2014

Orion

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ORION

Introduction

The purpose of this project is to chose a constellation and look at the objects in it and explore the boundaries of the constellation. I choose the constellation Orion. I chose this constellation because my first telescope was Orion brand and then because of my interest in astronomy I named my dog Orion. I liked the story and how it was related to the god of Moon. In this project we find out how composition of the star, distance to them and their mass related to each other.

* Constellation is a region in the sky where an asterism is the certain stars and the picture they form in the night sky.

M78

Explanation: An eerie blue glow and ominous columns of dark dust highlight M78 and other bright reflection nebula in the constellation of Orion. The dark filamentary dust not only absorbs light, but also reflects the light of several bright blue stars that formed recently in the nebula.

Source: apod.nasa.gov/apod/ap030313.html

Explanation of length of the Year Calculations

We expect that over the course of a year, the stars will make one complete circle around the sky and will return to their original position. If we were to make careful measurements of the rise or set times of the stars day after day, we could use this information to determine the length of the year. So we calculate the rise time of a star in the constellation for five weeks. Then we take the average change in rise time over that five week period and expand that daily change to a year. Over the course of a year change in daily time should add up to 24 hours. The small amount of error is due to the fact that we do the calculation only certain part of a year. Note that earths speed around the sun changes over the year. This is the reason why we have a little error.

Date		Rise Time for Betelgeuse	
	Hour	Minute	Second
May 23	8	19	31
May 30	7	51	59
June 6	7	24	28
June 13	6	56	56
June 20	6	29	25

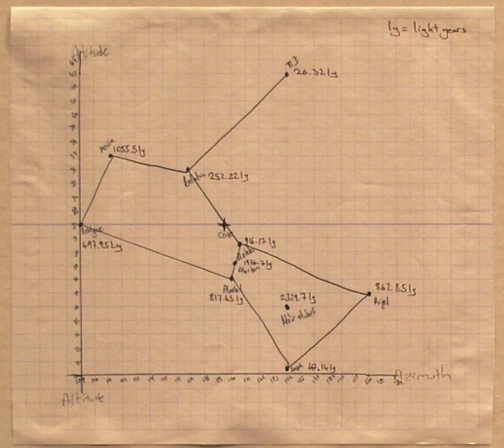
Dates	Change in Rise Time / Change in Time - Minute's	Second	Change in Time - Decimal min	Change in Time per Day in minutes/day
5/23–5/30	27	32	27.53	3.93
5/30–6/6	27	31	27.52	3.93
6/6–6/13	27	32	27.53	3.93
6/13–6/20	27	31	27.52	3.93

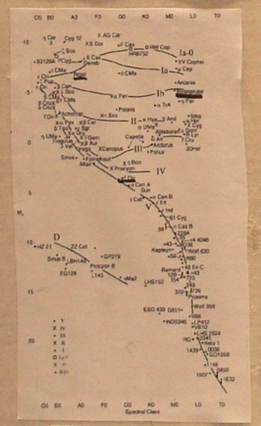
Average change in rise time per day: 3.93

Calculated number of days in a year: 366.41

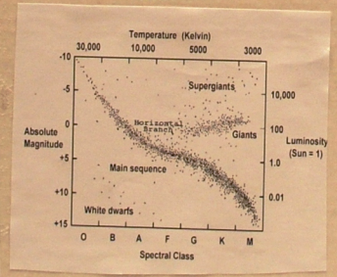
Percent Error = %0.31

Constellation drawing





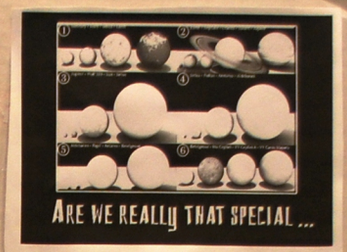
Hertzsprong – Russell Diagram



The Hertzsprung-Russell (H-R) diagram is an analog to the periodic table of the elements. It was discovered that when the absolute magnitude (MV) – intrinsic brightness – of stars is plotted against their surface temperature (stellar classification) the stars are not randomly distributed on the graph but are mostly restricted to a few well-defined regions. The stars within the same regions share a common set of characteristics, just like the groups, periods, and blocks of elements in the periodic table. Unlike the periodic table, as the physical characteristics of a star change over its evolutionary history, its position on the H-R diagram changes also – so the H-R diagram can also be thought of as a graphical plot of stellar evolution. From the location of a star on the diagram, its luminosity, spectral type, color, temperature, mass, age, chemical composition and evolutionary history is known.

Source of the picture and the text:

http://chandra.harvard.edu/edu/formal/variable_stars/bg_info.html



Source: thefreeman.net/journal/31tag:size-comparison

Star Name	Distance
Alnilam	1976.7 light years
Alnitak	817.43 light years
Bellatrix	252.22 light years
Betelgeuse	497.95 light years
Meissa	1055.5 light years
Mintaka	916.17 light years
Na'ir al Saif	2329.7 light years
Pi3 Orionis	26.32 light years
Rigel	862.85 light years
Saiph	647.14 light years

From earth, when we look up the night sky we see that all stars look like they are in the same area but this is not the case. As you can see from the table above, there are huge spaces between these stars. They may look close to each other but in reality they are really far apart.

Greek mythology

ARTWORK

Orion The Great Hunter

In mythology Orion is the great hunter. It has several different myths about it. The version I selected is not that popular in United States but it is very popular in Turkey. Story goes as this, Orion is a very handsome hunter. He is so handsome that the god of moon Artemis forgets his promise about never getting married and decides to get married with Orion. Her sister Apollo doesn't approve this marriage but Artemis is madly in love with Orion. After realizing how much Artemis loves Orion, Apollo gets jealous and decides to do something about it. One day when Orion is swimming in the sea, Apollo calls her sister who is an amazing archer. She tells her if she can shoot that black dot that is so far away from where they are. Artemis has no idea that it's Orion. She shoots the black dot and kills her lover. After her death Artemis hides behind the clouds for months. The moon doesn't shine on earth for months. After a while Artemis talks to her dad Zeus and tells him about what happened and asks him if he can put him on the sky as a constellation. Her dad agrees with her and creates the constellation Orion.

Stars' future

FUTURE OF STARS

Rigel (HIP 24436) is a B8Ia star so it is currently a supergiant with more than 8 solar masses. It already completed its main sequence life time which is 35,000,000. It also completed its red giant (RGB) and horizontal branch (RB) stages which took about 3.5 million years. It will explode as a type II supernova and become a neutron star with a mass of 1.3-3 solar masses.

PI3 Orionis (HIP 22449) is a F6V star, so it is currently on the main sequence and has less than 8 solar masses. Its main sequence lifetime is 5,917,160,000 years. After leaving the main sequence it will become a RGB and then move to HB. Then it will move to asymptotic giant branch (AGB) stage. It won't become a supergiant because it doesn't have enough mass. Its giant life time will be 591,716,000 years and it s current remaining life time is 650,936,000. After its giant stage it will become a planetary nebula and then it will be a white dwarf which wil be lower than 1.4 solar masses.

Alnitak (HIP 26727) has a spectral type of O9.5Ib. This star is currently a hot blue supergiant with more than 8 solar masses. It already completed main sequence life time which took 3,336,000 years. It also completed its giant stages (RGB and HB)in 333,600 years. It will stay as a supergiant for 33,360 years then it will explode as a type II supernova and become a black hole.

Star Name	HIP #	Spectral Type	Mass	Completed Life Times	Remaining Lifetime	Stages Completed	Remaining Stages	Fate of Stellar Core
Alnitak	26727	O9.5Ib	54.5	3336000 and 333600years	33360	MS,RGB,HB	Supergiant	Type II SN
Pi3 Orionis	22449	F6V	1.3	none	650936000	none	MS,RGB,HB,AGB	Black Hole
Rigel	24436	B8Ia	16.9	3.5million & 35million & 3.5million	350000	MS,RGB,HB	Supergiant	Planetary Nebula White Dwarf Type II SN Neutron Star

Star Name	HIP #	Spectral Type	Mass	Main Sequence Lifetime	Remaining Lifetime	Death Order	Fate of Stellar Core
Alnilam	26311	B0Ia	44.7	5000000	50000	3	black hole
Alnitak	26727	O9.5Ib	54.5	3336000	33360	1	black hole
Bellatrix	25336	B2III	20.6	23565000	26157150	9	neutron star
Betelgeuse	27989	M2Ib	12.1	68300000	683000	7	neutron star
Meissa	26207	O8III	46.5	4525000	497750	6	black hole
Mintaka	25930	O9.5II	45.9	4745000	47450	2	black hole
Na'ir al Saif	26241	O9III	37.3	7190000	790900	8	black hole
Pi3 Orionis	22449	F6V	1.3	5917160000	650936000	10	white dwarf
Rigel	24436	B8Ia	16.9	35000000	350000	5	neutron star
Saiph	27366	B0.5Ia	44.7	5000000	50000	4	black hole