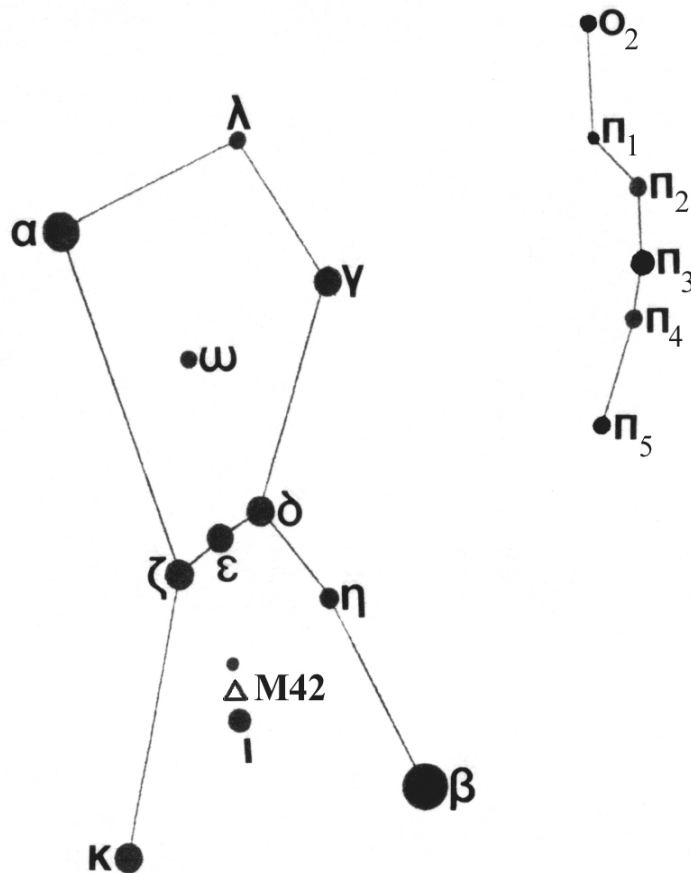


# Your Guide to the CONSTELLATIONS

*INSTRUCTOR'S HANDBOOK*



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## Preface

We Earthlings are far more aware of the surroundings at our feet than we are in the heavens above. The study of observational astronomy and locating someone who has expertise in this field has become a rare find. The ancient civilizations had a keen interest in their skies and used the heavens as a navigational tool and as a form of entertainment associating mythology and stories about the constellations. Constellations were derived from mankind's attempt to bring order to the chaos of stars above them. They also realized the celestial objects of the night sky were beyond the control of mankind and associated the heavens with religion.

Observational astronomy and familiarity with the night sky today is limited for the following reasons:

- Many people live in cities and metropolitan areas have become so well illuminated that light pollution has become a real problem in observing the night sky.
- Typical city lighting prevents one from seeing stars that are of fourth, fifth, sixth magnitude thus only a couple hundred stars will be seen.
- Under dark skies this number may be as high as 2,500 stars and many of these dim stars helped form the patterns of the constellations.
- Light pollution is accountable for reducing the appeal of the night sky and loss of interest by many young people as the night sky is seldom seen in its full splendor.
- People spend less time outside than in the past, particularly at night.
- Our culture has developed such a profusion of electronic devices that we find less time to do other endeavors in the great outdoors.

Learning the constellations of the night sky, one is pretty much on their own. This booklet, the result of my own study of the celestial sphere, was first written in 1989. It was shared with others and was well accepted. In 1992 after making some corrections additional copies were circulated. This time because of the data from the satellite Hipparcos, all of the magnitudes and distances of the bright stars have been updated. Note (Ref.18) and (Ref.19) where the data has been edited. Pages 2-3 will be helpful in your use of this text. I hope this publication will help you in your investigation or serve as an aid in helping others. Remember it takes patience, persistence and repetition to become proficient with the celestial sphere.

This book is Dedicated to my  
Outstanding Mentor

Lee Ann Hennig

Always fighting for the recognition of astronomy and  
whose life is focused on astronomical endeavors

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## FORWARD

This reference source is intended for astronomy instructors, and contains information that will help instructors obtain answers to frequently asked questions. When can the Orion constellation be seen? Find the provided reference page on the Orion constellation, and then refer to numbers 4 and 5. You can then tell the person that Orion is visible from November 10 until April 30, but is best seen about January 25 at 9 P.M. E.S.T.

A variety of constellations are in this guide, such as all twelve-zodiac constellations, all of the major constellations of the Northern Hemisphere, and several dim Northern Hemisphere constellations like Hercules, and Ophiuchus. Finally those constellations most mentioned by people in the Northern Hemisphere, Cancer, Libra and Pisces. Celestial terminology can be found in the glossary on page 90.

It is suggested that an amateur should start by becoming familiar with the following most easily seen constellations- Andromeda, Canis Major, Canis Minor, Cassiopeia, Cygnus, Gemini, Leo, Orion, Pegasus, Sagittarius, Scorpius, Taurus, Ursa Major, Ursa Minor. Sagittarius and Scorpius are good summer constellations for viewing.

The Big Dipper and Orion are good starting points for amateurs. Advance to other constellations by using suggested alignments #11. Becoming familiar with observational hints will enable you to choose the best viewing nights and help one become more successful at locating the constellations. This will help promote achievement and a continuing interest in exploring the night sky. As questions arise in your study of constellations, refer to the questions section of this booklet on page 11.

## REFERENCE INFORMATION ON CONSTELLATIONS

**What is a constellation?** Constellation is derived from the Latin "constellatus," set with stars; from "com-," together, and "stellare," to shine; stella, a star. A constellation is a group of stars, which might form a pattern or shape within a specific area of the sky and is often named after people, animals or objects. There are 88 constellations whose boundaries were established in the late 1920's and published in 1930 by the International Astronomical Union.

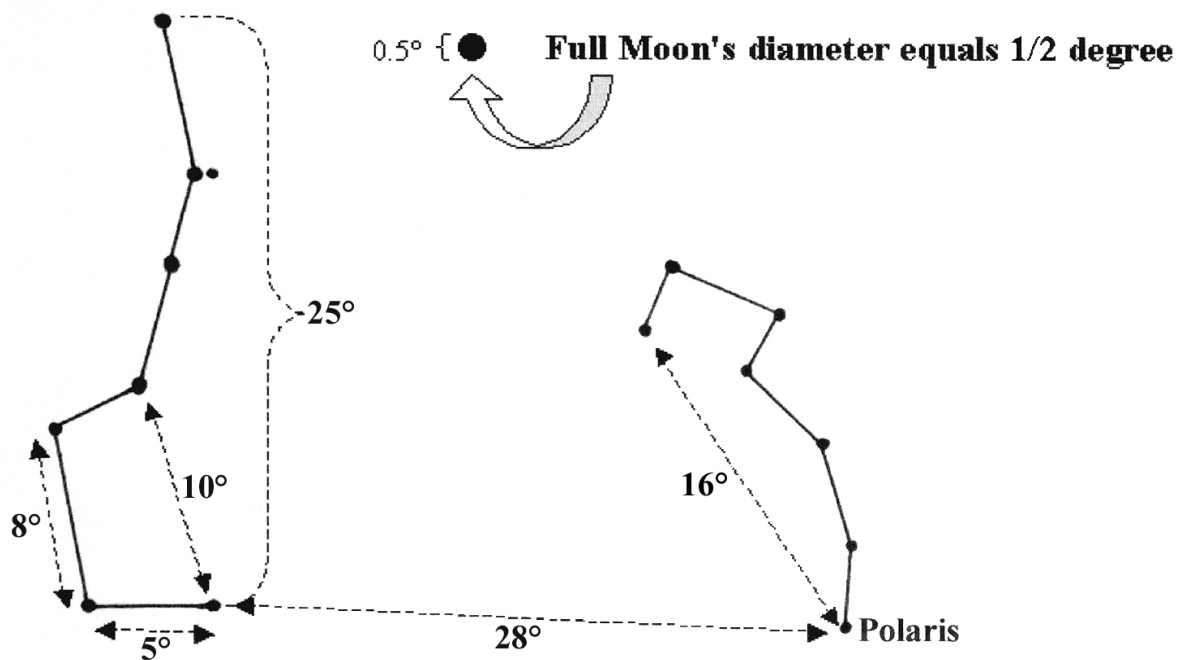
Constellations are best seen when they are at their highest point in the night sky, which is called the culmination of the constellation. The culmination dates are listed for all 88 constellations. This date is the time of the year when the constellation culminates at 9 P.M. Eastern Standard Time or 10 P.M. Eastern Daylight Saving Time. (The time when most people generally observe the sky.)

Every constellation culminates once a day, but it may be during the daylight hours and therefore not visible, or at an hour that isn't very convenient such as 2 A.M. Southern constellations that have a declination of greater than  $51^\circ$  south will not be seen from Northern Virginia (north latitude  $39^\circ$ ) and points farther North. Subtracting your latitude from  $90^\circ$  (maximum latitude) derives this number. Examples  $90^\circ - 39^\circ = 51^\circ$  south, Tropic of Cancer  $23.5^\circ$  north latitude  $90^\circ - 23.5^\circ = 66.5^\circ$  south, equator  $90^\circ - 0^\circ = 90^\circ$  south. Thus all constellations can be seen from the Earth's equator.

### Observation Hints

1. **The constellations are best seen at culmination** because you are looking through less of the Earth's atmosphere. Dim stars can best be seen in the direction of the zenith, remembering that even the bright sun is dimmed toward one's horizon at setting or rising. The apparent magnitude difference from the zenith to the horizon is approximately two magnitudes dimmer in brightness.
2. **The least desirable time to observe the constellations is when the moon, brighter than a quarter phase, is visible in the sky during your time of observation.** A full moon will prevent you from seeing sixth, fifth and fourth magnitude stars. Even third magnitude stars in the direction of the moon may be missed during observation sessions.
3. **Dark skies are necessary to observe dim constellations.** Night skies in the country are far darker than the skies around cities, primarily due to light pollution.
4. **Learn the compass directions (cardinal points) at your observation site.** You must know in which direction you are facing to find the constellations. A star or constellation finder should be used to help tell you in which direction and altitude to look for the date and time.
5. **Always give your eyes at least ten to fifteen minutes to adjust to the darkness.** Your eyes will still continue to adjust even after half an hour. If a flashlight is used to see a star finder, have the lens covered by a dark red filter so its light will not be as harmful in affecting your night vision.
6. **Location- Open area with a good view of horizon** (if possible a hill, since it gives a better view of the horizon) - minimal trees - minimal lights.
7. **Weather or Sky Condition-** no clouds, no haze, low relative humidity (less than 40%), little wind, high barometric pressure. Cold nights are better since cold air holds less water vapor. Therefore, if the relative humidity is the same but the temperature is different, the night with the lower temperature would generally be the best night for stargazing. The lower the dew point temperature, the less the atmospheric moisture.

8. **Where to look in sky- the zodiac constellations lie in a band along the ecliptic** that is best viewed when due south of you. The zodiac constellations are helpful in locating planets in the night sky since the planets wander in the zone of the zodiac.
9. **Obtain a "Star chart" and learn how to use it.**
10. **Current events-** You can get one good source by calling: 202-357-2000, which is the Smithsonian sky watchers report and contains astronomical information; other sources are the magazines, "Sky and Telescope," and "Astronomy Magazine". The weather maps in some newspapers lists the rise and set times for the observable planets, the sun and the moon. Explore web sites that refer to astronomy, amateur astronomers and planetariums.
11. **Learn how to use references terms to locate objects and describe their location -** Examples of references: **zenith, meridian, altitude, azimuth, right ascension, declination, and ecliptic**
12. **How to measure celestial distances: degrees.** Example: full moon = one-half of one degree; Sun = one-half of one degree; bottom of Big Dipper = eight degrees; opening in Big Dipper = ten degrees; distances between Pointer Stars = five degrees; total length of Big Dipper = twenty-five degrees; typical binocular field of view = seven degrees; width of index finger at arm's length = one degree; width across fist from thumb to opposite of the hand held at arm's length = ten degrees.



13. **Do not assume that all constellations will rise six hours before culmination and set six hours after and be visible for twelve hours;** that time frame applies to those on the celestial equator. Below the celestial equator, constellations will be up a shorter period of time, and above the celestial equator for a longer period of time. Those near the Pole Star never set. The constellations found around the Pole Star that never set are called the circumpolar constellations. There are no circumpolar constellations at the Equator and all constellations viewed from the poles of the Earth are circumpolar.

## CONSTELLATIONS' CATEGORIES

The present names of the constellations are given in most countries in Latin. Latin is considered the universal language and thus has been used by astronomers to name the standard 88 constellations. (Ref. International Astronomical Union)

The Greeks gave many of the Northern Hemisphere constellations to us: Ptolemy (*cal. 100-178*) listed 48 constellations in his 13 volumes the *Almagest*; Bayer contributed 13 new constellations in 1603, most of which were in the Southern Hemisphere. At least 14 constellations were added to the deep southern skies during an expedition to the Cape of Good Hope off the tip of Africa in 1750-54. The 88 modern constellations contain 30 inanimate objects, 23 animals, 15 people (12 men and 3 women), 10 water creatures, 9 birds, and 1 insect.

<b>30 Inanimate objects</b>	
1	Antlia - (air) pump
2	Ara - altar
3	Caelum - chisel of a sculptor's
4	Carina - keel
5	Circinus - compass (dividers)
6	Coma Berenices - lady's hair
7	Corona Australis - southern crown
8	Corona Borealis - northern crown
9	Crater - cup
10	Crux- cross
11	Eridanus - river
12	Fornax - furnace
13	Horologium - clock
14	Libra - balance, scales
15	Lyra - harp
16	Mensa - table
17	Microscopium - microscope
18	Norma - ruler
19	Octans-Octant- s. celestial pole
20	Pictor - painter's easel
21	Puppis - stern or deck
22	Pyxis - mariner's compass
23	Reticulum - net
24	Sagitta - arrow
25	Scutum - shield
26	Sextans - sextant
27	Telescopium - telescope
28	Triangulum - triangle
29	Triangulum Australe - southern triangle
30	Vela - sails
<b>23 Animals</b>	
1	Aries - Ram
2	Camelopardalis - giraffe
3	Canes Venatici - hunting dogs
4	Canis Major - greater dog
5	Canis Minor - lesser dog
6	Centaurus - Centaur - <u>half horse</u> *

<b>23 Animals- Continued</b>	
7	Chamaeleon - land lizard
8	Draco - dragon
9	Equuleus - colt
10	Lacerta - lizard
11	Leo - lion
12	Leo Minor - lesser lion
13	Lepus - hare
14	Lupus - wolf
15	Lynx - lynx
16	Monoceros - unicorn
17	Pegasus - (winged) horse
18	Scorpius - scorpion
19	Serpens - snake
20	Sagittarius-bowman- <u>half horse</u> *
21	Taurus - bull
22	Ursa Major - greater bear
23	Ursa Minor - lesser bear
24	Vulpecula - little fox
* (Number 6 and 20 equals one animal)	
<b>15 People</b>	
1	Andromeda - woman
2	Aquarius -water bearer- man
3	Auriga - charioteer-man
4	Boötes - herdsman-man
5	Cassiopeia - woman
6	Centaurus - Centaur- <u>half man</u>
7	Cepheus - king -man
8	Gemini - twins-male
9	Hercules - Hercules-man
10	Indus -Indian - male ("us" Latin suffix)
11	Ophiuchus - serpent bearer -man
12	Orion - hunter -man
13	Perseus - man
14	Sagittarius - bowman - <u>half man</u>
15	Virgo - woman
16	Sculptor - man (Earlier this was "the sculptor's workshop")



## CONSTELLATIONS' CATEGORIES

10 Water Creatures	
1	Cancer - crab
2	Capricornus - horned water goat
3	Cetus - whale
4	Delphinus - dolphin
5	Dorado- swordfish
6	Hydra - water snake (female)
7	Hydrus - water snake (male)
8	Pisces - fishes
9	Piscis Austrinus - southern fish
10	Volans - flying fish

9 Birds	
1	Apus - Bird of Paradise
2	Aquila - eagle
3	Columba - dove (Noah's)
4	Corvus - crow
5	Cygnus - swan
6	Grus - crane
7	Pavo - peacock
8	Phoenix - sun bird
9	Tucana - the toucan bird of S. H.
1 Insect	
1	Musca - fly

The total area of the celestial sphere is 41, 253 sq. degrees.

### The largest constellations-

#	Name of the Constellation	Size	Units
1 <sup>st</sup>	Hydra	1303	square degrees
2 <sup>nd</sup>	Virgo	1294	square degrees
3 <sup>rd</sup>	Ursa Major	1280	square degrees
4 <sup>th</sup>	Cetus	1231	square degrees
5 <sup>th</sup>	Hercules	1225	square degrees

### The smallest constellations-

#	Name of the Constellation	Size	Units
1 <sup>st</sup>	Crux	68	square degrees
2 <sup>nd</sup>	Equuleus	72	square degrees
3 <sup>rd</sup>	Sagitta	80	square degrees
4 <sup>th</sup>	Circinus	93	square degrees
5 <sup>th</sup>	Scutum	109	square degrees

### The oldest constellations-

Cassiopeia and Orion can be identified on Sumerian tablets.

The Sumerian age began about 3000 BC and lasted until about 2400 BC.

(Ref. World Book Encyclopedia 1984)

Taurus and Leo are also considered to be among the oldest constellations.

## STAR NAMES

Many star names are derived from Arabic such as: Betelgeuse, Algol, Alioth, Akhaid, Almach, Alphecca, Alpheratz, and Altair. Any star with the "Al" prefix is Arabic in origin. During the Dark Ages only the Arabs continued to record observations of the sky and their terminology has persisted. The brightest stars are individually named while others are given number and letter designations within the constellations, which translates into only 200 to 300 stars having names.

In 1603 Bayer identified stars visible to the naked eye by using a convenient system that is still widely used today; this system designates the brighter stars in a constellation with letters of the Greek alphabet:  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ , etc. Generally, the letters are assigned in descending order of brightness, with alpha denoting the star of greatest brightness in the constellation.

During the winter months, the stars visible on either side of the south meridian at 9 P.M. Eastern Standard time are named the Winter Constellations. Similarly after spring begins, the new constellations in the southern sky are known as the Spring Constellations. Remember constellations to the south change during the seasons of the year, but those in the north can be seen year round (the circumpolar constellations.)

### HISTORY OF THE WORD "STAR"

" Astarte " - Sumerian Goddess

" Ishtar " - Babylonian Goddess of Love and War

" Aster " - Greek for "star"

" Stella " - Latin for "star"

From the Oxford Dictionary the following history of the word is given

YEAR	SPELLING	SOURCE
825	STEORRA	OLD ENGLISH
1205	STEORRA	MIDDLE ENGLISH
1340	STERRE	MIDDLE ENGLISH
1449	STERRIS	A later form
1588	STEARRES	A later form
1784	STARS	Was used by WILLIAM COWPER British poet (1731-1800) first in its present form in his works.

## STAR COLOR AND TEMPERATURE

Few people notice that stars show faint color differences. The color tints can easily be observed with particular stars. The telescope, which increases the amount of light, further discloses the star's color. The easily noticed colors are red, yellow and bluish-white. A star's color is directly associated with its surface temperature; blue stars are hot stars and red stars are cooler stars. Yellow, the color of our Sun, is the color band to which the human eye is most sensitive.

Color is detected by the cones in the retina at the back of the eye and is used mainly in day vision. Rods are used for night vision and low luminosities, as they are more sensitive to light. Rods do not detect color, so the human eye is not really designed to be an actual color detector under dim lighting conditions like the night sky. True star colors are best measured by using films that are sensitive to light in the different color bands.

Star Color Associated with Surface Temperature of Stars and Star Classification (Ref. 16, p. 424)

The order of the identifying letters in the spectral classification is a matter of historical accident, and the letters themselves have no particular significance.

Two other rare classes are the C- and S- type stars. These are cool stars that overlap the K- and M-type in terms of temperature, but are placed in separate categories due to chemistry within the star. Very few of these stars are visible without optical aid, though the C- type U Hydrae, and the S- type Chi Cygni are exceptions.

SPECTRAL Classification	Star Color	Surface Temperature	Examples
O	Blue	Greater than 45,000 degrees F	10 Lacertae
B	Blue	45,000 degrees to 20,000 degrees F	Rigel, Spica
A	Blue	20,000 degrees to 13,000 degrees F	Sirius, Vega
F	Blue to White	13,000 degrees to 10,500 degrees F	Canopus, Procyon
G	White to Yellow	10,500 degrees to 9,000 degrees F	Sun, Capella
K	Orange to Red	9,000 degrees to 6,000 degrees F	Arcturus, Aldebaran
M	Red	Less than 6,000 degrees F	Betelgeuse, Antares

## APPARENT MAGNITUDE SCALE

The apparent ( $VM$ ) is really a means by which astronomers communicate the brightness of a celestial object.

In second century B.C., Hipparchus created the first magnitude scale by declaring the brightest stars were "of the first magnitude," the next brightest group of stars was "of the second magnitude" and so forth until the faintest stars visible to the naked eye were "of the sixth magnitude."

Norman R. Pogson placed Hipparchus's scale on a mathematical basis in 1856. A difference of about 100 in brightness equaled 5 magnitudes. Currently 5 magnitudes are equal to a brightness ratio of 100 to 1. Over time refined instruments allowed astronomers to discover stars brighter than first magnitude that resulted in the use of zero and negative numbers. The brightest star is Sirius, whose magnitude is -1.4. What is hard for students to realize is the lower the magnitude, the brighter the star.

Difference in Magnitude	Factor in Brightness
1 magnitude	2.512 times
2 magnitudes	6.31 times
3 magnitudes	15.85 times
4 magnitudes	39.81 times
5 magnitudes	100.0 times
6 magnitudes	251.0 times
7 magnitudes	631.0 times
8 magnitudes	1585.0 times
9 magnitudes	3,981.0 times
10 magnitudes	10,000.0 times

### Magnitude Number Relative to the Brightness of Known Objects

Limits of a 6 to 10 inch telescope	+10.0 to +12.0 magnitude
Dimmest star seen (naked eye) Under the best sky conditions	+6.0 magnitude
Polaris (north star)	+2.0 magnitude
Vega	0.0 magnitude
Brightest star of the night (Sirius)	-1.4 magnitude
Brightest planet Venus (generally)	-4.0 magnitude
Full moon	-12.5 magnitude
Sun	-26.7 magnitude

## THE FOLLOWING GIVES A PERSPECTIVE OF THE MAGNITUDE NUMBER

Magnitude	Brightness	What is seen at this magnitude
0	Extremely bright	Bright stars such as Capella in Auriga and Vega in Lyra. There are only <u>four</u> stars brighter than zero magnitude.
1	Very bright	Stars stand out among their neighbors. Conventionally any star brighter than 1.50 is said to be of the "first magnitude" There are only <u>eleven</u> stars between zero and first magnitude.
2	Moderately bright	Stars such as Polaris There are <u>thirty-three</u> stars between first and second magnitude.
3	Faint stars	Stars can still be seen, even in conditions of some haze or fairly strong moonlight.
4	Fainter stars	Fainter still, stars are concealed by moonlight (near full moon phase). The Milky Way Galaxy is generally NOT seen in a sky where only fourth magnitude stars can be seen.
5	Too faint	Stars too faint to be seen with the naked eye except when the sky is dark and clear. These are not seen in urban areas. Milky Way Galaxy can be observed in a sky where fifth magnitude stars can be seen.
6	Faintest stars	Stars visible with the naked eye under very good conditions, a totally dark sky. Milky Way Galaxy stands out clearly in a sky where sixth magnitude stars can be seen

(Ref. 10, p. 15) Moore, Patrick, Star Gazing Astronomy Without A Telescope, First Edition, 113 Crossways Park Drive, Woodburg, N.Y., Barron's Educational Series, Inc., 1985.

## THE STAR COUNTS FOR DIFFERENT MAGNITUDES ARE MADE FOR THE ENTIRE CELESTIAL SPHERE.

Magnitude of Stars	Total number of stars seen in the entire sky
Magnitude less than 0	Only 4 stars
Magnitude 0 to 1	11 stars
Magnitude 1 to 2	Equals approximately 30 stars
Magnitude 2 to 3	Equals approximately 90 stars
Magnitude 3 to 4	Equals approximately 265 stars
Magnitude 4 to 5	Equals approximately 915 stars
Magnitude 5 to 6	Equals approximately 2400 stars

Reference "Naked I Astronomy" by George Reed, former professor of astronomy at West Chester University in Pennsylvania.

## LIST OF 50 BRIGHTEST STARS (2.01 OR BRIGHTER)

Star Number	Star Name	Star Genitive	Constellation Designation	Apparent Magnitude	Absolute Magnitude	Distance in LY
1	Sirius	$\alpha$	Canis Majoris	-1.44	1.45	8.6
2	Canopus	$\alpha$	Carinae	-0.62	-5.53	312.6
3	Arcturus	$\alpha$	Boötis	-0.05	-0.31	36.7
4	Rigel Kent	$\alpha$	Centauri	-0.01	4.34	4.4
5	Vega	$\alpha$	Lyrae	0.03	0.58	25.3
6	Capella	$\alpha$	Aurigae	0.08	-0.48	42.2
7	Rigel	$\beta$	Orionis	0.18	-6.69	772.5
8	Procyon	$\alpha$	Canis Minoris	0.40	2.68	11.4
9	Betelgeuse	$\alpha$	Orionis	0.45	-5.14	427.3
10	Achernar	$\alpha$	Eridani	0.45	-2.77	143.7
11	Hadar	$\beta$	Centauri	0.61	-5.42	525.0
12	Altair	$\alpha$	Aquiliae	0.76	2.20	16.8
13	Acrux	$\alpha'$	Crucis	0.77	-4.19	320.6
14	Aldebaran	$\alpha$	Tauri	0.87	-0.63	65.1
15	Spica	$\alpha$	Virginis	0.98	-3.55	262.1
16	Antares	$\alpha$	Scorpii	1.06	-5.28	603.7
17	Pollux	$\beta$	Geminorum	1.16	1.09	33.7
18	Fomalhaut	$\alpha$	Piscis Austrini	1.17	1.74	25.1
19	Deneb	$\alpha$	Cygni	1.25	-8.73	3227.8
20	Beta Crux	$\beta$	Crucis	1.25	-3.92	352.4
21	Regulus	$\alpha$	Leonis	1.36	-0.52	77.5
22	Adhara	$\epsilon$	Canis Majoris	1.50	-4.10	430.7
23	Castor	$\alpha$	Geminorum	1.58	0.59	51.5
24	Gamma Crux	$\gamma$	Crucis	1.59	-0.56	87.9
25	Shaula	$\lambda$	Scorpii	1.62	-5.05	702.6
26	Bellatrix	$\gamma$	Orionis	1.64	-2.72	242.9
27	El Nath	$\beta$	Tauri	1.65	-1.37	131.0
28	Miaplacidus	$\beta$	Carinae	1.67	-0.99	111.1
29	Alnilam	$\epsilon$	Orionis	1.69	-6.38	1341.6
30	Alnair	$\alpha$	Gruis	1.73	-0.73	101.4
31	Alnitak	$\zeta$	Orionis	1.74	-5.26	817.0
32	Gamma Vela	$\gamma$	Velorum	1.75	-5.31	840.2
33	Alioth	$\epsilon$	Ursae Majoris	1.76	-0.21	80.9
34	Kaus Australius	$\epsilon$	Sagittarii	1.79	-1.44	144.6
35	Mirfak	$\alpha$	Persei	1.79	-4.50	591.7
36	Dubhe	$\alpha$	Ursae Majoris	1.81	-1.08	123.6
37	Wezen	$\delta$	Canis Majoris	1.83	-6.87	1791.2
38	Alkaid	$\eta$	Ursae Majoris	1.85	-0.60	100.6
39	Sargas	$\theta$	Scorpii	1.86	-2.75	271.9
40	Anvior	$\epsilon$	Carinae	1.86	-4.58	631.8
41	Menkalinan	$\beta$	Aurigae	1.90	-0.10	82.1
42	Atria	$\alpha$	Tranguli	1.91	-3.62	415.3
43	Delta Velorum	$\delta$	Velorum	1.93	-0.01	79.7
44	Alhena	$\gamma$	Geminorum	1.93	-0.60	104.8
45	Alpha Pavo	$\alpha$	Pavonis	1.94	-1.81	183.1
46	Polaris	$\alpha$	Ursae Minoris	1.97	-3.64	431.2
47	Mirzam	$\beta$	Canis Majoris	1.98	-3.95	499.2
48	Alphard	$\alpha$	Hydrae	1.99	-1.69	177.2
49	Algieba, Algeiba	$\gamma$	Leonis	2.01	-0.92	125.6
50	Hamal	$\alpha$	Arietis	2.01	0.48	65.9

Ref. The 150 stars in the Hipparcos Catalogue with highest apparent magnitude from website - <http://astro.estec.esa.nl/Hipparcos/table365-new.html> > and some star names taken from Ref. 8 page 180

## FREQUENTLY ASKED QUESTIONS

Why study constellations? For thousands of years people of many cultures have used stars for guiding them from one place to another. The North Star is within  $1^\circ$  of true north whereas the compass in Fairfax County is off by a full  $7^\circ$ . Knowing the stars of constellations can make you feel at home with familiar skies even when you are hundreds of miles away. The number of degrees the North Star is above the horizon equals your latitude. Fairfax Co. is between  $38.5^\circ$  and  $39.2^\circ$  latitude, so Polaris is always  $38.5^\circ$  to  $39.2^\circ$  above the north horizon in Fairfax, Virginia.

If you know the constellations, you will find it easy to track the planets as they move against the star background.

Constellations help you observe dim objects in the sky, such as comets, or spot the area of the sky where meteor showers occur. Constellations may also be used as a frame of reference in conversation with someone else about where they observed an object, like the ISS, the International Space Station, crossing the sky.

Amazingly, constellations examined today look basically the same as they did 5,000 years ago and will remain similar for the next 5,000 years. The fastest moving star is thought to be Barnard's star that changes its position by the width of the diameter of the full moon in about 200 years.

Stars exemplify symbols of importance. We highlight movie stars, sports stars, and rising stars in politics and business. Only 11 of the 50 state flags do not have stars somewhere on them.

1. **What is a star?** A star is a very large, glowing, sphere of gas due to its very high temperature. Our sun is a star, and is the only one near enough so that we can see its real shape. The sun's light reaches our planet in a little over 8 minutes.
2. **What is the closest star other than the sun?** It is Proxima Centauri at 4.22 light years.
3. **What is a light year?** The distance light travels in one year, or 6 trillion miles.
4. **What is the speed of light?** *186,287.49 miles per second* (300,000 km/sec.); actual 299,792,458 meters per second
5. **Why do stars seem to twinkle?** Starlight coming to us through the moving layers of air we call our atmosphere causes the apparent twinkling of stars
6. **Why can't stars be seen during the day?** The stars are present even in the daytime sky. The Sun's light is scattered through our atmosphere (coloring it blue) and making the sky so bright you can't see the stars in space beyond our atmosphere.
7. **Why do the stars and sun and moon move toward the west in the sky?** They aren't really moving to the west, but only seem to because of the rotation of our Earth toward the east.
8. **What is rotation?** It is the spin motion of a planet on its axis. The Earth turns  $15^\circ$  per hour, or 1040 miles per hour, completing one turn in about 24 hours.

9. **How big can stars be?** The sun is an average size star. There are stars that are at least 500 to 700 times the size of the sun, such as Betelgeuse, the bright star in the upper east shoulder of Orion the Hunter. Some red giant stars are thought to be so large that if they replaced our Sun their surface would extend out to the orbit of Saturn.
10. **How small can stars be?** There are stars called neutron stars that are thought to be less than 10 miles in diameter. Black Holes are even smaller.
11. **What are stars made of?** More than 90% of most stars are comprised mainly of hydrogen and some helium.
12. **How old are stars?** Small stars live a longer life than large stars. The range in a star's life is from about one half a million to over 12 billion years.
13. **What is a supernova?** It is a star that explodes and becomes billions of times brighter for a few months, then dims in a period of a year or two until only a telescope will allow you to observe it.
14. **What is the brightest star other than our sun seen in our skies?** Sirius at 8.6 light years (Ref.18) (See the constellation Canis Major)
15. **What is the surface temperature range for stars from cool to hot stars?** They range from about 2,500 degrees F to over 220,000 degrees F. (See table- page 7)
16. **How do stars shine and make their energy?** By nuclear reactions in their core- otherwise called nuclear fusion.
17. **How many stars are there?** Our Milky Way Galaxy has over 200 billion stars. Over 200 billion galaxies have been observed.
18. **How many stars are named?** Only a few of the brighter stars actually have names, (about 200 to 300)
19. **How are the distances to nearby stars measured?** Stars distances are measured by parallax, which measures the angle of one star to nearby stars against the background of more distant stars. Parallax is only accurate to several thousand light years with Hipparcos data. The Cepheid variable technique is another useful measurement out to millions of light-years.
20. **What are binary stars?** Two stars that move around each other and are held in their orbits by their mutual gravity.
21. **What is a black hole?** A collapsed massive star, so dense that not even light can escape the pull of its gravity.
22. **What is a galaxy?** A large system of millions to hundreds of billions of stars, often containing large amounts of dust and gas.
23. **What is a red giant star?** A cool, red star, very bright because of its large size; a late stage in the life of a typical star.
24. **What is a white dwarf?** A small dense hot white star; the final stage in stellar evolution of stars with masses similar to the Sun's or smaller. (generally equal to the Earth's diameter in size)



# THE 88 CONSTELLATIONS IN ALPHABETICAL ORDER

NUM.	NAME	SQ.°	DATE	NUM.	NAME	SQ.°	DATE
1	ANDROMEDA	722	10-Nov	45	LACERTA	201	10-Oct
2	ANTLIA	239	05-Apr	46	LEO	947	10-Apr
3	APUS	206	30-Jun	47	LEO MINOR	232	10-Apr
4	AQUARIUS	980	10-Oct	48	LEPUS	290	25-Jan
5	AQUILA	652	30-Aug	49	LIBRA	538	20-Jun
6	ARA	237	20-Jul	50	LUPUS	334	20-Jun
7	ARIES	441	10-Dec	51	LYNX	545	05-Mar
8	AURIGA	657	30-Jan	52	LYRA	286	15-Aug
9	BOÖTES	907	15-Jun	53	MENSA	153	30-Jan
10	CAELUM	125	15-Jan	54	MICROSCOPIUM	210	20-Sep
11	CAMELOPARDALIS	757	01-Feb	55	MONOCEROS	482	20-Feb
12	CANCER	506	15-Mar	56	MUSCA	138	10-May
13	CANES VENATICI	465	20-May	57	NORMA	165	05-Jul
14	CANIS MAJOR	380	15-Feb	58	OCTANS	291	20-Sep
15	CANIS MINOR	183	01-Mar	59	OPHIUCHUS	948	25-Jul
16	CAPRICORNUS	414	20-Sep	60	ORION	594	25-Jan
17	CARINA	494	15-Mar	61	PAVO	378	25-Aug
18	CASSIOPEIA	598	20-Nov	62	PEGASUS	1121	20-Oct
19	CENTAURUS	1060	20-May	63	PERSEUS	615	25-Dec
20	CEPHEUS	588	15-Oct	64	PHOENIX	469	20-Nov
21	CETUS	1231	30-Nov	65	PICTOR	247	20-Jan
22	CHAMAELEON	132	15-Apr	66	PISCES	889	10-Nov
23	CIRCINUS	93	15-Jun	67	PISCIS AUSTRINUS	245	10-Oct
24	COLUMBA	270	30-Jan	68	PUPPIS	673	25-Feb
25	COMA BERENICES	386	15-May	69	PYXIS	221	15-Mar
26	CORONA AUSTRALIS	128	15-Aug	70	RETICULUM	114	30-Dec
27	CORONA BOREALIS	179	30-Jun	71	SAGITTA	80	30-Aug
28	CORVUS	184	10-May	72	SAGITTARIUS	867	20-Aug
29	CRATER	282	25-Apr	73	SCORPIUS	497	20-Jul
30	CRUX	68	10-May	74	SCULPTOR	475	10-Nov
31	CYGNUS	804	10-Sep	75	SCUTUM	109	15-Aug
32	DELPHINUS	189	15-Sep	76	SERPENS	637	15-Jul
33	DORADO	179	20-Jan	77	SEXTANS	314	05-Apr
34	DRACO	1083	20-Jul	78	TAURUS	797	15-Jan
35	EQUULEUS	72	20-Sep	79	TELESCOPIUM	252	24-Aug
36	ERIDANUS	1138	05-Jan	80	TRIANGULUM	132	05-Dec
37	FORNAX	398	15-Dec	81	TRIANGULUM AUSTRALE	110	05-Jul
38	GEMINI	514	20-Feb	82	TUCANA	295	05-Nov
39	GRUS	366	10-Oct	83	URSA MAJOR	1280	20-Apr
40	HERCULES	1225	25-Jul	84	URSA MINOR	256	25-Jun
41	HOROLOGIUM	249	25-Dec	85	VELA	500	25-Mar
42	HYDRA	1303	20-Apr	86	VIRGO	1294	25-May
43	HYDRUS	243	10-Dec	87	VOLANS	141	01-Mar
44	INDUS	294	25-Sep	88	VULPECULA	268	10-Sep

# THE 88 CONSTELLATIONS 9 P.M. EST. CULMINATION

NUM.	NAME	SQ.°	DATE	NUM.	NAME	SQ.°	DATE
1	ERIDANUS	1138	05-Jan	45	NORMA	165	05-Jul
2	CAELUM	125	15-Jan	46	TRIANGULUM AUSTRALE	110	05-Jul
3	TAURUS	797	15-Jan	47	SERPENS	637	15-Jul
4	DORADO	179	20-Jan	48	ARA	237	20-Jul
5	PICTOR	247	20-Jan	49	DRACO	1083	20-Jul
6	LEPUS	290	25-Jan	50	SCORPIUS	497	20-Jul
7	ORION	594	25-Jan	51	HERCULES	1225	25-Jul
8	AURIGA	657	30-Jan	52	OPHIUCHUS	948	25-Jul
9	COLUMBA	270	30-Jan	53	CORONA AUSTRALIS	128	15-Aug
10	MENSA	153	30-Jan	54	LYRA	286	15-Aug
11	CAMELOPARDALIS	757	01-Feb	55	SCUTUM	109	15-Aug
12	CANIS MAJOR	380	15-Feb	56	SAGITTARIUS	867	20-Aug
13	GEMINI	514	20-Feb	57	TELESCOPIUM	252	24-Aug
14	MONOCEROS	482	20-Feb	58	PAVO	378	25-Aug
15	PUPPIS	673	25-Feb	59	AQUILA	652	30-Aug
16	CANIS MINOR	183	01-Mar	60	SAGITTA	80	30-Aug
17	VOLANS	141	01-Mar	61	CYGNUS	804	10-Sep
18	LYNX	545	05-Mar	62	VULPECULA	268	10-Sep
19	CANCER	506	15-Mar	63	DELPHINUS	189	15-Sep
20	CARINA	494	15-Mar	64	CAPRICORNUS	414	20-Sep
21	PYXIS	221	15-Mar	65	EQUULEUS	72	20-Sep
22	VELA	500	25-Mar	66	MICROSCOPIUM	210	20-Sep
23	ANTLIA	239	05-Apr	67	OCTANS	291	20-Sep
24	SEXTANS	314	05-Apr	68	INDUS	294	25-Sep
25	LEO	947	10-Apr	69	AQUARIUS	980	10-Oct
26	LEO MINOR	232	10-Apr	70	GRUS	366	10-Oct
27	CHAMAELEON	132	15-Apr	71	LACERTA	201	10-Oct
28	HYDRA	1303	20-Apr	72	PISCIS AUSTRINUS	245	10-Oct
29	URSA MAJOR	1280	20-Apr	73	CEPHEUS	588	15-Oct
30	CRATER	282	25-Apr	74	PEGASUS	1121	20-Oct
31	CORVUS	184	10-May	75	TUCANA	295	05-Nov
32	CRUX	68	10-May	76	ANDROMEDA	722	10-Nov
33	MUSCA	138	10-May	77	PISCES	889	10-Nov
34	COMA BERENICES	386	15-May	78	SCULPTOR	475	10-Nov
35	CANES VENATICI	465	20-May	79	CASSIOPEIA	598	20-Nov
36	CENTAURUS	1060	20-May	80	PHOENIX	469	20-Nov
37	VIRGO	1294	25-May	81	CETUS	1231	30-Nov
38	BOÖTES	907	15-Jun	82	TRIANGULUM	132	05-Dec
39	CIRCINUS	93	15-Jun	83	ARIES	441	10-Dec
40	LIBRA	538	20-Jun	84	HYDRUS	243	10-Dec
41	LUPUS	334	20-Jun	85	FORNAX	398	15-Dec
42	URSA MINOR	256	25-Jun	86	HOROLOGIUM	249	25-Dec
43	APUS	206	30-Jun	87	PERSEUS	615	25-Dec
44	CORONA BOREALIS	179	30-Jun	88	RETICULUM	114	30-Dec

## THE 88 CONSTELLATIONS IN SIZE ORDER

NUM.	NAME	SQ.°	DATE	NUM.	NAME	SQ.°	DATE
1	HYDRA	1303	20-Apr	45	GRUS	366	10-Oct
2	VIRGO	1294	25-May	46	LUPUS	334	20-Jun
3	URSA MAJOR	1280	20-Apr	47	SEXTANS	314	05-Apr
4	CETUS	1231	30-Nov	48	TUCANA	295	05-Nov
5	HERCULES	1225	25-Jul	49	INDUS	294	25-Sep
6	ERIDANUS	1138	05-Jan	50	OCTANS	291	20-Sep
7	PEGASUS	1121	20-Oct	51	LEPUS	290	25-Jan
8	DRACO	1083	20-Jul	52	LYRA	286	15-Aug
9	CENTAURUS	1060	20-May	53	CRATER	282	25-Apr
10	AQUARIUS	980	10-Oct	54	COLUMBA	270	30-Jan
11	OPHIUCHUS	948	25-Jul	55	VULPECULA	268	10-Sep
12	LEO	947	10-Apr	56	URSA MINOR	256	25-Jun
13	BOÖTES	907	15-Jun	57	TELESCOPIUM	252	24-Aug
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15	SAGITTARIUS	867	20-Aug	59	PICTOR	247	20-Jan
16	CYGNUS	804	10-Sep	60	PISCIS AUSTRINUS	245	10-Oct
17	TAURUS	797	15-Jan	61	HYDRUS	243	10-Dec
18	CAMELOPARDALIS	757	01-Feb	62	ANTLIA	239	05-Apr
19	ANDROMEDA	722	10-Nov	63	ARA	237	20-Jul
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22	AQUILA	652	30-Aug	66	MICROSCOPIUM	210	20-Sep
23	SERPENS	637	15-Jul	67	APUS	206	30-Jun
24	PERSEUS	615	25-Dec	68	LACERTA	201	10-Oct
25	CASSIOPEIA	598	20-Nov	69	DELPHINUS	189	15-Sep
26	ORION	594	25-Jan	70	CORVUS	184	10-May
27	CEPHEUS	588	15-Oct	71	CANIS MINOR	183	01-Mar
28	LYNX	545	05-Mar	72	CORONA BOREALIS	179	30-Jun
29	LIBRA	538	20-Jun	73	DORADO	179	20-Jan
30	GEMINI	514	20-Feb	74	NORMA	165	05-Jul
31	CANCER	506	15-Mar	75	MENSA	153	30-Jan
32	VELA	500	25-Mar	76	VOLANS	141	01-Mar
33	SCORPIUS	497	20-Jul	77	MUSCA	138	10-May
34	CARINA	494	15-Mar	78	CHAMAELEON	132	15-Apr
35	MONOCEROS	482	20-Feb	79	TRIANGULUM	132	05-Dec
36	SCULPTOR	475	10-Nov	80	CORONA AUSTRALIS	128	15-Aug
37	PHOENIX	469	20-Nov	81	CAELUM	125	15-Jan
38	CANES VENATICI	465	20-May	82	RETICULUM	114	30-Dec
39	ARIES	441	10-Dec	83	TRIANGULUM AUSTRALE	110	05-Jul
40	CAPRICORNUS	414	20-Sep	84	SCUTUM	109	15-Aug
41	FORNAX	398	15-Dec	85	CIRCINUS	93	15-Jun
42	COMA BERENICES	386	15-May	86	SAGITTA	80	30-Aug
43	CANIS MAJOR	380	15-Feb	87	EQUULEUS	72	20-Sep
44	PAVO	378	25-Aug	88	CRUX	68	10-May

## EXPLANATION OF THE CONSTELLATION DATA

1. **Latin Name** of Constellation- All 88 constellations are given Latin names since it is considered the universal language. The 12 zodiac constellations are listed along with the date when the sun is in that constellation and their numeric order in the zodiac. For example, Aries, the first of the zodiac constellations, has the Sun in it between April 19 to May 15 and in the future these dates will advance with time due to the precession of the Earth.
2. The **English name** is given to distinguish an actual form or mere resemblance with the associated star pattern.
3. In the **pronunciation**, capital letters indicate where the accent should be placed in the pronunciation of the name. Reference #17 was the most widely used reference.
4. The **date of culmination** is the date when the constellation will be highest in the sky on the meridian at 9 PM Eastern Standard Time. If you are on daylight saving time, the date given will correspond to the time 10 P.M.
5. The constellation should be **visible during the dates listed at 9 PM** Eastern standard time or 10 P.M. daylight saving time, but will be best observed on the date of culmination (date listed in #4) as it will be higher in the sky. Remember the closer a constellation is to the zenith the smaller the amount of atmosphere and haze you have to gaze through to see the constellation.
6. Constellation **star counts by magnitude**- a constellation near or viewed against the cross sectional view of the Milky Way Galaxy has a higher star density and larger number of stars. Generally, you will be interested in the stars of fourth magnitude or brighter, or second magnitude or brighter. In areas with streetlights, during times of the gibbous moon and full moon or hazy conditions, stars of third magnitude or brighter (lower numbers) are the only visible stars.
7. The **constellation diagrams** can vary considerably. The diagram given is only a suggested version. Even astronomers have their own personal idea of how the stars should be connected. The teacher shouldn't try to convert the student to one particular constellation diagram, but should make it clear to the student that the image is far different than the diagrams shown for the constellations. The diagrams are not to scale, relative to other constellations. See category #13 for the size and rank of constellations. The use of Greek letters is explained in number eight.
8. The **alpha star** in a constellation is generally the brightest star. However, don't assume this is always the case since Bayer sometimes picked the alpha star because of position (and some are apparently mistakes) as some stars of near equal brightness were ranked incorrectly. See the alpha star of Corvus, Hydra, Sagittarius, Ursa Major, and Ursa Minor for examples.

It was soon learned that not all stars have proper names; only the brighter stars were given names by the ancient observers. The most convenient and widely used system for identifying stars visible to the naked eye was devised by Bayer in 1603. This system designates the brighter stars in a constellation with letters of the Greek alphabet:  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ , etc. Generally, the letters are assigned in descending order of brightness, with alpha denoting the star of greatest brightness in the constellation. Ranking refers to the star's place in the order of brightness among visible stars. Ranking comes from data listed in Hipparcos chart. (Reference #18)

9. The **brighter stars** of the constellation are given with name, meaning of name, pronunciation, distance, magnitude, and other interesting information, for example, if it is a double or binary star.
10. The description of the **shape** of the constellation provides you with its real appearance for viewing. Example: Leo looks like a backward "?" mark, instead of the shape of a lion.
11. **Alignments** help the observer know where to look in the sky and generally include alignments of the brighter stellar objects.
12. **Location** The relation of neighboring constellations to a star illustrates its location that will become more meaningful as you learn more constellations.
13. The **size** of the constellation is rounded off to the nearest whole degree and provides its rank in size among the 88 constellations.
14. The following information will help you locate the star in the sky, as latitude and longitude locates one on earth. Your grasping the following specific information will be helpful but seldom used and is included for those with a **more in depth interest in astronomy**.

Ecliptic is the apparent path the sun follows across the sky during the year, and is within  $7^\circ$  of the path taken by the moon and all the observable planets. It is the apparent path, as it is really the motion of the earth in its orbit that causes this apparent motion of the Sun. The zodiac constellations lie along the ecliptic thus can help one locate planets. All the observable planets orbit the sun in nearly a flat plane, thus the reason they all seem to follow the ecliptic. (Exceptions are Mercury ( $7^\circ$ ) and Pluto ( $17.2^\circ$ .)

**Celestial equator** is the imaginary projection of the earth's equator into the sky.

**Celestial longitude** is longitude measured in degrees east along the ecliptic from the vernal equinox.

**Vernal equinox** is the intersection point of the ecliptic and the celestial equator that the sun passes on its way above or to the north of the celestial equator.

Now we can define right ascension and declination. Right ascension is the angle of a celestial object east of the vernal equinox, along the celestial equator, and is measured in hours, minutes and seconds. If you determine sidereal time and it is 5 hrs. 30 minutes, it means Orion is at culmination on the meridian as its right ascension is between 4 hours 41 minutes and 6 hours 23 minutes.

**Declination** is the celestial coordinate analogous to latitude and is used in astronomy to measure the number of degrees, minutes and seconds of arc north (+) or south (-) of the celestial equator. Stars with a declination of  $-51^\circ$  or more cannot be seen in Fairfax County. Stars with a declination of  $+51^\circ$  or more are circumpolar in Fairfax County.

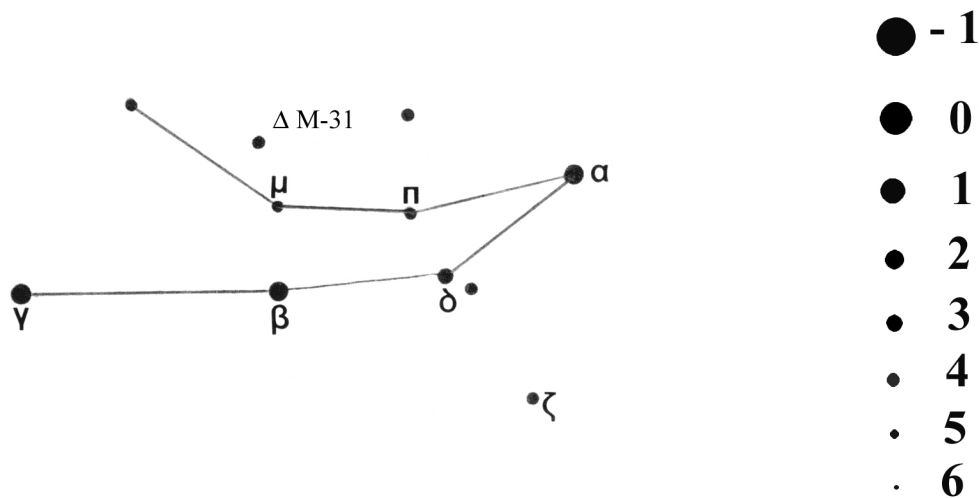
15. **Mythology**- This book summarizes the more popular Greek mythological stories associated with the constellation. There are many other references, but **Mythology** by Edith Hamilton may be most helpful.

16. **Remarks**- This section is left for interesting comments about the different constellations and additional information.

# ANDROMEDA

1. LATIN NAME OF CONSTELLATION ----- **Andromeda**
2. ENGLISH NAME OF CONSTELLATION ----- **The Chained Lady**
3. PRONUNCIATION OF CONSTELLATION ----- **Ann - DROM - eh - da**
4. DATE OF CULMINATION ON S. MERIDIAN AT 9P.M.- **November 10** (Ref. 2, p. 70)
5. APPROXIMATE TIME VISIBLE AT 9 P.M. E.S.T.- **AUGUST 1 - MARCH 11** (Ref.6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **100** (Ref. 5, p. 236)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **25** (Ref. 8, p. 177)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **7** (Ref. 8, p. 177)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **0** (Ref. 8, p. 177)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.<sup>o</sup> --- **9.19** (Ref. 8, p. 177)

## 7. DIAGRAM OF CONSTELLATION



**8. ALPHA STAR OF CONSTELLATION-** **α Alpheratz** (Al - FEE - rats) "horse's navel" (see Pegasus constellation) is the head star of Andromeda. Magnitude: + 2.07 Ranking: 55 Distance: 33.6 light years Spectrum Class: A0 Flamsteed: # 21 Hipparcos: #677 (Ref.18) (Ref.19) Alpheratz is a blue-white star, a spectroscopic binary and approximately 100 times brighter than our sun. This star as indicated by its Arabic name was meant to be a part of the constellation Pegasus but it is now within the boundary of Andromeda. (Ref. 15, p. 421)

**9. OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p. 112)

**Beta β Mirach** (MY - rack) "the loins" (Ref.15, p. 5) Magnitude: +2.07 Ranking: 57 Distance: 199.3 light years Spectrum Class: MO Flamsteed: # 43 Hipparcos: #5447 (Ref.18) (Ref.19)

**Gamma γ Almak** (AL - mac) literally "the earth - kid" (Ref.15, p. 5) (Ref.1) (Ref.2, p.112) (Almaak) Magnitude: +2.10 Ranking: 61 Distance: 354.7 light years Spectrum Class: KO Flamsteed: # 57 Hipparcos: #9640 (Ref.18) (Ref.19)



# AQUARIUS

1. LATIN NAME OF CONSTELLATION ----- **Aquarius**

**The eleventh Zodiac Constellation [Sun in Aquarius from approximately February 17 to March 13]** (Ref. 2, p. 114)

2. ENGLISH NAME OF CONSTELLATION ----- **Water Bearer**

3. PRONUNCIATION OF CONSTELLATION ----- **ack- KWAIR-ee-us**

4. DATE OF CULMINATION ON S. MERIDIAN AT 9P.M.- **October 10** (Ref. 2, p.70)

5. APPROXIMATE TIME VISIBLE AT 9P.M. - **August 20 - December 20** (Ref. 6)

6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **90** (Ref. 5, p. 236)

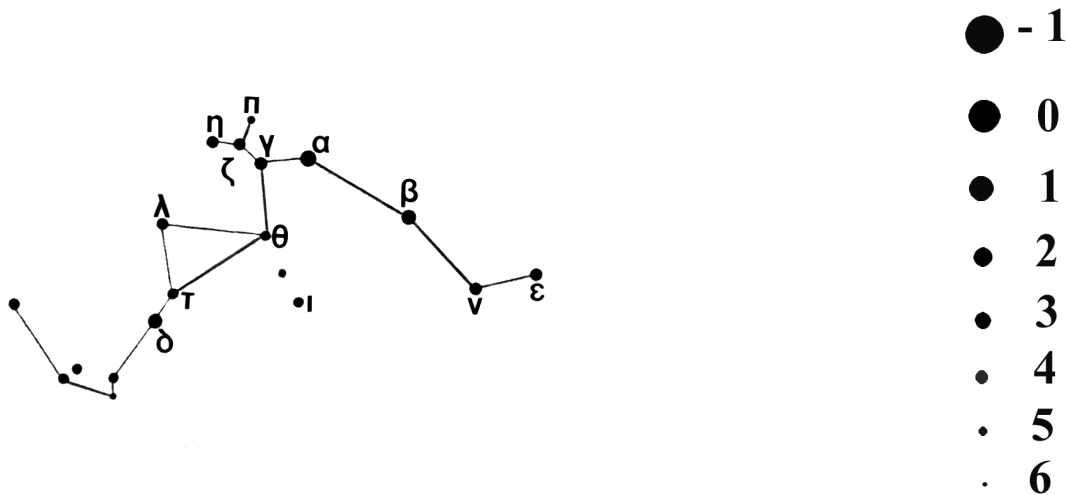
NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **31** (Ref. 8, p. 177)

NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **7** (Ref. 8, p. 177)

NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **0** (Ref. 8, p. 177)

STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°----- **3.16** (Ref. 8, p.177)

7. DIAGRAM OF CONSTELLATION



**8. ALPHA STAR OF CONSTELLATION-  $\alpha$  Sadalmelik** (SAD-al-MEL-ich) "lucky one of the king" "red star" and culminates October 11 (Ref. 15, p. 432) Magnitude: +2.95 Distance: 758.1 light years Spectrum Class: G0 Flamsteed: # 34 Hipparcos: #109074 (Ref.18) (Ref.19)

**9. OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p. 114)

**Beta  $\beta$  Sadalsud** (SAD-al-SUE-ud) "luckiest of the lucky" "yellow star" (Sadalsud) Magnitude: +2.90 Distance: 611.6 light years Spectrum Class: G0 Flamsteed: # 22 Hipparcos: #106278 (Ref.18) (Ref.19)

**Gamma  $\gamma$  Sadachbia** (SAD-AK-bay-ah) "lucky star of hidden things" "white star" (Sadalachbia) Magnitude: +3.86 Distance: 157.7 light years Spectrum Class: A0 Flamsteed: # 48 Hipparcos: #110395 (Ref.18) (Ref.19)



**Delta  $\delta$  Skat** (Skate) Arabic "the leg" (Ref. 15, p. 6) (Scheat) Magnitude: +3.27 Distance: 159.5 light years Spectrum Class: A2 Flamsteed: # 76 Hipparcos: #113136 (Ref.18) (Ref.19)

**Eta  $\epsilon$  Al Bali** (al-BAY-lee) "the lucky star of the swallower" (Ref. 15, p. 6) Magnitude: +3.78 Distance: 229.4 light years Spectrum Class: A0 Flamsteed: #2 Hipparcos: #102618 (Ref.18) (Ref.19)

**Theta  $\theta$  Ancha** (ANG-ka) "the hip" Magnitude: +4.17 Distance: 191.3 light years Spectrum Class: K0 Flamsteed: #43 Hipparcos: #110003 (Ref.18) (Ref.19).

**10. SHAPE OF THE CONSTELLATION-** This constellation is very dim having no star much brighter than 3<sup>rd</sup> magnitude and a very poorly defined shape of any water bearer. Of the twelve zodiac constellations this is one of the hardest to imagine resemblance to its human form. The constellation is usually described as a man pouring water from a jar. His head is the star Sadalmelik; his legs run down to star Albali, which is right over Capricornus. The water is flowing out of the urn south towards Skat and the bright first magnitude star Fomalhaut in Piscis Austrinus.

**11. HELPFUL ALIGNMENTS-** A line from the N.W. to S.E. corner of Pegasus, if extended downward, will run near the head of the "water bearer."

**12. LOCATION IN THE SKY-** Aquarius is south of Pegasus and Equuleus, north of Piscis Austrinus and Capricornus, west of Cetus and east of Aquila and Capricornus

**13. SIZE IN SQUARE DEGREES** = 980°      **RANK IN SIZE OF 88** = 10th  
(Ref. 2, p. 70)                                      (Ref. 2, p. 70)

**14. APPROXIMATE BOUNDARIES BY COORDINATES** (Ref. 5, p. 236)

HOURS RIGHT ASCENSION 20 HOURS, 36 MINUTES TO 23 HOURS, 54 MINUTES

DEGREES OF DECLINATION +03.1° TO -25.2°

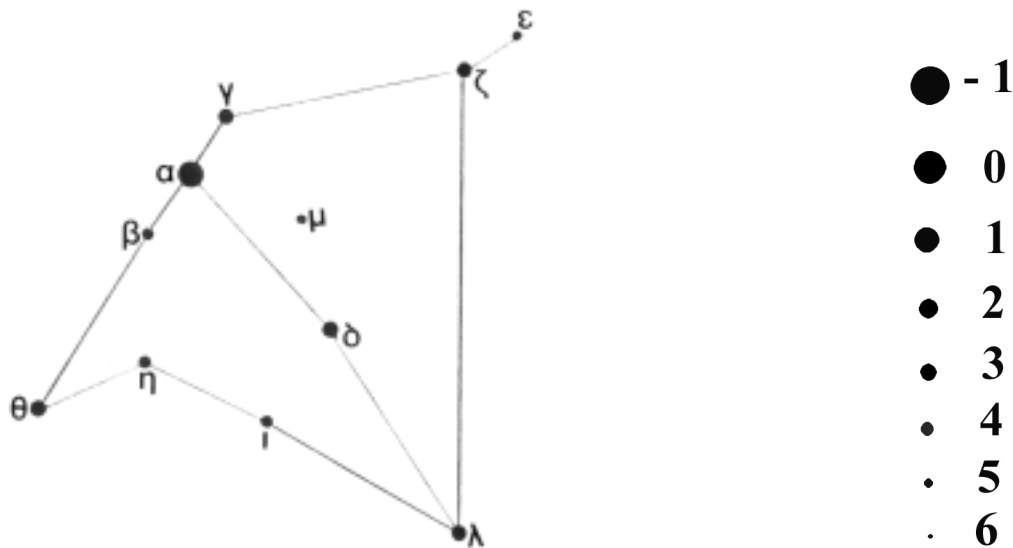
**15. MYTHOLOGY-** The Greeks identify Aquarius to the ancient legend of Ganymede; who was the cupbearer to Jove (Jupiter or Zeus). Aquila "the flying Eagle" bore Ganymede aloft to his place in the sky with Zeus.

**16. REMARKS-** In Egypt, the rainy season began when the sun rose concurrently with the stars of Aquarius. Man pouring water from an urn or jar "Aquarids" radiates from this area. In the so-called "Age of Aquarius," the vernal equinox will be located in this constellation in about 600 years from the present. (Ref. 2, p. 114) (The Delta Aquarids radiate from this region from July 15<sup>th</sup> to August 15<sup>th</sup> - at an estimate of 20-35 per hour.) This meteor shower is a part of the Arietid meteor stream. The Iota Aquarids radiate from this region July 15<sup>th</sup> to August 25<sup>th</sup> - at an estimate of 5-10 per hour. The globular cluster (M2) of 7<sup>th</sup> magnitude at distance of 40,000 light years is visible with binoculars. (Ref. 2, p. 114)

# AQUILA

1. LATIN NAME OF CONSTELLATION -----**Aquila**
2. ENGLISH NAME OF CONSTELLATION ----- **Eagle**
3. PRONUNCIATION OF CONSTELLATION ----- **ACK-will-a**
4. DATE OF CULMINATION ON S. MERIDIAN AT 9P.M.- **August 30** (Ref. 2, p. 70)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - **June 5 - December 5** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **70** (Ref. 5, p. 236)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **16** (Ref. 8, p. 177)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **8** (Ref. 8, p. 177)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **2** (Ref. 8, p. 177)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°---- **2.45** (Ref. 8, p. 177)

## 7. DIAGRAM OF CONSTELLATION



**8. ALPHA STAR OF CONSTELLATION-  $\alpha$  Altair** (Al-TARE) "the flying eagle or vulture" (Ref. 15, p. 6) 12<sup>th</sup> brightest of the night stars and 8<sup>th</sup> brightest of Northern Hemisphere night stars - Magnitude: +0.76 Ranking: 12 Distance: 16.8 light years Spectrum Class: A5 Flamsteed: # 53 Hipparcos: #97649. (Ref.18) (Ref.19) It is the 45<sup>th</sup> closest star (Ref. 2, p. 116) Altair is the southern most star in the summer triangle and represents the heart of the eagle. Altair is yellow in color and culminates September 4. (Ref. 15, p. 421)

**9. OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p. 116)

**Beta  $\beta$  Alshain** (al-SHAY-n) "from the substantive part of one of the Persian names of the constellation" Magnitude: +3.71 Distance: 44.7 light years Spectrum Class: K0 Flamsteed: # 60 Hipparcos: #98036 (Ref.18) (Ref.19)

**Gamma  $\gamma$  Tarazed Reda** (TAR-ah-zed) "from the adjectival part of the Persian name"  
Magnitude: +2.72 Ranking: 116 Distance: 460.5 light years Spectrum Class: K2 Flamsteed: #50  
Hipparcos: #97278 (Ref.18) (Ref.19)

**Delta  $\delta$  Denebokab** (de-NEB-oh-la) "the tail of the Eagle" Magnitude: +3.36 Distance: 50.1  
 light years Spectrum Class: F0 Flamsteed: # 30 Hipparcos: #95501 (Ref.18) (Ref.19)

**10. SHAPE OF THE CONSTELLATION-** Aquila has a broad kite or triangular shape.

**11. HELPFUL ALIGNMENTS-** Southern most part of summer triangle

**12. LOCATION IN THE SKY-** Altair, the Alpha or brightest star, is the southern most star in the summer triangle, just south of the constellations Lyra and Cygnus. Sagittarius and Capricorn border Aquila on the south, Aquarius and Delphinus on the east, Sagitta on the north, with Ophiuchus and the Serpens on the west. (Ref. 3, p. 195)

**13. SIZE IN SQUARE DEGREES = 652°     RANK IN SIZE OF 88 = 22<sup>nd</sup>**

(Ref. 2, p. 70)

(Ref. 2, p. 70)

**14. APPROXIMATE BOUNDARIES BY COORDINATES-** (Ref. 5, p. 236)

HOURS RIGHT ASCENSION 18 HOURS, 38 MINUTES TO 20 HOURS, 36 MINUTES

DEGREES OF DECLINATION -11.9° TO +18.6°

**15. MYTHOLOGY-** Eagle, the bird of Zeus, bore Ganymede "son of the King of Troy" (also known as "the cup bearer") aloft to his place in the sky with Zeus. Almost all cultures have associated this constellation with some type of bird. Also, Aquila carried the thunderbolts of Jove (Jupiter) to Earth. (Ref. 2, p. 116)

**16. REMARKS-** Aquila in Arabic means "the flying eagle" or the "soaring eagle." As noted (Ref. 3, p. 196) in 1918 on the western edge of Aquila occurred the brightest nova (1<sup>st</sup> magnitude) in 300 years.

# ARIES

1. LATIN NAME OF CONSTELLATION ----- **Aries**

**The first zodiac constellation - The sun is in this constellation from April 19 to May 15.**  
(Ref. 2, p. 118)

2. ENGLISH NAME OF CONSTELLATION ----- **The Ram**

3. PRONUNCIATION OF CONSTELLATION ----- **AIR - ees**

4. DATE OF CULMINATION ON S. MERIDIAN AT 9P.M.- **December 10** (Ref. 2, p. 70)

5. APPROXIMATE TIME VISIBLE AT 9P.M. - **August 25 - March 25** (Ref. 6)

6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **50** (Ref. 5, p. 236)

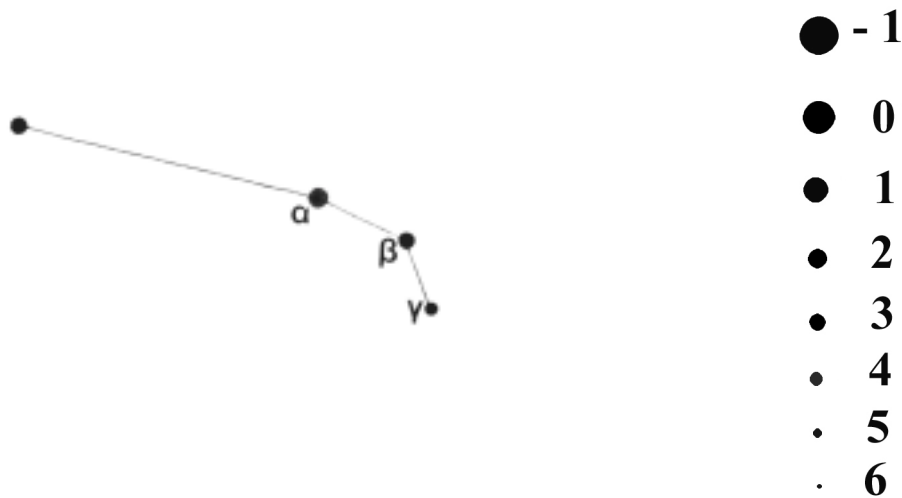
NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **11** (Ref. 8, p. 177)

NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **4** (Ref. 8, p. 177)

NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **1** (Ref. 8, p. 177)

STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.° -----**2.49** (Ref. 8, p. 177)

7. DIAGRAM OF CONSTELLATION-



**8. ALPHA STAR OF CONSTELLATION-  $\alpha$  Hamal** (HAHM-al) Arabic "the full-grown lamb" Magnitude: +2.01 Ranking: 50 Distance: 65.9 light years Spectrum Class: K2 Flamsteed: # 13 Hipparcos: #9884 (Ref.18) (Ref.19) It is a yellow star and approaching the earth at 9 miles per second and culminates December 10<sup>th</sup>. (Ref. 15, p. 426)

**9. OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p. 118)

**Beta  $\beta$  Sheratan** (SHARE-ah-tan) Arabic "the two signs" (Ref. 15, p. 6) (Sharatan) Magnitude: +2.64 Ranking: 104 Distance: 59.6 light years Spectrum Class: A5 Flamsteed: #6 Hipparcos: #8903 (Ref.18) (Ref.19)

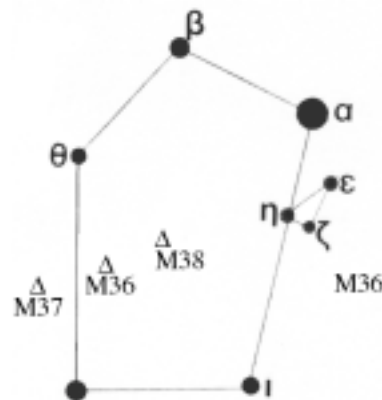
**Gamma  $\gamma$  Mesartim** (MEZ-are-tim) Arabic "the extremely fat ram" (Ref. 15, p. 7) (Mesarthim) Hebrew name for "minister" This star is a double star having a separation of 8 seconds of arc.



## AURIGA

1. LATIN NAME OF CONSTELLATION ----- **Auriga**
2. ENGLISH NAME OF CONSTELLATION ----- **Charioteer**
3. PRONUNCIATION OF CONSTELLATION ----- **Or-EYE-ga**  
**2<sup>nd</sup> Au-RYE-gah**
4. DATE OF CULMINATION ON S. MERIDIAN AT 9P.M.- **JANUARY 30** (Ref. 2 p.70)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - **June 1 - October 1** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **90** (Ref. 5, p. 236)  
NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **21** (Ref. 8, p. 177)  
NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **7** (Ref. 8, p. 177)  
NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **2** (Ref. 8, p. 177)  
STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°----- **3.20** (Ref. 8, p. 177)

### 7. DIAGRAM OF CONSTELLATION-



- - 1
- 0
- 1
- 2
- 3
- 4
- 5
- 6

**8. ALPHA STAR OF CONSTELLATION-  $\alpha$  Capella** (Ka-PELL-a) from Latin "little she goat" Magnitude: +0.08 Ranking: 6 Distance: 42.2 light years Spectrum Class: G0 Flamsteed: # 13 Hipparcos: #24608 (Ref.18) Sixth brightest star of earth in the night sky or fourth brightest of the Northern Hemisphere. Classified as a spectroscopic binary thus making its magnitude slightly variable. Capella, a white star, moves away from the earth at 18 miles per second and culminates January 22<sup>nd</sup>. (Ref. 15, p. 423)

**9. OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2 p. 118)

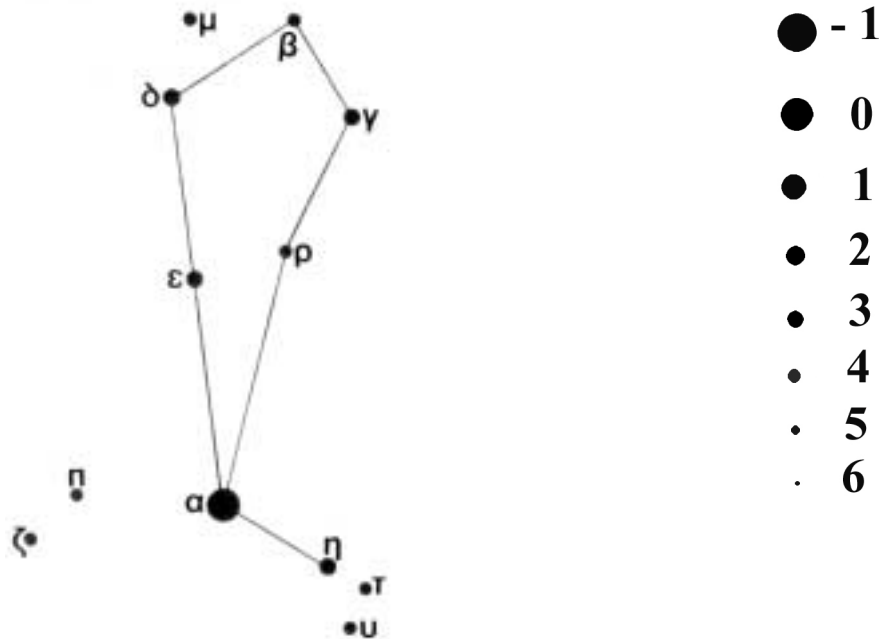
**Beta  $\beta$  Menkalinan** (MEN-call-ih-nan) means "the shoulder of the rein-holder) Magnitude: +1.90 Ranking: 41 Distance: 82.1 light years Spectrum Class: A0 Flamsteed: # 34 Hipparcos:



## BOÖTES

1. LATIN NAME OF CONSTELLATION ----- **Boötes**
2. ENGLISH NAME OF CONSTELLATION ----- **Herdsmen (Bear Driver)**
3. PRONUNCIATION OF CONSTELLATION ----- **(bo-OH-teez accent oh)**
4. DATE OF CULMINATION ON S. MERIDIAN AT 9 P.M - **June 15** (Ref. 2, p. 70)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - **February 25 - September 25** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **90** (Ref. 5, p. 236)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **24** (Ref. 8, p. 177)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **08** (Ref. 8, p. 177)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **1** (Ref. 8, p. 177)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.° ----**2.65** (Ref. 8, p. 177)

## 7. DIAGRAM OF CONSTELLATION-



**8. ALPHA STAR OF CONSTELLATION-  $\alpha$  Arcturus** (ark-TEW-russ) from the Greek "the bear-guard"- Second brightest star in the night sky of our latitude ( $39^\circ$ ) and the third brightest of the night sky for planet Earth- It has been called the watcher of the bear. Its color is golden yellow and culminates June 11<sup>th</sup>. (Ref.15, p.422) Magnitude: -0.05 Ranking: 3 Distance: 36.7light years Spectrum Class: K0 Flamsteed: #16 Hipparcos: #69673 (Ref.18) (Ref.19)

**9. OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p. 120)

**Beta-  $\beta$  Nekkar** (Neck-car) it is Arabic for the "herdsman" and also stands for the head of Boötes. (Merez) Magnitude: +3.49 Distance: 218.7 light years Spectrum Class: G5  
Flamsteed: # 42 Hipparcos: #73555 (Ref.18) (Ref.19)





## CANCER

1. LATIN NAME OF CONSTELLATION ----- **Cancer**

**Fourth of the zodiac constellations with the sun in this constellation July 7<sup>th</sup> until August 11<sup>th</sup>** (Ref. 2 p.122)

2. ENGLISH NAME OF CONSTELLATION ----- **Crab**

3. PRONUNCIATION OF CONSTELLATION ----- **CAN-sir**

4. DATE OF CULMINATION ON S. MERIDIAN AT 9P.M.- **March 15** (Ref. 2, p.70)

5. APPROXIMATE TIME VISIBLE AT 9P.M. - **December 15 - June 15** (Ref. 6)

6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **60** (Ref. 5, p. 236)

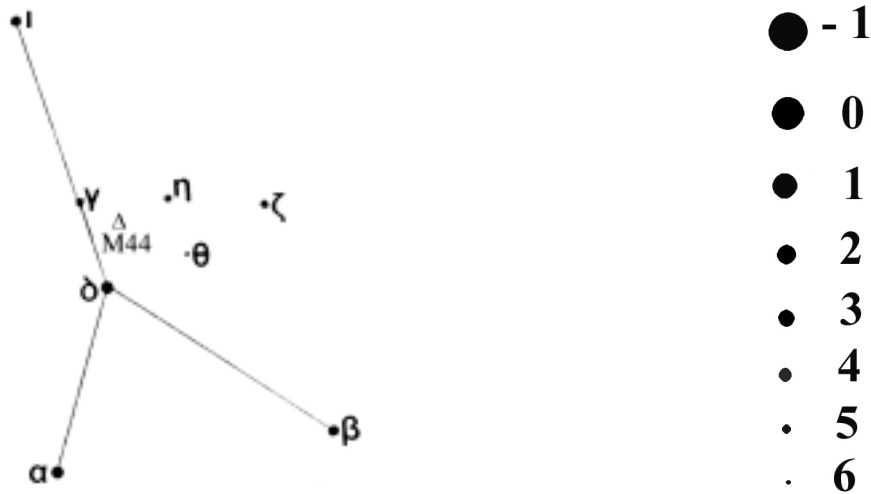
NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **6** (Ref. 8, p. 177)

NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **1** (Ref. 8, p. 177)

NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **0** (Ref. 8, p. 177)

STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°----- **1.19** (Ref. 8, p. 177)

7. DIAGRAM OF CONSTELLATION -



**8. ALPHA STAR OF CONSTELLATION-** **α Acubens** (ACK-you-bens) Arabic for "the claws" (Sertan) Magnitude: +4.26 Distance: 173.5 light years Spectrum Class: A3 Flamsteed: # 65 Hipparcos: #44066 (Ref.18) (Ref.19)

**9. OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p.122)

**Beta β Altarf** (Al Tarf) Magnitude: +3.53 Distance: 290.3 light years Spectrum Class: K2 Flamsteed: # 17 Hipparcos: #40526 (Ref.18) (Ref.19)

**Gamma γ Asellus Borealis** (ah-SELL-us BOW-ree-A-liss) "the northern little donkey"

(Ref. 15, p. 8) Magnitude: +4.66 Distance: 158.4 light years Spectrum Class: A0

Flamsteed: # 43 Hipparcos: #42806 (Ref.18) (Ref.19)

Delta  $\delta$  Asellus Australis (ah-SELL-us oss-TRAY -liss) "the southern little donkey"

(Ref.15, p.8) Magnitude: +3.94 Distance: 136.0 light years Spectrum Class: K0 Flamsteed: # 47  
Hipparcos: #42911 (Ref.18) (Ref.19)

**10. SHAPE OF THE CONSTELLATION-** Resembles an upside down, capital "Y."

**11. HELPFUL ALIGNMENTS-** Cancer is centered at the halfway point on the line drawn from Regulus to Pollux in Gemini.

**12. LOCATION IN THE SKY-** (Ref. 3, p. 203) Cancer the crab is located between the much brighter constellations of Gemini and Leo. Above or to the north is Lynx and to the south is the head of the Hydra. Its brightest star is Acubens with a 4.27 magnitude

**13. SIZE IN SQUARE DEGREES** =  $506^\circ$       **RANK IN SIZE OF 88** = 31<sup>st</sup>  
 (Ref. 2, p. 70)    (Ref. 2, p. 70)

**14. APPROXIMATE BOUNDARIES BY COORDINATES-** (Ref. 5, p. 236)

HOURS RIGHT ASCENSION    7 HOURS, 53 MINUTES TO 9 HOURS, 19 MINUTES

DEGREES OF DECLINATION         $+6.8^\circ$  TO  $+33.3^\circ$

**15. MYTHOLOGY-** (Ref. 2, p.122) Hercules, while engaged in a fight with the Hydra, stepped on a crab and crushed it. Juno had sent the crab to distract Hercules so the Hydra would win the fight. Even though the crab was unsuccessful, Juno gave the crab an honorable place in the sky to reward his efforts. Two thousand years ago the summer solstice occurred while the sun was in this constellation thus came about the "Tropic of Cancer."

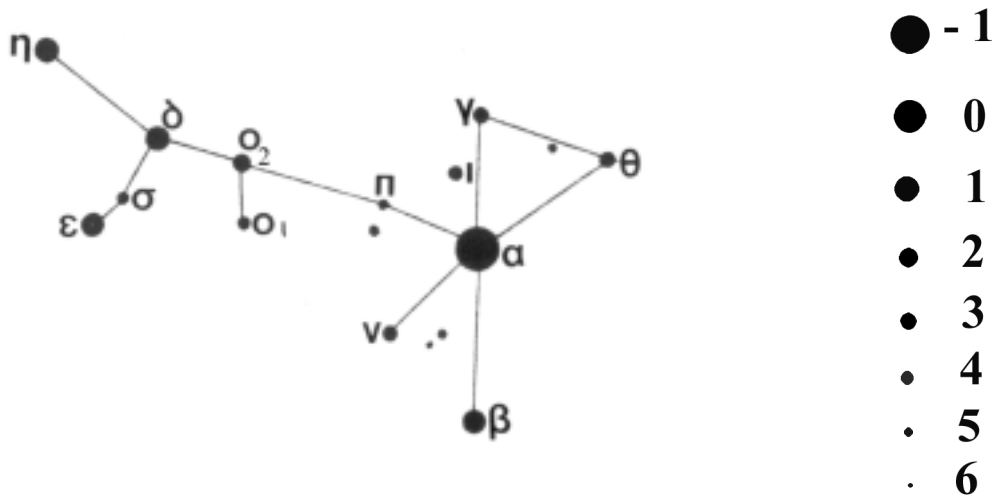
**16. REMARKS-** Cancer has few bright stars and is known as the dimmest of the zodiac constellations. The beautiful open or galactic cluster M44 is found near the center of the constellation of Cancer and is easily observed through binoculars. M44 is also known as the "Beehive" or "Praesepe." There are about 300 stars in M44 between magnitude 6 and 12. (Ref. 7, p. 92)

See the triangle on the diagram of the constellation in # 7 on page 30 for the location of M44.

## CANIS MAJOR

1. LATIN NAME OF CONSTELLATION ----- **Canis Major**
2. ENGLISH NAME OF CONSTELLATION ----- **Greater Dog**
3. PRONUNCIATION OF CONSTELLATION - **KAY-neeZ MAAy-jeer**  
**2<sup>nd</sup> Kay-niss May-jeer**
4. DATE OF CULMINATION ON S. MERIDIAN AT 9P.M.- **February 15** (Ref. 2, p. 70)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - **December 15 - May 10** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **80** (Ref. 5, p. 236)  
NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **26** (Ref. 8, p. 177)  
NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **10** (Ref. 8, p. 177)  
NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **4** (Ref. 8, p. 177)  
STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°---- **6.84** (Ref. 8, p. 177)

### 7. DIAGRAM OF CONSTELLATION -



**8. ALPHA STAR OF CONSTELLATION-  $\alpha$  Sirius** (SEAR-ee-us) from the Greek "scorching one" also referred to as "the dog star"- The brightest star of the night sky and it is the fifth closest known star to planet Earth. Magnitude: -1.44 Ranking: 1 Distance: 8.6 light years Spectrum Class: A0 Flamsteed: # 9 Hipparcos: #32349 (Ref.18) (Ref.19)

**9. OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p.124)

**Beta  $\beta$  Mirzam** (MERE-zam) "the announcer" (Murzim) Star is slightly variable. Magnitude: +1.98 Ranking: 47 Distance: 499.2 light years Spectrum Class: B1 Flamsteed: #2 Hipparcos: #30324 (Ref.18) (Ref.19)

**Gamma  $\gamma$  Muliphen** (Muliphein) Magnitude: +4.11 Distance: 402.0 light years Spectrum Class: B5 Flamsteed: # 23 Hipparcos: #34045 (Ref.18) (Ref.19)



## CANIS MINOR

1. LATIN NAME OF CONSTELLATION ----- **Canis Minor**
2. ENGLISH NAME OF CONSTELLATION ----- **Small or Little Dog or "Lesser Dog"**
3. PRONUNCIATION OF CONSTELLATION ----- **KAY-niss MY-ner**
4. DATE OF CULMINATION ON S. MERIDIAN AT 9P.M. - **March 1** (Ref. 2, p. 70)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - **November 25 - June 5** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **20** (Ref. 5, p. 236)
  - NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **4** (Ref. 8, p. 177)
  - NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **2** (Ref. 8, p. 177)
  - NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **1** (Ref. 8, p. 177)
  - STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°----- **2.19** (Ref. 8, p. 177)

### 7. DIAGRAM OF CONSTELLATION -



- - 1
- 0
- 1
- 2
- 3
- 4
- 5
- 6

**8. ALPHA STAR OF CONSTELLATION-  $\alpha$  Procyon** (PRO-see-on (2<sup>nd</sup> PRO-seh-on) Greek meaning "before the dog". "The leading Dog" as Procyon rises before Sirius. Procyon is the twelfth nearest star to the Earth and is a double star. Magnitude: +0.40 Ranking: 8 Distance: 11.4 light years Spectrum Class: F5 Flamsteed: # 10 Hipparcos: #37279 (Ref.18) (Ref.19) Its companion is four-arc seconds distance, orbits the primary in 40.6 years, and is a white dwarf much like the white dwarf of Sirius. (Ref. 2, p. 126)

### 9. OTHER MAJOR STARS OF CONSTELLATION- (Ref. 2, p. 126)

**Beta  $\beta$  Gomeisa** (go-MY-za) "weeping one" Magnitude: +2.89 Distance: 170.2 light years Spectrum Class: B8 Flamsteed: # 3 Hipparcos: #36188 (Ref.18) (Ref.19)

**10. SHAPE OF THE CONSTELLATION-** The two prominent stars of this constellation form a short straight line.

**11. HELPFUL ALIGNMENTS-** The bright star Procyon lies just a little east of a line from Pollux to Sirius, but closer to Pollux than Sirius.

**12. LOCATION IN THE SKY-** (Ref. 3, p. 210) Canis Minor is bordered on the west by Monoceros and by a tiny extension of Gemini. Gemini covers most of its northern edge. Cancer and Hydra cover the eastern side. Monoceros again extends along its entire southern boundary.

**13. SIZE IN SQUARE DEGREES** = 183°      **RANK IN SIZE OF 88** = 71<sup>st</sup>  
 (Ref. 2, p. 70)                                  (Ref. 2, p. 70)

**14. APPROXIMATE BOUNDARIES BY COORDINATES-** (Ref. 5, p. 236)

HOURS RIGHT ASCENSION    7 HOURS, 4 MINUTES TO 21 HOURS, 57 MINUTES

DEGREES OF DECLINATION    -00.1° TO +13. 2 °

**15. MYTHOLOGY-** (Ref. 2, p. 126) Orion's small hunting dog known for his faithfulness, drinks from the Milky Way which was once thought to be a river.

**16. REMARKS-** Canis Minor is a very small constellation with only 2 prominent stars in the constellation. It really has no appearance of a dog at all. It is also very small with only 17 other constellations being smaller.

## CAPRICORNUS

1. LATIN NAME OF CONSTELLATION ----- Capricornus

**This is the tenth constellation of the zodiac and the sun is in this constellation from January. 20 to February 15** (Ref. 14)

2. ENGLISH NAME OF CONSTELLATION ----- Sea Goat, Fish Goat

3. PRONUNCIATION OF CONSTELLATION ----- Cap-rih-CORN

4. DATE OF CULMINATION ON S. MERIDIAN AT 9P.M.- **September 20** (Ref. 2, p. 70)

5. APPROXIMATE TIME VISIBLE AT 9P.M. - **July 25 - November 25** (Ref. 6)

6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **50** (Ref. 5, p. 236)

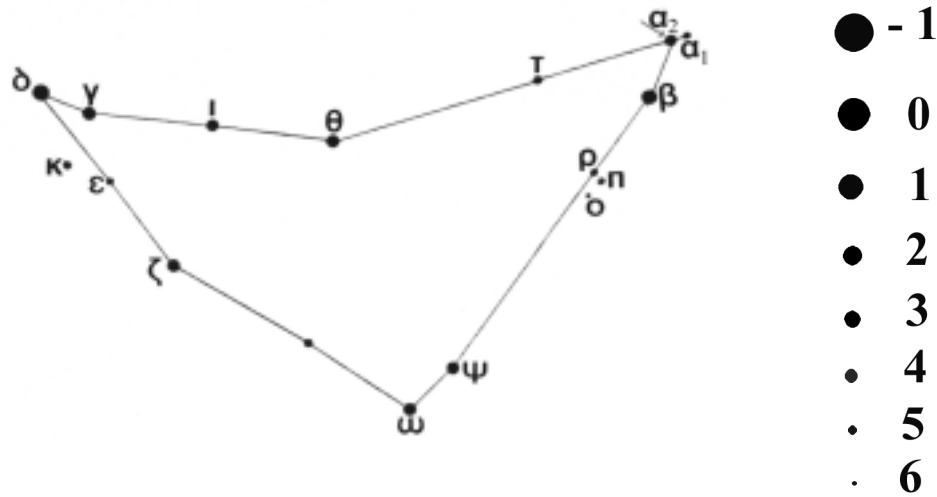
NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **16** (Ref. 8, p. 177)

NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **5** (Ref. 8, p. 177)

NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **0** (Ref. 8, p. 177)

STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.° ----**3.86** (Ref. 8, p. 177)

7. DIAGRAM OF CONSTELLATION



**8. ALPHA STAR OF CONSTELLATION-  $\alpha$  Prima Giedi**, "goat" It appears as a double (optical double) but the stars are not gravitationally related. The primary is Magnitude: +4.30 Distance: 686.3 light years Spectrum Class: G0 Flamsteed: # 5 Hipparcos: #100027 (Ref.18) The secondary  $\alpha$  Secunda Giedi Magnitude: +3.58 Distance: 108.6 light years Spectrum Class: G6 Flamsteed: #6 Hipparcos: #100064 (Ref.18) (Ref.19)

**9.OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p. 126)

**Beta-  $\beta$  Dabih** (DAY-bee) "slaughterers" referring to sacrifices by ancient Arabs at the heliacal rising of Capricorn is a double star ( $\alpha$  and  $\beta$ ). (It is the last stars rising that could be viewed before the sunrise. This was difficult as the constellation is in a similar direction as the



sunrise.) Primary magnitude has a Magnitude: +3.09 Distance: 343.8 light years Spectrum Class: G0 Flamsteed: #9 Hipparcos: #100345 (Ref.18). This system had been previously identified as a multiple in the Hipparcos Catalog. (Ref.18) (Ref.19)

**Gamma-  $\gamma$  Nashira** (Nay-sheh-rah) Arabic "the lucky star" or "bringing good tidings" Magnitude: +3.69 Distance: 138.8 light years Spectrum Class: F0 Flamsteed: #40 Hipparcos: #106985 (Ref.18) (Ref.19)

**Delta-  $\delta$  Deneb Algedi** (DEN- ebb al-GEE-dee) meaning "tail of goat" It is a slightly variable star. Magnitude: +2.85 Distance: 38.5 light years Spectrum Class: A5 Flamsteed: #49 Hipparcos: #107556 (Ref.18) (Ref.19)

**10. SHAPE OF THE CONSTELLATION-** Capricornus has a symmetrical shape, resembling the boomerang, but is very faint with no star brighter than third magnitude.

**11. HELPFUL ALIGNMENTS-** A line drawn from Vega to Altair extended will run through Capricornus which is only seen low in the southern sky and never at high altitudes.

**12. LOCATION IN THE SKY-** (Ref. 3, p. 211) Capricornus is bound on the west side by Sagittarius that also includes some of the southern edge and by Aquila that makes the corner toward the north. Aquarius takes in all of the remaining north boundary and eastern side. Pisces Austrinis and Microscopium make up most of the southern border.

**13. SIZE IN SQUARE DEGREES = 414°**      **RANK IN SIZE OF 88 = 40<sup>th</sup>**  
(Ref. 2, p. 70)    (Ref. 2, p. 70)

**14. APPROXIMATE BOUNDARIES BY COORDINATES-** (Ref. 5, p. 236)

HOURS RIGHT ASCENSION    20 HOURS, 4 MINUTES TO 21 HOURS, 57 MINUTES  
DEGREES OF DECLINATION      -8.7°    TO    -27.8°

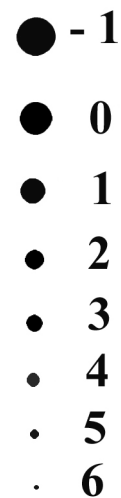
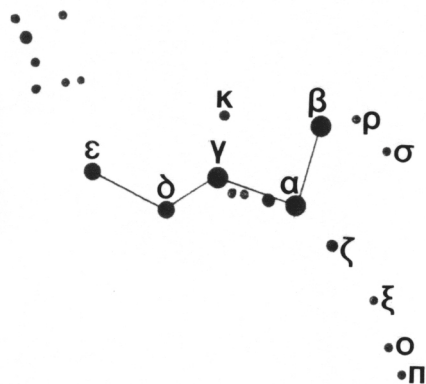
**15. MYTHOLOGY-** (Ref. 2, p.126) The Greeks once identified Capricornus with the nature god, Pan, who was pictured as half man, half goat. Pan in fear fled the giant Typhon by leaping into the Nile and changed his tail to that of a fish; hence the derivation of the word "panic". It is the leading constellation of the three consecutive water affiliated constellations.

**16. REMARKS-** Capricornus "The Goat's Horn" or "The Horned Goat" according to one interpretation. The goat, an expert climber, represents the sun's climb from its lowest position in the sky in December, while the fish's tail represents the seasonal rains that will follow. (Ref. 1, p. 136)

## CASSIOPEIA

1. LATIN NAME OF CONSTELLATION ----- **Cassiopeia**
2. ENGLISH NAME OF CONSTELLATION ----- **Queen**
3. PRONUNCIATION OF CONSTELLATION ----- **Kass-eh-oh-PEA-ah**
4. DATE OF CULMINATION ON S. MERIDIAN AT 9P.M.- **November 25** (Ref. 2, p. 70)
5. APPROXIMATE TIME VISIBLE AT 9P.M.- **circumpolar constellation** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **90** (Ref. 5, p. 236)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **23** (Ref. 8, p. 177)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **7** (Ref. 8, p. 177)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **0** (Ref. 8, p. 177)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°---- **3.85** (Ref. 8, p. 177)

### 7. DIAGRAM OF CONSTELLATION-



**8. ALPHA STAR OF CONSTELLATION-** **α Schedar** (Shed-are) "the breast" Magnitude: +2.24 Ranking: 71 Distance: 228.5 light years Spectrum Class: K0 Flamsteed: #18 Hipparcos: #3179 (Ref.18) (Ref.19)

### 9. OTHER MAJOR STARS OF CONSTELLATION- (Ref.2 p. 128)

**Beta- β Caph** (Kaff) "the stained hand" Magnitude: +2.28 Ranking: 74 Distance: 54.4 light years Spectrum Class: F5 Flamsteed: # 11 Hipparcos: #746 (Ref.18) (Ref.19)

**Gamma- γ Cih** - Magnitude: +2.15 Ranking: 63 Distance: 612.8 light years Spectrum Class: B0 Flamsteed: # 34 Hipparcos: #4427 (Ref.18) (Ref.19)

**Delta-  $\delta$  Ruchbah** (RUCK-bah) "the knee of the lady of the chair" is thought to be an eclipsing binary star (Ref. 15, p. 10) Magnitude: +2.66 Ranking: 108 Distance: 99.4 light years  
Spectrum Class: A5 Flamsteed: #37 Hipparcos: #6686 (Ref.18) (Ref.19)

**10. SHAPE OF THE CONSTELLATION**- It has a "W" shape, the lazy side of the W is where her head is located. Line from Epsilon to Iota often is omitted as a part of the "W" shape.

**11. HELPFUL ALIGNMENTS**- A line from the star Mizar the bend in the handle of the Big Dipper, through the north pole star will lead one to the head of Cassiopeia.

**12. LOCATION IN THE SKY**- (Ref. 3, p. 214) She is beside her husband, Cepheus, in the northern sky and is circumpolar. Cepheus is between her and the North Star. Andromeda extends across the southern boundary.

**13. SIZE IN SQUARE DEGREES** =598°      **RANK IN SIZE OF 88** = 25<sup>th</sup>  
 (Ref. 2, p. 70)                                      (Ref. 2, p. 70)

**14. APPROXIMATE BOUNDARIES BY COORDINATES**- (Ref. 5, p. 236)

HOURS RIGHT ASCENSION    22 HOURS, 56 MINUTES TO    3 HOURS, 36 MINUTES

DEGREES OF DECLINATION                      +46.4° TO    +77.5 °

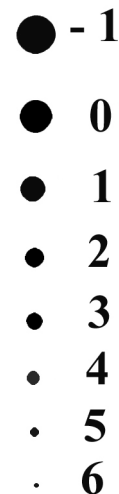
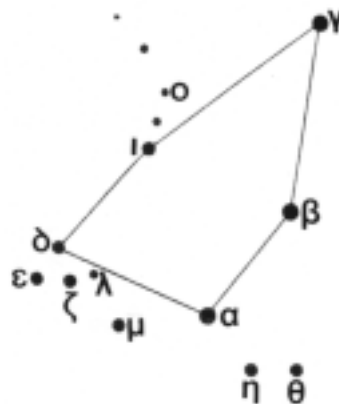
**15. MYTHOLOGY**- (Ref. 2, p. 128) As a vain woman, the gods punished her for boasting of her great beauty and that she was more beautiful than the sea nymphs, by hanging her upside down in the sky part of the year. Neptune threatened to destroy her city if she didn't sacrifice her daughter to Neptune's sea monster Cetus, the whale. Perseus came to Andromeda's aid at the last second and turned the monster to stone by showing it the head of Medusa.

**16. REMARKS**- Cassiopeia is easily recognized as a "W" or "M" constellation that appears on 4000-year-old seals from the Euphrates Valley. (Ref. 2, p. 128)

## CEPHEUS

1. LATIN NAME OF CONSTELLATION ----- **Cepheus**
2. ENGLISH NAME OF CONSTELLATION ----- **King**
3. PRONUNCIATION OF CONSTELLATION ----- **See-FEW-us**  
**2<sup>nd</sup> See-FEE-us**
4. DATE OF CULMINATION ON S. MERIDIAN AT 9P.M. - **October 15** (Ref. 2, p. 70)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - **Circumpolar constellation** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **60** (Ref. 5, p. 236)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **20** (Ref. 8, p. 177)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **8** (Ref. 8, p. 177)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **0** (Ref. 8, p. 177)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.° ----**3.40** (Ref. 8, p. 177)

### 7. DIAGRAM OF CONSTELLATION -



8. **ALPHA STAR OF CONSTELLATION- α Alderamin** (al-DARE-ah-min) "right forearm" (Ref. 15, p. 10) Magnitude: +2.45 Ranking: 88 Distance: 48.8 light years Spectrum Class: A5 Flamsteed: #5 Hipparcos: #105199 (Ref.18) (Ref.19) Alderamin will be the brightest star "closest" to the north celestial pole from 6500 to 8300 A.D. (Ref. 15, p. 10)

### 9. OTHER MAJOR STARS OF CONSTELLATION- (Ref. 2, p. 130)

- Beta- β Alfirk** (AL-furck)" the flock" (Ref. 15, p. 10) (Alphirk) Magnitude: +3.23 Distance: 594.9 light years Spectrum Class: B1 Flamsteed: #8 Hipparcos: #106032 (Ref.18) (Ref.19) Beta β Alfirk will be the brightest star "near" the celestial pole from 5100 to 6500 A.D. (Ref. 15, p. 10)

**Gamma-  $\gamma$  Errai** (err-RAY-ee) or "the shepherd" is the closest bright star to the North Star - a successor to Polaris from 3100 to 5100 (Ref. 15, p. 10) (Alria) (Arrai) Magnitude: +3.21 Distance: 45.0 light years Spectrum Class: K0 Flamsteed: #35 Hipparcos: #116727 (Ref.18) (Ref.19)

**Delta-  $\delta$  Cephei** does not have a common name but is famous as the prototype of Cepheid. Variable stars magnitude equals a range of + 3.51 to 4.42 in a 5.37 day period. Magnitude: +4.07 Distance: 981.9 light years Spectrum Class: F5 Flamsteed: #27 Hipparcos: #110991 (Ref.18) (Ref.19)

**10.SHAPE OF THE CONSTELLATION-** The five brightest stars of Cepheus form the outline of a square with a triangle set on its top, similar to a child's elementary drawing of a house.

**11.HELPFUL ALIGNMENTS-** The star at the apex of the triangle is the brightest star "closest" to the North Star. A line drawn from "the pointer stars" of the Big Dipper extending through Polaris will also go through the apex star (Gamma) of the triangle of Cepheus.

**12.LOCATION IN THE SKY-** (Ref. 3, p. 217) Cepheus is a circumpolar constellation at our latitude. The northernmost star in Cepheus is the closest bright star to Polaris (the Pole Star.)

**13. SIZE IN SQUARE DEGREES = 588°**      **RANK IN SIZE OF 88 = 27<sup>th</sup>**  
 (Ref. 2, p. 70)   (Ref. 2, p. 70)

**14. APPROXIMATE BOUNDARIES BY COORDINATES-** (Ref. 5, p. 236)  
 HOURS RIGHT ASCENSION    20 HOURS, 1 MINUTE TO 8 HOURS, 30 MINUTES  
 DEGREES OF DECLINATION                                 +53.1° TO +88.5 °

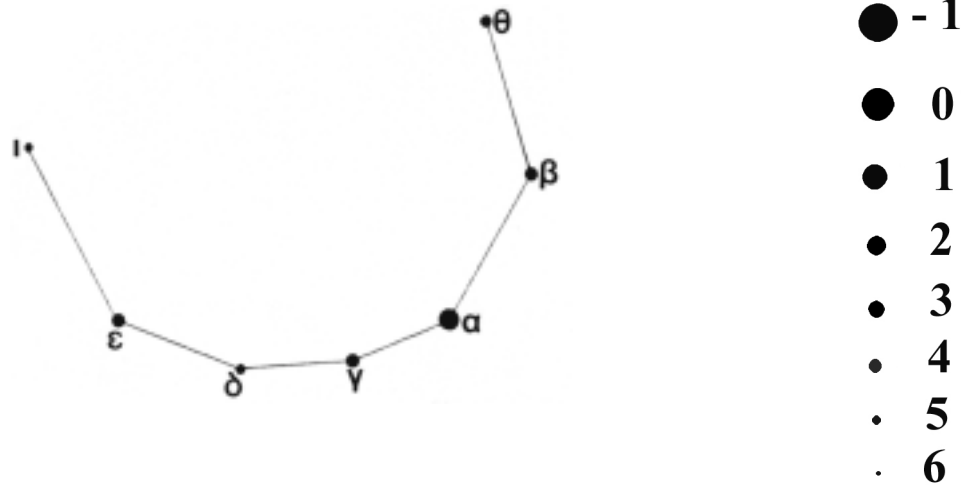
**15.MYTHOLOGY-** (Ref. 4, p. 36) King of Ethiopia- husband of Cassiopeia and father of Andromeda- Chinese regarded this star group as representing royalty- the inner throne of the five Emperors. There is a theory that Cepheus may be in honor of Cheops the famous pharaoh of Egypt.

**16.REMARKS-** Cepheus is said to be among the oldest constellations even though it isn't easily viewed and contains stars of 3 magnitude or dimmer. This constellation ensemble has not changed in 5000 years. (Ref. 3, p. 216) Alderamin will be the North Pole Star in about 5000 years. (Ref. 2, p. 130)

## CORONA BOREALIS

1. LATIN NAME OF CONSTELLATION ----- **Corona Borealis**
2. ENGLISH NAME OF CONSTELLATION ----- **Northern Crown**
3. PRONUNCIATION OF CONSTELLATION ----- **COE-ROW-nah BORE-ee-ALICE**
4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **JUNE 30** (Ref. 2, p. 70)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - **March 15 - October 25** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **20** (Ref. 5, p. 236)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **10** (Ref. 8, p. 177)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **3** (Ref. 8, p. 177)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **0** (Ref. 8, p. 177)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.° ----**5.59** (Ref. 8, p. 177)

### 7. DIAGRAM OF CONSTELLATION-



8. **ALPHA STAR OF CONSTELLATION-  $\alpha$  Gemma** "gem" in the crown or (Alphekka) (Alphecca) (al-FECK-ah) (Ref.18) "the broken or fractured one" (the word does not mean "dish" or "bowl"- it is the broken circle.) (Ref. 15, p. 11) Alphecca, the older name for this eclipsing binary star, has a 17.3-day period. (Ref. 3, p. 223) Magnitude: +2.22 Ranking: 67 Distance: 74.7 light years Spectrum Class: A0 Flamsteed: #5 Hipparcos: #76267 (Ref.18) (Ref.19)

### 9. OTHER MAJOR STARS OF CONSTELLATION- (Ref. 2, p.138)

**Beta  $\beta$  Nusakan** (NU-sa-kan) "the two series or lines" of stars Magnitude: +3.66 Distance: 114.0 light years Spectrum Class: F0 Flamsteed: #3 Hipparcos: #75695 (Ref.18) (Ref.19)

10. **SHAPE OF THE CONSTELLATION-** A curved semi-circle of stars that form a "U" shape with the opening generally up when facing the south horizon.

**11. HELPFUL ALIGNMENTS-** If a line is extended from Phad of the Big Dipper through the end of the handle it will run into Gemma.

**12. LOCATION IN THE SKY-** (Ref. 3, p. 223) Corona Borealis lies between Boötes and Hercules, which form its western and eastern borders, respectively. These same two constellations also meet to make its northern boundary; Serpens Caput bounds it on the south.

**13. SIZE IN SQUARE DEGREES =  $179^\circ$       RANK IN SIZE OF 88 = 72**  
 (Ref. 2, p. 70)                                      (Ref. 2, p. 70)

**14. APPROXIMATE BOUNDARIES BY COORDINATES-** (Ref. 5, p. 236)

HOURS RIGHT ASCENSION    15 HOURS, 14 MINUTES TO 16 HOURS, 22 MINUTES  
 DEGREES OF DECLINATION                   $+25.8^\circ$  TO  $+39.8^\circ$

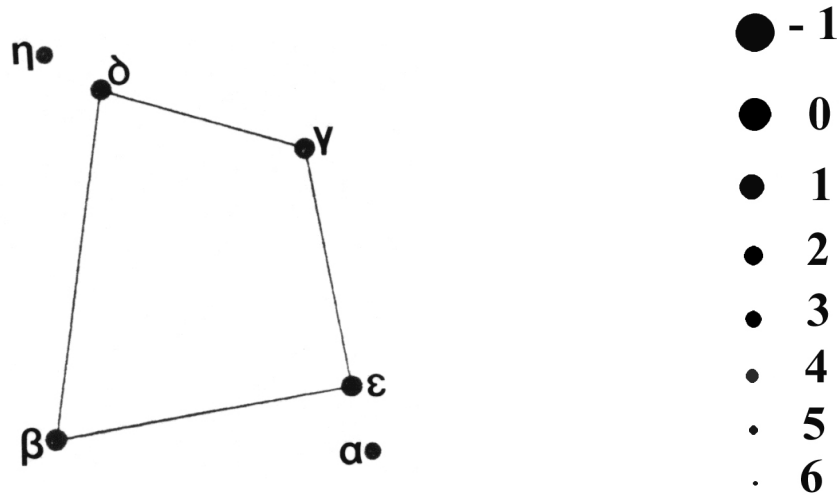
**15. MYTHOLOGY-** (Ref. 2, p. 138) Corona Borealis is the crown of the ruler of Athens or the crown of Ariadne, daughter of King Minos of Crete, builder of the labyrinth guarded by the fearsome Minotaur. When Theseus the Greek hero was imprisoned in the labyrinth, Ariadne gave him a sword and a spool of thread. Unwinding the thread as he went, until he found and slew Minotaur, helped him find his way back out to freedom. The Arabs believed the semicircle of stars was a dish or bowl; but to the American Shawnee Indians it was a circle of dancing girls or celestial sisters.

**16. REMARK-** Only one star in this very dim constellation is near 2<sup>nd</sup> magnitude, however in a dark sky it is easily viewed due to its well-defined shape.

## CORVUS

1. LATIN NAME OF CONSTELLATION ----- **Corvus**
2. ENGLISH NAME OF CONSTELLATION ----- **Crow**
3. PRONUNCIATION OF CONSTELLATION ----- **CORE - vuss**
4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **May 10** (Ref. 2, p.70)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - **March 10 - July 20** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **15** (Ref. 5, p. 236)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **6** (Ref. 8, p. 177)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **5** (Ref. 8, p. 177)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **0** (Ref. 8, p. 177)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°--- **3.26** (Ref. 8, p. 177)

## 7. DIAGRAM OF CONSTELLATION-



**8. ALPHA STAR OF CONSTELLATION-  $\alpha$  Alchiba** (al-KEY-bah) "the tent" (Alchita).  $\alpha$  Alchiba is the fifth brightest star in the constellation but for some unknown reason it is the Alpha star. Magnitude: +4.02 Distance: 48.2 light years Spectrum Class: F0 Flamsteed: #1 Hipparcos: #59199 (Ref.18) (Ref.19)

**9. OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p. 138)

**Beta-  $\beta$  Kraz** (Tso Hea China) "left hand" Magnitude: +2.65 Ranking: 106 Distance: 139.7 light years Spectrum Class: G5 Flamsteed: #9 Hipparcos: #61359 (Ref.18) (Ref.19)

**Gamma-  $\gamma$  Gienah** (GEE-nah) Ghurab "right wing of the raven" Magnitude: +2.58 Ranking: 100 Distance: 164.8 light years Spectrum Class: B8 Flamsteed: #4 Hipparcos: #59803 (Ref.18) (Ref.19)

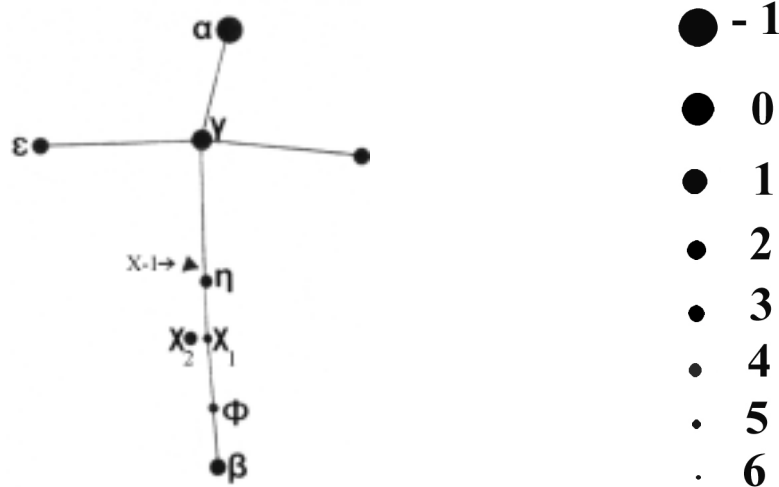




## CYGNUS

1. LATIN NAME OF CONSTELLATION ----- **CYGNUS**
2. ENGLISH NAME OF CONSTELLATION ----- **SWAN**
3. PRONUNCIATION OF CONSTELLATION ----- **SIG-nuss**
4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **September 10** (Ref. 2, p. 70)
5. APPROXIMATE TIME VISIBLE AT 9P.M.- **May 25 - January 5** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **150** (Ref. 5, p. 236)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **43** (Ref. 8, p. 177)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **11** (Ref. 8, p. 177)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **1** (Ref. 8, p. 177)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°----- **5.35** (Ref. 8, p. 177)

### 7. DIAGRAM OF CONSTELLATION -



**8. ALPHA STAR OF CONSTELLATION-  $\alpha$  Deneb** (DEN-ebb) Arabic for "the hen's tail" and "the top of the cross" and the "tail of the swan." Magnitude: +1.25 Ranking: 19<sup>th</sup> Distance: 3228 light years Spectrum Class: A2 Flamsteed: #50 Hipparcos: #102098 (Ref.18) (Ref.19) Deneb ranks nineteenth in the list of brightest visible stars, estimated to be 30,000 times brighter than the sun. (Ref. 2, p. 140), (Ref. 7, p. 104) Deneb has an absolute magnitude of -8.73 (Ref.18) (Ref.19)

### 9. OTHER MAJOR STARS OF CONSTELLATION (Ref. 2 p. 140)

**Beta-  $\beta_1$  Albireo** (al-BEER-ee-oh) "of unknown derivation" (Ref. 15, p. 12) Magnitude: +3.05 Distance: 385.3 light years Spectrum Class: K0 Flamsteed: #6 Hipparcos: #95947 (Ref.18) (Ref.19)

**Gamma-  $\gamma$  Sadr** (SAD-der) "the hen's breast" At the center of the cross lies (Sador). Magnitude: +2.23 Ranking: 69 Distance: 1523.4 light years Spectrum Class: F8 Flamsteed: #37 Hipparcos: #100453 (Ref.18) (Ref.19)

**Delta-  $\delta$  Cygni** is a double star, with Magnitude: +2.86 Distance: 170.9 light years Spectrum Class: A0 Flamsteed: #18 Hipparcos: #97165 (Ref.18) (Ref.19)

**Epsilon-  $\epsilon$  Gienah** (GEE-nah) (or Gienah) "The wing" is often confused with Gamma Corvi. Magnitude: +2.48 Ranking: 91 Distance: 72.0 light years Spectrum Class: K0 Flamsteed: #53 Hipparcos: #102488 (Ref.18) (Ref.19)

**10. SHAPE OF THE CONSTELLATION-** Deneb sits atop a cross-like shape, with 4 stars in the long bar and 3 stars in the short bar of  $10^\circ$ . The long bar of  $15^\circ$  represents the long neck of the swan and the short bar mirrors the wings.

**11. HELPFUL ALIGNMENTS-** Cygnus is in the northern most corner of the summer triangle. Deneb, along with the other 2 bright stars Vega and Altair comprise the summer triangle, which is featured even on a hazy summer night.

**12. LOCATION IN THE SKY-** (Ref. 3, p. 227) Draco and Cepheus border Cygnus to the north, while Lacerta and Pegasus border the east. Vulpecula lies to the south and Lyra and Draco appear toward the west.

**13. SIZE IN SQUARE DEGREES**  $804^\circ$  **RANK IN SIZE OF 88** =  $16^{\text{th}}$   
(Ref. 2, p. 70) (Ref. 2, p. 70)

**14. APPROXIMATE BOUNDARIES BY COORDINATES-** (Ref. 5, p. 236)

HOURS RIGHT ASCENSION 19 HOURS, 7 MINUTES TO 22 HOURS, 1 MINUTE  
DEGREES OF DECLINATION  $+27.7^\circ$  TO  $+61.2^\circ$

**15. MYTHOLOGY-** (Ref. 2, p. 140) Zeus changed himself into a swan when he visited Leda, the wife of the king of Sparta. Their relationship led to the offspring of Castor, Pollux, Clytemnestra and Helen of Troy.

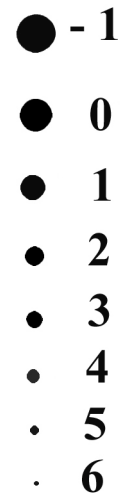
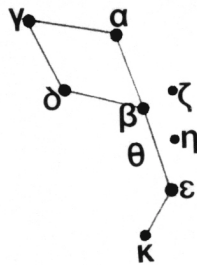
**16. REMARKS-** As our solar system revolves around the center of our Milky Way galaxy we are moving toward Deneb at 250 km/sec. (Ref. 2, p. 140) Cygnus is known as the asterism of the Northern Cross.

Cygnus X-1, X-ray source located at about 7,000 light years, has a dark companion with a mass between ten and twenty times that of the sun and an orbital period of 5.6 days. There is also evidence of quantities of hot gas being transferred from the super giant star to the unseen companion, which may be a black hole star! (Ref. 9, p. 195)

## DELPHINUS

1. LATIN NAME OF CONSTELLATION ----- **Delphinus**
2. ENGLISH NAME OF CONSTELLATION ----- **Dolphin**
3. PRONUNCIATION OF CONSTELLATION ----- **del-FYE-nuss**
4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **September 15** (Ref. 2, p. 70)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - June 10 - **December 25** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **30** (Ref. 5, p. 236)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **6** (Ref. 8, p. 177)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **4** (Ref. 8, p. 177)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **0** (Ref. 8, p. 177)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°----- **3.17** (Ref. 8, p. 177)

### 7. DIAGRAM OF CONSTELLATION -



8. **LPHA STAR OF CONSTELLATION-** **α Sualocin** "Nicolaus" reversed (see remarks) - Italian astronomers named the star in 1814. Magnitude: +3.77 Distance: 240.6 light years Spectrum Class: B8 Flamsteed: #9 Hipparcos: #101958 (Ref.18) (Ref.19)
9. **OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p.142)  
**Beta- β Rotanev** from "Venator" an assistant to Piazzi- His name is reversed. (See remarks)  
Magnitude: +3.64 Distance: 97.3 light years Spectrum Class: F5 Flamsteed: #6 Hipparcos: #101769 (Ref.18) (Ref.19)
10. **SHAPE OF THE CONSTELLATION-** Shape of a small diamond fish with a short tail or a very small kite with a tail.

**11. HELPFUL ALIGNMENTS-** Delphinus is found just to the east of the bright star Altair; also the two end stars of the head of Pegasus point toward Delphinus.

**12. LOCATION IN THE SKY-** (Ref. 3, p. 231) Sagitta and Vulpecula border Delphinus on the north, Pegasus and Equuleus on the east, Aquarius and Aquila on the south and Aquila and Sagitta on the west.

**13. SIZE IN SQUARE DEGREES = 189°**      **RANK IN SIZE OF 88 = 69<sup>th</sup>**  
 (Ref. 2, p. 70)                                      (Ref. 2, p. 70)

**14. APPROXIMATE BOUNDARIES BY COORDINATES-** (Ref. 5, p. 236)

HOURS RIGHT ASCENSION    20 HOURS, 13 MINUTES TO    21 HOURS, 6 MINUTES  
 DEGREES OF DECLINATION                      +02.2° TO +20.8°

**15. MYTHOLOGY-** (Ref. 2, p. 142) There are many stories of the dolphin. According to Greek legend, Delphinus saved the life of the poet-minstrel Arion when he leapt overboard from a ship to escape sailors who threatened his life.

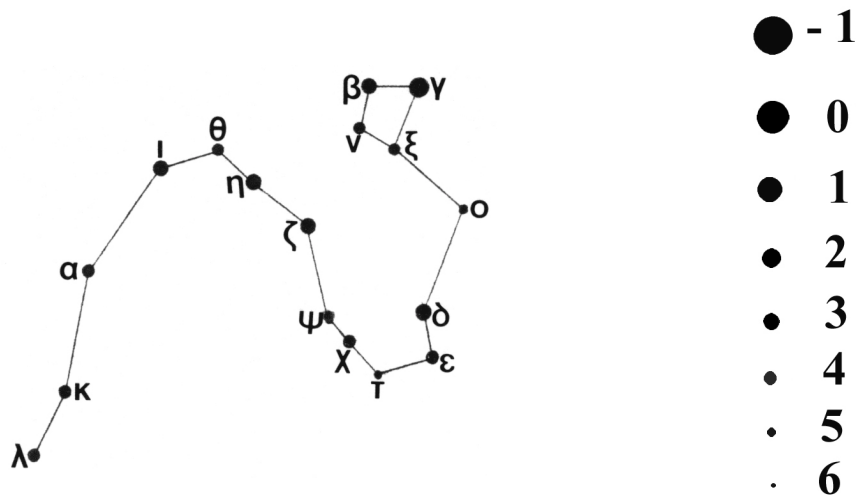
Arion, a native of Lesbos, was a famous poet and musician. While returning home on a ship sailors became envious of his fame and set out to kill him. Arion learned of the plot and played his lute to attract a group of dolphins. Arion leaped on the back of the dolphins that carried him safely to shore. The other sailors upon their arrival to port were executed. Neptune, pleased with the dolphins' coming to Arion aid, honored the dolphins with a place in the celestial sphere. (Ref. 15, p. 151)

**16. REMARKS-** The Italian astronomer Giuseppe Piazzi (1746-1826), who found the first asteroid, had a faithful, hard-working assistant named Nicolo Cacciatore. Cacciatore means "hunter" and the Latin term for hunter is "Venator" and the Latin for Nicolo is "Nicolaus." Nicolaus spelled backwards becomes Sualocin, and Venator backwards is Rotanev, hence the two stars of the constellation Delphinus.

## DRACO

1. LATIN NAME OF CONSTELLATION ----- **Draco**
2. ENGLISH NAME OF CONSTELLATION ----- **Dragon**
3. PRONUNCIATION OF CONSTELLATION ----- **DRAY-coe**
4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **July 20** (Ref. 2, p. 70)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - **circumpolar constellation** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **80** (Ref. 5, p. 236)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **26** (Ref. 8, p. 177)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **11** (Ref. 8, p. 177)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **0** (Ref. 8, p. 177)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°---- **2.40** (Ref. 8, p. 177)

### 7. DIAGRAM OF CONSTELLATION -



8. **ALPHA STAR OF CONSTELLATION-  $\alpha$  Thuban** (THOO-ban) meaning "the serpent or dragon" is a spectroscopic binary. Thuban, worshipped by the Egyptians, was the North Star in 2750 B.C., but its position has since changed with the precession of the equinoxes. Magnitude: +3.67 Distance: 308.7 light years Spectrum Class: A0 Flamsteed: #11 Hipparcos: #68756 (Ref.18) (Ref.19)
9. **OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p. 144)
  - Beta-  $\beta$  Rastaban** (RAS-tah-ban) "the dragon's head" Magnitude: +2.79 Distance: 361.4 light years Spectrum Class: G0 Flamsteed: #23 Hipparcos: #85670 (Ref.18) (Ref.19)
  - Gamma-  $\gamma$  Eltanin** (el-TAY-nin) or "the dragon's head," is now the brightest star in the constellation. Magnitude: +2.24 Ranking: 21 Distance: 147.5 light years Spectrum Class: K5 Flamsteed: #33 Hipparcos: #87833 (Ref.18) (Ref.19)



## GEMINI

1. LATIN NAME OF CONSTELLATION ----- **Gemini**

**This is the third of the Zodiac constellations and the sun is in this constellation from June 21 to July 21** (Ref. 2, p. 148)

2. ENGLISH NAME OF CONSTELLATION ----- **Twins**3. PRONUNCIATION OF CONSTELLATION ----- **GEM - in -eye**4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **February 20** (Ref. 2, p. 70)5. APPROXIMATE TIME VISIBLE AT 9P.M. - **November 10 - June 15** (Ref. 6)6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **70** (Ref. 5, p. 236)

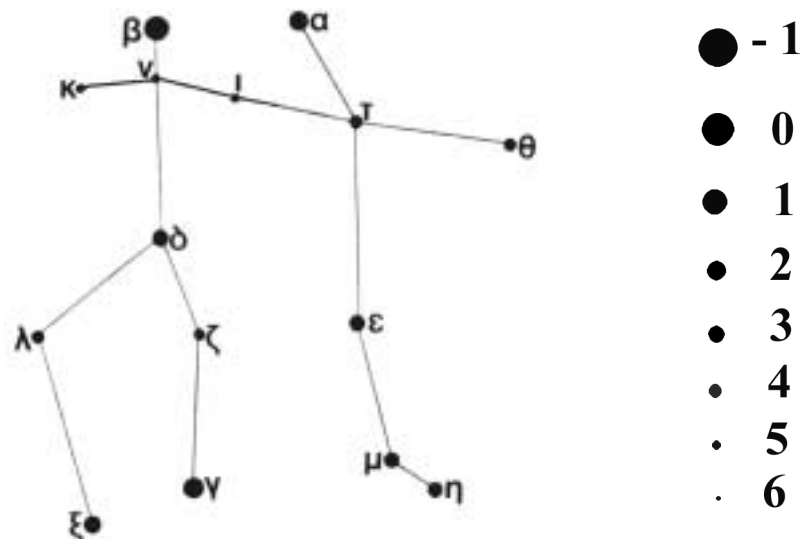
NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **23** (Ref. 8, p. 177)

NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **13** (Ref. 8, p. 177)

NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **3** (Ref. 8, p. 177)

STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°---- **4.47** (Ref. 8, p. 177)

## 7. DIAGRAM OF CONSTELLATION -



**8. ALPHA STAR OF CONSTELLATION-  $\alpha$  Castor** (CASS-ter) from Latin form of Greek "one of the twin sons of Zeus" is a close double (separation 2 seconds of arc) and both are spectroscopic binaries. A third binary of ninth magnitude is 73 arc seconds away completing a system of 6 stars. (Ref. 2, p. 148) Magnitude: +1.58 Ranking: 23 Distance: 51.5 light years Spectrum Class: AO Flamsteed: # 66 Hipparcos: #36850 (Ref.18) (Ref.19)

**9. OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p. 148)

**Beta-  $\beta$  Pollux** (PAUL-lucks) Latin form of Greek meaning "the other twin son of Zeus" shines brighter than Castor. Magnitude: +1.16 Ranking: 17 Distance: 33.7 light years Spectrum Class: KO Flamsteed: # 78 Hipparcos: #37826 (Ref.18) (Ref.19)



**Gamma-  $\gamma$  Alhena** (al-HEN-ah) "the brand-mark" on the feet of Pollux  
Magnitude: +1.93 Ranking: 44 Distance: 104.8 light years Spectrum Class: AO Flamsteed: # 24 Hipparcos: #31681 (Ref.18) (Ref.19)

**Delta-  $\delta$  Wasat** (WAY-sat) "the middle of the sky" (Wesat) It is a double separated by 7 seconds of arc. Magnitude: +3.50 Distance: 58.8 light years Spectrum Class: FO Flamsteed: # 55 Hipparcos: #35550 (Ref.18) (Ref.19)

**Epsilon-  $\epsilon$  Mebsuta** (meb-SUE-tah) "the outstretched paw of the lion" (Ref. 15, p. 14) Magnitude: +3.06 Distance: 903.0 light years Spectrum Class: G5 Flamsteed: # 27 Hipparcos: #32246 (Ref.18) (Ref.19)

**Eta-  $\theta$  Propus** (PRO-puss) from Greek in Ptolemy's description of "the projecting foot." (Praepes) (Ref. 15, p. 14) In Castor's left foot the magnitude is somewhat variable. Magnitude: +3.31 Distance: 349.0 light years Spectrum Class: M1 Flamsteed: # 7 Hipparcos: #29655 (Ref.18) (Ref.19)

**10. SHAPE OF THE CONSTELLATION-** Two bright stars, Castor and Pollux, comprise the heads of the twins. Their bodies resemble two stick figures or two rather straight parallel lines of stars.

**11. HELPFUL ALIGNMENTS-** The Alignment should be drawn from Rigel (in Orion) through Betelgeuse (in Orion) until it passes close to the head of the two twins.

**12. LOCATION IN THE SKY-** (Ref. 3, p. 237) Auriga, Taurus, and Orion border Gemini on the west; Auriga and Lynx on the north, Cancer on the east and Canis Minor and Monoceros skirts the south.

**13. SIZE IN SQUARE DEGREES = 514°      RANK IN SIZE OF 88 = 30<sup>th</sup>**  
 (Ref. 2, p. 70)      (Ref. 2, p. 70)

**14. APPROXIMATE BOUNDARIES BY COORDINATES-** (Ref. 5, p. 236)

HOURS RIGHT ASCENSION    5 HOURS, 57 MINUTES TO    8 HOURS, 6 MINUTES

DEGREES OF DECLINATION                      +10.0° TO    +35.4°

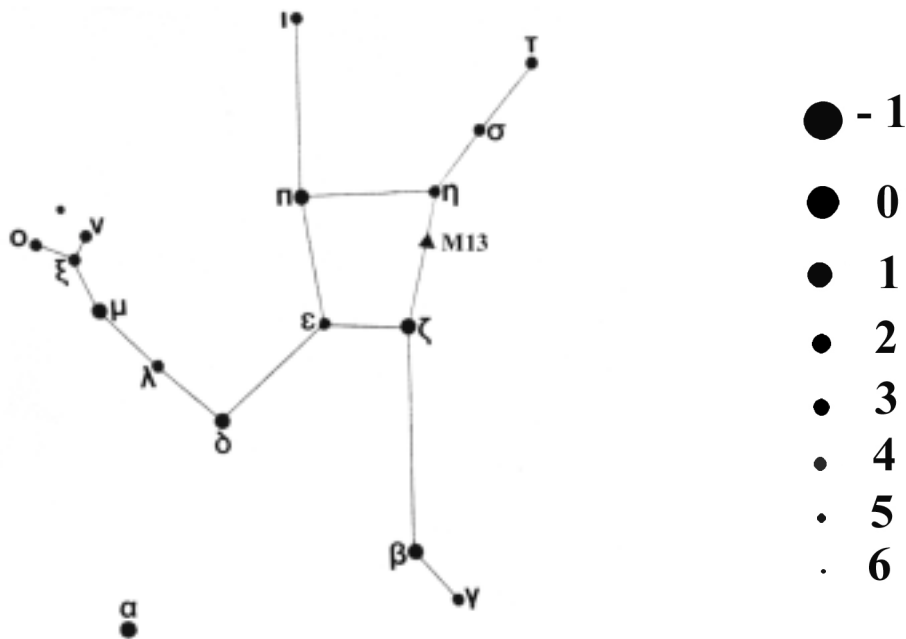
**15. MYTHOLOGY-** (Ref. 4, p. 60) The Gemini twins (brothers) were a part of the Argonauts' party that sailed with Jason to secure the Golden Fleece of Aries. Pollux is the son of Jupiter and Leda. Castor is known as the mortal son of Tyndareus (Tin-DAR-a-OSS.) Castor was an excellent manager of horses and Pollux an excellent soldier in battle and boxer. Sailors often used this constellation for navigation and it was considered a sign of good luck. Warriors also believed if you saw Gemini the night before battle that luck would have it that you would live to see Gemini again. (Ref. 9, p. 337)

**16. REMARKS-** M35 is a 6<sup>th</sup> magnitude open cluster of stars at 2,800 light years and can be easily observed with binoculars. The Hindus referred to Gemini as a boy and girl, Adam and Eve. "The position of the planet Uranus when it was discovered by Sir William Herschel in 1782, was not far from Eta Geminorum. It was also in this region that Pluto stood when in 1930, Clyde Tombaugh found the tiny dot that appeared to move among the many faint stars scattered in the sky here." (Ref. 3, p. 239)

## HERCULES

1. LATIN NAME OF CONSTELLATION ----- **Hercules**
2. ENGLISH NAME OF CONSTELLATION ----- **Strongman**
3. PRONUNCIATION OF CONSTELLATION ----- **HER-kyou-leez**
4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **July 25** (Ref. 2, p. 70)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - **April 10 - November 1** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **140** (Ref. 5, p. 236)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **37** (Ref. 8, p. 177)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **15** (Ref. 8, p. 177)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **0** (Ref. 8, p. 177)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°----- **3.02** (Ref. 8, p. 177)

### 7. DIAGRAM OF CONSTELLATION -



**8. ALPHA STAR OF CONSTELLATION-** **Alpha α Ras Algethi** (RAS-al-GEE-th-ee) Arabic translating to "the kneeler's head", and has a telescopic double separation of five seconds of arc. (Ref. 2, p. 150) Magnitude: +2.78 Distance: 382.2 light years Spectrum Class: M5 Flamsteed: # 64 Hipparcos: #84345 (Ref.18) (Ref.19)

**Beta- β Kornephoros** (Core-NEF-oh-rus) "club- bearer" (Ref. 15, p. 14) Magnitude: +2.78 Distance: 147.7 L.Y. Spectrum Class: KO Flamsteed: # 27 Hipparcos: #80816 (Ref.18) (Ref.19)

**Gamma-  $\gamma$  Hercules** Magnitude: +3.74 Distance: 195.3 light years Spectrum Class: FO  
Flamsteed: # 20 Hipparcos: #80170 (Ref.18) (Ref.19)

**10. SHAPE OF THE CONSTELLATION-** Hercules is described as a man kneeling upside down in the sky with the keystone as his chest. The keystone bears resemblance to a rough square with an extension of each corner making a rough "H" form.

**11. HELPFUL ALIGNMENTS-** The keystone of Hercules is found by extending a line from the southern part of Corona Borealis to the bright star Vega. Concurrently a line from Gemma of Corona Borealis to the bright head star of Ophiuchus will pass through the alpha and beta stars of Hercules. (Ref. 10, p. 75)

**12. LOCATION IN THE SKY-** (Ref. 3, p. 240) It is bound on the west by Boötes, Corona Borealis, and Serpens Caput, to the north by Draco, on the east by Lyra, Vulpecula, Sagitta and Aquila, and on the south by Ophiuchus.

**13. SIZE IN SQUARE DEGREES = 1,225° RANK IN SIZE OF 88 = 5th**  
 (Ref. 2, p. 70) (Ref. 2, p. 70)

**14. APPROXIMATE BOUNDARIES BY COORDINATES-** (Ref. 5, p. 236)

HOURS RIGHT ASCENSION 15 HOUR, 47 MINUTES TO 18 HOUR, 45 MINUTES  
 DEGREES OF DECLINATION +3.9° TO +51.3°

**15. MYTHOLOGY-** (Ref. 3, p 241) This constellation memorializes Hercules, the famous Theban and hero of mythology. He is remembered for his 12 great labors, which required the display of such valor and heroism. Those twelve labors were:

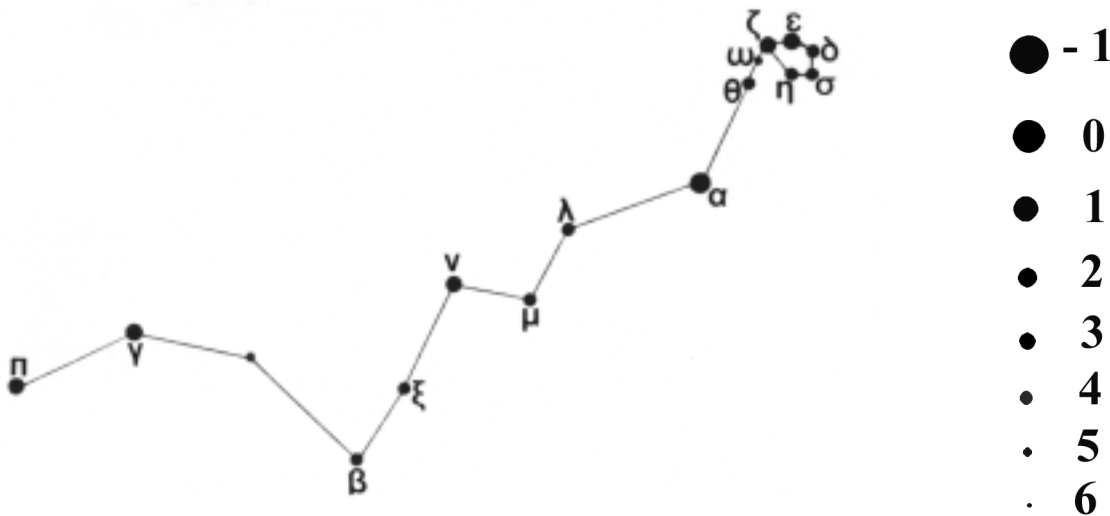
1. To kill the lion no weapons could wound. - Hercules choked the lion.
2. To kill the nine-headed creature called the Hydra- He used the poisonous blood of the Hydra to poison his arrows.
3. To bring back alive an Arcadian stag with horns of gold
4. To capture a great boar
5. To clean the stables of Augeas that hadn't been cleaned for years, which housed thousands of cattle- He had to do the task in a day.
6. To drive away the enormous number of birds that plagued the people of Stymphalus
7. To master the savage bull of Crete
8. To drive off the man-eating mares of the King Diomedes
9. To bring back the girdle of the Queen of the Amazon
10. To capture the cattle of the fearful monster Geryon
11. To recover the golden apples of the Hesperides
12. To bring up from Hades the 3 headed dog, Cerberus, which was considered the worst of all.

**16. REMARKS-** Hercules is considered one of the most ancient of the constellations. The Arabs pictured Hercules as a kneeling giant but gave it no name. The Greek culture then used the Arab figure and named it after their muscular hero, Hercules. The triangle on the diagram of the constellation #7 marks the location of the 6<sup>th</sup> magnitude object of M13 the famous globular cluster of Hercules. Edmond Halley (1656-1742) discovered Messier #13 in 1716 and described it as "a little patch." A 4 to 6 inch telescope lens is required to resolve some of its stars, while it's estimated to have 100,000 stars or more and is 21,000 light years distance. (Ref. 2, p. 150)

# HYDRA

1. LATIN NAME OF CONSTELLATION ----- **Hydra**
2. ENGLISH NAME OF CONSTELLATION ----- **Water Serpent**
3. PRONUNCIATION OF CONSTELLATION ----- **HIGH-druh**
4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **April 20** (Ref. 2, p. 70)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - **March 1 - June 30** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **130** (Ref. 5, p. 236)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **32** (Ref. 8, p. 177)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **9** (Ref. 8, p. 177)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **1** (Ref. 8, p. 177)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.<sup>o</sup>----- **2.46** (Ref. 8, p. 177)

## 7. DIAGRAM OF CONSTELLATION-



8. **ALPHA STAR OF CONSTELLATION- α Alphard** (AL-fard) "the solitary star in the serpent" (Alfard) It represents the chest of the serpent to some. Magnitude: +1.99 Ranking: 48 Distance: 177.2 light years Spectrum Class: K2 Flamsteed: #30 Hipparcos: #46390 (Ref.18) (Ref.19)

## 9. OTHER MAJOR STARS OF CONSTELLATION- (Ref. 2, p. 152)

**Beta- β Hydrae** Magnitude: +4.29 Distance: 365.1 light years Spectrum Class: B9 Hipparcos: #57936 (Ref.18) (Ref.19)

**Gamma-  $\gamma$  Hydrae** is brighter than Beta (Ref. 2, p. 152) Magnitude: +2.99 Distance: 132.0 light years Spectrum Class: G5 Flamsteed: # 46 Hipparcos: #64962 (Ref.18) (Ref.19)

**Delta-  $\delta$  Hydrae** Magnitude: +4.14 Distance: 179.0 light years Spectrum Class: AO Flamsteed: # 4 Hipparcos: #42313 (Ref.18) (Ref.19)

**10. SHAPE OF THE CONSTELLATION-** The constellation reminds one of a very long snake-like creature found just above the horizon, running almost SW to SE, with its head pointing towards the west.

**11. HELPFUL ALIGNMENTS-** Below Cancer are six faint stars that form the head of the Hydra, which lies just east of Procyon with its tail ending near Libra, or ends just east of the bright star Spica. Never high in the sky, it's visible above the southern horizon in the spring. A line drawn from Castor through Pollux if extended will point out the head of the Hydra.

**12. LOCATION IN THE SKY-** (Ref. 3, pp. 242-243) Along its northern boundary from west to east lie Cancer, Leo, Sextans, Crater, Corvus, Virgo and Libra. Hydra is bounded on the southern side by Puppis, Pyxis, Antia and Centaurus, while Canis Minor touches Hydra on the west and Libra at its east end.

**13. SIZE IN SQUARE DEGREES = 1,303° RANK IN SIZE OF 88 = 1st**  
(Ref. 2, p 70) (Ref. 2, p 70)

**14. APPROXIMATE BOUNDARIES BY COORDINATES-** (Ref. 5, p 236)  
HOURS RIGHT ASCENSION 8 HOUR, 8 MINUTES TO 14 HOUR, 58 MINUTES  
DEGREES OF DECLINATION +06.8° TO +35.3°

**15. MYTHOLOGY-** (Ref. 3, p. 242) The Hydra was a horrid swamp (marshes of Lerna) or monster that had nine heads. (Ref. 2, p. 152) One of the tasks given to Hercules was to kill the Hydra. The job was very difficult because every time Hercules cut off a head, two grew back in its place. Finally a clever cousin suggested searing the cut with fire to prevent the duplication of heads, thus Hercules was able to defeat the monster. The immortal head was buried beneath a huge rock where it could do no harm.

**16. REMARKS-** The stars Zeta, Epsilon, Delta, Sigma, Eta and Rho comprise the head of the serpent. The term Hydra was connected with a male image in Greco-Roman mythology but is sometimes called a female snake because the Latin name is feminine thus Hydrus (male water serpent) is used to separate it from the feminine name. (Ref. 3, p. 243)

## LEO

1. LATIN NAME OF CONSTELLATION ----- **Leo**

**The fifth sign of the zodiac; the sun is in this constellation from August 12 to September 17.** (Ref. 2, p. 156)

2. ENGLISH NAME OF CONSTELLATION ----- **Lion**

3. PRONUNCIATION OF CONSTELLATION ----- **LEE-oh**

4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **April 10** (Ref. 2, p. 70)

5. APPROXIMATE TIME VISIBLE AT 9P.M. - **January 15 - July 25** (Ref. 6)

6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **70** (Ref. 5, p. 237)

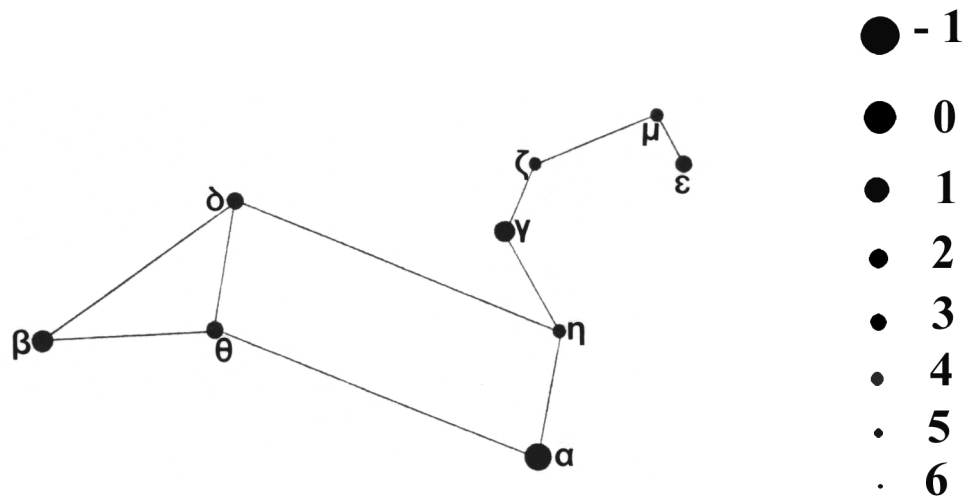
NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **26** (Ref. 8, p. 177)

NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **10** (Ref. 8, p. 177)

NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **2** (Ref. 8, p. 177)

STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.<sup>o</sup> ---**2.75** (Ref. 8, p. 177)

7. DIAGRAM OF CONSTELLATION -



**8. ALPHA STAR OF CONSTELLATION-  $\alpha$  Regulus** Latin for "the prince" (Ref. 15, p. 15) or (REG-you-luss) "little king," as named by Copernicus (Ref. 2, p.156) One of four guardian stars - the others are Fomalhaut, Aldebaran, and Antares that were used to mark the seasons. Regulus is the 21st brightest star and is often thought of as the heart of the Lion. Magnitude: +1.36 Ranking: 21 Distance: 77.5 light years Spectrum Class: B8 Flamsteed: #32 Hipparcos: #49669 (Ref.18) (Ref.19)

**9. OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p. 156) **Beta-  $\beta$  Denebola** (de-NEB-oh-la) Arabic "tail of the lion" Magnitude: +2.14 Ranking: 62 Distance: 36.2 light years Spectrum Class: A2 Flamsteed: #94 Hipparcos: #57632 (Ref.18)(Ref.19)



## LIBRA

1. LATIN NAME OF CONSTELLATION ----- **Libra**

**The seventh zodiac constellation; the sun is in this constellation from November 1 to November 23.** (Ref. 2, p. 160)

2. ENGLISH NAME OF CONSTELLATION ----- **Scales**

3. PRONUNCIATION OF CONSTELLATION ----- **LIE-bra**  
**2nd LEE-bra**

4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **June 20** (Ref. 2, p. 71)

5. APPROXIMATE TIME VISIBLE AT 9P.M. - **May 10 - September 5** (Ref. 6)

6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **50** (Ref. 5, p. 237)

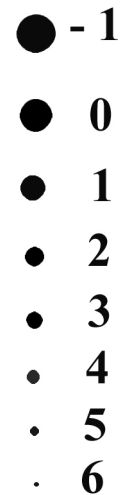
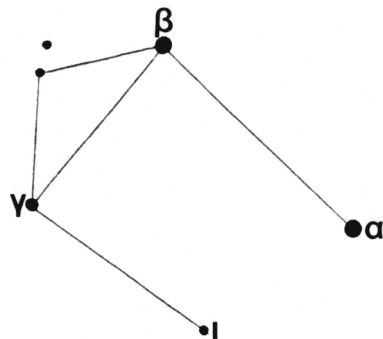
NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **13** (Ref. 8, p. 177)

NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **5** (Ref. 8, p. 177)

NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **0** (Ref. 8, p. 177)

STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°--- **2.42** (Ref. 8, p. 177)

7. DIAGRAM OF CONSTELLATION -



8. ALPHA STAR OF CONSTELLATION-  $\alpha^1$  **Zubenelgenubi** (zoo-BEN-el-gee-new-be)  
Arabic "the southern claw of the scorpion" is a double star. The two stars have a separation of 231 seconds of arc.  $\alpha^1$  Zubenelgenubi Magnitude: +5.15 Distance: 77.1 light years Spectrum Class: F5 Flamsteed: # 8 Hipparcos: #72603 (Ref.18) (Ref.19)

$\alpha^2$  **Zubenelgenubi** Magnitude: +2.75 Ranking: 122 Distance: 42.3 light years Spectrum Class: A3 Flamsteed: # 9 Hipparcos: #72622 (Ref.18) (Ref.19)



**9. OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p160)

**Beta-  $\beta$  Zubeneschamali** (zoo-BEN-ess-show-MAY-lee) Arabic "north claw of the scorpion" Magnitude: +2.61 Ranking: 102 Distance: 160.0 light years Spectrum Class: B8 Flamsteed: # 27 Hipparcos: #74785 (Ref.18) (Ref.19)

**Gamma-  $\gamma$  Zubenelakrab** (zoo-BEN-el-ha-CRAW-be) Arabic "the scorpion's claw" Magnitude: +3.91 Distance: 152.2 light years Spectrum Class: K0 Flamsteed: #38 Hipparcos: #76333 (Ref.18) (Ref.19)

**10. SHAPE OF THE CONSTELLATION-** Alpha, Beta, Gamma, Iota, the four brighter stars of Libra form a cockeyed rectangle that has its longest dimension running NW to SE.

**11. HELPFUL ALIGNMENTS-** Locate the star Antares in Scorpius then project a line toward Arcturus and Spica. Libra can be found between these line segments and just west of Scorpius.

**12. LOCATION IN THE SKY-** (Ref. 3, p 250) Virgo and Serpens Caput border it on the north, Ophiuchus and Scorpius on the east, Lupus and Hydra on the south and Virgo again on the west.

**13. SIZE IN SQUARE DEGREES = 538°      RANK IN SIZE OF 88 = 29<sup>th</sup>**  
(Ref. 2, p 71)      (Ref. 2, p 71)

**14. APPROXIMATE BOUNDARIES BY COORDINATES-** (Ref. 5, p. 237)

HOURS RIGHT ASCENSION 14 HOUR, 18 MINUTES TO 15 HOUR, 59 MINUTES  
DEGREES OF DECLINATION      -00.3° TO -29. 9°

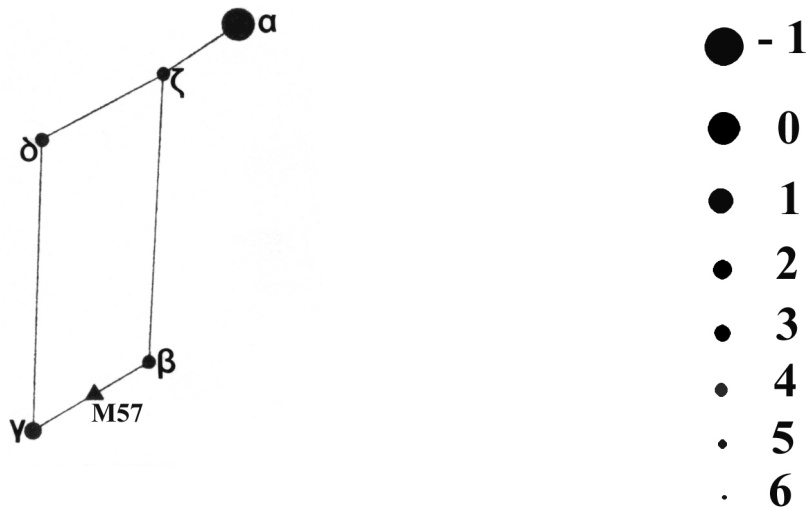
**15. MYTHOLOGY-** (Ref. 3, pp. 249-250), (Ref. 2, p. 160) Libra generates five main mythological references. Early stories associated 1) Libra in memory of Mechus, the inventor of weights; 2) Libra with Julius Caesar a token of his justice; 3) Libra with Astraea, the goddess of justice; 4) Libra with the balance of the seasons; 5) Libra with the balance of light and dark of fall.

**16. REMARKS-** Libra, added to the zodiac by the Romans, is the only constellation that represents an inanimate object. (Ref. 2, p. 160) Astronomers refer to this constellation as "the scales" since in classical times the autumnal equinox (when days and nights are equal) occurred when the sun was within this constellation. Astraea, the goddess of justice, is pictured holding "the scales of justice." (Ref. 2, p. 160) The beta star of Libra is said to be the only naked eye star that is greenish in color. (Ref. 11, p. 63)

# LYRA

1. LATIN NAME OF CONSTELLATION ----- **Lyra**
2. ENGLISH NAME OF CONSTELLATION ----- **Lyre (or Harp)**
3. PRONUNCIATION OF CONSTELLATION ----- **LIE-rah**
4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **August 15** (Ref. 2, p 71)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - **April 10 - December 25** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **45** (Ref. 5, p. 237)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **11** (Ref. 8, p. 178)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **4** (Ref. 8, p. 178)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **1** (Ref. 8, p. 178)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.<sup>o</sup> ---**3.85** (Ref. 8, p. 178)

## 7. DIAGRAM OF CONSTELLATION -



8. **ALPHA STAR OF CONSTELLATION-**  **$\alpha$  Vega** Arabic "the falling eagle or vulture" (Ref. 15, p. 16) (VEE-gah) The solar system is moving toward Vega, which is the third brightest star in the night sky of our latitude. Magnitude: 0.03 Ranking: 5 Distance: 25.3 light years Spectrum Class: A0 Flamsteed: # 3 Hipparcos: #91262 (Ref.18) (Ref.19)

## 9. OTHER MAJOR STARS OF CONSTELLATION- (Ref. 2, p. 162)

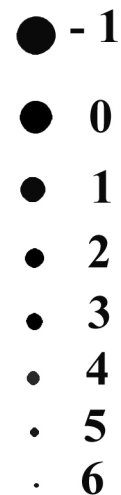
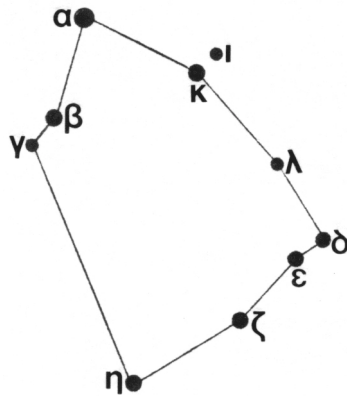
- Beta-  $\beta$  Sheliak** (SHELL-yak) Persian for "tortoise" (Sheluak) and is an eclipsing binary. Magnitude: +3.52 Distance: 881.1 light years Spectrum Class: B8 Flamsteed: #10 Hipparcos: #92420 (Ref.18) (Ref.19)



# OPHIUCHUS

1. LATIN NAME OF CONSTELLATION ----- **Ophiuchus**
2. ENGLISH NAME OF CONSTELLATION ----- **Serpent Bearer**
3. PRONUNCIATION OF CONSTELLATION ----- **OFF-ih-YOU-cuss**
4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **July 25** (Ref. 2, p. 71)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - **May 10 - October 10** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **100** (Ref. 5, p. 237)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **36** (Ref. 8, p. 178)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **12** (Ref. 8, p. 178)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **0** (Ref. 8, p. 178)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°----- **3.80** (Ref. 8, p. 178)

## 7. DIAGRAM OF CONSTELLATION -



**8. ALPHA STAR OF CONSTELLATION- α Rasalhague** (RAS-al-HAY-gwee) Arabic "the head of the serpent collector" (Ref. 15, p. 16) Magnitude: +2.08 Ranking: 59 Distance: 46.7 light years Spectrum Class: A5 Flamsteed: #55 Hipparcos: #86032 (Ref.18) (Ref.19)

**9. OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p.170)

**Beta- β Cebalrai** (SEB-al-RAY-ee) Arabic "the shepherd's dog" Magnitude: +2.76 Distance: 82.0 light years Spectrum Class: K0 Flamsteed: #60 Hipparcos: #86742 (Ref.18) (Ref.19)

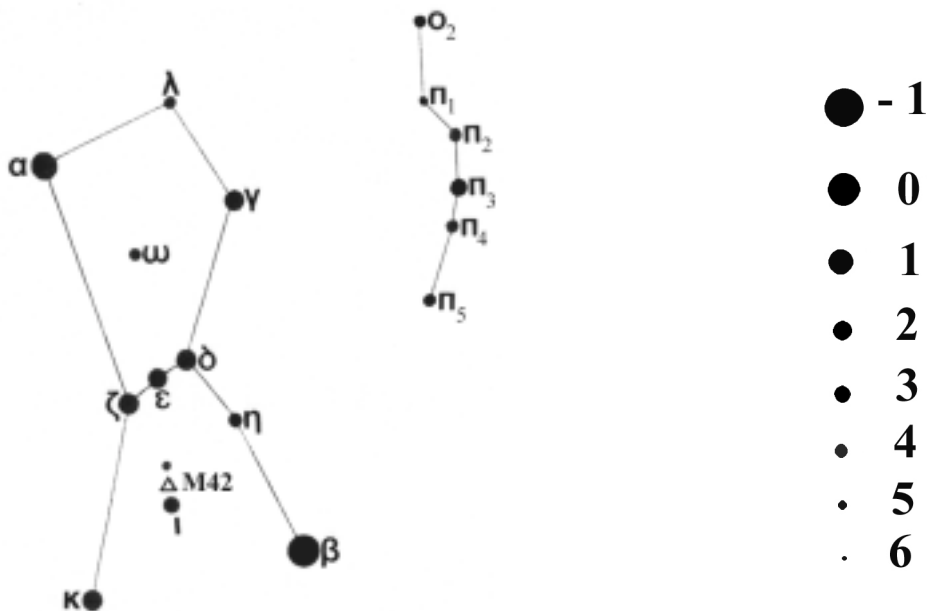
**Gamma- γ Marfik** (MAR-fick) Arabic "the elbow" Magnitude: +3.75 Distance: 94.7 light years Spectrum Class: A2 Flamsteed: #35 Hipparcos: #84012 (Ref.18) (Ref.19)



# ORION

1. LATIN NAME OF CONSTELLATION ----- **Orion**
2. ENGLISH NAME OF CONSTELLATION ----- **Hunter**
3. PRONUNCIATION OF CONSTELLATION ----- **oh-RYE-un**
4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **January 25** (Ref. 2, p. 71)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - **November 10 - April 30** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **120** (Ref. 5, p. 237)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **42** (Ref. 8, p. 178)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **15** (Ref. 8, p. 178)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **5** (Ref. 8, p. 178)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.<sup>o</sup> --- **7.07** (Ref. 8, p. 178)

## 7. DIAGRAM OF CONSTELLATION -



**8. ALPHA STAR OF CONSTELLATION-** **α Betelgeuse** (BET-el-jooz) Arabic for the "armpit of the central one," Betelgeuse is 500 to 700 times the size of our sun and the ninth brightest star in the night sky. Betelgeuse is a red giant star that is somewhat variable. Magnitude: +0.45 Ranking: 9 Distance: 427.3 light years Spectrum Class: M0 Flamsteed: #58 Hipparcos: #27989 (Ref.18) (Ref.19)

**9. OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2 p. 178) **Beta- β Rigel** (RYE-jel) Arabic "Orion's left foot" (Ref. 15, p. 17) The brightest star in Orion, the seventh brightest



Juno, who was incensed at Orion's conceit. (Ref. 4, p. 28) He claimed superiority over every creature on the Earth. The gods punished his conceit by sending the Scorpion to attack him, causing his death. At Diana's request Orion was placed in the sky to honor him and positioned him at the opposite part of the sky so he would never meet the Scorpion again.

Another legend says Orion fell in love with Merope and they attempted to elope. Her father interfered and was so mad at Orion that he blinded him. The blind giant wandered aimlessly until he came to the forge of Vulcan. Vulcan took pity on him and led him to the top of a high mountain and had him face the rising sun and his sight was restored. (Ref. 13, p. 277)

One of the most famous legends concerns Orion meeting Diana, the moon goddess or huntress, on the island of Crete. Diana was so much in love with Orion that she was neglecting her responsibility for driving the lunar chariot across the night sky. Her brother, the driver of the solar chariot, warned her not to neglect her duties, but she would not leave Orion. Finally, Apollo, in disgust, tricked her. He pointed to a very faint distant object in the sea and told Diana she had lost her touch even as a huntress and couldn't hit the faint distant object moving in the water. Of course her aim was excellent and her arrow made its mark, killing her lover Orion as he swam. Suffering from his misdirected death Diana transported Orion into the bitter cold winter sky, forever reminding her of her bitter loss by making him one of the most gloriously bright constellations. Legend has it that Orion is strategically placed in the heavens so that the moon passes it monthly so Diana can still visit her lover in spirit. (Ref. 9, p. 333)

**16. REMARKS-** Many people consider Orion to be the most easily identified constellation because of its seven bright stars. It is the only northern hemisphere constellation that has more than one 1st magnitude star within it. Orion's belt can be used to help the young astronomer find the eye of Taurus the bull as the 3 stars of the belt point up to the eye of the bull. The three belt stars point down to the east toward Sirius, the brightest star in the sky and the nose of the big dog Canis Major.

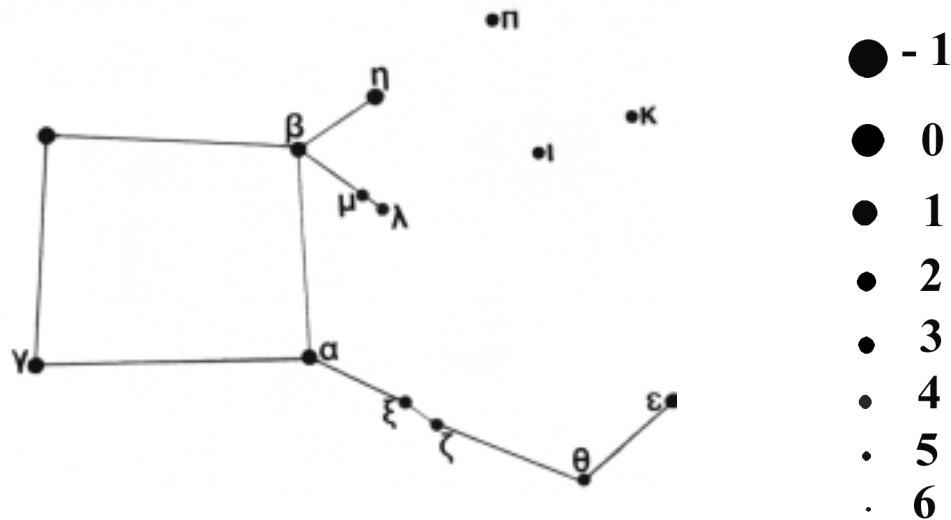
The triangle under the belt of Orion M42 is the great Orion nebula, which is about 1800 light years distance and more than 30 light years in width, making it is one of the showpieces of the sky. To the unaided eye this diffuse nebula appears as a slightly fuzzy patch of light. The star  $\eta$  Orionis appears to be enveloped in a haze that indicates the presence of the great nebula.  $\eta$  Orionis is a quadruple called the Trapezium that are all very young stars of sixth to eighth magnitude. Also to the west of M42 is the smaller diffuse nebula M43. (Ref. 2, p. 172) (Ref. 13, p. 278)



# PEGASUS

1. LATIN NAME OF CONSTELLATION ----- **Pegasus**
2. ENGLISH NAME OF CONSTELLATION ----- **Winged Horse**
3. PRONUNCIATION OF CONSTELLATION ----- **PEG-uh-suss**
4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **October 20** (Ref. 2, p. 71)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - **August 1 - February 10** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **100** (Ref. 5, p. 237)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **29** (Ref. 8, p. 178)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **9** (Ref. 8, p. 178)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **0** (Ref. 8, p. 178)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.<sup>o</sup> ----**2.59** (Ref. 8, p. 178)

## 7. DIAGRAM OF CONSTELLATION -



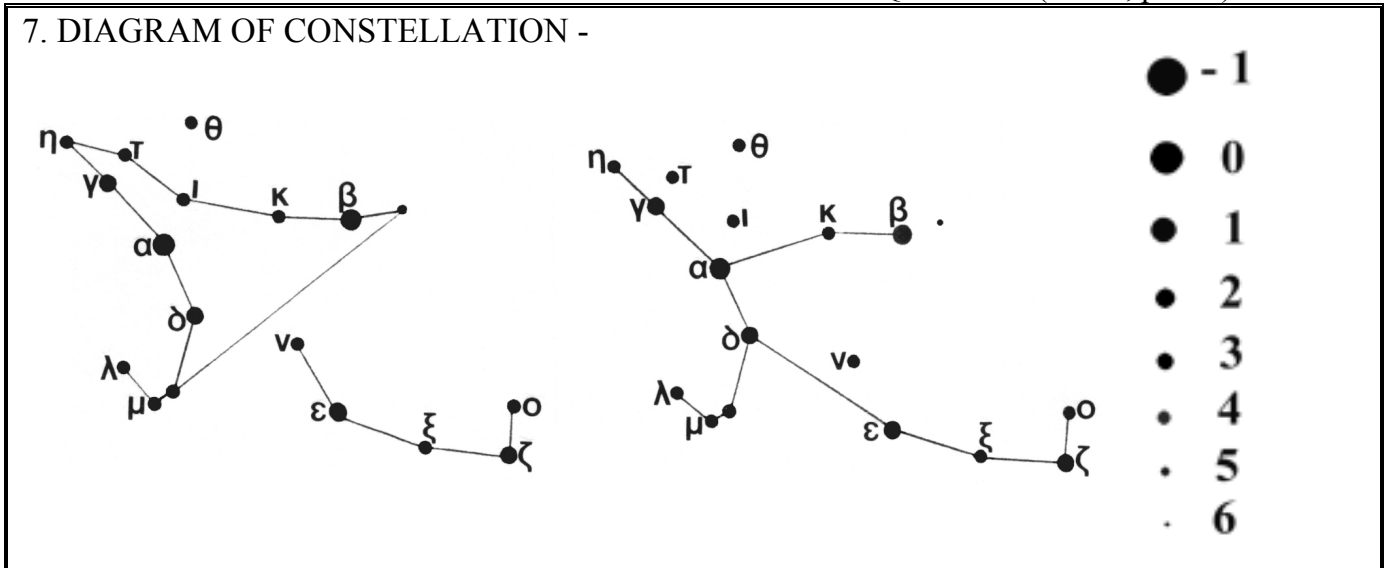
8. **ALPHA STAR OF CONSTELLATION- α Markab** (MAR-kab) marks the lower western corner of the square, and is Arabic meaning either "riding" or some kind of vehicle or an animal to ride on. (Ref. 3, p. 265) It may also be "the saddle." (Ref. 2, p. 174) Magnitude: +2.49 Ranking: 92 Distance: 139.6 light years Spectrum Class: A0 Flamsteed: #54 Hipparcos: #113963 (Ref.18) (Ref.19) (Ref. 2, p. 174) Alpheratz is the alpha star of Andromeda and is also used by Pegasus to make the square of Pegasus. See Andromeda, page 18, for Alpheratz.
9. **OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p. 174) **Beta- β Scheat** (SHEE-at) a corrupt transliteration of the Arabic (Ref. 15, p. 18) "the shoulder" (of the horse)



# PERSEUS

1. LATIN NAME OF CONSTELLATION ----- **Perseus**
2. ENGLISH NAME OF CONSTELLATION ----- **Hero**
3. PRONUNCIATION OF CONSTELLATION ----- **PURR-see-us**
4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST-**December 25** (Ref. 2, p. 71)
5. APPROXIMATE TIME VISIBLE AT 9 P.M. - **August 10 - May 15** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **90** (Ref. 5, p. 237)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **34** (Ref. 8, p. 178)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **10** (Ref. 8, p. 178)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **1** (Ref. 8, p. 178)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°----- **5.52** (Ref. 8, p. 178)

## 7. DIAGRAM OF CONSTELLATION -



8. **ALPHA STAR OF CONSTELLATION-  $\alpha$  Mirfak** (Mirphak) (MERE-fak) Arabic "the elbow of the Pleiades" or Algenib (Al-GEE-nib) "the side of Perseus" (Ref. 15, pp. 18-19)  
Magnitude: +1.79 Ranking: 35 Distance: 591.7 light years Spectrum Class: F5 Flamsteed: #33 Hipparcos: #15863 (Ref.18) (Ref.19)

## 9. OTHER MAJOR STARS OF CONSTELLATION- (Ref. 2 p. 174)

- Beta-  $\beta$  Algol** (AL-gall) Arabic meaning "the demon's head" or Demon Star, which "blinks" + 2.06 to +3.28 is an eclipsing binary with a period of 2.87 days. Magnitude: +2.09 Ranking: 60 Distance: 92.8 light years Spectrum Class: B8 Flamsteed: #26 Hipparcos: #14576 (Ref.18) (Ref.19)



# PISCES

1. LATIN NAME OF CONSTELLATION ----- **Pisces**

**The twelfth constellation of the zodiac; the sun is in this constellation from March 13 to April 19th.** (Ref. 2, p. 178)

2. ENGLISH NAME OF CONSTELLATION ----- **Fishes**

3. PRONUNCIATION OF CONSTELLATION ----- **PIE-seas**

4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **Nov. 10** (Ref. 2, p. 71)

5. APPROXIMATE TIME VISIBLE AT 9P.M. - **August 15 - February 10** (Ref. 6)

6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **75** (Ref. 5, p. 237)

NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **24** (Ref. 8, p. 178)

NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **3** (Ref. 8, p. 178)

NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **0** (Ref. 8, p. 178)

STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.<sup>o</sup> --- **2.70** (Ref. 8, p. 178)

7. DIAGRAM OF CONSTELLATION -



8. ALPHA STAR OF CONSTELLATION-  **$\alpha$  Alrisha** (Alrescha) (al-REE-shah) Arabic for "the rope or cord" (Ref. 15, p. 19) is a double star. Magnitude: +3.82 Distance: 139.0 light years Spectrum Class: A2 Flamsteed: #113 Hipparcos: #9487 (Ref.18) (Ref.19)

9. OTHER MAJOR STARS OF CONSTELLATION- (Ref. 2, p. 178)

**Beta-  $\beta$  Fum Al Samakah** (FOOM-al sah-MAH-kah) "fish's mouth" Magnitude: +4.48, Distance: 492.4 light years; Spectrum Class: B5 Flamsteed: #4 Hipparcos: #113889 (Ref.18) (Ref.19)

**Gamma-  $\gamma$  Piscis** - is the southern fish under the square of Pegasus. Magnitude: +3.70  
Distance: 130.8 light years Spectrum Class: K0 Flamsteed: #6 Hipparcos: #114971  
 (Ref.18) (Ref.19)

**10. SHAPE OF THE CONSTELLATION-** A very dim constellation with only one star as bright as third magnitude. A dim oval of stars under the square of Pegasus forms what is known as the southern fish. The second and dimmer group of stars just below the center of Andromeda is the northern fish. A line of very dim stars known as a rope or ribbon connects the two fish.

**11. HELPFUL ALIGNMENTS-** Learn the surrounding constellations of Pegasus, Andromeda and Aries first, then look for a small group of stars for the northern fish half way between the brightest stars of Andromeda and Aries. The southern fish is located below the center of the square of Pegasus. Binoculars are helpful in tracking the dim string or else only look for it under the best sky conditions.

**12. LOCATION IN THE SKY-** (Ref. 3, p. 270) Aquarius is located on Pisces southwestern corner and Pegasus touches its western and much of its northern side, while Triangulum completes the north side of Pisces. Aries and Cetus border the east side and Cetus covers most of the southern border.

**13. SIZE IN SQUARE DEGREES = 889°**      **RANK IN SIZE OF 88 = 14th**  
 (Ref. 2, p. 71)                                      (Ref. 2, p. 71)

**14. APPROXIMATE BOUNDARIES BY COORDINATES-** (Ref. 5, p. 237)  
 HOURS RIGHT ASCENSION    22 HOUR, 49 MINUTES TO 2 HOUR, 4 MINUTES  
 DEGREES OF DECLINATION                      -06.6° TO +33.4°

**15. MYTHOLOGY-** One Greek story based on Syrian legend says Venus and her son Cupid escaped Typhon, the fire-breathing giant, by jumping into the Euphrates River and turning themselves into fish. A Roman story says the constellation is in honor of the fish that carried Venus and her son to safety. (Ref. 2, p. 178) They were bound together by the string so they wouldn't get separated from each other. (Ref. 7, p. 287)

**16. REMARKS-** About 2000 years ago spring started in Aries, the first sign of the zodiac. Due to precession of the Earth, the sun crosses the celestial equator heading north in the constellation of Pisces. We are now in the "age of the fish;" the "age of Aquarius" will occur in about 600 years. (Ref. 2, p. 178)

# SAGITTARIUS

1. LATIN NAME OF CONSTELLATION ----- **Sagittarius**

**Sagittarius is the ninth constellation of the zodiac; the sun is in Sagittarius from December 19 to January 19<sup>th</sup>** (Ref. 2, p. 184)

2. ENGLISH NAME OF CONSTELLATION ----- **Archer**

3. PRONUNCIATION OF CONSTELLATION ----- **Saj-ih-TAY-rih-us**

4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **August 20** (Ref. 2, p. 71)

5. APPROXIMATE TIME VISIBLE AT 9 P.M. - **June 20 - October 10** (Ref. 6)

6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **115** (Ref. 5, p. 237)

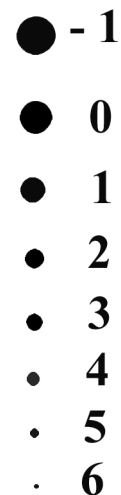
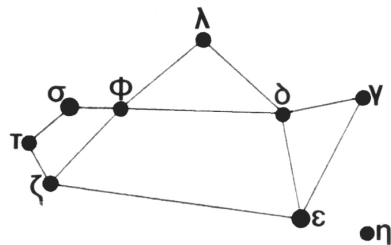
NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **33** (Ref. 8, p. 178)

NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **14** (Ref. 8, p. 178)

NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **1** (Ref. 8, p. 178)

STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.<sup>o</sup> -----**3.80** (Ref. 8, p. 178)

7. DIAGRAM OF CONSTELLATION -



8. ALPHA STAR OF CONSTELLATION- **α Rukbat** (RUCK-bat) Arabic "the archer's knee" (Rucba) Magnitude: +3.9 Distance: 169.8 light years Spectrum Class: B8 Hipparcos: #95347 (Ref.18) (Ref.19)

9. OTHER MAJOR STARS OF CONSTELLATION- (Ref. 2, p. 184)

**Beta- β<sup>1</sup>Arkab Prior** (Arkab) (ARE-kab) Arabic "the tendon" (Ref. 2, p. 184) "the archer's tendon Achilles" (Ref. 15, p. 19) is an optical double. (Ref. 2, p. 184) Magnitude: +3.96 Distance: 378.2 light years Spectrum Class: B8 Hipparcos: #95241 (Ref.18) (Ref.19)

**Beta- β<sup>2</sup>Arkab Posterior** Magnitude: +4.27 Distance: 763.5 light years Spectrum Class: F0 Hipparcos: #95294 (Ref.18) (Ref.19)

**Gamma-  $\gamma^1$  Kaus Media** Arabic word for "bow" (kaus) and Latin for "middle" (Ref. 15, p. 19)  
Magnitude: +4.66 Distance: 2076.4 light years Spectrum Class: F8 Flamsteed: #8  
Hipparcos: #88567 (Ref.18) (Ref.19)

**Gamma-  $\gamma^2$  Al Nasl** (al-NAYZ-el) Arabic "the point of the arrow" (Ref. 15, p. 19) Magnitude:  
+2.98 Distance: 96.1 light years Spectrum Class: K0 Flamsteed: #10 Hipparcos: #88635  
(Ref.18) (Ref.19)

**Epsilon-  $\epsilon$  Kaus Australis** "southern star of the bow" Magnitude: +1.79 Ranking: 34  
Distance: 144.6 light years Spectrum Class: A0 Flamsteed: #20 Hipparcos: #90185 (Ref.18)  
(Ref.19)

**Zeta-  $\zeta$  Ascella** Latin for the "armpit" of the archer Magnitude: +2.60 Ranking: 101 Distance:  
89.0 light years Spectrum Class: A2 Flamsteed: #38 Hipparcos: #93506 (Ref.18) (Ref.19)

**Sigma-  $\sigma$  Nunki** (NUN-key) which is an old Mesopotamian (Sumerian) name - "the asterism  
of the yoke of the sea;" "the asterism of the holy city" (Ref. 15, p. 20) Magnitude: +2.05  
Ranking: 52 Distance: 224.2 light years Spectrum Class: B3  
Flamsteed: #34 Hipparcos: #92855 (Ref.18) (Ref.19)

**10. SHAPE OF THE CONSTELLATION-** Sagittarius is supposed to form the shape of a Centaur when in fact its shape really resembles that of a "teapot" tipped slightly toward the west.

**11. HELPFUL ALIGNMENTS-** When the summer triangle is high in the sky, the Northern Cross points down the Milky Way toward the "teapot" Sagittarius.

**12. LOCATION IN THE SKY-** (Ref. 3, p. 275) Sagittarius is bordered on the west by Scorpius and Ophiuchus and Serpens Cauda; Aquila and Scutum act as a border on the north. Capricornus and Microscopium cover the east and Telescopium and Corona Australis enclose the south.

**13. SIZE IN SQUARE DEGREES = 867°**      **RANK IN SIZE OF 88 = 15th**  
(Ref. 2, p. 70)      (Ref. 2, p. 70)

**14. APPROXIMATE BOUNDARIES BY COORDINATES-** (Ref. 5, p. 236)  
HOURS RIGHT ASCENSION    17 HOUR, 41 MINUTES TO 20 HOUR, 25 MINUTES  
DEGREES OF DECLINATION      -11.8° TO -45.4°

**15. MYTHOLOGY-** (Ref. 13, pp. 156-157) The archer aims his arrow at the heart of the Scorpion. Centaur (SEN-tar), half man and half horse, the son of Saturn, is said to have changed himself into a horse in order to escape from his jealous wife, Rhea. He died from a scratch he received from a poisoned arrow. Chiron was famous for marksmanship, education, medicine, and teacher of heroes - Hercules, Apollo, Achilles, and Jason.

**16. REMARKS-** Sagittarius is never seen high in the sky even at culmination. The top of the "teapot" is less than 30° above the south horizon. Just above and to the west of the pour spout of the teapot is the center point of the Milky Way galaxy.



# SCORPIUS

1. LATIN NAME OF CONSTELLATION ----- **Scorpius**

**Scorpius is the 8<sup>th</sup> constellation of the zodiac; the sun is in Scorpius from November 23 to November 30.** (Ref. 2, p. 184)

2. ENGLISH NAME OF CONSTELLATION ----- **Scorpion**

3. PRONUNCIATION OF CONSTELLATION ----- **SCORE-pea-uss**

4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **July 20** (Ref. 2, p. 71)

5. APPROXIMATE TIME VISIBLE AT 9P.M. - **June 25 - September 10** (Ref. 6)

6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **100** (Ref. 5, p. 237)

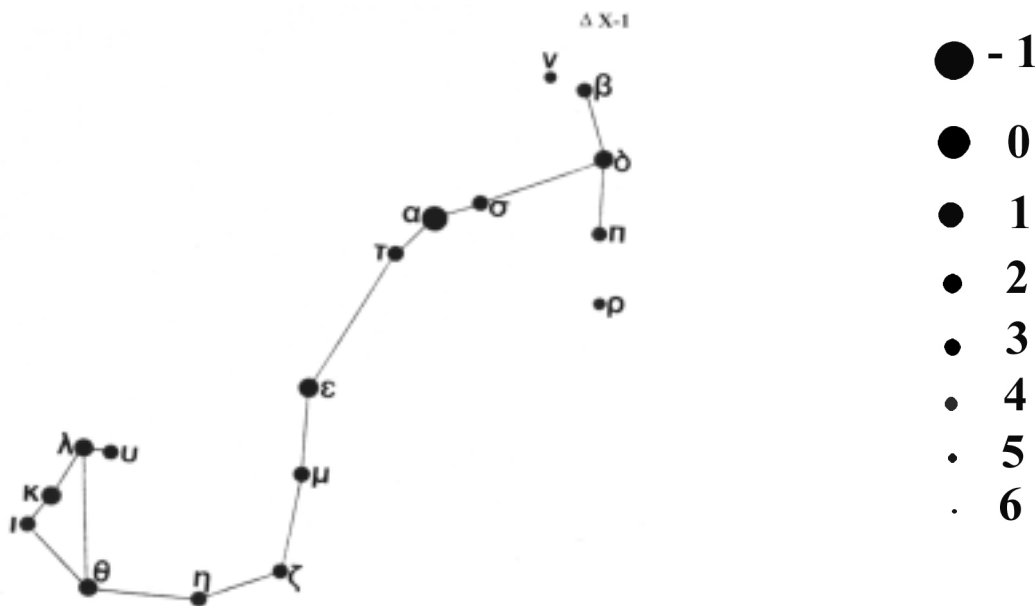
NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **38** (Ref. 8, p. 178)

NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **17** (Ref. 8, p. 178)

NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **3** (Ref. 8, p. 178)

STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.<sup>o</sup>- **7.64** (Ref. 8, p. 178)

7. DIAGRAM OF CONSTELLATION -



**8. ALPHA STAR OF CONSTELLATION-  $\alpha$  Antares** (an-TAY-rease) Greek "rival of Mars" (Ref. 15, p. 20) Antares is a double star named for the bright red color of the super red giant primary star. Antares' magnitude is somewhat variable. Its secondary star is three arc seconds apart and is a fifth magnitude star. (A six-inch telescope should separate them when viewing.) (Ref. 2, p.184) Magnitude: +1.06 Ranking: 16 Distance: 603.7 light years Spectrum Class: M0 Flamsteed: #21 Hipparcos: #80763 (Ref.18) (Ref.19)

**9. OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p. 184)

**Beta-  $\beta$ ' Graffias** (GRAF-ih-as) Greek "the crab" (Ref. 15, p. 20) is a triple star system. The combined is Magnitude: +2.56 Ranking: 96 Distance: 530.1 light years Spectrum Class: B1 Flamsteed: #8 Hipparcos: #78820 (Ref.18)(Ref.19)

**Delta-  $\delta$  Dschubba** "the forehead" Luminosity  $\square$  Dschubba is 3,500 times brighter than the sun. Magnitude: +2.29 Ranking: 75 Distance: 401.5 light years Spectrum Class: B0 Flamsteed: #7 Hipparcos: #78401 (Ref.18) (Ref.19)

**Epsilon-  $\epsilon$  Scorpii** Magnitude: +2.29 Ranking: 76 Distance: 65.4 light years Spectrum Class: K0 Flamsteed: #26 Hipparcos: #82396 (Ref.18) (Ref.19)

**Theta-  $\theta$  Sargas** Magnitude: +1.86 Ranking: 39 Distance: 271.9 light years Spectrum Class: F0 Hipparcos: #86228 (Ref.18) (Ref.19)

**Kappa-  $\kappa$  Scorpii** Magnitude: +2.39 Ranking: 83 Distance: 463.7 light years Spectrum Class: B2 Hipparcos: #86670 (Ref.18) (Ref.19)

**Lambda-  $\lambda$  Shaula** (SHOW-la) Also meaning "sting" Magnitude: +1.62 Ranking: 25 Distance: 702.6 light years Spectrum Class: B2 Flamsteed: #35 Hipparcos: #85927 (Ref.18) (Ref.19)

**Upsilon-  $\psi$  Lesath** (LESS-ath) Arabic "the scorpion's sting" Magnitude: +2.70 Ranking: 114 Distance: 518.3 light years Spectrum Class: B3 Flamsteed: #114 Hipparcos: #78401 (Ref.18) (Ref.19)

**10. SHAPE OF THE CONSTELLATION-** Scorpius is striking and should be easy to identify in July near culmination. Antares, the heart of Scorpius, marks the top of a "J" shape that is the curve of the scorpion's tail. Toward the west of Antares are three stars of second to third magnitude that form the head of the scorpion.

**11. HELPFUL ALIGNMENTS-** The Milky Way can be your guide as the scorpion's tail lies near the direction of the center of our galaxy and will always be on the southernmost end of the Milky Way trail as seen from our latitude. The brightest star Antares, the scorpion's heart, can help confirm your identification. A line extended from Deneb through Vega will point out Scorpius. (Ref. 10, p. 77)

**12. LOCATION IN THE SKY-** (Ref. 3, p. 279) Scorpius is bordered on the west by Centaurus and Libra and on the north by Ophiuchus, with Sagittarius bordering the corner and most of the western side. Ophiuchus comes down to cover the upper western edge, with Corona Australis finishing up the western side. On the south Scorpius is encompassed by Ara and Norma.

**13. SIZE IN SQUARE DEGREES** = 497°      **RANK IN SIZE OF 88** = 33  
(Ref. 2, p. 70)                                      (Ref. 2, p. 70)

**14. APPROXIMATE BOUNDARIES BY COORDINATES-** (Ref. 5, p. 237)

HOURS RIGHT ASCENSION 15 HOUR, 44 MINUTES TO 17 HOUR, 55 MINUTES  
DEGREES OF DECLINATION                      -08.1° TO -45.6°

**15. MYTHOLOGY-** (Ref. 2, p.184) The scorpion stung Orion on the foot at the command of Juno or Hera because of Orion's conceit, thus causing Orion's death. They were placed in the opposite part of the sky at Diana's request so Orion wouldn't be bitten again. These constellations never appear in the heavens at the same time.

**16. REMARKS-** When the sun entered Scorpius there was much sickness prevalent in Egypt. Also, in classical times, it was the largest of the constellations and later Libra was formed from its claws.

In June 1962, Scorpius X-1 was discovered to be a binary with an intense short wave energy emission and a good black hole candidate. This possible black hole is located by the triangle in the constellation diagram in #7 and is thought to be about 1600 light years distance.

# TAURUS

1. LATIN NAME OF CONSTELLATION ----- **Taurus**

**Taurus is the second constellation of the zodiac; the sun is in Taurus from May 14 to June 21.** (Ref. 2, p. 188)

2. ENGLISH NAME OF CONSTELLATION ----- **Bull**

3. PRONUNCIATION OF CONSTELLATION ----- **TAW-russ**

4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **January 15** (Ref. 2, p. 71)

5. APPROXIMATE TIME VISIBLE AT 9P.M. - **October 5 - April 30** (Ref. 6)

6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **125** (Ref. 5, p. 237)

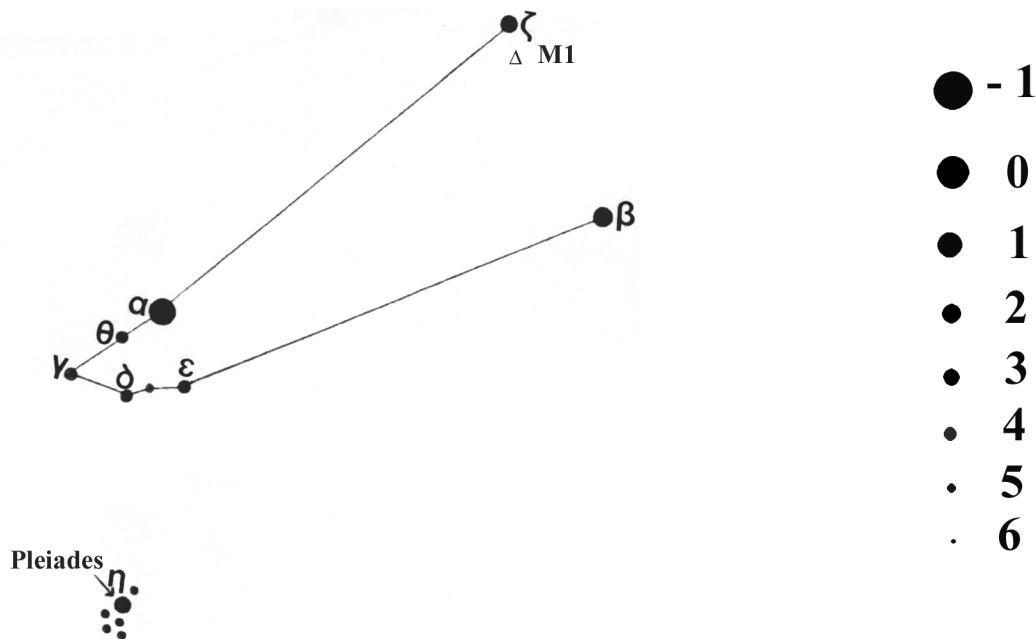
NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **44** (Ref. 8, p. 178)

NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **14** (Ref. 8, p. 178)

NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **2** (Ref. 8, p. 178)

STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°-----**5.52** (Ref. 8, p. 178)

7. DIAGRAM OF CONSTELLATION -



8. ALPHA STAR OF CONSTELLATION-  **$\alpha$  Aldebaran** (al-debb-a-ran) Arabic "follower" (Ref. 15, p. 21) of the Pleiades lies between Earth and the Hyades star cluster, being only 65.1 light years away. Magnitude: +0.87 Ranking: 14 Distance: 65.1 light years Spectrum Class: K5 Flamsteed: # 87 Hipparcos: #21421 (Ref.18) (Ref.19)



Also note the B star El Nath belongs to the constellation Taurus but is sometimes used in Auriga to form the pentagon shape. (See Auriga, p. 26)

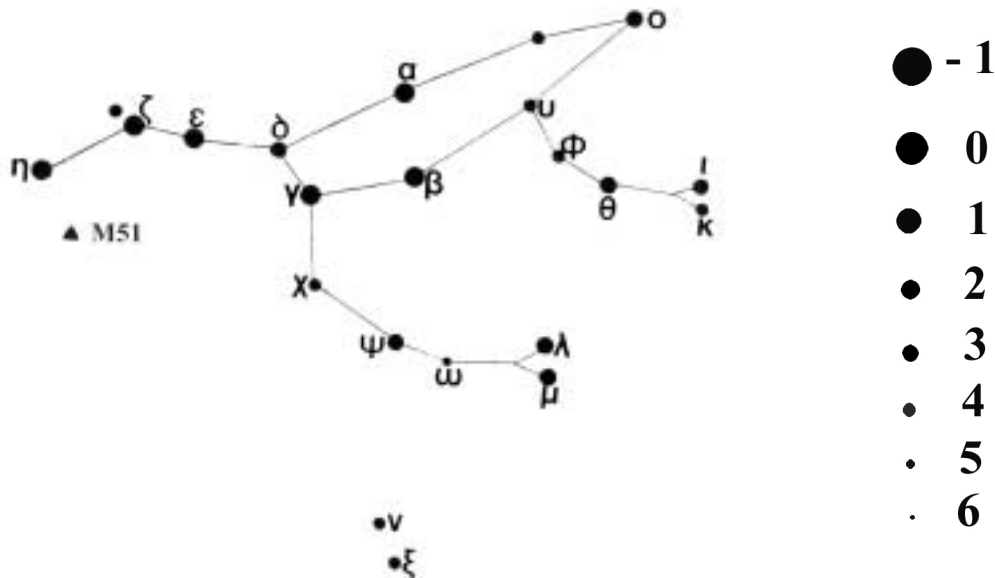
The Pleiades or Seven Sisters are a famous open or galactic star cluster found along the parameter of Taurus. The group is 2° wide and 541 L.Y. distance. (Ref. 2, p. 188) They are the 7 daughters of Atlas who all married gods but one, and she was so ashamed she hasn't shown her light since. All the names of the Pleiades originate with the Greek. (Ref. 15, p. 21)

1. **Alcyone** (al-SIGH-oh-nee) or Halcyone- "the queen who wards off evil (storms)" This is the brightest star of the Pleiades (Ref. 13, p. 274)
2. **Merope** (MERE-oh-pea) She was to marry Orion but Orion kept postponing the event. (Ref. 12, p. 297) She ended up marrying Sisyphus (very wise) son of Aeolus, grandson of Deucalion (the Greek Noah) and great grandson of Prometheus. She had sons Glaucus, Ornytion, and Sinon and may also have been the mother of Daedalus.
3. **Celaeno** "swarthy" She had sons Lycus (wolf) and Chimaerus (he-goat) by Prometheus.
4. **Taygete** "long necked" She was charmed by Zeus and gave birth to Lacedaemon, founder of Sparta. In another myth, she wasn't willing to yield to Zeus and Artemis disguised her as a female red deer to elude him.
5. **Sterope** (Sometimes spelled Asterope) She was kidnapped by Ares and gave birth to Oenomaus, King of Pisa. In another myth, she was the daughter of the river Cebren. She also may be the daughter of Porthaon and mothered the Sirens, renowned for luring sailors to their deaths with their enchanting singing.
6. **Electra** (Mother of Dardanus)- founder of the Trojan race (Ref. 12, p. 297) She was the wife of Corythus and gave Zeus a son, Dardanus, founder of Troy.
7. **Maia** (Mother of Hermes) (Ref. 12, p. 297) "grandmother," "mother," "nurse" She was the eldest and most beautiful of the sisters. She was charmed by Zeus and gave him a son Hermes. Later she became a foster-mother to Arcas (Zeus son by Callisto), while Callisto was a bear. Zeus then put Callisto and Arcas in the heavens. [She was Ursa Major, see page 82 and he was either Boötes, (page 28) or Ursa Minor.]

# URSA MAJOR

1. LATIN NAME OF CONSTELLATION ----- **Ursa Major**
2. ENGLISH NAME OF CONSTELLATION ----- **Great Bear**
3. PRONUNCIATION OF CONSTELLATION ----- **URR-sah MA-joor**
4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **April 20** (Ref. 2, p.71)
5. APPROXIMATE TIME VISIBLE AT 9P.M. - **circumpolar constellation** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **125** (Ref. 5, p. 237)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **35** (Ref. 8, p. 178)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **19** (Ref. 8, p. 178)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **3** (Ref. 8, p. 178)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°----- **2.73** (Ref. 8, p. 178)

## 7. DIAGRAM OF CONSTELLATION -



8. **ALPHA STAR OF CONSTELLATION-  $\alpha$  Dubhe** (DUBB-ee) "the bear" in Arabic is the pointer star nearer to Polaris. It is a double separated by one second of arc. Magnitude: +1.81 Ranking: 36 Distance: 123.6 light years Spectrum Class: K0 Flamsteed: #50 Hipparcos: #54061 (Ref.18) (Ref.19)

## 9. OTHER MAJOR STARS OF CONSTELLATION- (Ref. 2, p. 194)

**Beta-  $\beta$  Merak** (ME-rack) Arabic "loins of the greater bear" (Ref. 15, p. 21) is the second "Pointer star". (Ref. 2, p. 194) Magnitude: +2.34 Ranking: 80 Distance: 79.4 light years Spectrum Class: A0 Flamsteed: #64 Hipparcos: #53910 (Ref.18) (Ref.19)

**Gamma-  $\gamma$  Phecda** (FECK-dah) Arabic "the thigh of the greater bear" (Ref. 15, p. 21)

(Ref. 2, p. 194) (Phad) Magnitude: +2.41 Ranking: 85 Distance: 83.6 light years Spectrum Class: A0 Flamsteed: # 64 Hipparcos: #58001 (Ref.18) (Ref.19)

**Delta-  $\delta$  Megrez** (ME-grez) Arabic "the root of the tail of the greater bear" (Ref. 15, p. 21)

Magnitude: +3.32 Distance: 81.4 light years Spectrum Class: A2 Flamsteed: # 69 Hipparcos: #59774 (Ref.18) (Ref.19)

**Epsilon-  $\epsilon$  Alioth** (Al-lee-oth) meaning uncertain but is thought to be the ridiculously corrupt form of the ancient Arabic name Capella (Ref. 15, pp. 21-22) Alioth is somewhat variable. (Ref. 2, p. 194) Magnitude: +1.76 Ranking: 33 Distance: 80.9 light years Spectrum Class: A0 Flamsteed: # 77 Hipparcos: #62956 (Ref.18) (Ref.19)

**Zeta-  $\zeta$  Mizar** (MY-czar) (incorrectly the "girdle") Arabic name for this star meant "the female kid" (Ref. 15, p. 22) Mizar companion, Alcor, with a separation of 708 seconds of arc is the "rider" and Mizar the "horse." Alcor has been used to test eyesight during history. Magnitude: +2.22 Ranking: 70 Distance: 78.1 light years Spectrum Class: A2 Flamsteed: # 79 Hipparcos: #65378 (Ref.18) (Ref.19)

**Eta-  $\theta$  Alkaid** (AL-kaid) Arabic and sometimes Benetnash "the daughters of the greater bear" (Ref. 15, p. 22) Magnitude: +1.85 Ranking: 38 Distance: 100.6 light years Spectrum Class: B3 Flamsteed: #85 Hipparcos: #67301 (Ref.18) (Ref.19)

**10. SHAPE OF THE CONSTELLATION-** The "Big Dipper" forms a striking asterism that is very useful in finding the Great Bear. The Dipper forms the long tail of the bear that has a triangle for his head and two long legs with two stars at each paw that forms the claws.

**11. HELPFUL ALIGNMENTS-** The Big Dipper is a striking asterism which is used to find the Great Bear as the dipper's long handle makes up the tail section of the great bear.

**12. LOCATION IN THE SKY-** (Ref. 3, p. 291) Ursa Major is surrounded on the north by Draco and Camelopardalis and on the east by Boötes and Canes Venatici (KAY-knees vee-NAT-eh-see.) Coma Berenices brushes the southeastern corner of Ursa Major and Leo and Leo Minor touch it on the south. Lynx completes most of the western edge of Ursa Major.

**13. SIZE IN SQUARE DEGREES** = 1,280° **RANK IN SIZE OF 88** = 3rd  
(Ref. 2, p. 71) (Ref. 2, p. 71)

**14. APPROXIMATE BOUNDARIES BY COORDINATES-** (Ref. 5, p. 237)  
HOURS RIGHT ASCENSION 8 HOUR, 5 MINUTES TO 14 HOUR, 27 MINUTES  
DEGREES OF DECLINATION +28.8° TO +73.3°

**15. MYTHOLOGY-** Zeus fell in love with Callisto, a beautiful princess of the kingdom of Arcadia. When Callisto bore Arcas, the son of Zeus, Hera, furious with jealousy, turned Callisto into a bear. One day when Arcas had grown up and became an excellent hunter, Hera sought to bring Callisto before Arcas as prey. Zeus intervened and placed Callisto in the heavens as the



Great Bear for her own safety. Following Arcas's death, Zeus placed him in the sky near his mother as the "Little Bear." Hera, frustrated in her revenge, got Poseidon to forbid the celestial Bears any rest by dipping beneath the horizon. The bears both have extraordinary long tails acquired when Zeus swung the bears around while slinging them up into the sky. (Ref. 9, p. 81) The American Indians knew bears didn't have long tails thus the Indians have a different legend. They said three hunters were pursuing the bear around the northern sky. Alcor was the hunter carrying a pot to cook the bear in. (Ref. 2, p. 194) Some tribes claimed the chase lasted from spring to fall when the hunters' arrows hit the bear causing its blood to fall to the Earth, coloring the leaves of autumn.

**16. REMARKS-** The two "pointer stars" Alpha and Beta in Ursa Majoris indicate the position of Polaris or the "North Star," found at the end of the handle of the "Little Dipper." The "Big Dipper" of this constellation is often used as an example where stars in the Bayer system do not follow the order of brightness. In some studies this is apparently much more common than generally thought. (See the Alpha stars of Sagittarius).

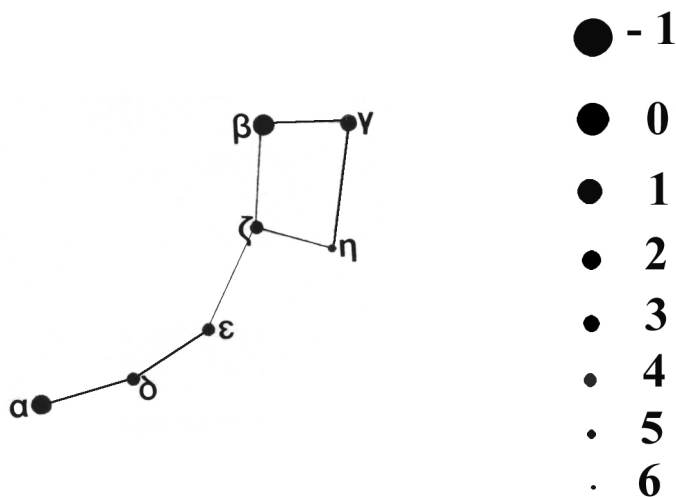
It is interesting to note that there was no "bear" constellation in the time of the Sumerians and Babylonians but this was a name meaning to them "the constellation of the long chariot." (Ref. 15, p. 21) Even today in Britain the dipper is seen as a plough not a Bear.

M51, the famous Whirlpool Galaxy, views as only a splotch of light without detail in small telescopes. It is of eighth magnitude and is an open armed spiral galaxy at a distance of 14 million light years (Ref. 2, p. 124) M51 is located in the constellation diagram #7 by the triangle. M51 is really in the upper corner of Canes Venatici (KAY-knees vee-NAT-eh-see) but is very near the star Alkaid at the tip of the asterism called the Big Dipper.

## URSA MINOR

1. LATIN NAME OF CONSTELLATION ----- **Ursa Minor**
2. ENGLISH NAME OF CONSTELLATION ----- **Little Bear**
3. PRONUNCIATION OF CONSTELLATION ----- **URR-sah MY-ner**
4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **June 25** (Ref. 2, p. 71)
5. APPROXIMATE TIME VISIBLE AT 9 P.M. - **circumpolar constellation** (Ref. 6)
6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **20** (Ref. 5, p. 237)  
 NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **9** (Ref. 8, p. 178)  
 NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **3** (Ref. 8, p. 178)  
 NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **1** (Ref. 8, p. 178)  
 STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°----- **3.51** (Ref. 8, p. 178)

## 7. DIAGRAM OF CONSTELLATION -



8. **ALPHA STAR OF CONSTELLATION-**  **$\alpha$  Polaris** (poe-LAIR-iss) Latin for "Stella polaris" has been the pole since about 300 A.D. The North Pole star is a Cepheid variable, and a double with a ninth magnitude companion, with eighteen arc seconds separation. Magnitude: +1.97 Ranking: 46 Distance: 431.2 light years Spectrum Class: F8 Flamsteed: #1 Hipparcos: #11767 (Ref.18) (Ref.19)

9. **OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p.194)

**Beta-  $\beta$  Kocab** (COE-cab) (Kocab) Arabic translation meaning "the north star" was named during the period when it was the brightest star near the pole, from about 1500 B.C. to 300 A.D. (Ref. 15, p. 23) Magnitude: +2.06 Ranking: 58 Distance: 126.4 light years Spectrum Class: A5 Flamsteed: #7 Hipparcos: #72607 (Ref.18) (Ref.19)



## VIRGO

1. LATIN NAME OF CONSTELLATION ----- **Virgo**

**Virgo is the sixth constellation of the zodiac; the sun is in Virgo from September 21 to November 1.** (Ref. 2, p. 196)

2. ENGLISH NAME OF CONSTELLATION ----- **Maiden**

3. PRONUNCIATION OF CONSTELLATION ----- **VURR-go**

4. DATE OF CULMINATION ON S. MERIDIAN 9P.M. EST- **May 25** (Ref. 2, p. 70)

5. APPROXIMATE TIME VISIBLE AT 9P.M. - **March 15 - September 1** (Ref. 6)

6. NUMBER OF STARS 6 MAGNITUDE OR BRIGHTER ----- **95** (Ref. 5, p. 237)

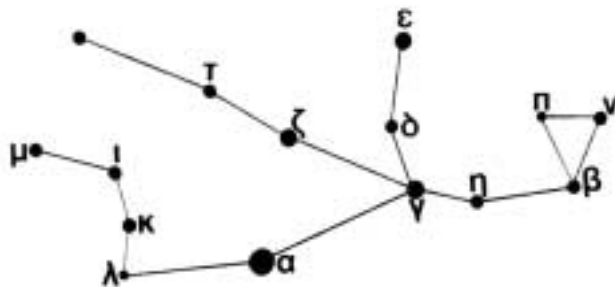
NUMBER OF STARS 5 MAGNITUDE OR BRIGHTER ----- **26** (Ref. 8, p. 178)

NUMBER OF STARS 4 MAGNITUDE OR BRIGHTER ----- **8** (Ref. 8, p. 178)

NUMBER OF STARS 2 MAGNITUDE OR BRIGHTER ----- **1** (Ref. 8, p. 178)

STAR DENSITY 5 MAGNITUDE OR BRIGHTER PER 100 SQ.°-----**2.01** (Ref. 8, p. 178)

7. DIAGRAM OF CONSTELLATION -



● - 1  
 ● 0  
 ● 1  
 ● 2  
 ● 3  
 ● 4  
 ● 5  
 ● 6

8. **ALPHA STAR OF CONSTELLATION-  $\alpha$  Spica** (SPY-kah) Latin for "ear of corn," or Arabic meaning "the unarmed prop" (Ref. 15, p. 23). The Egyptians worshipped this fifteenth brightest eclipsing binary star. Magnitude: +0.98 Ranking: 15 Distance: 262.1 light years Spectrum Class: B2 Flamsteed: #67 Hipparcos: #65474 (Ref.18) (Ref.19)

9. **OTHER MAJOR STARS OF CONSTELLATION-** (Ref. 2, p.196)

**Beta-  $\beta$  Zavijav** (Zavijava) "angle" or "corner of the barking dog" The dog originates from the influence of ancient Babylonian astronomy. (Ref. 15, p. 23) Magnitude: +3.59 Distance: 35.5 light years Spectrum Class: F8 Flamsteed: #5 Hipparcos: #57757 (Ref.18) (Ref.19)



## GLOSSARY OF TERMS

1. **ALTITUDE**- The angular distance in degrees of a celestial object above or below the horizon, measured at a right angle to the horizon
2. **ANGULAR MEASUREMENT**- The part of a circle of the heavenly sphere or the distance a celestial object is from a reference point, as the horizon. A good observer with proper vision and the best gazing conditions can separate objects as close as six minutes of arc.
  - a. One degree equals the width of the Full Moon. One minute of arc equals one-sixtieth ( $1/60$ ) of a degree.
  - b. One second of arc equals one thirty-six hundredths ( $1/3600$ ) of a degree.
3. **ASTERISM**- A group of stars forming a pattern in the sky that isn't recognized as one of the formal 88 constellations, example: "The Summer Triangle."
4. **APPARENT MAGNITUDE**- Apparent magnitude is the brightness of a celestial object as viewed from the Earth.
5. **APPARENT MOTION**- The illusion of the sky's motion as a result of the Earth's rotation
6. **ASTRONOMY**- Astronomy is the study of celestial objects and their motions.
7. **BINARY STAR**- A double star system where one star revolves around a companion star (More than half the stars are binary.)
8. **CARDINAL POINTS**- The four main directions: north, east, south and west
9. **CELESTIAL**- Refers to the heavens
10. **CIRCUMPOLAR MOTION**- Circular apparent motion of the northern constellations (see apparent motion).
11. **CIRCUMPOLAR STARS**- Stars lying closer to the celestial pole than the horizon and appear to circle the pole star in the night sky without setting.
12. **CIRCUMPOLAR CONSTELLATIONS**- Constellations lying closer to the celestial pole than the horizon that appear to circle the pole star in the night sky without setting.
13. **CONSTELLATION**- Constellation is a pattern of stars within an area of the sky named after objects, animals, and people.

14. **DIURNAL MOTION**- Diurnal motion is the daily apparent motion of the celestial objects caused by the rotation of the Earth (see apparent motion).
15. **GALAXY**- Galaxy is a large island of millions to hundreds of billions of stars and in many cases contains large amounts of gas and dust.
16. **HORIZON**- The imaginary boundary between the sky and the land
17. **LIGHT POLLUTION**- Unwanted light in the night sky, as from city lights, that makes it more difficult for astronomers to see stars, constellations and photograph celestial objects
18. **LIGHT YEAR**- Approximately six trillion miles or the distance light travels in one year's time
19. **MASSIER CATALOGUE**- A catalogue of nebulous objects compiled by Charles Messier in 1787 to prevent those objects from being confused with comets, example: M1 is the Crab Nebula.
20. **MERIDIAN**- An imaginary north to south line passing through the zenith
21. **METEOR**- Space debris observed as a streak of light, due to the heat of friction in the sky passing through the Earth's atmosphere
22. **METEOROID**- Smaller space debris still in or still traveling through space
23. **METEORITE**- Space debris too large to burn up while going through the Earth's atmosphere, thereby hitting the Earth's surface
24. **MOON**- Earth's natural satellite and nearest neighbor in space and fifth largest moon of the solar system
25. **NORTH STAR (POLARIS)**- The star observed overhead at the North Pole; from Fairfax County, Virginia, Polaris is about half way up ( $39^\circ$ ) in the northern sky above the north horizon.
26. **NORTHERN LIGHTS (AURORA BOREALIS)**- A shimmering display of lights caused by solar storms and observed in the north sky.
27. **ORBIT**- The path of a celestial object as it revolves around another celestial object
28. **PLANET**- Any of the nine main celestial objects which revolve in their orbits around the Sun

29. **PLANETARIUM**- An instrument which projects images of celestial objects and demonstrates their motions; also a place where this instrument is housed
30. **REVOLUTION**- The motion of a celestial object in its orbit, for example, the Earth revolves around the Sun in 365.25 days.
31. **ROTATION**- The motion of a celestial object spinning about its center axis The Earth rotates on it axis in 23 hours and 56 minutes.
32. **STAR**- Star is a spherical, celestial object lit by its own energy: a sun.
33. **STAR CHART**- Star chart is a map of the sky showing the brightness and location of celestial objects.
34. **SUN**- The nearest star which gives us our light and heat energy for life; one of 200 billion stars in our Milky Way Galaxy; the only star in our solar system.
35. **TELESCOPE**- An instrument with lenses that makes distant objects appear larger and closer
36. **ZENITH**- The imaginary point in the sky directly overhead, or the highest point in the sky
37. **ZODIAC**- The twelve constellations that the Sun seems to pass through during its annual journey around the celestial sphere



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## The Greek Alphabet in Star Designation

**Johannes Bayer used the lower case letters of the Greek alphabet to designate the brightness of stars in a constellation. Alpha is the brightest star but there are a few exceptions to his procedure. See page16, item number eight.**

Letter	Lower Case	Upper Case
Alpha	$\alpha$	A
Beta	$\beta$	B
Gamma	$\gamma$	$\Gamma$
Delta	$\delta$	$\Delta$
Epsilon	$\epsilon$	E
Zeta	$\zeta$	Z
Eta	$\eta$	H
Theta	$\theta$	$\Theta$
Iota	$\iota$	I
Kappa	$\kappa$	K
Lambda	$\lambda$	$\Lambda$
Mu	$\mu$	M
Nu	$\nu$	N
Xi	$\xi$	$\Xi$
Omicron	$\omicron$	O
Pi	$\pi$	$\Pi$
Rho	$\rho$	P
Sigma	$\sigma$	$\Sigma$
Tau	$\tau$	T
Upsilon	$\upsilon$	Y
Phi	$\phi$	$\Phi$
Chi	$\chi$	X
Psi	$\psi$	$\Psi$
Omega	$\omega$	$\Omega$