

OPHIUCHUS AND SERPENS



Two constellations that don't get a lot of respect are in the southwest this evening, above the Moon and the bright planet

Jupiter. One of them is slighted by anyone who can name the 12 signs of the zodiac. The other was slighted by the people who established the constellation boundaries: they chopped out its middle.

The constellations are Ophiuchus, the serpent bearer, and Serpens, the serpent.

Ophiuchus is one of the largest constellations. More important, it lies along the ecliptic — the Sun's path across the sky. The constellations along this path form the zodiac. But Ophiuchus isn't included in the lineup, even though the Sun spends more time inside its borders than in Scorpius, which is next door.

Ophiuchus represents the founder of medicine. In myth, he was such a good healer that he even brought the dead back to life. That was reminiscent of the powers of a snake: It can kill, but it also rejuvenates itself every year when it sheds its skin. So in the sky, the physician is also known as the serpent bearer.

Appropriately enough, he's holding on to Serpens. The serpent's head is to the west of Ophiuchus, with the tail to the east — severed by the body of Ophiuchus.

Serpens and Ophiuchus are well up in the southwest at nightfall. Look for the crescent Moon quite low in the sky, with brilliant Jupiter and the bright orange star Antares to its upper left. Ophiuchus and Serpens stretch out above this bright trio.

This is the transcript of a StarDate radio episode that aired September 17, 2007. Script by Diamond Benningfield, ©2007.

We see different stars at different times of year because Earth orbits (revolves around) the Sun. Some constellations are small, while others are large. The Sun appears to move from one constellation to another in as few as 6 days or as many as 43.

Add more celestial objects to your model by handing planet cards to more students. These objects orbit the Sun like Earth, but at different rates. This works best if they come in one at a time, each with their own rate of orbiting the Sun. The following table recommends some approximations to use, along with the exact values, for periods of revolution (the time it takes for the object to revolve around the Sun one time). Distance scales are not preserved in this activity. For example, tell the students that Mercury orbits the Sun four times in one Earth year. So the person who represents Mercury has to race around the Sun four times while Earth goes around only once. Some students will count this out. For younger students, drawing the circles on the floor helps them maintain the proper distances. Stop occasionally to ask, "If you are on Earth, where or when can you see that object?" Add more or fewer objects depending upon the age of the group. For older students, model sunrise/sunset and ask what objects are visible in the sky at various times of day (just after sunset or at midnight, for example) and in which constellations they appear. If you have already studied phases of the Moon (see "Observing the Moon," page 11), it can be inserted into this model, orbiting Earth in about one month while Earth orbits the Sun in one year.

Object	Approximate period	Actual period
Mercury	1/4 year	0.24 year = 88 days
Earth	1 year	1 year = 365.25 days
Moon	1 month	27.3 days
Mars	2 years	1.88 years
Jupiter	12 years	11.86 years

EVALUATE

- The asteroid Ceres has a period of 4.6 years. Where would it go in this scheme? (Answer: between Mars and Jupiter.)
- Why did we not include Venus (0.61 year), Saturn (29.42 years), Uranus (83.75 years), or Neptune (163.73 years)? (Answer: 0.61 years would be difficult to model and adding Venus would make it crowded. The other planets orbit so slowly that they would barely move!)
- Place a plain piece of paper under the loop and sketch the number of orbits (or partial orbits) for Earth and two other objects.

Teaching note: Although this activity does not indicate relative distances, it is correct that all of the planets orbit the Sun in approximately the same plane. That is why we can limit ourselves to just the constellations that form one great circle on the celestial sphere.

Modeling the Night Sky

Subjects: Our Solar System, Observing the Sky

Grade Levels: K-12

Students explore the Earth and Sun's positions in relation to the constellations of the ecliptic with a small model. Then they extend to explore the motions of the Earth and inner planets in a larger classroom-size model. A very interactive and fun activity.

Texas Essential Knowledge and Skills

Science:

§112.11. grade K (b)-8(B) identify events that have repeating patterns, including seasons of the year and day and night.

§112.12. grade 1 (b)-8(B) observe and record changes in the appearance of objects in the sky such as clouds, the Moon, and stars, including the Sun.

§112.13. grade 2 (b)-8(D) observe, describe, and record patterns of [caused by] objects in the sky, including [shadows and] the appearance of the Moon.

§112.14. grade 3 (b)-3(C) represent the natural world using models such as volcanoes or Sun, Earth, and Moon system and identify their limitations, including size, properties, and materials.

§112.14. grade 3 (b)-4(A) collect, record, and analyze information using tools, including microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, wind vanes, rain gauges, pan balances, graduated cylinders, beakers, spring scales, hot plates, meter sticks, compasses, magnets, collecting nets, notebooks, sound recorders, and Sun, Earth, and Moon system models; timing devices, including clocks and stopwatches; and materials to support observation of habitats of organisms such as terrariums and aquariums.

§112.14. grade 3(b)-8(C) construct models that demonstrate the relationship of the Sun, Earth, and Moon, including orbits and positions.

§112.14. grade 3 (b)-8(D) identify the planets in Earth's solar system and their position in relation to the Sun.

§112.16. grade 5 (b)-8(C) demonstrate that Earth rotates on its axis once approximately every 24 hours causing the day/night cycle and the apparent movement of the Sun across the sky.

§112.18. grade 6 (b)-3(C) identify advantages and limitations of models such as size, scale, properties, and materials.

§112.18. grade 6 (b)-11(A) describe the physical properties, locations, and movements of the Sun, planets, Galilean moons, meteors, asteroids, and comets.

§112.18. grade 6 (b)-3(C) identify advantages and limitations of models such as size, scale, properties, and materials.

§112.20. grade 8 (b)-3(B) use models to represent aspects of the natural world such as an atom, a molecule, space, or a geologic feature.

§112.20. grade 8 (b)-7(A) model and illustrate how the tilted Earth rotates on its axis, causing day and night, and revolves around the Sun causing changes in seasons.

Astronomy, grade 9-12:

§112.33. (c)-6(B) compare and contrast the scale, size, and distance of objects in the solar system such as the Sun and planets through the use of data and modeling.