Early Astronomy 6

Allegorical representation of Saturn as Cronus, the Greek god of the harvest. In ancient Assyria, Saturn was represented by the hunting god, Nisroch, and in Babylonia by the god Ninib.

For centuries, we humans have looked upward in an effort to understand the universe and our place in it. In the course of our earliest ancestors' celestial searching, the science of astronomy was developed. Not only has this science of the skies paved the way for inventions ranging from the calendar to the space shuttle, but it has always gone hand in hand with the study and development of mathematical concepts and tools.

The patterns of such heavenly bodies as the sun and the moon were vastly important to early peoples. Successful agricultural management depended on an understanding of the sun's seasonal cycles. The phases of the moon determined the occurrence of various ritual practices. Solar and lunar eclipses were especially significant, predicted and used by religious leaders to demonstrate their power, or seen by the populace as messages from the gods.

To keep track of astronomical events over long periods of time, early astronomers created calendars. In ancient Egypt, for example, each year priests observed that the star Sirius first appeared over the horizon just before sunrise on a summer morning. A few days later, the Nile spilled over its banks and people hurried to move their livestock and possessions to higher ground. Over time, the priests noted that the flooding of the river coincided with the appearance of the star, and after about fifty years of observation, it became evident that the rising of the star could be predicted. The time between its first appearance each summer was calculated to be 365 days and a bit more—in four years the "bit more" amounted to a full day. So, the Egyptians produced a value of 365¼ days for the year's length, which is extremely close to what we now use as the true value, 365.2422 days.

The Maya of southern Mexico and Guatemala believed that the sun, the moon, and the planets were gods who conducted their lives in the skies, high above the human realm. In observing the movements of their sky gods, Mayan priests discovered that these heavenly bodies circled the earth in regular cycles. This was important information. By being able to anticipate these cycles, the priests could provide the Mayan government with the correct times to plant crops, celebrate festivals, and otherwise conduct the affairs of the kingdom. Thus they modified their complex number system to create one of history's most accurate and beautiful calendars.

For more on astronomy and calendars, see vignettes 7-9, 11, 23, 26-28, 30, 40-42, 47, 48, 57, 59, 65, and 94. ★

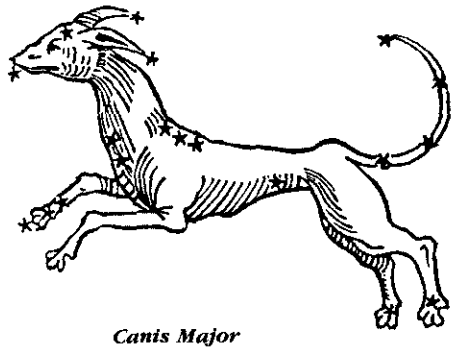
Activities

1. How did the Babylonians make their advance predictions of eclipses of the sun and moon? What mathematical principles did they use to do so?

2. Egyptian physician **Troth** (ca 3000 B.C.) devised a solar calendar known as the Calendar of Troth. How was this calendar constructed?

3. How did astronomer **Yi Xing** (A.D. 683–727) contribute to the development of mathematics in China?

4. Identify the numbers and the units associated with the terms *light year, magnitude of a star,* and *astronomical unit.* The star Sirius (Dog Star), in the Canis Major (Big Dog) constellation, is 8.5 light years from earth and 26 times as luminous as our sun. In miles, how far is Sirius from Earth?



Canis Major

Related Reading

Asimov, Isaac. *Guide to Earth and Space.* New York: Ballantine Books, 1991.

Bushwich, N. *Understanding the Jewish Calendar.* Brooklyn, NY: Moznaim, 1989.

Cleminshaw, C.H. *The Beginner's Guide to the Stars.* New York: Thomas Y. Crowell, 1977.

McLeish, John. *The Story of Numbers: How Mathematics Has Shaped Civilization.* New York: Fawcett Columbine, 1991.

Moeschl, Richard. *Exploring the Sky.* Chicago: Independent Publishers Group, 1989.

Newman, James R. *The World of Mathematics.* Redmond, WA: Tempus Books, 1988.

Tauber, Gerald E. *Man's View of the Universe.* New York: Crown Publishers, 1979.