

## **A Collection of Curricula for the STARLAB® Constellation Cylinder**



*Including:*

*Constellation Identification by Science First®/STARLAB®*

*A Look at the Constellations Cylinder by Joyce Kloncz*

*Stories in the Stars by Gary D. Kratzer*



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# Constellation Identification

## Note

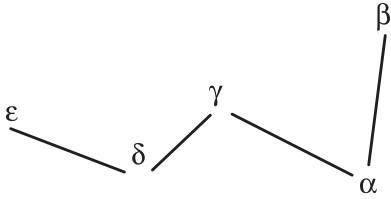
Following are diagrams and notes on each constellation included in the Constellation Cylinder. Wherever possible, we have listed the primary stars, their spectral class (abbreviated as SC), apparent or visual magnitude (abbreviated as VM), and distance in light years (abbreviated as LY). Also when possible we have given a brief summary of the Greek mythology that accompanies the constellation and any noteworthy remarks. They are arranged by season in the northern hemisphere. For your convenience, we have also listed the 48 cylinder constellations alphabetically with the corresponding page number below.

## Alphabetical Listing of Constellations

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<i>Columba (Winter)</i> .....	10	<i>Ursa Major (Northern Celestial Pole)</i> .....	5
<i>Corvus (Spring)</i> .....	14	<i>Ursa Minor (Northern Celestial Pole)</i> .....	5
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<i>Lepus (Winter)</i> .....	11		
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## Northern Celestial Pole Constellations

### Cassiopeia



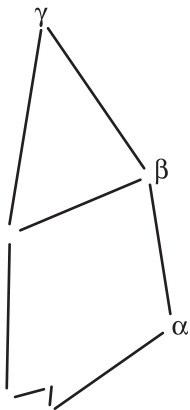
#### Chief Stars

- α Schedar — orange giant, SC: K0, VM: 2.24, LY: 229
- β Caph — yellowish giant to subgiant, SC: F2, VM: 2.28, LY: 54
- γ Cih — giant, SC: B0, VM: 2.2, LY: 650
- δ Ksora (Rucbar) — SC: A5, VM: 2.68, LY: 76
- ε Segin — SC: B3, VM: 3.38, LY: 470

#### Legend

Cassiopeia was placed in the sky to be punished for her vanity. She swings every half night around the North Star. She is upside down in the chair in which she is seated, hanging on for dear life in a position most humiliating for a queen so proud of her beauty.

### Cepheus



#### Chief Stars

- α Alderamin — white main sequence, SC: A7, VM: 2.45, LY: 49
- β Alfirk — variable double star, SC: B2, VM: 3.23 to 3.35, LY: 740
- γ Alrai — subgiant, SC: A7, VM: 3.21, LY: 50

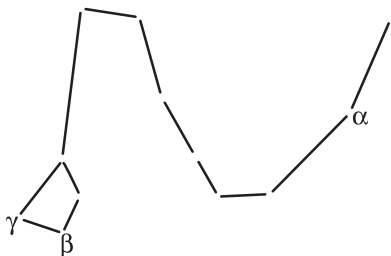
#### Legend

King Cepheus, King of Ethiopia and descended from Zeus, always played second fiddle to his wife, Queen Cassiopeia, who ruled the roost.

#### Of Special Note

Cepheus is intersected by the Milky Way and is full of many double stars, clusters and variable stars.

### Draco (The Dragon)



#### Chief Stars

- α Thuban — white giant, SC: A0, VM: 3.67, LY: 309
- β Alwaid — double star, SC: G2, VM: 2.79, LY: 365
- γ Eltanin (Etamin) — orange giant, SC: K5, VM: 2.24, LY: 148

#### Legend

Draco is the dragon sent by Juno to guard the golden apples which she had given Jupiter as her wedding present to him.

#### Of Special Note

Thuban was very near the Celestial North Pole 4,500 years ago.

## Ursa Major (The Great Bear)

### Chief Stars

- $\alpha$  Dubhe — orange giant, SC: K0, VM: 1.81, LY: 124
- $\beta$  Merak — white main sequence, SC: A1, VM: 2.34, LY: 79
- $\gamma$  Phecda — white main sequence, SC: A0, VM: 2.41 LY: 84
- $\delta$  Megrez — white main sequence, SC: A3, VM: 3.32, LY: 81
- $\epsilon$  Alioth — SC: A0, VM: 1.76, LY: 81
- $\eta$  Alkaid (Benetnash) — blue main sequence, SC: B3, VM: 1.85, LY: 101
- $\zeta$  Mizar — white main sequence, SC: A1, VM: 2.23, LY: 78

### Legend

Jupiter married a beautiful earth maiden named Callisto. This enraged his goddess wife, Juno who sought revenge on Callisto by taking away her beauty — she turned Callisto into a mangy bear. One day while hunting, Callisto's son, Arcas, was about to shoot a bear with an arrow when Jupiter intervened. The bear was, of course, his mother. Jupiter turned Arcas into a bear to join his mother. He grasped both bears by their short, stumpy tails and heaved them high up into the heavens where they landed near the North Pole. The bears were so heavy, the strain on their tails caused them to be stretched to the unusual lengths seen in their heavenly constellations.

### Of Special Note

Dubhe and Merak form a line that intersects with Polaris A in Ursa Minor.

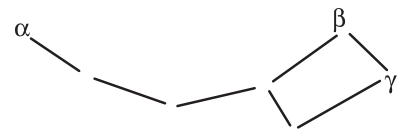
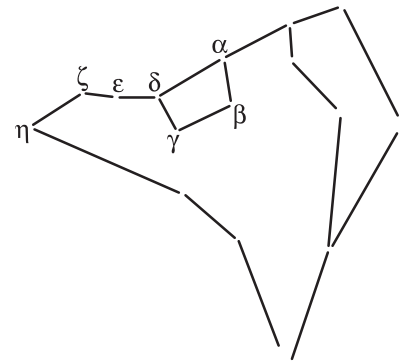
## Ursa Minor (The Little Bear)

### Chief Stars

- $\alpha$  Polaris A — variable bright or supergiant, SC: F7, VM: 1.97, LY: 431
- $\beta$  Kochab — orange giant, SC: K4, VM: 2.07, LY: 126
- $\gamma$  Pherkad — SC: A3, VM: 3.05, LY: 180

### Of Special Note

The Little Bear is better known as the Little Dipper. Polaris, the North Star, has been the guide star for those who sail their ships across the northern hemisphere and for those who travel across the land.



### Abbreviation Key

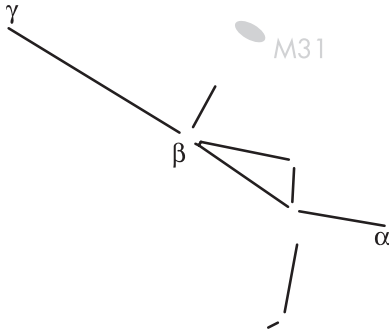
SC = Spectral Class

VM = Visual Magnitude

LY = Light Years

## Autumn Constellations

### Andromeda (Andromeda)



#### Chief Stars

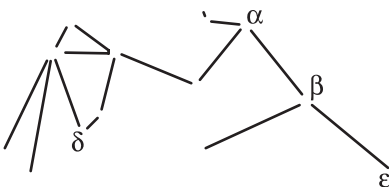
- α Alpheratz — blue subgiant, SC: A0, VM: 2.07, LY: 97
- β Mirach — red giant, SC: M0, VM: 2.07, LY: 199
- γ Almak A — yellow-orange giant, SC: K3, VM: 2.1, LY: 355

#### Legend

The daughter of King Cepheus and Queen Cassiopeia is chained by her ankles and wrists to a rocky island where she is offered as a sacrifice to Cetus, the Sea Monster.

#### Of Special Note

Located just northeast of Andromeda is the Great Nebula (NGC 224 or M31), a large spiral galaxy, which can be viewed unaided.



### Aquarius (The Water Carrier)

#### Chief Stars

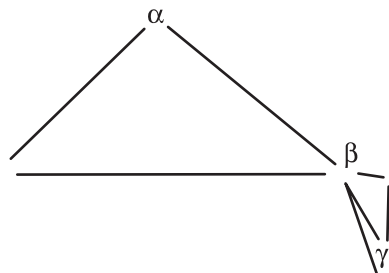
- α Sadalmelek — yellow supergiant, SC: G2, VM: 2.95, LY: 760
- β Sadalsud — supergiant, SC: G0, VM: 3.07, LY: 1100
- δ Skat — SC: A2, VM: 3.51, LY: 78
- ε Alkali — SC: A1, VM: 3.83, LY: 172

#### Legend

Aquarius rises above the southern horizon in autumn. It is comprised of relatively faint stars but represents Aquarius, a giant, holding a huge upturned urn from which pours an unending stream of water.

#### Of Special Note

Within Aquarius are NGC 7089, a globular star cluster, Helix (NGC 7293) a planetary nebula and Saturn (NGC 7009) a nebula resembling the planet Saturn due to its position. The ecliptic passes right through Aquarius.



### Aries (The Ram)

#### Chief Stars

- α Hamal — orange giant, SC: K2, VM: 2.01, LY: 65.9
- β Sheratan — SC: A5, VM: 2.64, LY: 50
- γ Mesarthim — hydrogen double star, SC: A0, VM: 3.9, LY: 148 and 172

#### Of Special Note

Aries is a small constellation that lies between Pisces and Taurus with three faint stars that form the ram. Despite the fact that precession has caused the vernal point to shift into the constellation, Pisces, Aries remains one of the most famous of the zodiac constellations. From 2100 BC to 100 AD when stars tracked the passage of time, it was the stars of Aries that announced the spring equinox.

## Cetus (The Sea Monster)

### Chief Stars

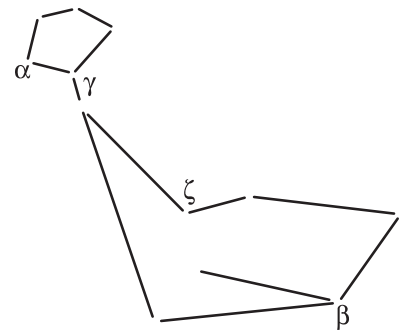
- $\alpha$  Menkar — red giant, SC: M1, VM: 2.54, LY: 220
- $\beta$  Diphda (Deneb Kaitos) — yellow-red giant, SC: G9, VM: 2.04, LY: 96
- $\gamma$  Alkaffaljdhina — SC: A2, VM: 3.47, LY: 82
- $\zeta$  Baten Kaitos — giant, SC: K2, VM: 3.73, LY: 148

### Legend

Cetus is the sea monster that Neptune sent to devour Andromeda and thus punish Queen Cassiopeia. Cetus had the forked tail of a dolphin, paws of an animal, head of a greyhound with short tusks and a long, scaly neck. It was said to be 40 feet in length.

### Of Special Note

Within Cetus is a well-known red giant star, Mira Ceti, with an apparent magnitude of 2.5 to 9.6 and a long luminosity period of 331 days.



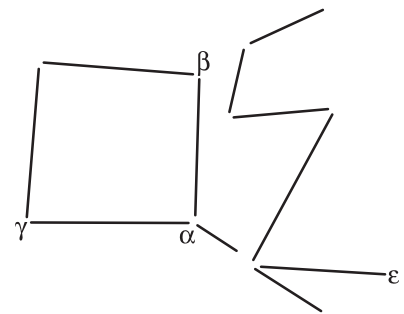
## Pegasus (The Winged Horse)

### Chief Stars

- $\alpha$  Markab — blue, SC: B9, VM: 2.49, LY: 140
- $\beta$  Scheat — red giant, SC: M2, VM: 2.44, LY: 172
- $\gamma$  Algenib — subgiant, SC: B2, VM: 2.83, LY: 333
- $\epsilon$  Enif — orange supergiant, SC: K2, VM: 2.38, LY: 670

### Legend

Pegasus was the winged horse which carried Perseus through the sky as he returned the head of the Medusa. Neptune, who had loved Medusa when she was young and pretty, created Pegasus from white beach sand, rainbow-colored foam of breaking waves, and drops of blood from the severed head of Medusa.



## Perseus (The Champion)

### Chief Stars

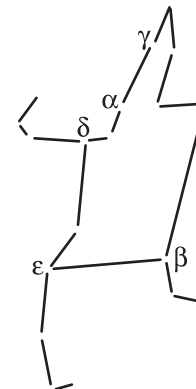
- $\alpha$  Algenib (Mirfak) — yellowish supergiant, SC: F5, VM: 1.79, LY: 592
- $\beta$  Algol — triple star system, VM: 2.09, LY: 93
  - A — blue, SC: B8
  - B — yellow, SC: G8
- $\gamma$  Gamma Persei — giant, SC: G8, VM: 2.93, LY: 205
- $\epsilon$  Epsilon Persei — helium, SC: B0.5, VM: 2.93, LY: 1100
- $\zeta$  Menkhib (Atik) — supergiant, SC: B1, VM: 2.85, LY: 820

### Legend

Perseus was known for two courageous acts: bringing back the head of the Medusa, who had snakes for her hair and was so ugly that anyone who looked at her turned to stone and saving Andromeda from Cetus the sea monster.

### Of Special Note

Within Perseus are two open star clusters NGC 869 and NGC 884 (also called the



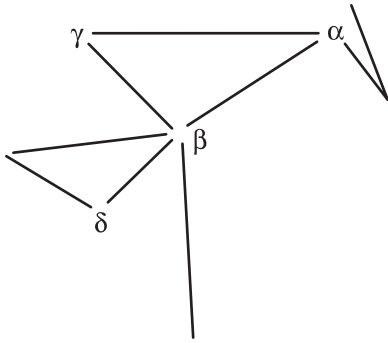
### Abbreviation Key

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Sword Handle) which are known together as the Double Cluster. They can be seen with the naked eye northeast of Gamma Persei.



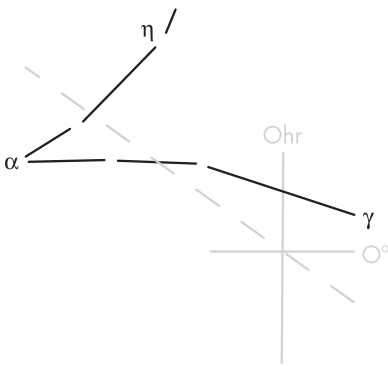
## Phoenix (The Phoenix)

### Chief Stars

- $\alpha$  Ankaa — orange giant, SC: K0, VM: 2.4, LY: 77
- $\beta$  Beta Phoenicis — SC: G8, VM: 3.31, LY: 180
- $\gamma$  Gamma Phoenicis — red star, SC: K5, VM: 3.40, LY: 1400
- $\delta$  Delta Phoenicis — yellow star, SC: G4, VM: 3.96, LY: 120

### Legend (Classical Mythology)

A mythical bird of glorious plumage that lived 500 years at a time. It would then burn itself on a funeral pyre and emerge with renewed youth to begin another life cycle.



## Pisces (The Fishes)

### Chief Stars

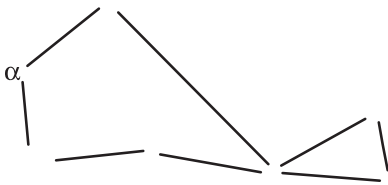
- $\alpha$  Alrisha — double, SC: A2, VM: 4.33 and 5.23, LY: 130
- $\gamma$  Gamma Piscium — yellow giant, SC: G8, VM: 3.69, LY: 125
- $\eta$  Alpherq — SC: G8, VM: 3.62

### Legend

Venus and her son, Cupid, changed themselves into fishes to escape Typhon, a fire-breathing dragon. Typhon could survive only in flames and fire but not in water. Venus and Cupid tied themselves together with a long cord so that they would not be separated.

### Of Special Note

The vernal equinox occurs just south of Gamma Piscium. The sun passes through this point around March 21.



## Piscis Austrinus (The Southern Fish)

### Chief Stars

- $\alpha$  Fomalhaut — white, SC: A3, VM: 1.17, LY: 25

### Legend

Fomalhaut, meaning "mouth of the fish," marks the mouth of the Southern Fish which is opened wide to catch the torrent of water pouring down from the upturned urn of Aquarius, the Water Carrier, located above Pisces Australis.

### Of Special Note

Fomalhaut is the nearest young star to earth, where planets appear to be forming.



## Winter Constellations

### Auriga (The Charioteer)

#### Chief Stars

- $\alpha$  Capella — quadruple star, VM: 0.08, LY: 42.2
  - A — yellow giant, SC: G5
  - B — yellow giant, SC: G0
  - H — (pair) red dwarves, SC: M1 and M5
- $\beta$  Menkalinan — multiple star system
  - A — white subgiant, SC: A2, VM 1.9, LY: 82.1
- $\epsilon$  Epsilon Aurigae — variable supergiant, SC: F0, VM: 3.4 to 4.5, LY: 3300
- $\iota$  Hassaleh — SC: K3, VM: 2.69
- $\theta$  Theta Aurigae — SC: A0, VM: 2.62

#### Of Special Note

Auriga is a large constellation including the bright star, Capella. The rising of Capella was a welcome sign for shepherds for it foretold the coming of the rainy season upon which they relied for renewed growth of pasture land. On the other hand, the rising of Capella was a most unwelcome sign for sailors for it signaled the beginning of the stormy season. The kids were regarded as mad stars by sailors' wives, who feared for the well-being of their men at sea during the stormy season. Within Auriga are several open star clusters, M36, M37 and M38 between Theta Aurigae and Hassaleh.

### Canis Major (The Greater Dog)

#### Chief Stars

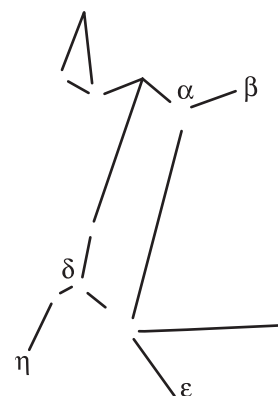
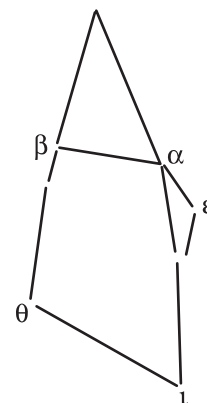
- $\alpha$  Sirius — white main sequence, SC: A1, VM: -1.44, LY: 9
- $\beta$  Mirzam — blue subgiant or giant, SC: B1, VM: 1.98, LY: 500
- $\delta$  Wezen — yellowish supergiant, SC: F8, VM: 1.83, LY: 1790
- $\epsilon$  Adhara — blue bright giant, SC: B2, VM: 1.5, LY: 431
- $\eta$  Aludra — blue supergiant, SC: B5, VM: 2.45, LY: 3200

#### Legend

Canis Major is the largest of the hunting dogs that had been Orion's faithful companions on Earth. He was placed at Orion's feet in the sky so that he could continue to have his help as he chased Taurus the Bull across the heavens.

#### Of Special Note

Sirius is one of the closest stars to Earth. It is also the brightest star in the night sky.

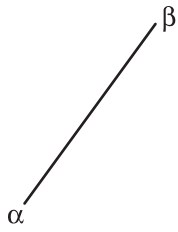


#### Abbreviation Key

SC = Spectral Class

VM = Visual Magnitude

LY = Light Years



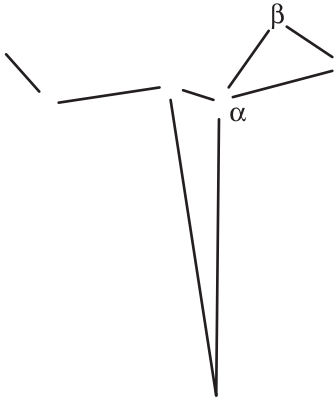
## Canis Minor (The Lesser Dog)

### Chief Stars

- $\alpha$  Procyon — (binary) yellowish subgiant, SC: F5, VM: 0.4, LY: 11
- $\beta$  Gomeisa — SC: B8, VM: 2.9, LY: 136

### Legend

Canis Minor is the second and smaller of the two hunting dogs placed in the sky to keep Orion company.



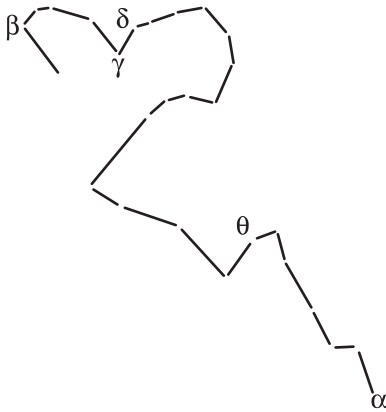
## Columba (The Dove)

### Chief Stars

- $\alpha$  Phakt — double star, SC: B8, VM: 2.64, LY: 148
- $\beta$  Wazn — subgiant, SC: K2, VM: 3.12, LY: 120

### Of Special Note

Columba was first identified as a separate constellation by Petrus Plancius in 1592. Plancius renamed Argo Navis to be Noah's Ark and identified Columba as the dove sent out by Noah in search of dry land as the great flood ebbed that had covered the world.



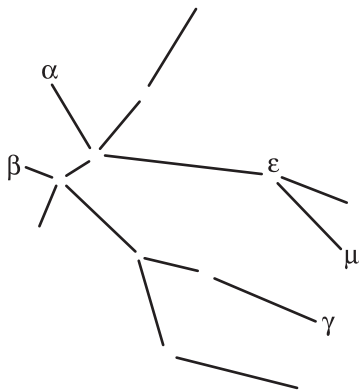
## Eridanus (The River Eridanus)

### Chief Stars

- $\alpha$  Achernar — blue main sequence, SC: B3, VM: 0.45, LY: 144
- $\beta$  Cursa — SC: A3, VM: 2.79, LY: 82
- $\gamma$  Zaurak — red giant, SC: M0, VM: 2.95, LY: 375
- $\delta$  Rana — dwarf, SC: K0, VM: 3.54, LY: 29
- $\theta$  Acamar — binary, SC: A3 and A2, VM: 2.88, LY: 161

### Of Special Note

Eridanus, the river of the heavens, can be traced from where it starts close to Rigel at the foot of Orion, to where it winds down and disappears below the southern horizon. It stretches more than  $60^\circ$  in its long course and is outlined by a host of 3rd magnitude stars. Achernar, though, is one of the brightest stars in the night sky.



## Gemini (The Twins)

### Chief Stars

- $\alpha$  Castor — triple star system
  - A — white main sequence, SC: A1, VM: 2.0, LY: 45
  - B — main sequence, SC: A5, VM: 2.8
  - C — red main sequence dwarf, SC: M1
- $\beta$  Pollux — orange giant, SC: K0, VM: 1.16, LY: 34
- $\gamma$  Alhena — white subgiant, SC: A0, VM: 1.93, LY: 105
- $\epsilon$  Mebsuta — supergiant, SC: G8, VM: 3.18, LY: 1100
- $\mu$  Tejat — variable, SC: M3, VM: 2.88

### Legend

In Greek mythology, Castor (a mortal) and Pollux (immortal) were twin brothers so devoted to each other that they were inseparable. When Castor died in battle, Pollux begged Jupiter to take away his immortality so he too could die. Jupiter arranged for Pollux to spend half of each day with Castor in Hades, and Castor to spend the other half with Pollux on Mount Olympus among the Gods. Eventually Jupiter honored the twins by changing them into stars and placing them in the heavens as a memorial to brotherly love.

### Of Special Note

Gemini, a zodiac constellation, has two very bright stars, Castor and Pollux. It is a good viewing point for planets as it is the culminating point of the ecliptic. The large constellation lies between Cancer and Taurus. Also within Gemini and viewable with binoculars is NGC 2168, an open star cluster.

## Lepus (The Hare)

### Chief Stars

- $\alpha$  Arneb — supergiant, SC: F0, VM: 2.58, LY: 1280
- $\beta$  Nihal (Nibal) — yellow bright giant, SC: G5, VM: 2.81, LY: 159
- $\epsilon$  Epsilon Leporis — giant, SC: K5, VM: 3.19, LY: 220

### Legend

Lepus was located below Orion, who was so busy chasing Taurus the Bull that the hare was able to remain unnoticed as long as he stayed absolutely quiet. Or, another thought is that the hare stayed below Orion in hopes that he would remain unnoticed by Sirius, the Big Dog who was swiftly pursuing him.

### Of Special Note

Within Lepus is a globular cluster, NGC 1904 (M79).

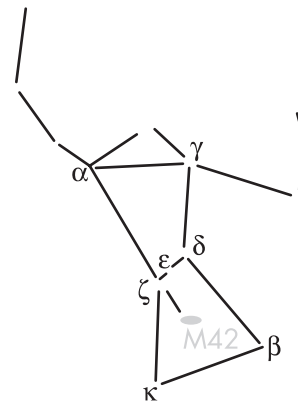
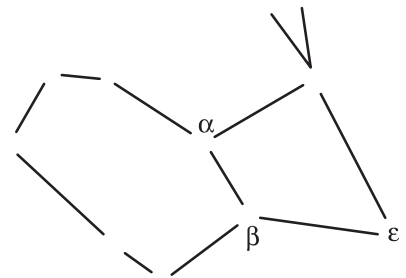
## Orion (Orion)

### Chief Stars

- $\alpha$  Betelgeuse — red supergiant, SC: M1, VM: 0.45, LY: 427
- $\beta$  Rigel — multiple star system, VM: 0.18, LY: 770
  - A — blue supergiant, SC: B8
  - B, C — binary
- $\gamma$  Bellatrix — blue normal giant, SC: B2, VM: 1.64, LY: 243
- $\delta$  Mintaka — blue bright giant, SC: O9.5, VM: 2.25, LY: 920
- $\epsilon$  Alnilam — blue supergiant, SC: B0, VM: 1.69, LY: 1340
- $\zeta$  Alnitak — double, VM: 1.74, LY: 820
  - A — blue supergiant, SC: O9.5
  - Companion — yellow
- $\kappa$  Saiph — blue supergiant, SC: B0.5, VM: 2.07, LY: 720

### Legend

Orion was the bravest hunter of ancient times. Diana, goddess of both the moon and hunting, fell in love with him and began to neglect her duty of driving the moon chariot across the sky at night so that she could hunt with Orion. When her brother



### Abbreviation Key

SC = Spectral Class

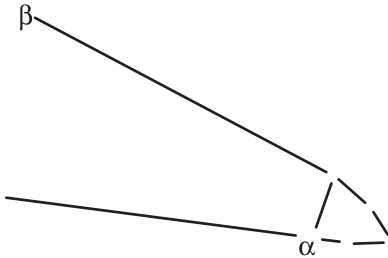
VM = Visual Magnitude

LY = Light Years

Apollo heard of this neglect, he tricked Diana into hitting Orion with her bow and arrow. When she realized what had happened, she put Orion's body in her moon chariot and drove to the darkest part of the sky. There she placed the body of her beloved Orion.

**Of Special Note**

M42 (Orion Nebula) and M43 are part of the sword of Orion.



## Taurus (The Bull)

**Chief Stars**

$\alpha$  Aldebaran — orange giant, SC: K5, VM: 0.87, LY: 65

$\beta$  Elnath — blue giant, SC: B7, VM: 1.65, LY: 131

**Legend**

Jupiter, disguised as a snow-white bull, came down from Mount Olympus one day to where Europa, a beautiful maiden, was playing in the meadow. The bull was so gentle that Europa climbed on its back. Then off sped Jupiter to the seashore, where he plunged into the waves and swam with his captive Europa across to the island of Crete. There, Jupiter revealed himself as the king of the gods and won Europa as his bride.

**Of Special Note**

Within Taurus, the second sign of the zodiac, lies the Pleiades (M45) or the Seven Sisters, an open star cluster with seven stars. Also lies a v-shaped asterism, the Hyades in the bull's mouth.

## Spring Constellations

### Boötes (The Herdsman) and Canes Venatici (The Hunting Dogs)

#### Chief Stars in Boötes

- $\alpha$  Arcturus — binary, VM: -0.05, LY: 37  
A — orange giant, SC: K1.5
- $\beta$  Nekkar — giant, SC: G8, VM: 3.5, LY: 136
- $\gamma$  Haris (Sequinus) — dwarf, SC: A7, VM: 3.0, LY: 99
- $\epsilon$  Izar A — orange subgiant to giant, SC: K0, VM: 2.35, LY: 210

#### Of Special Note for Boötes

Boötes contains Arcturus, the 4th brightest star in the night sky.

#### Chief Stars in Canes Venatici

- $\alpha$  CorCaroli 2 — binary star, SC: A0, VM: 2.89, LY: 110
- $\beta$  Asterion — dwarf, SC: G0, VM: 4.32, LY: 30

#### Legend

Boötes and his two hunting dogs, Canes and Venatici, were put in the heavens to keep watch over the Big Bear and make certain that it stayed forever in its proper place, endlessly circling the North Star.

#### Of Special Note

Canes Venatici contains the spiral nebula NGC 5194 (M51) and many galaxies.

### Cancer (The Crab)

#### Chief Stars

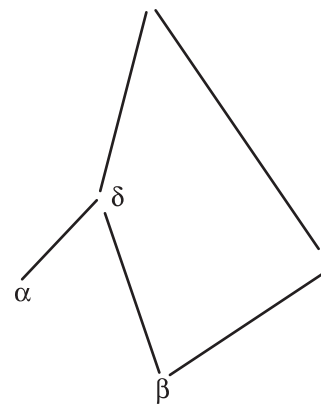
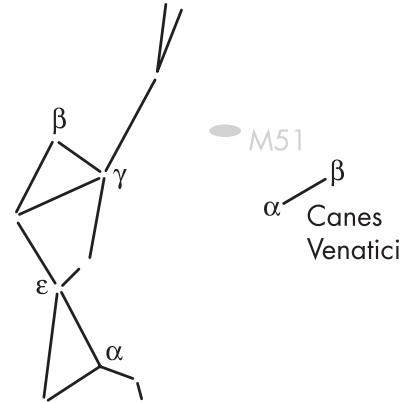
- $\alpha$  Acubens — double star, SC: F0, VM: 4.27, LY: 99
- $\beta$  Altarf — SC: K4, VM: 3.52
- $\delta$  Asellus Australis — giant, SC: K0, VM: 3.94, LY: 220

#### Legend

Juno sent Cancer to annoy Hercules as he fought his desperate battle with the many-headed Hydra, the water snake. Hercules easily crushed the crab with his foot, but Juno who realized the creature had done its best in trying to serve her, rewarded it by placing it as a constellation in the sky (albeit very faint).

#### Of Special Note

Within Cancer are two open clusters, M44 (The Beehive or Manger), an easy naked-eye object to observe, and M67.

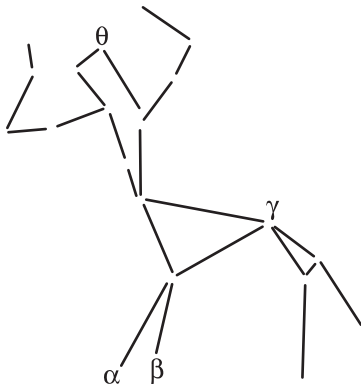


#### Abbreviation Key

SC = Spectral Class

VM = Visual Magnitude

LY = Light Years



## Centaurus (The Centaur)

### Chief Stars

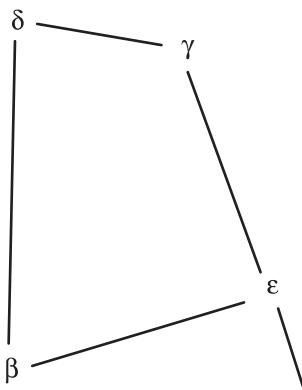
- $\alpha$  Alpha Centauri (Rigel Kentaurus or Toliman) — triple star, VM: -0.1, LY: 4.4  
A — yellow, SC: G2  
B — orange, SC: K1, VM: 1.33  
C — red, SC: M5
- $\beta$  Hadar (Agena) — blue giant, SC: B1, VM: 0.61, LY: 525
- $\gamma$  Menkent — SC: A0, VM: 2.17, LY: 325
- $\theta$  Haratan — orange, SC: K0, VM: 2.06, LY: 61

### Legend

This constellation that is half man and half horse contains the double star Alpha Centauri or Toliman. It is visible in the southern sky, above the horizon.

### Of Special Note

Within Centaurus is a giant globular cluster, Omega Centauri which can be seen with the naked eye. Alpha Centauri is the closest star to Earth. It is also one of the brightest stars in the night sky. Alpha Centauri and Hadar are known as the pointer stars for the Southern Cross.



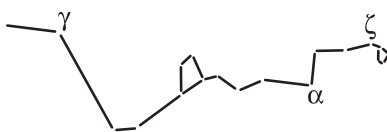
## Corvus (The Crow)

### Chief Stars

- $\beta$  Kraz — giant, SC: G5, VM: 2.65, LY: 172
- $\gamma$  Gienah (Minkar) — blue giant, SC: B8, VM: 2.58, LY: 165
- $\delta$  Algorel — SC: B9, VM: 2.95
- $\epsilon$  Epsilon Corvi — SC: K2, VM: 3.00

### Legend

The crow once had silver white feathers and a beautiful singing voice. One morning the god Apollo sent the crow to fetch a cup of water. Having spied some half-ripened figs, the crow lingered at the spring waiting for them to ripen. He had quite a feast, but soon realized he was due for a scolding from Apollo for his tardiness. The crow lied to Apollo about his whereabouts blaming Hydra the water snake, but Apollo easily saw through his falsehoods. He angrily changed his feathers to black and his song to a croak.



## Hydra (The Water Snake)

### Chief Stars

- $\alpha$  Alphard — orange subgiant or giant, SC: K3, VM: 1.99, LY: 177
- $\gamma$  Gamma Hydrae — giant, SC: G5, VM: 3.00, LY: 130
- $\zeta$  Zeta Hydrae — SC: K0, VM: 3.11

### Legend

Hydra is the water snake which the Crow tried to blame for delaying him so long in bringing back the cup of water (Crater) to Apollo. Hydra was a multiheaded snake-like monster who was the offspring of the monster Typhon and the Echidna — a creature that was half snake and half woman. The water snake was difficult to kill, because when one head was cut off, two more heads grew back out of the stump of the old one. Hercules was able to slay the monster with the aid of his charioteer Iolaus,

who burned the stumps with a torch as Hercules cut off the heads of the monster. It was said that one of the heads of the monster was immortal.

#### Of Special Note

Hydra is one of the longest constellations, stretching out for 100° across a full quarter of the sky. Halfway down its long, snaky coils are the two small constellations of Corvus, the Crow and Crater, the Cup.

## Leo (The Lion)

#### Chief Stars

- $\alpha$  Regulus — multiple star system, VM: 1.36, LY: 77
  - A — blue main sequence, SC: B7
  - B — orange main sequence, SC: K1, VM: 8.13
  - C — dwarf
- $\beta$  Denebola — double, white main sequence, SC: A3, VM: 2.14, LY: 36
- $\gamma$  Algieba A — yellow-orange giant, SC: K0, VM: 2.01, LY: 126
- $\delta$  Zosma — SC: A4, VM: 2.56, LY: 68

#### Of Special Note

Leo is the fourth zodiac constellation lying directly on the ecliptic. Regulus was always a star of great importance to ancient astronomers who considered it to be the ruler over all other stars. Its duty was to keep them all in order and in their proper places in the sky. The majestic head and mane of Leo, the Lion are formed by the curving line of stars known as the Sickle. Within Leo are several bright barred spiral galaxies, NGC 3623, NGC 3627, NGC 3351 and NGC 3368.

## Lupus (The Wolf)

#### Chief Stars

- $\alpha$  Men — helium, SC: B1, VM: 2.3, LY: 820
- $\gamma$  Gamma Lupi — SC: B3, VM: 2.78, LY: 230

#### Legend

The Wolf is usually pictured as hanging from a pole carried by the Centaur, which is the next constellation to the west. The writers of classical times considered this area of the sky to be part of the Centaur. It was only in Renaissance times that the constellation become identified with a wolf.

#### Of Special Note

Lupus lies on the Milky Way and therefore has many stars within it.

## Virgo (The Virgin)

#### Chief Stars

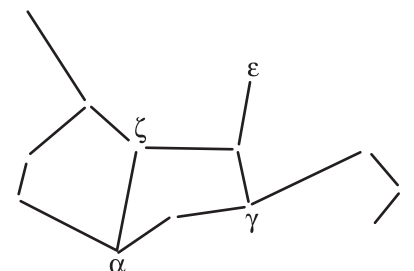
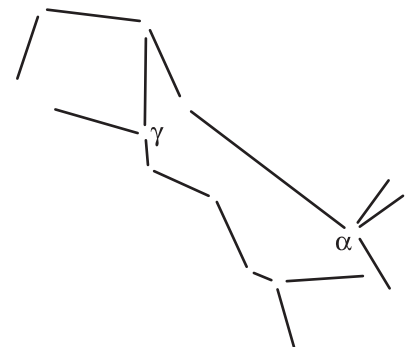
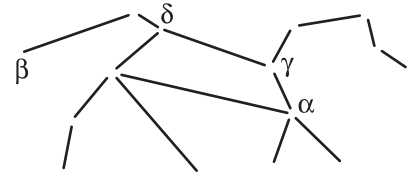
- $\alpha$  Spica — blue subgiant or giant and blue main sequence, SC: B1 and B2, VM: 0.98, LY: 262
- $\gamma$  Porrima (Arich) — dwarf, SC: F0, VM: 2.75, LY: 35
- $\epsilon$  Vindemiatrix — yellow giant, SC: G9, VM: 2.83, LY: 93
- $\zeta$  Heze — SC: A3, VM: 3.37

#### Abbreviation Key

SC = Spectral Class

VM = Visual Magnitude

LY = Light Years



**Of Special Note**

Within Virgo are many galaxies that are viewable with a telescope. One in particular is M104 (Sombrero Galaxy) which does, indeed, look like a sombrero through a telescope.



## Summer Constellations

### Aquila (The Eagle)

#### Chief Stars

- $\alpha$  Altair — white main sequence, SC: A7, VM: 0.76, LY: 16.77
- $\beta$  Alshain — binary star system, VM: 3.71, LY: 44.7
  - A — yellow subgiant, SC: G8
  - B — red dwarf, SC: M3
- $\zeta$  Dheneb — SC: B9, VM: 2.99

#### Legend

The eagle was Jupiter's favorite bird and was given many difficult tasks to do.

#### Of Special Note

Altair is very close to Earth at only 16.7 light years. Also within Aquila is Eta Aquilae, a giant star from the spectral class G0. It is a variable star with a visual magnitude that varies from 4.1 to 5.3 in a 7.18 day period.

### Ara (The Altar)

#### Chief Stars

- $\alpha$  Alpha Arae — SC: B3, VM: 2.97, LY: 220
- $\beta$  Beta Arae — SC: K3, VM: 2.85, LY: 930
- $\gamma$  Gamma Arae — helium star, VM: 3.51, LY: 148

#### Legend

This constellation lies below Scorpius and contains a number of bright stars. The celestial altar Ara was set into the heavens by the Olympians. Some say that the altar was placed before the great war representing the site where the Olympians battled the Titans. Others say that the altar was erected by the Olympians after the war to commemorate their victory. Ara was also known as the altar that Noah built after the great flood.

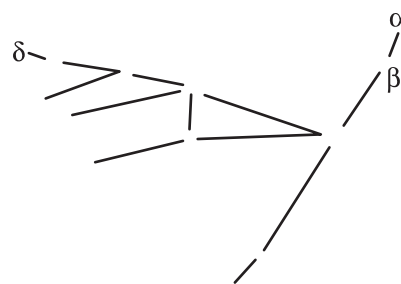
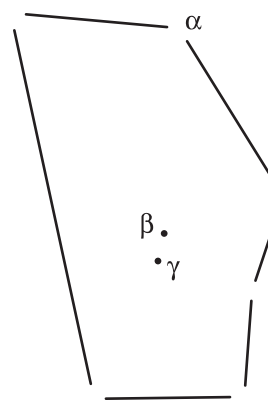
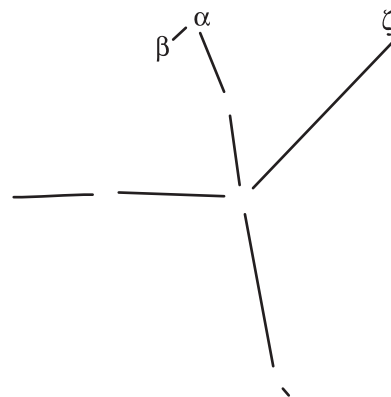
### Capricornus (The Goat)

#### Chief Stars

- $\alpha_2$  Al Giedi — double, SC: G9, VM: 3.57, LY: 1100
- $\beta$  Dabih — dwarf, SC: F8, VM: 3.08, LY: 250
- $\delta$  Deneb Algiedi — variable, SC: A5, VM: 2.87, LY: 50

#### Legend

The figure of a goat, the animal most famous for his climbing ability, was chosen to represent the constellation in which the sun was found at this time. The goat of the heavens is half goat and half fish, thus a creature not only able to climb, but also at home in the rains and floods of the winter season.

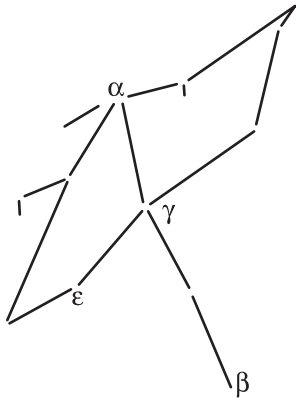


#### Abbreviation Key

SC = Spectral Class

VM = Visual Magnitude

LY = Light Years



### Of Special Note

Capricornus appears in the sky at the time of the winter solstice when the sun stops dropping and begins to climb higher and higher in the sky day by day. It is the tenth sign of the zodiac.

## Cygnus (The Swan)

### Chief Stars

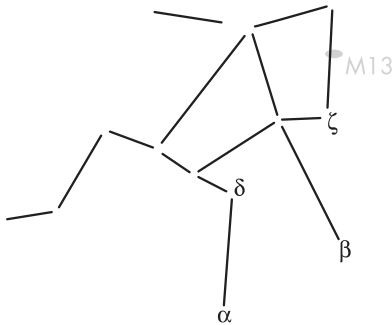
- α Deneb — white supergiant, SC: A2, VM: 1.25, LY: 3200
- β Albireo — double star, VM: 3.05, LY: 386
  - A — yellow bright giant, SC: K3
  - Companion — blue
- γ Sadr — yellowish supergiant, SC: F8, VM: 2.23, LY: 1520
- ε Gienah — orange giant, SC: K0, VM: 2.48, LY: 72

### Legend

Cygnus was the best friend of Phaeton, son of Apollo. When Phaeton was struck by lightning bolts and fell into the river Eridanus, Cygnus dove into the river over and over again in search of his body. Jupiter was so moved by the love and devotion that Cygnus showed for Phaeton that he turned Cygnus into a swan so he could dive more easily. Finally after Cygnus gave up in despair of ever finding the body of Phaeton, Jupiter placed him in the heavens as a swan.

### Of Special Note

Alberio, a binary star, is noted for its two distinct colors, blue and yellow which can be seen using a telescope.



## Hercules

### Chief Stars

- α Rasalgethi — multiple star system, VM: 2.78, LY: 382
  - A — red bright or supergiant, SC: M5
  - B — binary
- β Kornephoros — giant, SC: G8, VM: 2.77, LY: 125
- δ Sarin — blue star, SC: A3, VM: 3.16, LY: 105
- ζ Rutilicus — SC: G0, VM: 2.81

### Legend

Hercules was the son of Jupiter and one of his mortal wives. His birth made Jupiter's goddess wife, Juno, so jealous that she decided to make Hercules' life miserable. While he was still a baby, she sent two huge snakes to kill him, but Hercules strangled both of them. When he had grown to manhood, Juno caused Hercules to become insane for a brief period during which he murdered his family. To atone for that dreadful deed, he was bound out as a slave and had to earn his freedom by successfully completing 12 heroic tasks, the labors of Hercules.

### Of Special Note

Within Hercules is the Hercules Cluster (NGC 6205 or M13) a globular cluster that can be seen with the naked eye but is spectacular using a telescope.

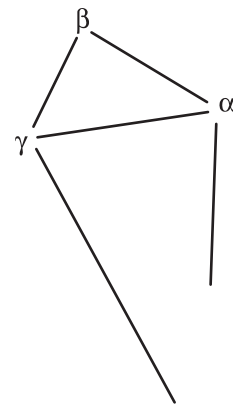
## Libra (The Scales)

### Chief Stars

- $\alpha$ 2 Zubenelgenubi — white subgiant, SC: A3, VM: 2.75, LY: 77
- $\beta$  Zubenelchemali — helium, SC: B8, VM: 2.61, LY: 148
- $\gamma$  Zubenelhakrabi — giant, SC: G8, VM: 3.91, LY: 109

### Legend

Libra, the seventh zodiac constellation, is the only one that does not represent something living. In honor of Julius Caesar, the claw stars of the Scorpion were combined to form the figure of Caesar holding a pair of balance scales. The constellation was meant to be an eternal memorial in the heavens to the infinite wisdom and justice of Caesar. After Caesar's death, however, his figure was dropped out of the constellation picture and only the scales were retained.



## Lyra (The Lyre)

### Chief Stars

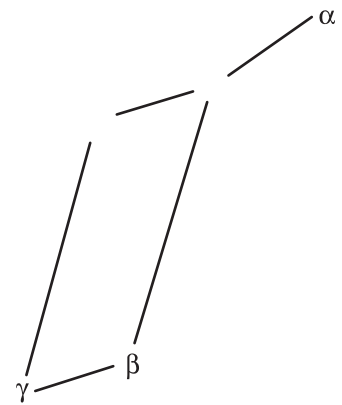
- $\alpha$  Vega — white main sequence star, SC: A0, VM: 0.03, LY: 25
- $\beta$  Sheliak — variable, VM: 3.4 to 4.3, LY: 1100
- $\gamma$  Sulaphat — SC: B9, VM: 3.24

### Legend

Mercury made the first lyre and presented it to Apollo, who in turn gave it to his son Orpheus. Orpheus learned to play such sweet music on it that birds came to listen, wild beasts were tamed and sea monsters charmed by the music's spell. After the death of Orpheus, Jupiter sent a vulture to bring back the lyre and he placed it in the heavens as a constellation.

### Of Special Note

Within Lyra (between Sulaphat and Sheliak) is the planetary nebula NGC 6720 or M57.



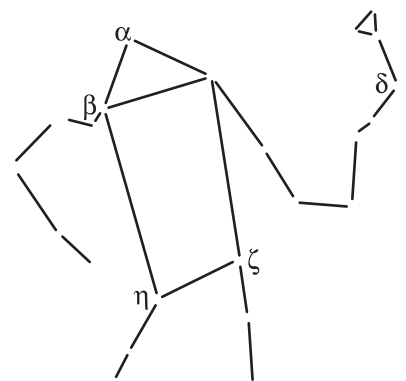
## Ophiuchus (The Serpent Holder)

### Chief Stars

- $\alpha$  Rasalhague — white giant, SC: A5, VM: 2.08, LY: 47
- $\beta$  Kelb Alrai — giant, SC: K1, VM: 2.94, LY: 125
- $\delta$  Yed Prior — SC: M1, VM: 2.74
- $\eta$  Sabik — binary star system, VM: 2.43, LY: 84
  - A — white main sequence, SC: A2
  - B — white main sequence, SC: A3
- $\zeta$  Han — SC: 09.5, VM: 2.56

### Legend

Ophiuchus was said to represent the famous Greek physician, Aesculapius, who discovered how to bring a dead snake dead back to life using a mysterious herb. So successful was Aesculapius's use of the herb that Pluto, ruler of the underworld, complained to Jupiter that he had no dead souls and his business was ruined. Jupiter, fearing that Aesculapius had found the way to give immortality to every man, sent a deadly lightning bolt that killed the doctor. But in tribute to his great skills as a physi-

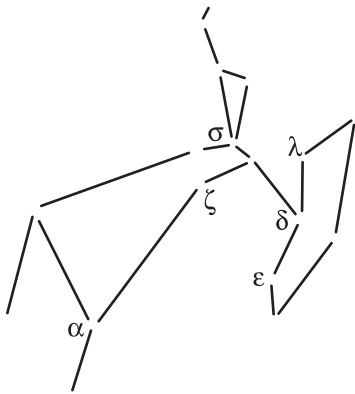


### Abbreviation Key

SC = Spectral Class

VM = Visual Magnitude

LY = Light Years



cian, Jupiter placed Aesculapius among the stars along with the snake.

**Of Special Note**

Within Ophiuchus are several globular clusters, NGC 6333 (M9), NGC 6254 (M10), NGC 6218 (M12), NGC 6402 (M14) and NGC 6273 (M19).

**Sagittarius (The Archer)**

**Chief Stars**

- α Rukbat (Alrami) — SC: B8, VM: 3.97, LY: 250
- δ Kaus Meridionalis — giant, SC: K2, VM: 2.70, LY: 136
- ε Kaus Australis — blue subgiant, SC: B9.5, VM: 1.79, LY: 147
- λ Kaus Borealis — giant, SC: K1, VM: 2.94, LY: 84
- σ Nunki — blue main sequence, SC: B2.5, VM: 2.05, LY: 224
- ζ Ascella — SC: A2, VM: 2.59

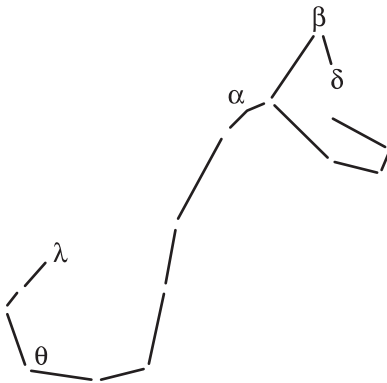
**Legend**

The Centaurs, half man and half horse, had the power and speed of a horse with the brains of a man. They were savage creatures, known for their evil ways except for Chiron who was known for his goodness and wisdom. Chiron was immortal, but due to a painful wound, he begged Jupiter to allow him to die rather than to live in agony. Jupiter granted his request. Before Chiron died, he designed all the constellations to aid the navigators. He designed Sagittarius to honor himself since he was known as a great archer.

**Of Special Note**

Within Sagittarius is the Trifid Nebula (NGC 6514 or M20), the Lagoon Nebula (NGC 6523 or M8) and the Swan (Omega) Nebula (NGC 6618 or M17).

**Scorpius (The Scorpion)**



**Chief Stars**

- α Antares — double star system, VM: 1.06, LY: 600
  - A — red supergiant, SC: M1.5
  - B — blue main sequence, SC: B4
- β Acrab (Graffias) — SC: B0 and B2, VM: 2.90, LY: 540
- δ Dschubba — blue subgiant, SC: B0, VM: 2.29, LY: 402
- λ Shaula — blue subgiant, SC: B2, VM: 1.62, LY: 700
- θ Sargas — yellowish bright giant, SC: F1, VM: 1.86, LY: 272

**Legend**

Juno, wife of Jupiter, arranged to have the scorpion kill Orion with its deadly sting to punish him for his boasting. When Diana, the goddess of the moon, learned of her lover's death, she begged Jupiter to place him as a constellation in the heavens. Juno demanded that Jupiter must also honor the scorpion in the same way, so he placed them far apart in the sky — Orion in the winter sky and the Scorpion in the summer sky.

**Of Special Note**

Within Scorpius lies three open clusters, NGC 6405 or M6 (the Butterfly Cluster), NGC 6475 or M7, and NGC 6322 and two globular clusters, NGC 6121 or M4 and NGC 6093 or M80.

## Southern Celestial Pole Constellations

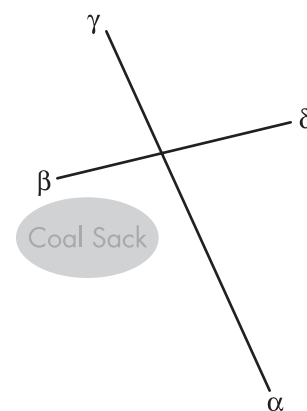
### CruX (The Cross)

#### Chief Stars

- $\alpha$  Acrux — triple star, VM: 0.77, LY: 321
  - A — blue subgiant, SC: B0
  - C — blue subgiant, SC: B0
- $\beta$  Mimosa — blue giant, SC: B0.5, VM: 1.25, LY: 353
- $\gamma$  Gacrux — red giant, SC: M3.5, VM: 1.59, LY: 88
- $\delta$  Delta Gruxis — SC: B2, VM: 2.80

#### Of Special Note

This is a bright constellation in the southern sky. The latitude of Athens is about 39° North, and as one moves south, the whole Cross becomes visible at about 25° North. Therefore, the Greeks would never have seen the whole Cross, at least from their homeland. However, what they did see, including the pointers (Alpha & Beta Centauri), they incorporated into the Centaur. The Southern Cross was first identified as a separate constellation by European navigators and astronomers of the sixteenth century. The Italian navigator Andreas Corsali described the constellation as being “so fair and beautiful that no other heavenly sign may be compared to it.” Next to the constellation is an area known as the Coal Sack which is a dark nebula measuring 7 by 5 degrees.



#### Abbreviation Key

- SC = Spectral Class
- VM = Visual Magnitude
- LY = Light Years

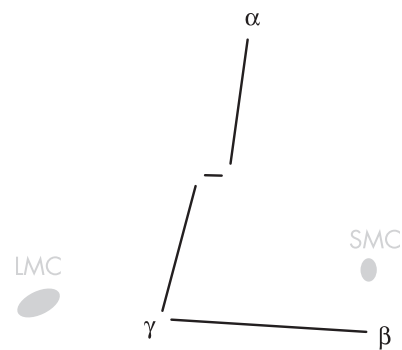
### Hydrus (The Lesser Water Snake)

#### Chief Stars

- $\alpha$  Alpha Hydri — SC: F0, VM: 2.86, LY: 41
- $\beta$  Beta Hydri — dwarf, SC: G1, VM: 2.8, LY: 22
- $\gamma$  Gamma Hydri — SC: M0, VM: 3.24, LY: 250

#### Of Special Note

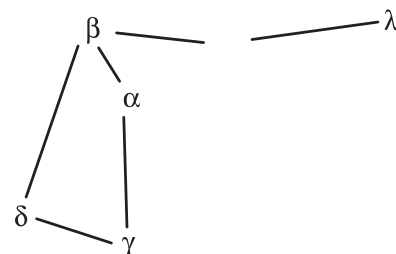
Hydrus lies in the southern sky between the Large Magellanic Cloud (LMC) and the Small Magellanic Cloud (SMC). Some say it was created as a companion to the female water snake, Hydra.

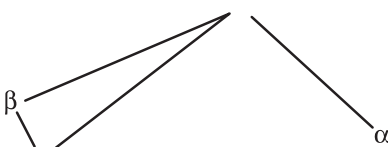
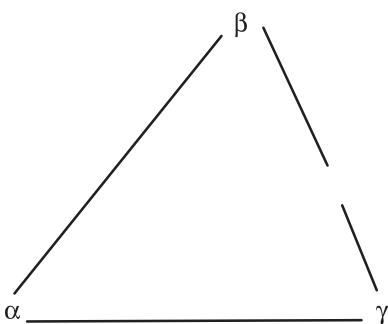
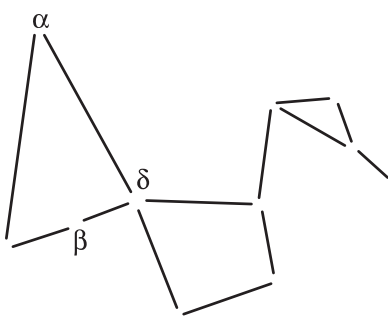
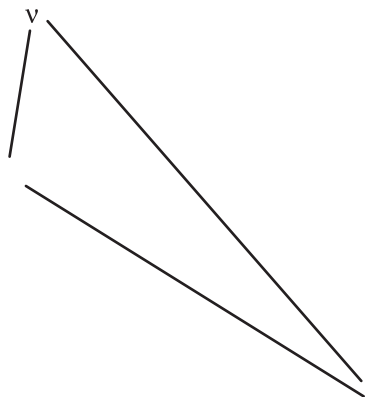


### Musca (The Fly)

#### Chief Stars

- $\alpha$  Alpha Muscae — SC: B3, VM: 2.69, LY: 365
- $\beta$  Beta Muscae — SC: B3, VM: 3.05, LY: 270
- $\gamma$  Gamma Muscae — SC: B5, VM: 3.87, LY: 270
- $\delta$  Delta Muscae — SC: K2, VM: 3.62, LY: 155
- $\lambda$  Lambda Muscae — SC: A5, VM: 3.64





**Abbreviation Key**  
 SC = Spectral Class  
 VM = Visual Magnitude  
 LY = Light Years

**Of Special Note**

Musca is a constellation that lies near Crux in the southern sky and is actually within the constellation, Centaurus. It contains two fairly bright globular clusters, NGC 4833 and NGC 4372.

**Octans (The Octant)**

**Chief Stars**

$\nu$  Nu — SC: K0, VM: 3.76, LY: 84

**Of Special Note**

In position, Octans at the southern celestial pole is equal to Ursa Minor at the northern celestial pole, but the similarities end there. Other than Nu, none of the stars in the constellation including Alpha Octantis (closest to the pole) is brighter than fourth magnitude.

**Pavo (The Peacock)**

**Chief Stars**

$\alpha$  Peacock — blue subgiant, SC: B2, VM: 1.94, LY: 183

$\beta$  Beta Pavonis — SC: A5, VM: 3.42, LY: 112

$\delta$  Delta Pavonis — dwarf, SC: G5, VM: 3.56, LY: 19

**Of Special Note**

Within Pavo is a bright star cluster NGC 6752.

**Triangulum Australe (The Southern Triangle)**

**Chief Stars**

$\alpha$  Atria — orange subgiant to giant, SC: K2, VM: 1.91, LY: 415

$\beta$  Beta Trianguli Australis — SC: F5, VM: 2.85, LY: 38

$\gamma$  Gamma Trianguli Australis — SC: A0, VM: 2.89

**Of Special Note**

The counterpart of the northern constellation, Triangulum.

**Tucana (The Toucan)**

**Chief Stars**

$\alpha$  Alpha Tucanae — SC: K3, VM: 2.86, LY: 142

$\beta$  Beta Tucanae — double, SC: B8 and A2, VM: 3.7, LY: 148

**Of Special Note**

Within Tucana lies NGC 104, a globular cluster. This constellation lies north of the Small Magellanic Cloud.



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## MATERIALS

- STARLAB Portable Planetarium
- Constellation Cylinder
- seasonal star maps
- arrow pointers
- red flashlights (for reading star maps)

# A Look at the Constellation Cylinder

by Joyce Kloncz

## Introduction

This cylinder is an excellent tool to teach beginning constellations to students. The following are some ideas you can use to introduce this cylinder.

## Note

*The numbers on the ecliptic of the cylinder represent the position of the sun during each month of the year in the sky, for example, the number 5 represents the position of the sun in the sky in May.*

## Objectives

To locate easy-to-find seasonal constellations and progress from season to season as students get older.

## Process Skills

Describing • observing • interpreting • communicating • inferring • working cooperatively

## Procedure

- Explain to children as you ease the side lights down and the projector lights up, that if you had a huge ladder to the stars and a white crayon, you could connect the stars like a giant dot-to-dot puzzle. That is what this cylinder looks like.
- H. A. Rey, the author of the book, *The Stars — A New Way To See Them*, has drawn the constellations so that they look much like the figures for which they are named.
- With the youngest children, choose 2 or 3 easy-to-find constellations, such as Orion, Cassiopeia (the Lazy W), and Ursa Major. To familiarize children with the constellations, tell the Greek mythology story that goes with each constellation (see the Greek Mythology section). Point out where these 3 constellations are found on the Constellation Cylinder with the arrow pointer. Practice having children close their eyes and try to find the constellations in the STARLAB again when they open them.

With older students, pass out the star map that goes with the season. Pass out red flashlights. Point out the cardinal directions of north, south, east and west. Have students work in teams and locate the constellations. (It works best if you assign students constellations that are across from them in STARLAB, rather than behind them.) Give a group of students the northern constellations, a group the southern constellations, a group the eastern constellations, and a group the western constellations. Have students hold their star map with the direction they will be looking toward next to their body. Then look at the constellations right above the horizon on the star map, and look across STARLAB to find their assigned constellation.

The following are the major constellations in the four seasons that elementary-aged students can identify:

- Winter: Orion, Gemini, Auriga, Taurus, Canis Major, Canis Minor, Cassiopeia, Ursa Major, Ursa Minor



- Spring: Leo, Bootes, Virgo
- Summer: Sagittarius, Scorpius, Cygnus, Lyra, Aquila
- Fall: Pegasus, Andromeda

Other constellations in the night sky are difficult for children to see, such as Aries, Aquarius, Pisces, and Hydra, so choose those that children can successfully find.

After students have worked in teams, pass out the arrow pointers and have individual students locate the constellations in STARLAB. It is helpful for younger students (grades kindergarten through second grade) to look for only one season of constellations. For third grade add a second season of constellations, fourth grade add a third season, and fifth grade add the fourth season. In that way, they will build on past knowledge by using the information gained in previous years.

Show students how to “star hop” to make finding constellations easier. Point out the following “star hopping” tips:

- Find the Winter Triangle, with Betelgeuse, Procyon, and Sirius.
- Find the Summer Triangle, with Vega, Deneb, and Altair.
- Follow the “Arc to Arcturus and Spica on the Spica.”
- Follow the guardian stars of the Big Dipper to find Polaris.
- Use the other two bowl stars to go down to Regulus in Leo.
- Follow the top of the bowl of the Big Dipper and go up to find Capella in Auriga.
- Follow the third handle star in the Big Dipper to go through Polaris and keep going to Cassiopeia.
- Follow the top two stars in Cassiopeia and go down to the Square of Pegasus.
- Use Orion’s three belt stars to go down to Sirius, the Dog star, and up to Aldebaran in Taurus, the Bull. Keep going up to the Pleiades.

**Note**

*Terence Dickinson’s book, Exploring the Night Sky, does a nice job of “star hopping” to find constellations. Also use “Tours of the Night Sky” included with your STARLAB system, for an excellent preparation for teaching children on how to locate constellations and stars.*

**Evaluation**

Have students show you the constellations with the arrow pointer.

## MATERIALS

- STARLAB Portable Planetarium
- Constellation Cylinder
- Starfield Cylinder
- Greek Mythology Cylinder
- Transparent Cylinder (optional)
- sheets of black paper (11" x 14" or larger)
- glow-in-the-dark stars (optional)
- chalk (white or yellow)
- dry erase markers of various colors
- gold stick-on stars
- flashlight pointer

## Stories in the Stars

by Gary D. Kratzer

### Note

*Although this activity has been placed with the Constellation curriculum, it can actually be used with any or all of the following cylinders: Greek Mythology, Starfield, and Transparent.*

### Objectives

1. To design patterns and interpret what they may look like.
2. To make up stories about constellations.
3. To explore the origin of legends, myths and fables.

### Procedure

1. After entering STARLAB, project a starfield from the Starfield Cylinder and ask the students to tell stories or myths they have heard about the stars.
2. Have the students point out shapes or patterns they see.
3. Place the Constellation Cylinder on the projector and show the patterns created when stars appear connected. Examine and discuss some of the shapes. Without changing the projector settings, return the cylinder platform to vertical and put on the Greek Mythology Cylinder. Project some of the constellations as seen by the Greeks. Compare the connected constellations seen earlier to the figures and shapes seen by the Greeks. Discuss a few of the constellations and some of the mythology associated with these.
4. Return to the classroom where the students will create their own constellation. Group the students (3 or 4 per group). Pass out black sheets of construction paper and about 8-10 gold stick-on stars per group. One person in the group is to hold the stick-on stars in one hand, about 2 feet above the paper, and then drop them.
5. Without moving the stars around, carefully pick up the stars and glue or stick them on the black paper exactly where they fell. Discuss the patterns with your students.
6. Have the groups exchange their star patterns. After exchanging star patterns, tell the groups to create a constellation by connecting the lines between the stars with chalk.
7. Ask the groups to design a story to go along with the shape or object their stars look like and share it with the class.

### Closure

Discuss the importance of legends, myths and fables and why they came to be. Challenge your students to discuss stories of the stars with relatives or grandparents and return to class and discuss what they have learned.

### Extension

Have each group bring their constellation sheet into STARLAB. Ask one group at a time to come up to the projector and draw their constellation (with dry erase pens) on the Transparent Cylinder. Make sure the students do not draw the constellation too

large. Drawings and writings will be reversed. While a group is drawing on the cylinder, the other groups should be preparing to tell the story about their constellation. When all drawings are complete, turn up the projector and have each group locate their constellation. The groups can take turns telling their stories to the class while pointing to their constellation.

If a Transparent Cylinder is not available, have the students stick glow-in-the-dark stars on the dome to represent their constellations (glow-in-the-dark stars are often found at craft stores). After all constellations are on the dome, slowly dim the lights until the glowing stars can be seen. Have the groups take turns telling their stories about their constellations.