STEM EXTRAS

Constellations

Constellations

NGSS

5-ESS1-1

Objective

The student will understand what comprises a constellation, why constellations change in the sky throughout the year, and how early navigators used the stars when at sea.

The student will be able to develop their own unique constellation and differentiate between a star and a galaxy; the student will be able to describe their constellation design and the components of that constellation.

Vocabulary

Constellation: A group of stars forming a recognizable pattern that is traditionally named after its apparent form or identified mythological figure.

Star: An astronomical object that is luminous and held together by its own gravity.

Galaxy: A culmination of stars, as Earth's Sun is only one star in the Milky Way Galaxy.

Planet: Distinguished from fixed stars by moving in an elliptical orbit around a star.

Moon: A natural satellite that revolves around a planet.

Solar System: Consists of the sun (a star), and its orbiting planets (like Earth) along with moons, asteroids, rocks, dust, and comet materials, among others.

Universe: Includes all stars, planets, and galaxies (of which there are billions) combined.

Background

Did you know that there are 88 officially recognized constellations in the night sky?! And of these, just over half are deemed ancient/original because they were described by early observers of the stars (the Greeks and Babylonians). Interestingly, the sky was noticed to have an astrological significance in relation to the Zodiac signs, as many of them were visible in the sky, thus their name and relative shape as a constellation were provided.

Because the telescope was not invented until the 17th century, many of the early constellations were named and coined after some of the brighter stars in the sky. More modern constellations - which filled the spaces between these brighter constellations with dimmer, less vibrant stars - were named following the invention of the telescope.

Stars are constant in the sky, just more pronounced at night. Also, due to the tilt of the Earth and in reference to the time of year, the constellations in the night sky – such as Orion the Hunter, the Big Dipper, and Polaris (the brightest star in the sky) - all change their relative positions. This is observable with the change in seasons. Additionally, the night sky in the Northern Hemisphere looks very different than that of the Southern Hemisphere (below the equator).

Navigation has been an important tool for moving, whether by land or sea for many centuries. The earliest navigation methods involved using the direction of the sun and stars. Sailors used celestial navigation in the open water when landmarks could not be seen at shore. The stars, moon, sun and even horizon were all used to calculate relative position on a map, given the time of year. Therefore, navigators not only carried with them a map of the sea and land, but also one of the stars corresponding to the time of year, as different constellations were visible during different seasons or were in relatively different positions based on the time of year. It was even important to know what hemisphere one was sailing in, as familiar constellations in the Southern Hemisphere (e.g. Southern Cross) were not visible in the Northern Hemisphere and vice versa (e.g. Big Dipper). Navigators would often use a tool called a sextant to measure the angle between a constellation in the sky and the horizon to inform them of their relative location at sea.

Materials

Per student:

- LED single tealight
- Plastic cup
- Constellation sheets (5 in total)
- Rubber band
- Tape
- Pencil or pen
- Scissors

Procedure

1. Begin lesson with a community building activity, via an ice breaker question.
2. Provide an overview of the objectives for the day to the students, and begin discussing the pertinent background information.

   ****Relate to students' everyday lives. What do they see when they look up at the night sky?**
3. Encourage students to begin building their apparatus to "hold their constellation." This will utilize the plastic cup with paper taped to the top and a rubber band around it. The bottom will be cut out so that the tealight can shine to the top.

   ****Check in with students for apparatus building. Demonstrate if necessary.**
4. Then, have the students use the Zodiac Sign Indicator and Constellation key to: **determine 1) the zodiac sign for their birthdate and 2) what the constellation for their sign looks like.**
5. Students will then transfer this constellation design to **Blank #1 (in resources) to be placed on top of the apparatus.**
6. Students will share their constellation to the group. Other students observing will use the Constellations key to guess the presenter's Zodiac sign based on how the constellation lights up on the apparatus.
7. After all students have had a chance to share, provide students with the opportunity to design ANY Constellation that they would want to fill the night sky AND name it. They will use **Blank #2 (in resources)** for this portion.
8. Again, students will have an opportunity to share out the name, design, and reason for choosing their respective constellation.
9. Close the activity with a recollection of two vocabulary terms and provide students with an opportunity for reflection on the activities.

Guiding Questions

- Why do you think early travelers on boats used the stars to guide for navigation?
- What do you think would be a cool constellation?
- Why is it that the constellations in the sky change their positioning throughout the year?

Career/Future Application

NASA and other agencies working on missions to space! Looking up at a clear sky at night and being able to spot some constellations.

Sources

https://nightsky.jpl.nasa.gov/news-display.cfm?News_ID=573

https://astronomy.com/observing/astro-for-kids/2008/03/learn-the-constellations

https://www.nationalgeographic.org/encyclopedia/navigation/#:~:text=For%20sailors%2C%20celestial%20navigation%20is,and%20horizon%20to%20calculate%20position.&text=Navigators%20using%20this%20method%20need,the%20sky%20and%20the%20horizon.

https://www.space.com/15486-night-sky-constellations-names.html

Aries

Taurus

Leo

Virgo

Gemini

Cancer

Libra

Scorpio

Sagittarius

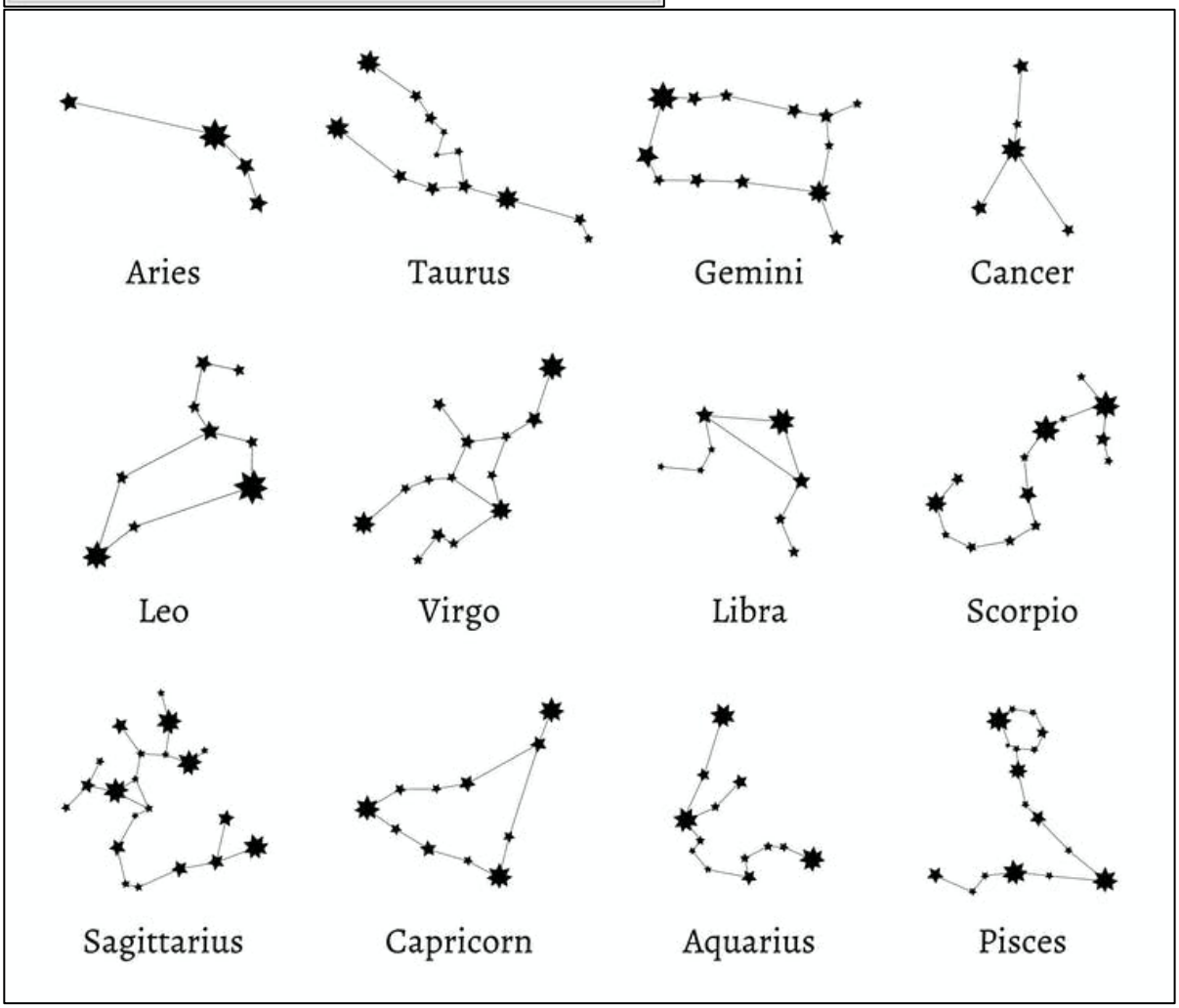
Capricorn

Aquarius

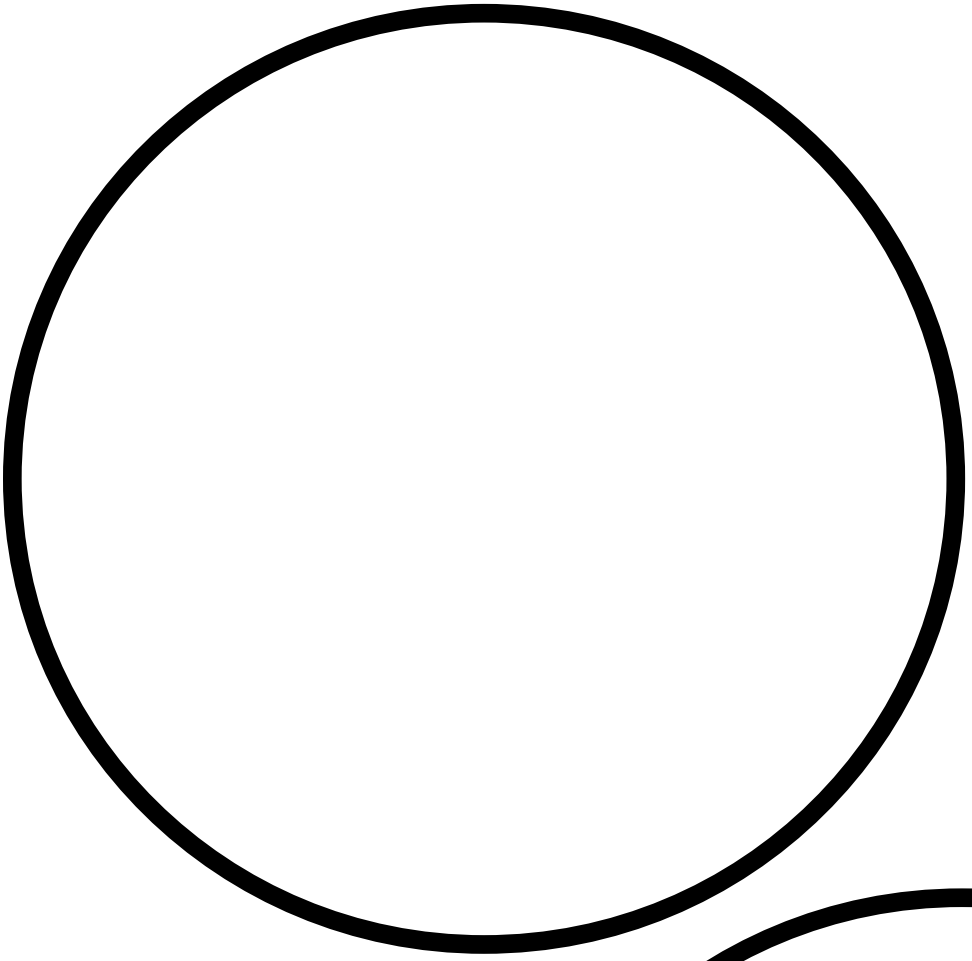
Pisces

Zodiac Sign Indicator	
Zodiac Sign	**Birth Date Range**
Aries	Mar 21 - Apr 20
Taurus	Apr 21 - May 20
Gemini	May 21 - Jun 21
Cancer	Jun 22 - Jul 22
Leo	Jul 23 - Aug 23
Virgo	Aug 24 - Sep 23
Libra	Sep 24 - Oct 23
Scorpio	Oct 24 - Nov 22
Sagittarius	Nov 23 - Dec 21
Capricorn	Dec 22 - Jan 20
Aquarius	Jan 21 - Feb 18
Pisces	Feb 19 - Mar 20

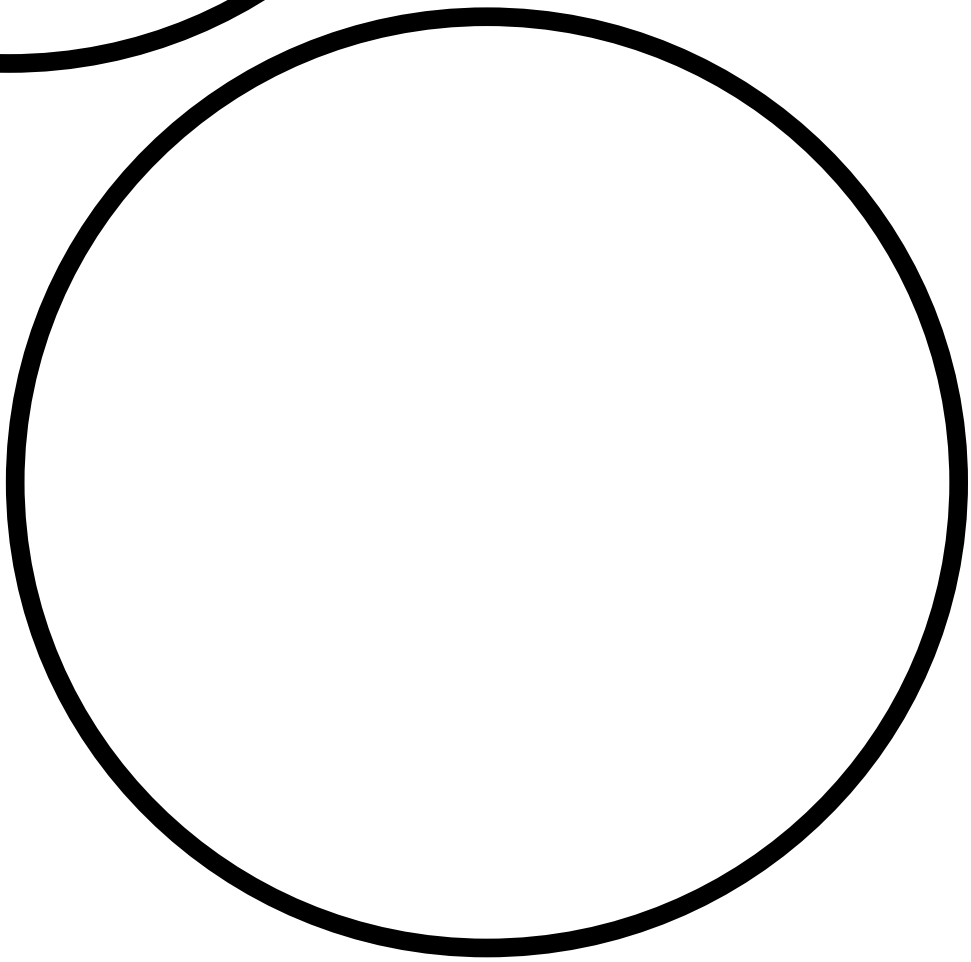
Zodiac Sign Constellations KEY



What is your Zodiac Sign?!



Blank #1



Blank #2