Constellations

Science Topic Paper

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What is a constellation?

If you ask a high school students if they know what a constellation is, it is very likely they will tell you that they do. However, if you were to ask a follow up question having them explain scientifically what they are, their answers might not be as confident. To the general public, most people would agree that constellations are formations of stars in the sky that astronomers have discovered and named. Although this is what most people believe, there is much more to constellations than one would think.

According to Mohn (2014) a constellation is, “a section of the night sky officially designated by the International Astronomical Union and recognized by patterns of stars,” (p. 1). There are 88 total constellations that have been officially recognized and can be seen from Earth through different times of year. The constellations have different meanings and stories behind them and, according to Mohn (2014) “In the past, people used these patterns to tell the time of year,” (p. 1). Heifetz and Tirion (2012) point out that “to aid in recognising specific stars, they placed the brighter ones into star group patterns we now call constellations,” (p. 1).

How and When were Constellations Discovered?

According to Ridpath (2001), “the basic constellation figures probably date from before 3000 BC, and Mesopotamian tablets from 1100 BC depicting the Sun, Moon and zodiac figures still exist,” (p. 29). The night sky was used for different purposes in ancient times than it is used for today. Ridpath (2001) explains, “in ancient times, no one looked at the sky for what we would now call scientific purposes; they saw it instead as a tool for prophecy,” (p. 29). Constellations were identified from all around the world, from Europe to Egypt, to China, to Greece, and to India, to name a few. In fact, “the oldest possible representation of a star pattern was carved on a mammoth tusk in Germany about 32,500 years ago and seems to depict the constellation Orion, the hunter,” (“Astronomy,” 2019).

What are the Different Uses of Constellations?

Constellations were identified and used for many different reasons. As stated above, the ancient astronomers who discovered constellations were not doing so for scientific reasons, but instead for philosophical or organizational reasons. One of the major uses of constellations was to create and keep a calendar. " In the Middle East, from about 1800 to 400 BC, Babylonians astronomers had refined their observations to such an extent that they created detailed astronomical calendars that were able to predict the movements of the moon and sun and the occurrences of lunar and solar eclipses," ("Astronomy," 2019). Back in ancient times, the people did not have daily, monthly, or yearly calendars already prepared for them so in order to keep track of time, they relied heavily on the night sky, specifically constellations. Constellations were also used as a guide for Western astrology. Most of us are aware of our zodiac sign, whether it is from finding your birthday between the dates to figure out which sign you are or knowing someone who firmly believes in what their horoscopes are telling them. There are 12 zodiac signs that come from the 12 zodiac constellations which, according to Mohn (2014), zodiac is, "an imaginary band across the sky that follows the ecliptic (the path along which the sun appears to travel over one year when viewed from Earth) and is divided into twelve equal sections, each occupied by one of twelve constellations," (p. 1). Another use of constellations was being able to identify different parts of the sky. As Ridpath (2001) discusses, "constellations originated in the distant past as easy-to-remember patterns of stars, but nowadays astronomers regard them merely as areas of the sky convenient for locating and naming celestial objects," (p. 254). Something interesting to note is that, although the constellations have been identified for thousands of years, the stars that make up the constellations, they have moved since they were discovered as part of a

pattern. “Although stars appear to be fixed in their constellation patterns, precise measurements reveal that they do slowly move relative to each other,” (Ridpath, 2001).

What Constellations can be seen from Columbus, Ohio?

One of the most exciting parts of constellations is getting the chance to see them from your own backyard. It is important to note that, “In order to see the full figure represented by a constellation, it is necessary to imagine lines between and around the stars that show its rough shape and outline,” (Mohn, 2014). Being able to see constellations requires being able to let your imagination take over. The most common constellations we are usually taught to see in the night sky are the “Big Dipper” and “Little Dipper.” However, these constellations are formally named “Ursa Major” and “Ursa Minor.” “For example, Sagittarius is supposed to be an archer, Ursa Major a large bear, and Ursa Minor a small bear,” (K. L. Lerner & B. W. Lerner, 2019), which shows how the common constellations we know were named after people, objects, or animals but the constellations do not always take the expected shape. The constellations we are able to see in Columbus, Ohio change throughout the year, but we are able to see “Ursa Major” and “Ursa Minor” all year long. Here is a list of a few constellations per season we can see in Ohio: Orion and Gemini, which can be seen in a clear winter sky, Leo and Virgo through the spring, Sagittarius and Scorpio in the summer, Pegasus and Pisces throughout the fall, and we can see Cassiopeia, Cepheus, and Draco all year, (Martin, 2019). Ridpath 2001 gives some helpful tips to have the best stargazing experience:

> Choose a site as dark as possible and as far from trees and building as you can get. If you are observing in the summer, you will have to wait until quite late in the evening for the sky to get dark, as the Sun does not drop as far below the horizon as in the winter. Instead of using an ordinary torch to read your chart, use one with a red bulb as this helps you

> retain your dark adaption. If you know the rough direction of north, then you can point the northernmost part of the star chart in this direction, but do not forget that you have to hold the chart above your head at the same time. (p. 236)

Constellations are accessible to all types of people and part of astronomy that anyone can enjoy. Once you get an idea of how to find them in the sky, they can be quite enjoyable and educational. The last helpful piece of advice from Ridpath (2001) is, “you may be surprised how far apart stars are from each other in the sky; some patterns which appear obvious on the star chart can be very spread out and not quite so obvious when you are looking at them in reality,” (p. 236).

Questions?

There are a few remaining questions I have. How can students make connections with math and constellations in the high school classroom? Will the International Astronomical Union ever let more than the already 88 identified constellations be identified?

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