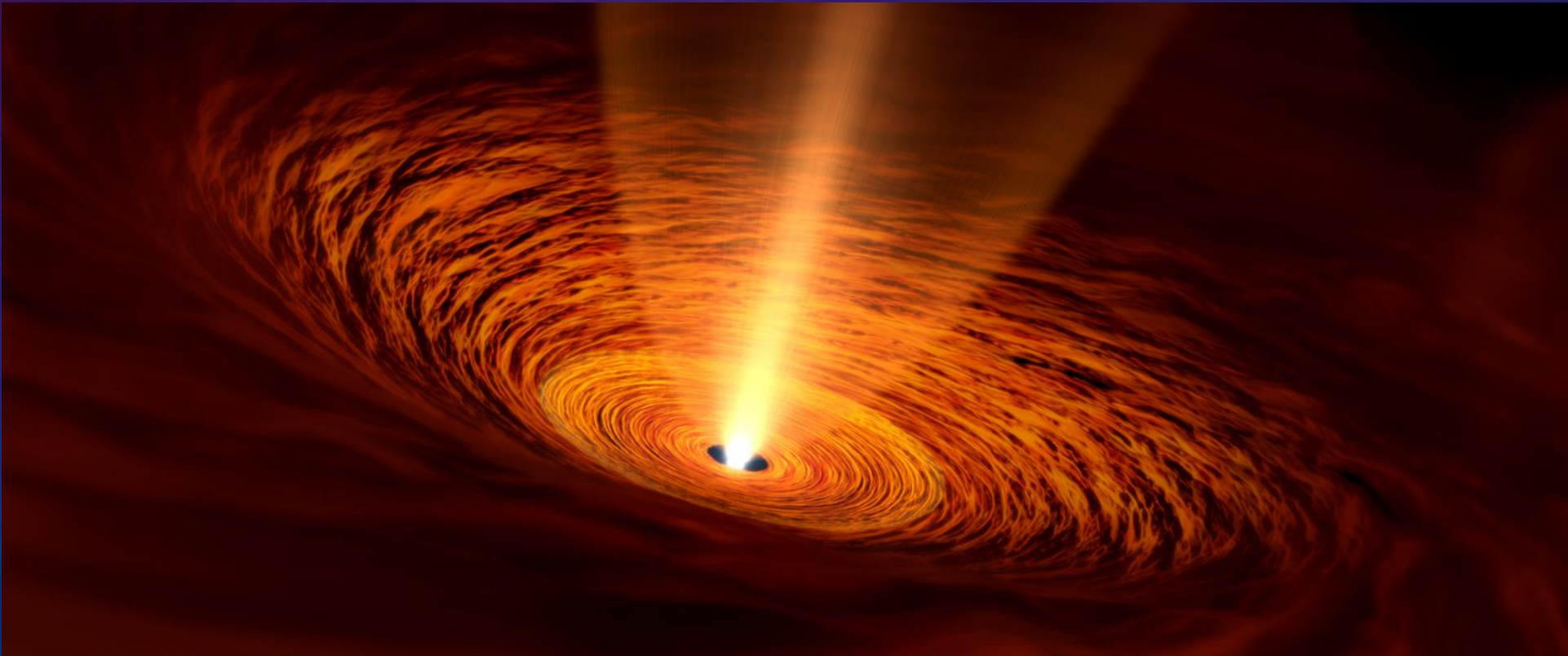
STELLAR NEBULA

- Stars are born from a Nebula (a cloud of gas and dust).
- The nebula eventually contracts & the temperature rises, until it emits energy as long wavelength red light. This is the protostar stage.

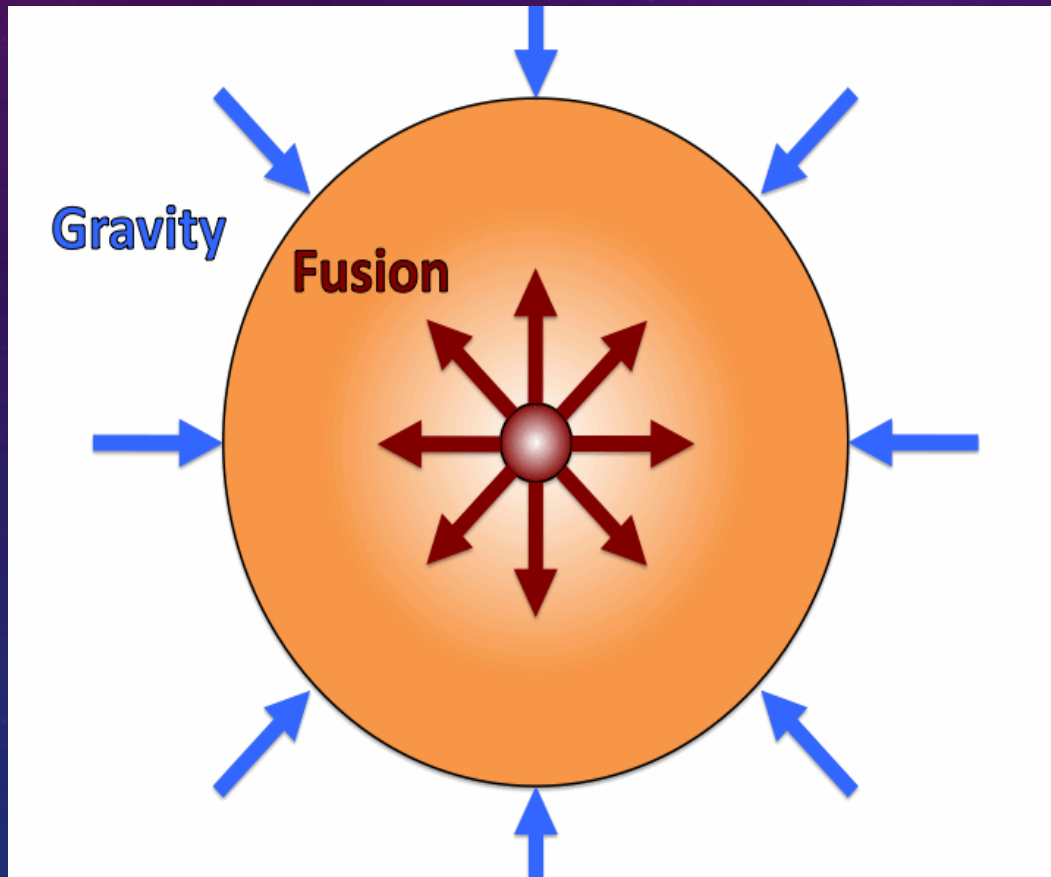


PROTOSTAR

When the core of a **protostar** reaches 10 million K, the pressure is so great that nuclear fusion begins & a star is born.



MAIN SEQUENCE STAGE

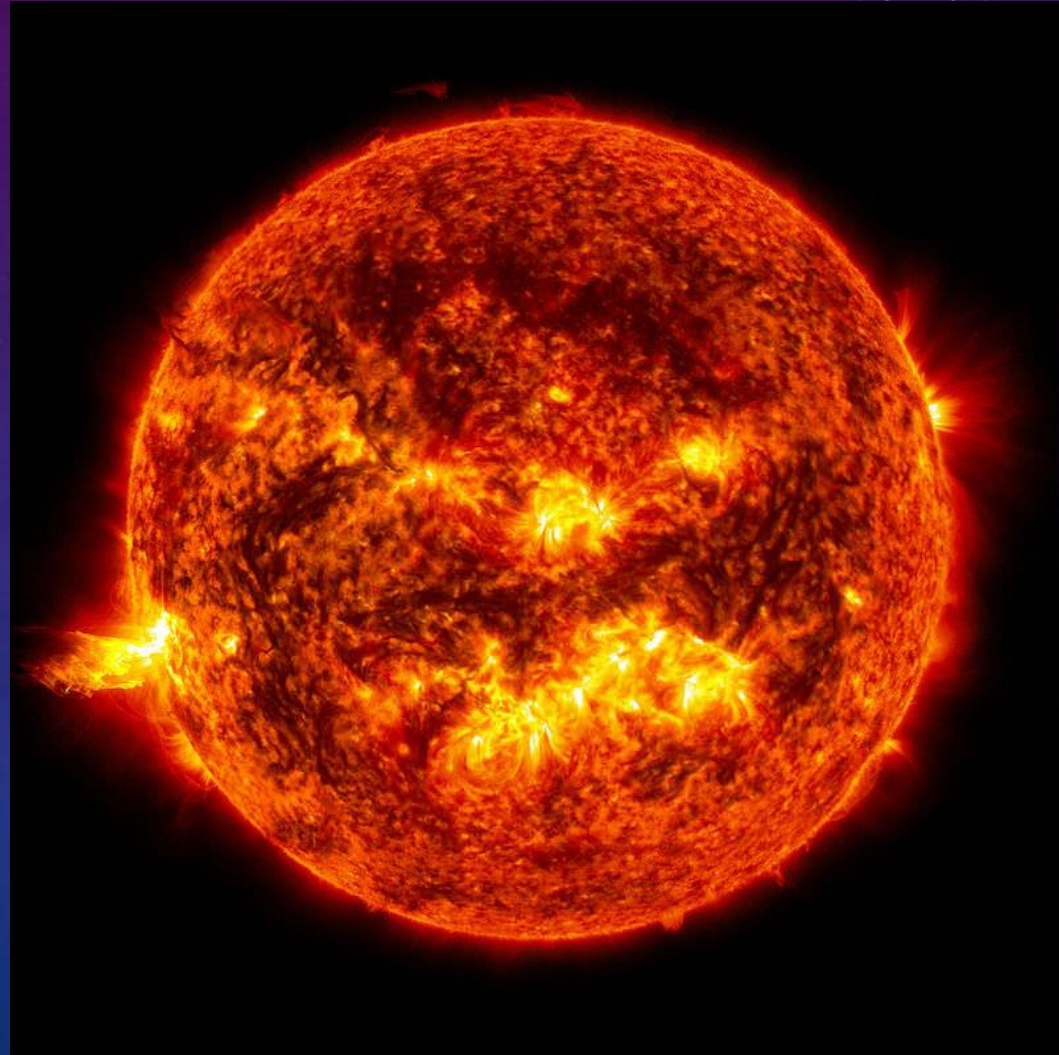


A star becomes a Main Sequence Star when it becomes stable, achieving:

- Hydrostatic Equilibrium – the force of nuclear fusion pushing out equals the force of gravity pushing in.

MAIN SEQUENCE STAGE

- 90% of a star's life
- The hotter the star the shorter its life span.
 - Hot Blue stars average a few million years.
 - Cooler Red hundreds of billions of years.
 - Medium Yellow (Sun) around 10 billion



RED GIANT STAGE

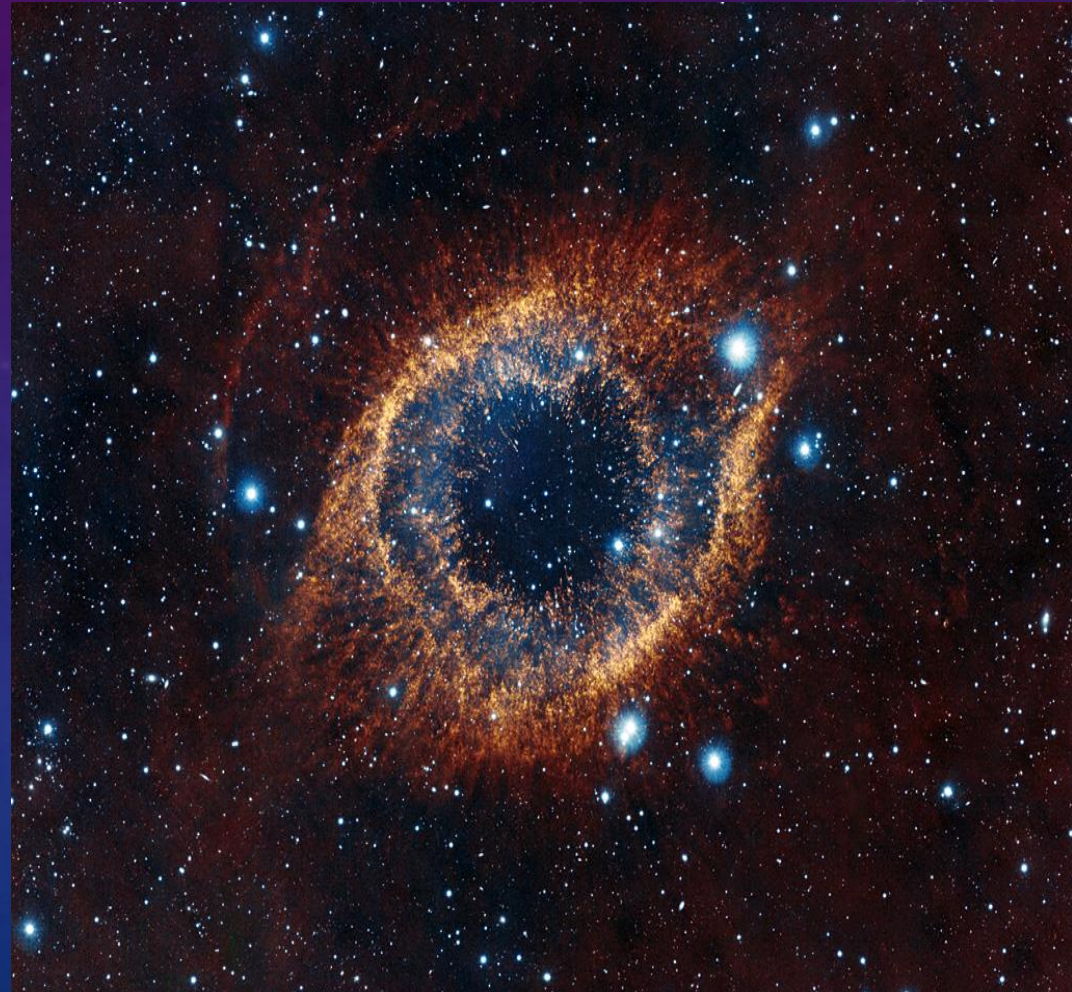


- Zone of Hydrogen Fusion moves outward leaving behind a helium core.
- Core begins to collapse & outer shell cools (turns red) & expands.
- Eventually, hydrogen is consumed, helium is converted to carbon & energy is produced.

<https://www.youtube.com/watch?v=wIHQV52fJ1A>

PLANETARY NEBULA

- All stars eventually run out of fuel & collapse due to gravity.
- On their way to becoming a **White Dwarf**, Low/Medium mass stars eject their outer layer & become a cloud of gas called a Planetary Nebula.



WHITE DWARFS

- The final stage for most low/medium mass stars.
- Matter contracts into a high density, cooler & dimmer star.



BURNOUT & DEATH

- Massive stars collapse & end in a brilliant explosion called a Super Nova



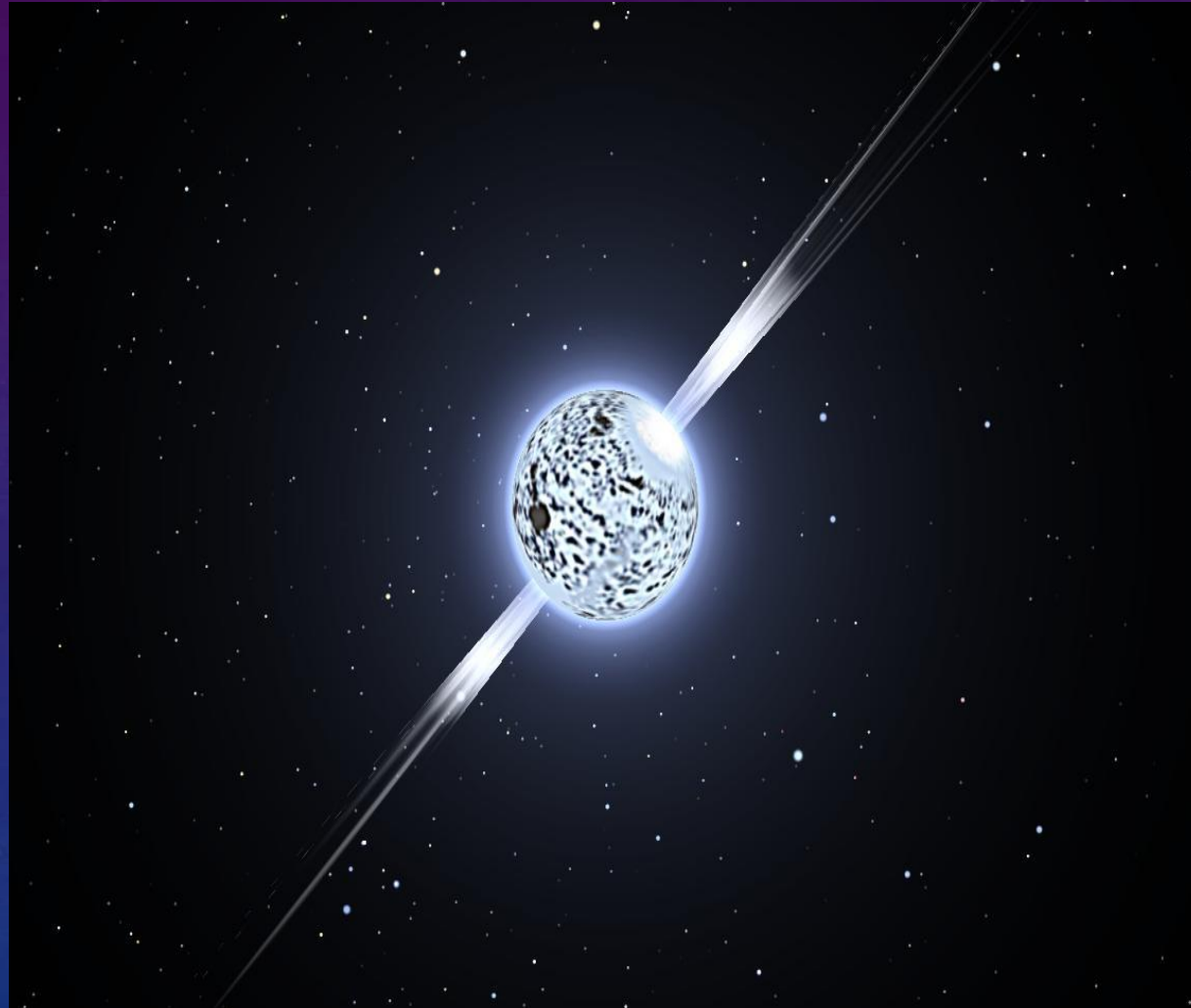
https://www.youtube.com/watch?v=YIKXvDlf8_0

The image shows the Crab Nebula, a complex of glowing gas and dust in space. It has a central bright blue region with intricate filamentary structures in shades of green, yellow, and orange extending outwards. The background is a deep purple-blue gradient with faint white stars. On the right side, there are white circular and arc-like patterns, some with arrows, resembling a technical diagram or a stylized representation of celestial mechanics. At the bottom left, there are faint, overlapping circular lines.

A remnant of a Super Nova event recorded by the Chinese in 1054, called the Crab Nebula

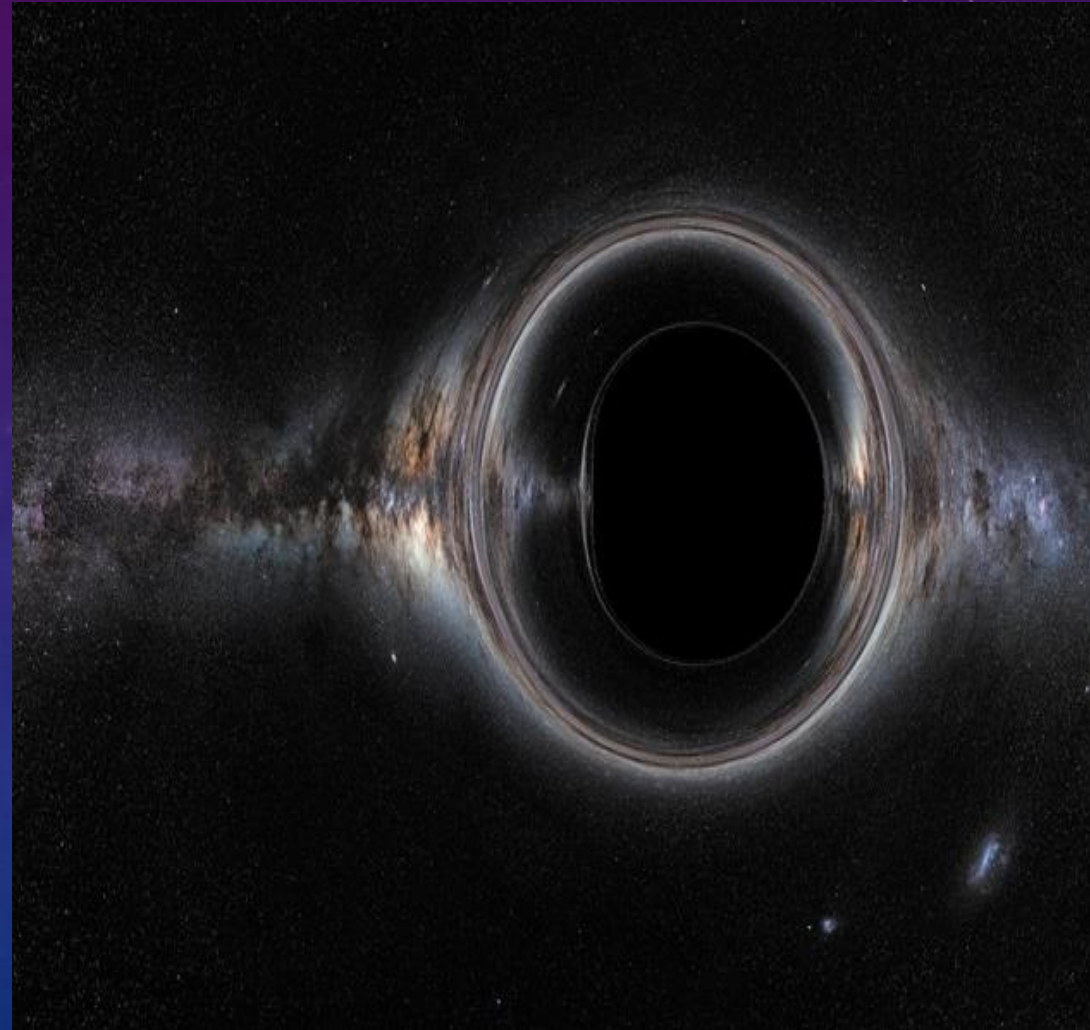
NEUTRON STARS

- Remnants of Super Nova events
- An extremely high density celestial object with a collection of tightly packed neutrons and a small radius.



BLACK HOLES

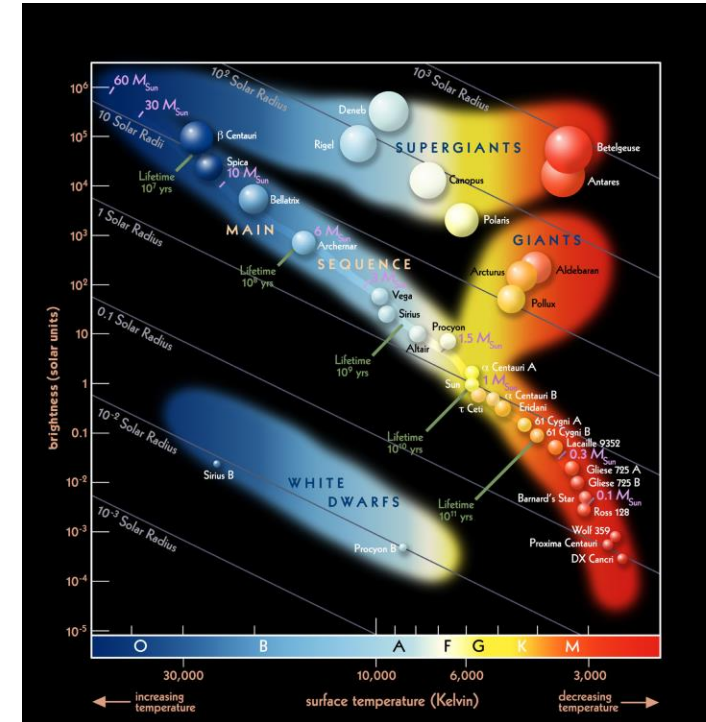
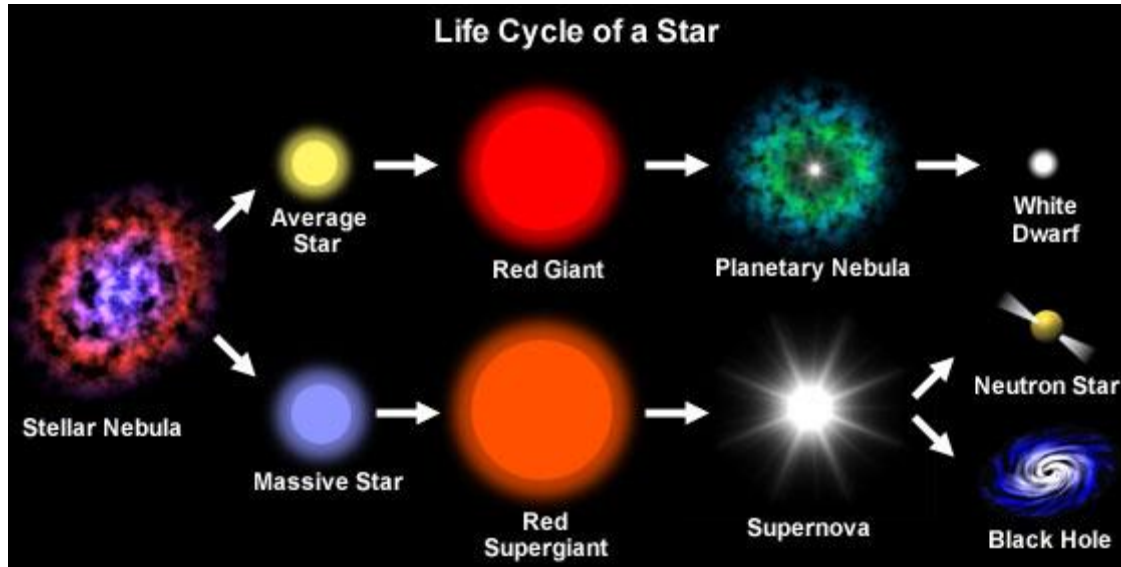
- A collapsed massive star with gravity so strong that all matter & energy can't escape it.
- Produced by a Super Nova event of a star 20 times more massive than the sun, which collapses into an object smaller than a neutron star.
- Scientists look for matter being rapidly swept into a region of apparent nothingness.



<https://www.youtube.com/watch?v=e-P5IFTqB98>


HAPPY FRIDAY! 2-7-2020

- **Bell Ringer: What causes the solar weather? For example what causes solar flares?**
 - (Hint: Think about what creates the structure of the Corona)
- Today's Agenda:
 - H-R Diagram with group
 - EVERYONE needs to write their answers down!!
 - Exit Question
- Learning Objective:
 - I can categorize and analyze stars based on temperature and brightness.



2-10-2020 BELL RINGER

- Explain how a star like our sun would move to different locations on the H-R diagram throughout its life cycle.
- Describe its temperature and brightness at each stage.
- Use complete sentences and include 3 different stages of its life cycle.

- 
- 1. As a main sequence star the temperature and brightness are average.
 - 2. As a Red Giant the temperature decreases and the brightness increases.
 - 3. As a White Dwarf the temperature increases and the brightness decreases.

MONDAY, FEBRUARY 10, 2020

- Today's Agenda:
 - Bell Ringer
 - Finish H-R Diagram Questions and grade them
 - Period Table Review
- Learning Objective:
 - I can model the life cycle of our Sun
 - I can model nuclear fusion (start today, end tomorrow)

EXIT TICKET

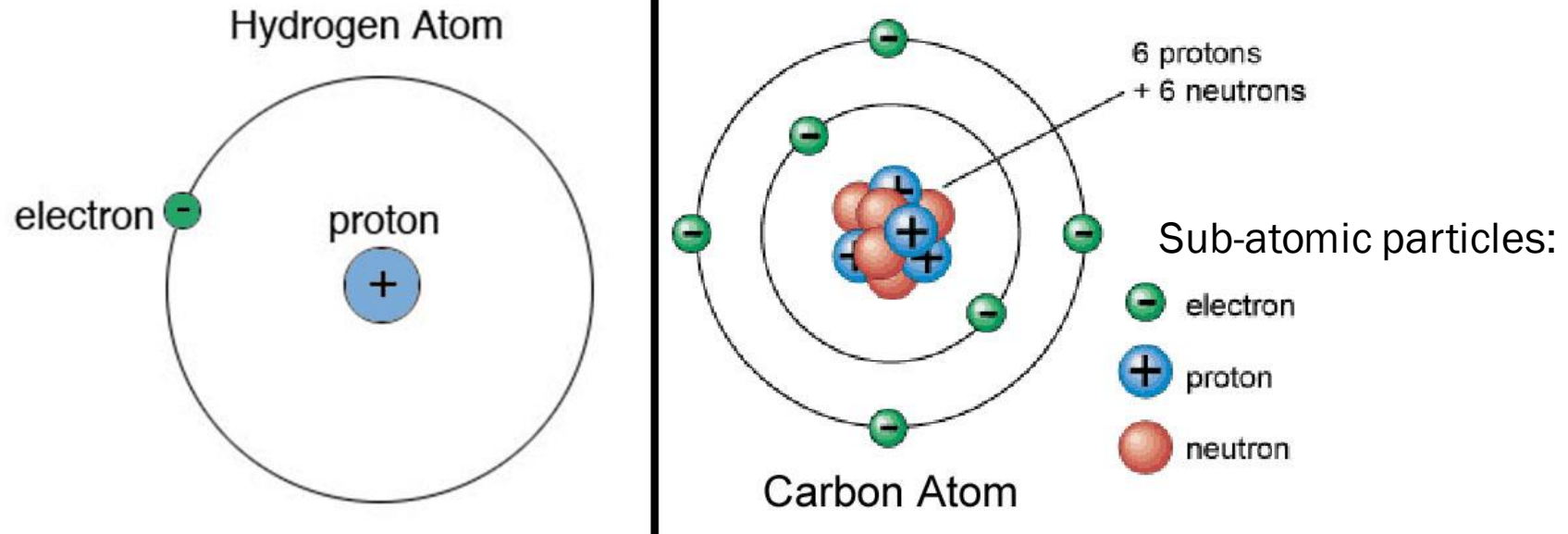
What type
of star is
our sun?



Where is
it in its life
cycle?

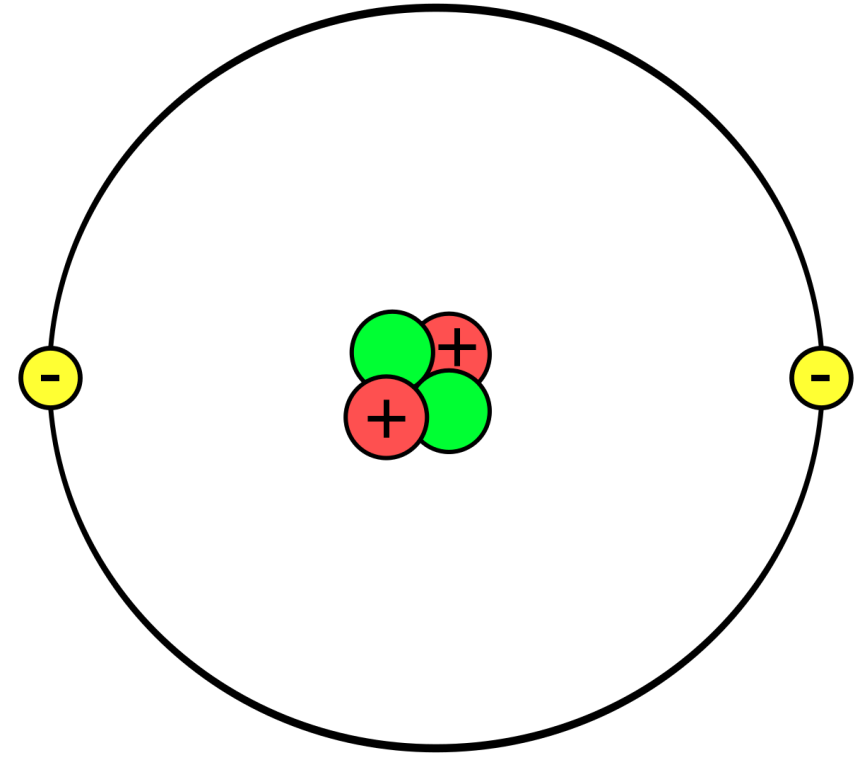
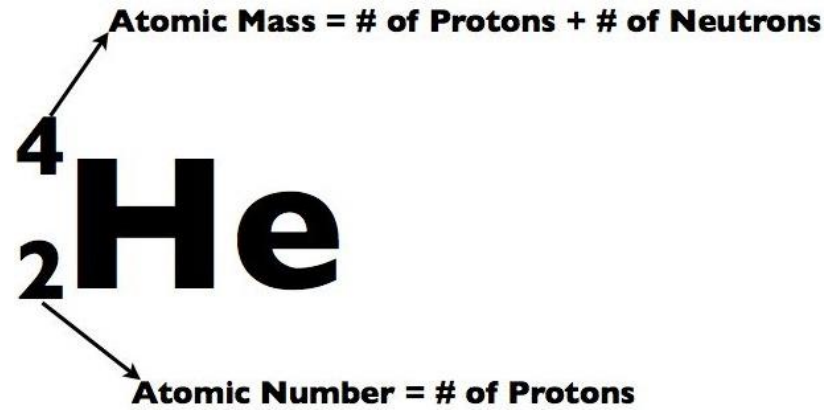
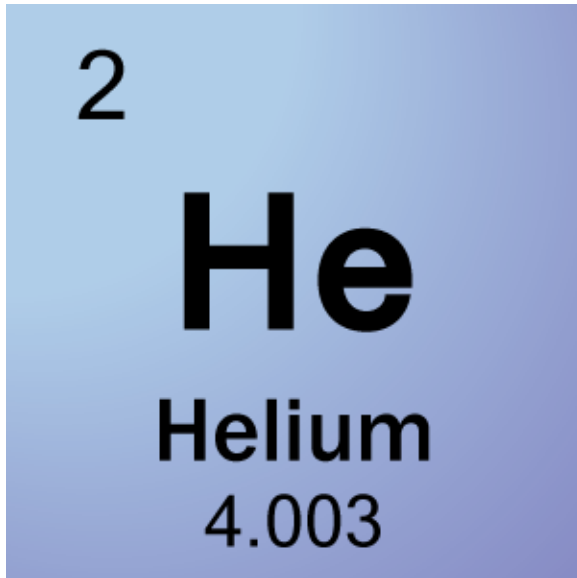
HAPPY TUESDAY 2-11-2020

- Bell Ringer: What is solar weather and how long is the cycle it goes through?
 - Answer the question after we watch this video as a class: <https://www.bbc.com/news/science-environment-51420402>
- Today's Agenda:
 - Bell Ringer
 - 10 minutes to finish H-R Diagram
 - Atomic Review and Nuclear Fusion
 - Exit Question
- Learning Objective: I can explain nuclear fusion in our sun's core.



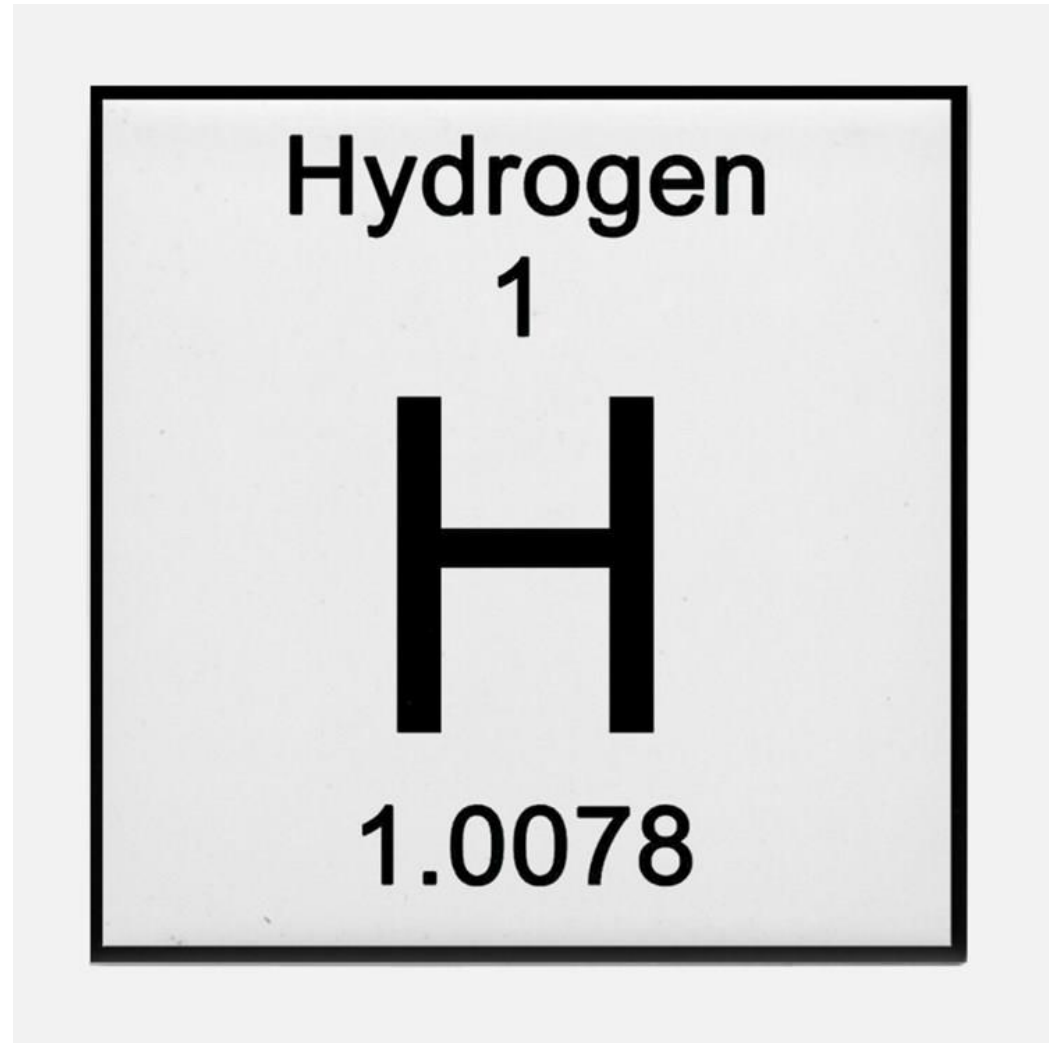
**ATOMS: THE SMALLEST “PIECE” OF ANY SUBSTANCE
MADE UP OF A PROTON(+), NEUTRON, ELECTRON (-)**

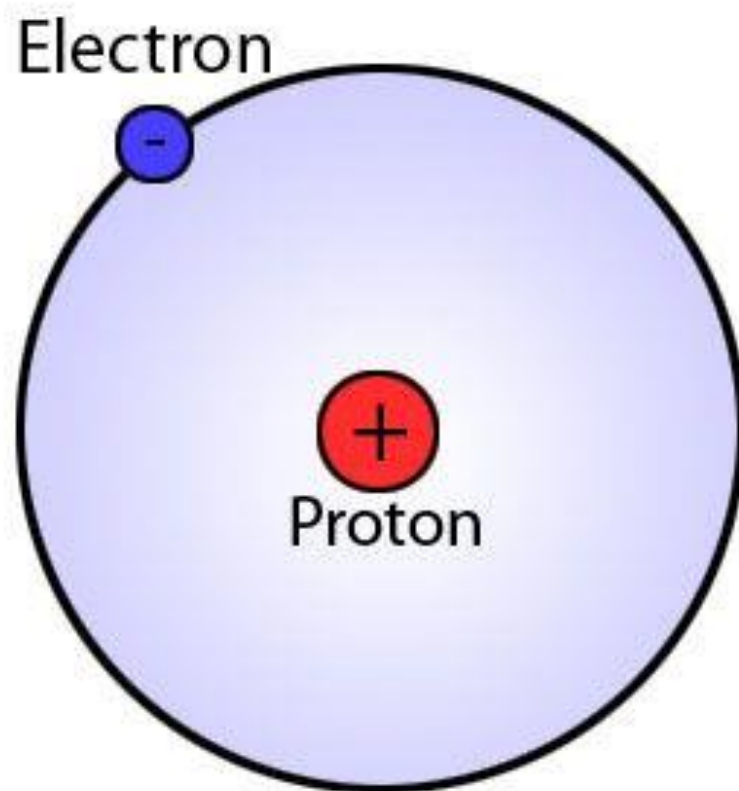
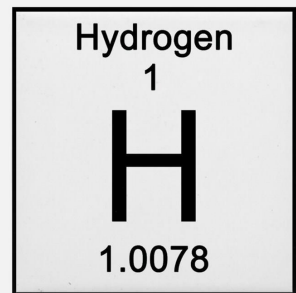
ATOMS NOTES



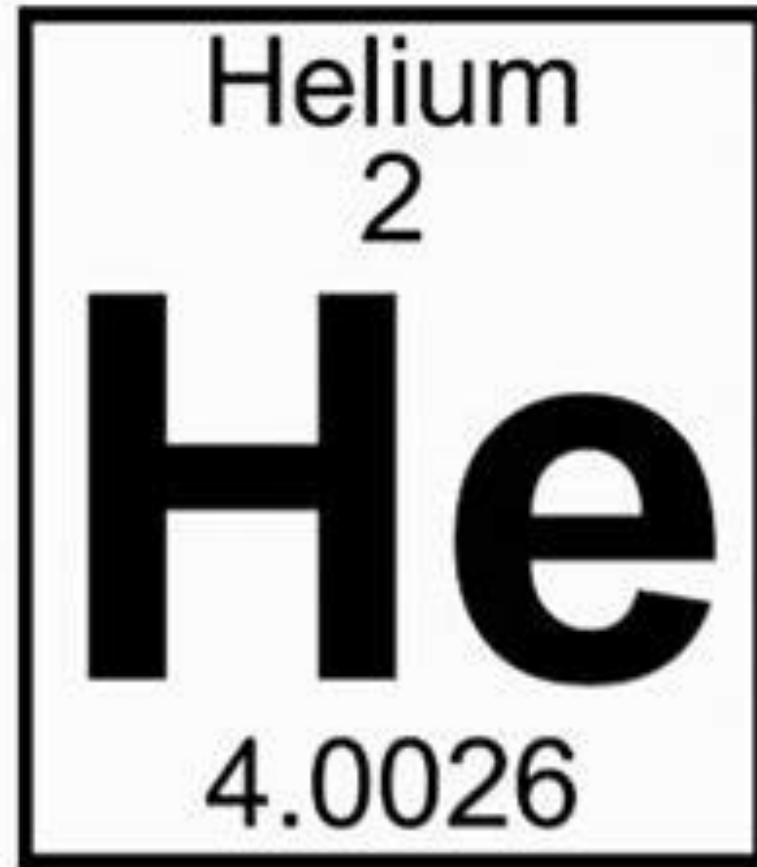
ELEMENT PRACTICE

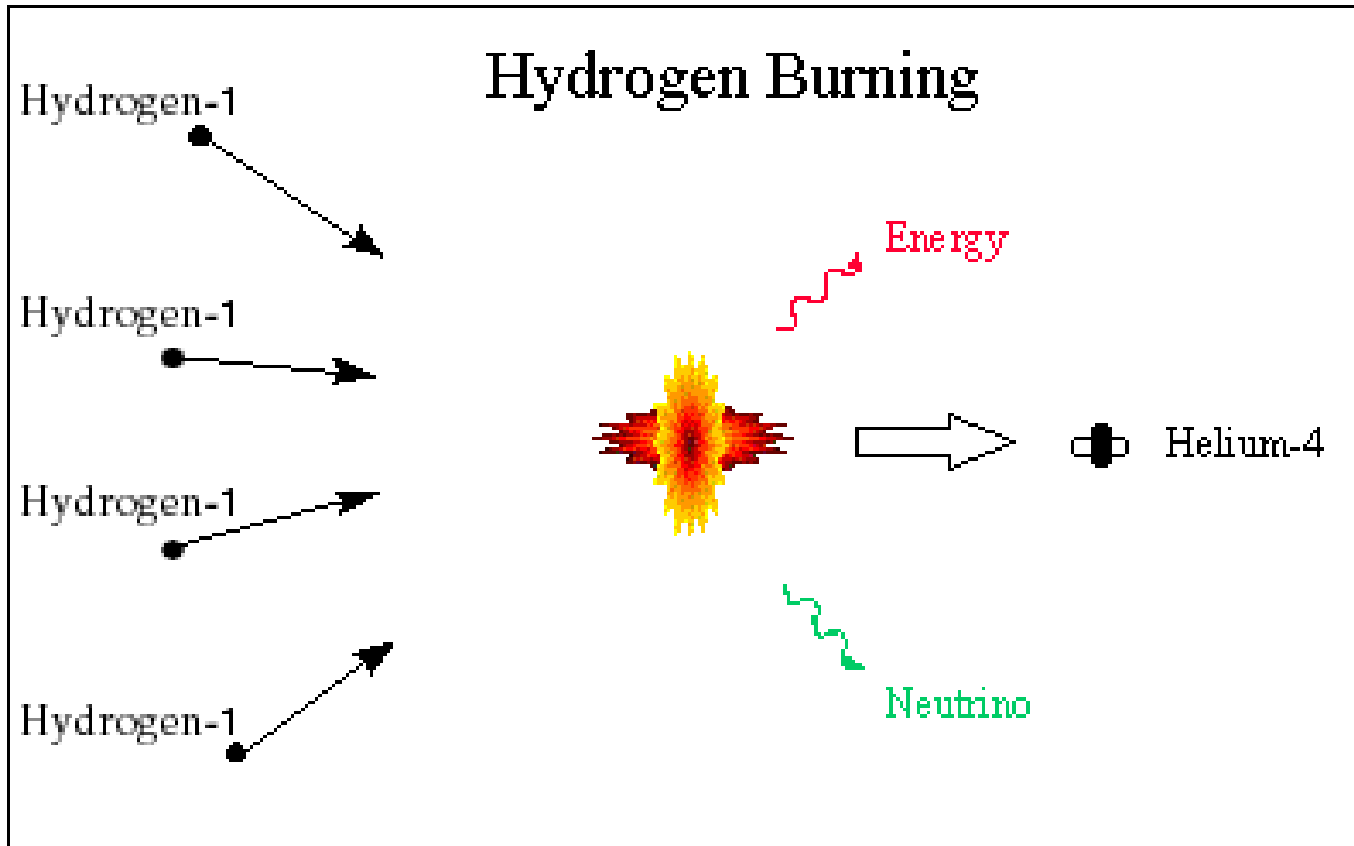
- Draw a model of a hydrogen atom based on the information provided:





**DRAW A
HELIUM ATOM**



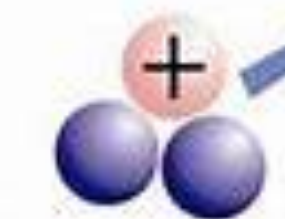
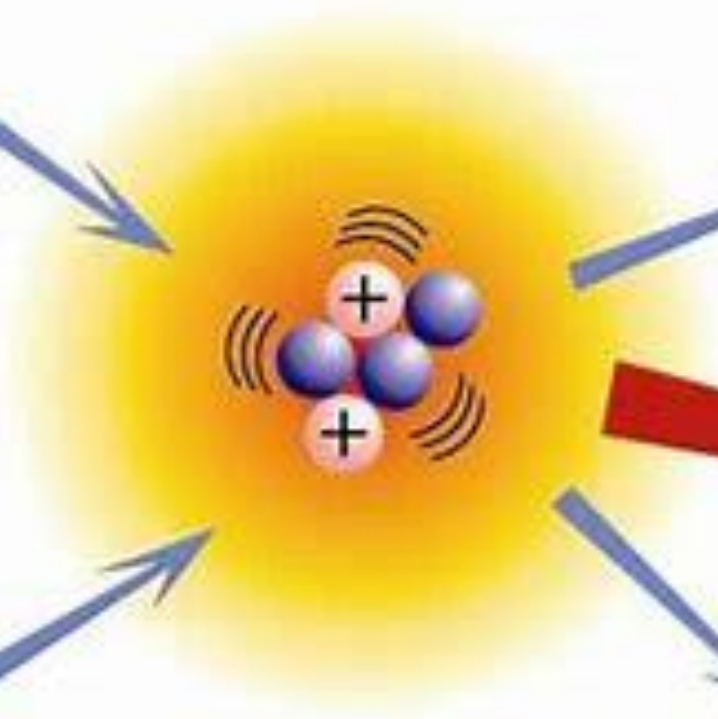
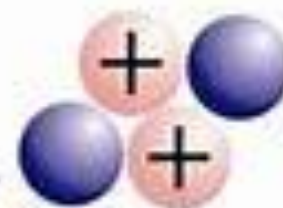


NUCLEAR FUSION IN THE SUN

Deuterium



Helium



Tritium

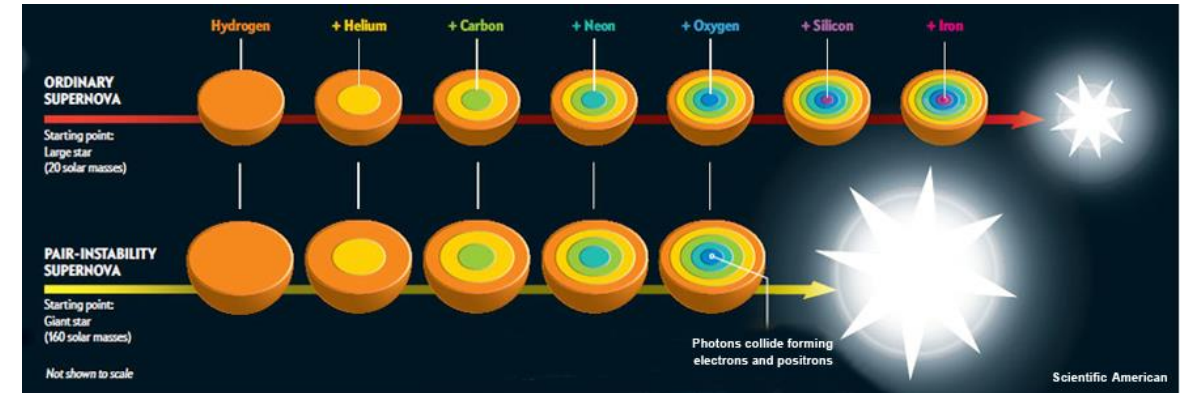
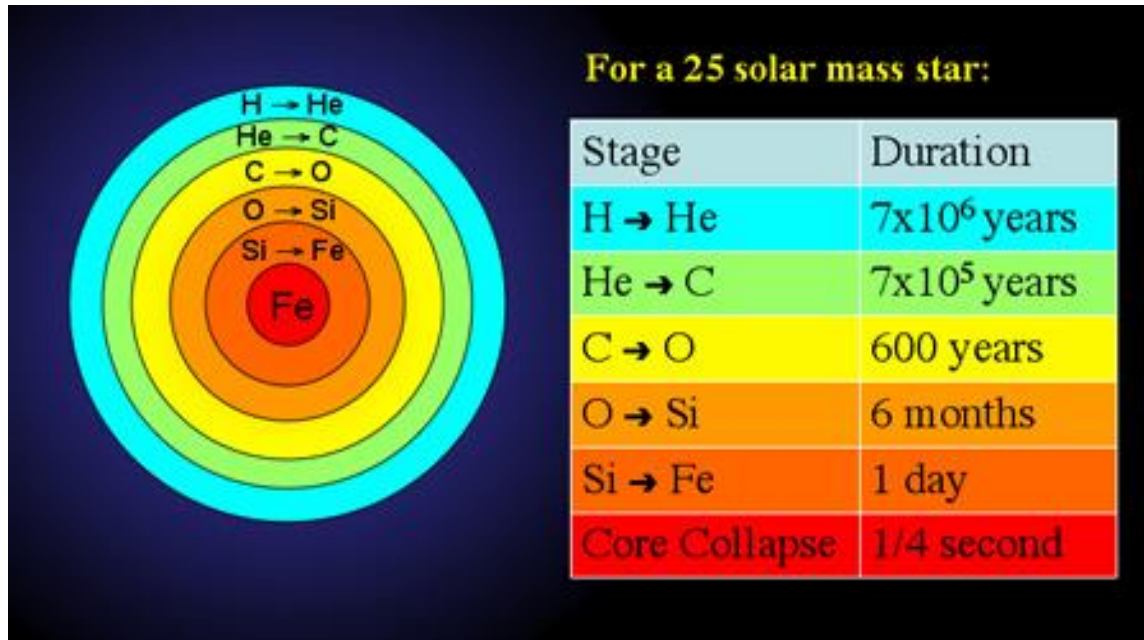


Neutron

Energy

Periodic Table of the Elements

Periodic Table of the Elements																		18 VIIIA 8A			
1 1IA 11A																	2 IIA 2A				
1 H Hydrogen 1.0079																	2 He Helium 4.00260				
3 Li Lithium 6.941	4 Be Beryllium 9.01218											13 IIIA 3A	14 IVA 4A	15 VA 5A	16 VIA 6A	17 VIIA 7A	18 VIIIA 8A				
5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.00674	8 O Oxygen 15.9994	9 F Fluorine 18.998403	10 Ne Neon 20.1797											13 Al Aluminum 26.981539	14 Si Silicon 28.0855	15 P Phosphorus 30.973762	16 S Sulfur 32.066	17 Cl Chlorine 35.4527	18 Ar Argon 39.948
11 Na Sodium 22.989768	12 Mg Magnesium 24.305	3 IIIB 3B	4 IVB 4B	5 VB 5B	6 VIB 6B	7 VIIB 7B	8 VIII 8	9 VIII 8	10 VIII 8	11 IB 1B	12 IIB 2B	13 Al Aluminum 26.981539	14 Si Silicon 28.0855	15 P Phosphorus 30.973762	16 S Sulfur 32.066	17 Cl Chlorine 35.4527	18 Ar Argon 39.948				
19 K Potassium 39.0983	20 Ca Calcium 40.078	21 Sc Scandium 44.95591	22 Ti Titanium 47.88	23 V Vanadium 50.9415	24 Cr Chromium 51.9961	25 Mn Manganese 54.938	26 Fe Iron 55.847	27 Co Cobalt 58.9332	28 Ni Nickel 58.6934	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Ga Gallium 69.732	32 Ge Germanium 72.64	33 As Arsenic 74.92159	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.80				
37 Rb Rubidium 85.4678	38 Sr Strontium 87.62	39 Y Yttrium 88.90585	40 Zr Zirconium 91.224	41 Nb Niobium 92.90638	42 Mo Molybdenum 95.94	43 Tc Technetium 98.9072	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.9055	46 Pd Palladium 106.42	47 Ag Silver 107.8682	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.71	51 Sb Antimony 121.760	52 Te Tellurium 127.6	53 I Iodine 126.90447	54 Xe Xenon 131.29				
55 Cs Cesium 132.90543	56 Ba Barium 137.327	57-71	72 Hf Hafnium 178.49	73 Ta Tantalum 180.9479	74 W Tungsten 183.85	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.9665	80 Hg Mercury 200.59	81 Tl Thallium 204.3833	82 Pb Lead 207.2	83 Bi Bismuth 208.98037	84 Po Polonium [208.9824]	85 At Astatine 209.9871	86 Rn Radon 222.0176				
87 Fr Francium 223.0197	88 Ra Radium 226.0254	89-103	104 Rf Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [266]	107 Bh Bohrium [264]	108 Hs Hassium [269]	109 Mt Meitnerium [268]	110 Ds Darmstadtium [269]	111 Rg Roentgenium [272]	112 Cn Copernicium [277]	113 Uut Ununtrium unknown	114 Uuq Ununquadium [289]	115 Uup Ununpentium unknown	116 Uuh Ununhexium [298]	117 Uus Ununseptium unknown	118 Uuo Ununoctium unknown				
Lanthanide Series		57 La Lanthanum 138.9055	58 Ce Cerium 140.115	59 Pr Praseodymium 140.90765	60 Nd Neodymium 144.24	61 Pm Promethium 144.9127	62 Sm Samarium 150.36	63 Eu Europium 151.9655	64 Gd Gadolinium 157.25	65 Tb Terbium 158.92534	66 Dy Dysprosium 162.50	67 Ho Holmium 164.93032	68 Er Erbium 167.26	69 Tm Thulium 168.93421	70 Yb Ytterbium 173.04	71 Lu Lutetium 174.967					
Actinide Series		89 Ac Actinium 227.0278	90 Th Thorium 232.0381	91 Pa Protactinium 231.03588	92 U Uranium 238.0289	93 Np Neptunium 237.0482	94 Pu Plutonium 244.0642	95 Am Americium 243.0614	96 Cm Curium 247.0703	97 Bk Berkelium 247.0703	98 Cf Californium 251.0796	99 Es Einsteinium [254]	100 Fm Fermium 257.0951	101 Md Mendelevium 258.1	102 No Nobelium 259.1009	103 Lr Lawrencium [262]					
Alkali Metal		Alkaline Earth		Transition Metal		Basic Metal		Semimetals		Nonmetals		Halogens		Noble Gas		Lanthanides		Actinides			



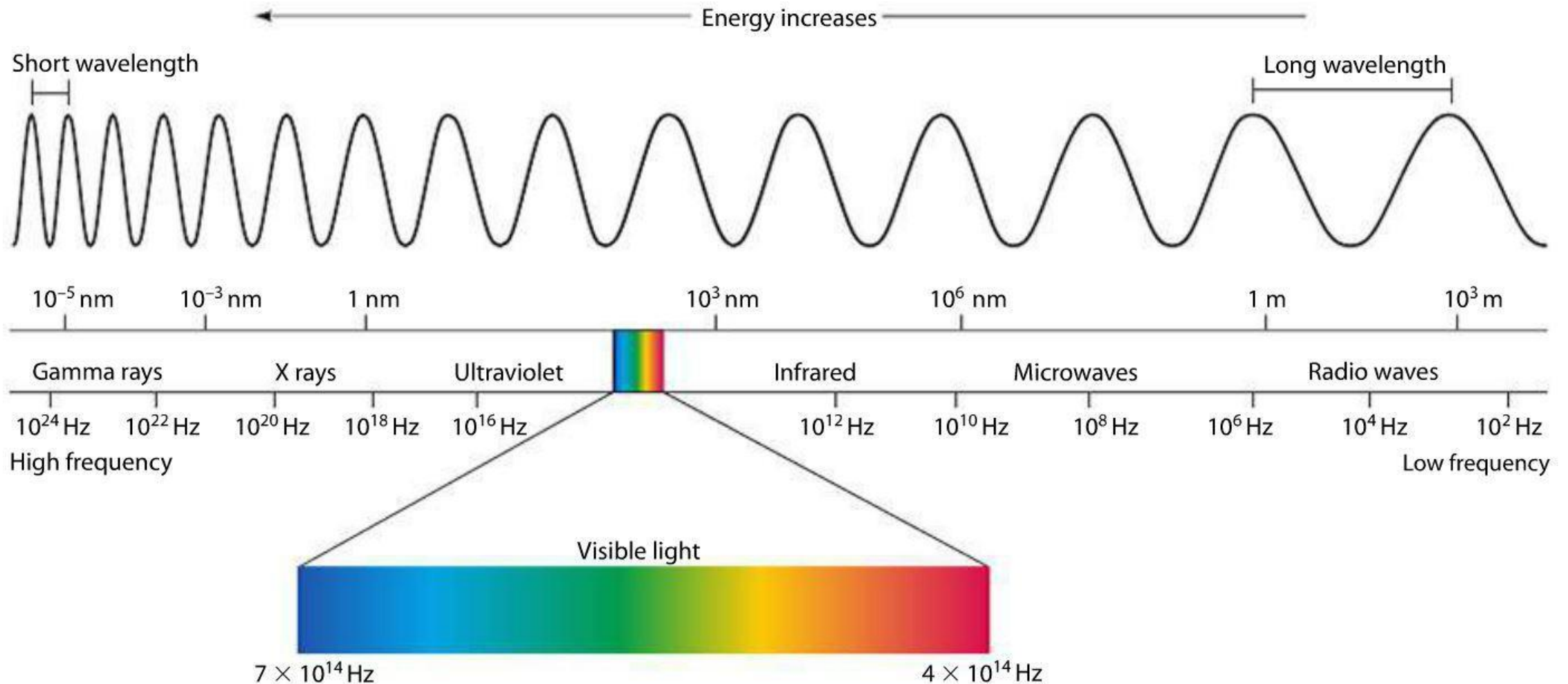
SIZE OF THE STAR DETERMINES HOW BIG OF ELEMENTS ARE MADE

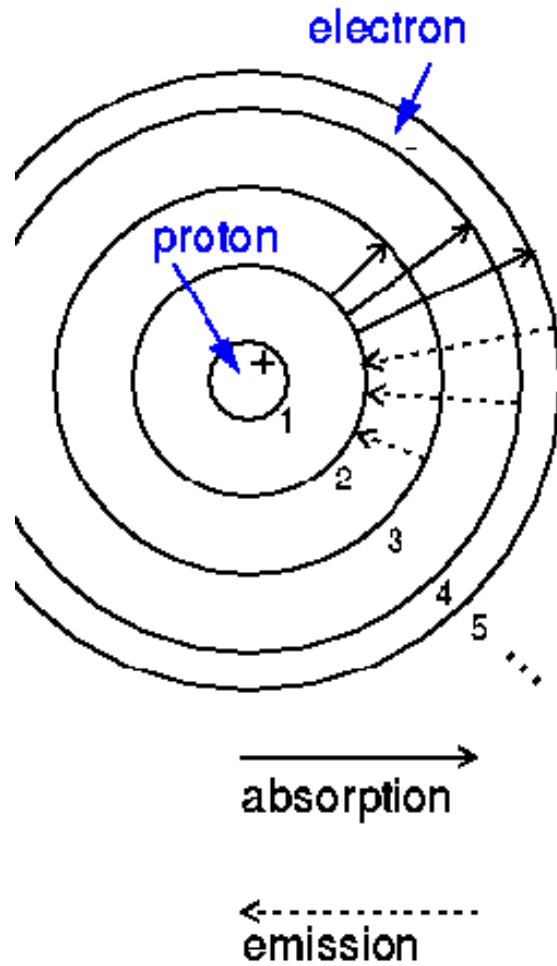


WEDNESDAY 2-12-2020

- Bell Ringer: In 2 sentences or more describe nuclear fusion and how stars make different elements.
- Today's Agenda:
 - Bell Ringer
 - Electromagnetic Radiation (Mini lecture)
 - Spectroscopy Lab (open in One Note)
- Learning Objective: I can explain where larger elements come from.

ELECTROMAGNETIC RADIATION IS ALL THE WAVELENGTHS OF ENERGY EMITTED BY A STAR. WE CAN ONLY SEE A SMALL PORTION, OR THESE WAVELENGTHS CALLED THE VISIBLE SPECTRUM.





Bohr Model of Hydrogen Atom

Ground State: Electron is in lowest energy level.

Absorption Spectrum: Electron absorbs light photons and jumps up to an excited state of higher energy .

Emission Spectrum: Electron emits light photon as it jumps down to a state of lower energy .

DIFFERENT GASSES PRODUCE DIFFERENT EMISSION SPECTRA

