

3. If drawings of the sunspot locations are done very accurately and several observations have been made, the tilt of the sun's axis can be determined. It will be found to be approximately 7° .

Once the students become fascinated in this pastime of "star gazing," they can continue to work on their own.

The star parties are a necessary function in teaching a unit on astronomy.

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OBSERVATION FORM 1

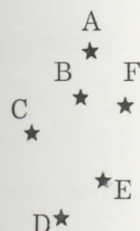
NAME: _____

DATE: _____

TIME: _____

LOCATION WHERE OBSERVATION WAS MADE: _____

LYRA



Which star appears to be the brightest? _____

Which star appears to be the faintest? _____

Arrange the stars in the diagram at the left in the order of their brightness, from brightest to faintest. Record your observations on the six spaces below.

If two stars appear equally bright, connect them with a line in the sequence above.

Examine each star and also the space between D and E, first with the unaided eye and then with the telescope. Record below any peculiarities or color contrasts noted.

On two other evenings check LYRA to see if any of the stars have changed in brightness from your first observation.

Date: _____ Observations: _____

Date: _____ Observations: _____

COMMENTS: Note below the weather conditions, and the phase of the moon when the observations were made.

OBSERVATION FORM 2

NAME: _____

DATE: _____

TIME: _____

LOCATION WHERE OBSERVATIONS WERE MADE: _____

SIZE OF TELESCOPE OR BINOCULARS USED IN OBSERVATION: _____

Comments: Note below the weather conditions, and the phase of the moon when the observations were made: _____

SAGITTARIUS



Above is the outline of the constellation SAGITTARIUS. Carefully search this region of the sky for any unusual objects with a telescope or binoculars. Mark the location of your "find" on the above diagram and assign it a number. Describe these objects below:

Object number 1 _____
2 _____
3 _____
4 _____
5 _____

THE CONSTELLATIONS

INTRODUCTION

Many of us are familiar with the names of the constellations although we may not be able to identify them by sight at night in the sky. The constellation patterns in the sky represent man's oldest picture book. A few hours of study each month during the course of the year will provide the learner the ability to identify many of the constellations. If a person is proficient at identifying the constellations, he can locate without any difficulty a NASA satellite going across the sky. Then by plotting the satellite's path on a star map he can obtain the picture of the orbit of the satellite similar to the results of the earlier activity with the string and globe. The observer should also be able to determine from this the satellite's orbital inclination to the earth's equator.

Today, 88 constellations are recognized. This was by agreement of the International Astronomical Union in 1922. During the course of a year a person who lives at a latitude comparable to New York City can see approximately 70 of the 88 constellations. The boundaries of the 88 constellations are accurately defined, just as the state boundaries between states are accurately defined. It should be noted, however, that when one speaks of Vega in the constellation LYRA, it is no more meaningful than when one speaks of Kansas City in Missouri. In other words, the stars named in the constellations just denote regions in the sky.

ORIGINS

The origins of the names of all the constellations have been lost in antiquity. The constellations of antiquity were probably named for various vocations, mythological characters, or the animals man domesticated or hunted. These were placed in the heavens to honor them. Some of the vocations at the time were hunting (ORION), mythological characters (HERCULES), or domesticated animals such as the dog (CANIS MAJOR).

No doubt the stories of the constellations were passed from one generation to the next by word of mouth. Probably the Greeks received a lot of their information about the constellations from their neighbors who were very interested in shepherding. The Sumerians applied shepherding terms to the names of the constellations. The stars were referred to as the heavenly flock. Arcturus' name at the time meant "Star of the Shepherd," and the sun was called "Old Sheep."

THE HISTORY

Why should anyone want to group the stars in the patterns that are referred to as constellations? Aratus, in 270 B.C., wrote a poem, a part of which may help to answer this question... "People of long ago grouped the stars in companies. For it had exceeded their skill to recognize the stars and name them one by one." It was then a matter of convenience to group the stars for identification purposes. Even today when a star rises its name may not be known, but with a reasonable amount of certainty one is able to identify the constellation group to which it is associated.

Ptolemy was one of the first to begin an organized study of the constellations. At the time of Ptolemy, 48 constellations had been grouped into patterns and named. These 48 constellations did not cover the whole sky. In the region that Ptolemy studied, all of the sky was not visible. There were large areas of the southern celestial sphere which never rose. Therefore, it remained uncharted.

Fourteen centuries after Ptolemy, new interest was given to the addition of new constellations to the sky. In 1603, Bayer added some 11 new constellations. These star patterns were found in the sky over the southern hemisphere, and were primarily named for different types of birds and fish. John Bartsch, Kepler's son-in-law, formed and named three more constellations in the northern skies. They are CAMELOPARDALIS, MONOCEROS AND COLUMBA. The SOUTHERN CROSS was added to the list of constellations by Royer in 1679 while at about the same time, Isack Habrecht added the constellation RETICULUM. Hevelius further added to the growing list of constellations in 1690. His additions were CANES VENATICI, LACERTA, LEO MINOR, SEXTANS, LYNX, SCUTUM and VULPECULA. The last major additions to the constellation list were by Lacaille in 1769. These 13 new constellations were principally named for the parts of a ship or for instruments used by scientists and artists.

THE NAMES OF STARS

There are three primary ways to name the stars in the various constellations — by name, Greek letter, or by assigning a number.

The oldest method of identifying the individual stars was to assign them a name. A great number of the stars have a name of Greek or Latin origin. Sirius and Capella are two examples. In addition, the Arabs named many of the stars. Almost any star with an AL prefix is of Arabic origin. Some examples are Algol, Altair and Albireo. Other stars had names to denote their position in the mythological characters. Deneb in CYGNUS refers to the tail of the bird.

The second method of identifying the stars was developed by Bayer. His method employed the use of Greek letters. The stars of each constellation were assigned a Greek letter such as Alpha, Beta or Gamma — according to their brightness. The brightest star in a constellation would be assigned the letter Alpha, the next brightest, the letter Beta, etc.

After the Greek letters were exhausted, the stars were then identified by a Roman letter. When there are several stars of the same brightness in a particular constellation, the stars' identification was made according to its position in the mythological figure beginning at the head.

The last method of naming the stars was originated by Flamsteed. In 1729, he numbered the stars by their right ascension. Beginning at the west side of each constellation and working toward the east, each star was numbered. The farther west the star, the lower the assigned number. The star numbers get progressively larger toward the east.

BRIGHTNESS OF STARS

Everyone has noticed how some stars appear brighter than others. The brightness of a star is referred to as apparent magnitude. Any individual with good eyesight and excellent seeing conditions can view stars down to the sixth magnitude. The magnitude scale is an arbitrary scale, and the numbers themselves are meaningful only when compared to one another.

The apparent magnitude is a useful scheme in the identification of stars. This was the method first employed by Bayer. There are approximately 20 first magnitude stars, and 50 second magnitude stars. The number of stars in each magnitude class increases. There are 150 third magnitude stars, 600 fourth magnitude stars, 1,500 fifth magnitude stars, and several thousand sixth magnitude stars.

The total number of individual stars that can be seen during the course of one year is nearly 9,000. However, on any one evening only one-third of the total is visible. In the city fewer stars can be seen as compared to the rural areas at any given time.

The brighter a star, the lower the magnitude. All of the bright stars have names. Zero magnitude stars such as Rigel, Arcturus, Vega, Capella or Procyon are extremely bright. These are the first stars to appear in the evening after sunset, and the last stars to disappear before sunrise. The first magnitude stars are also very bright. Antares, Spica, Pollux and Deneb are