

Helping Kids Learn – Post #4 April 8, 2020

STEM: Science – Earth and Space Sciences

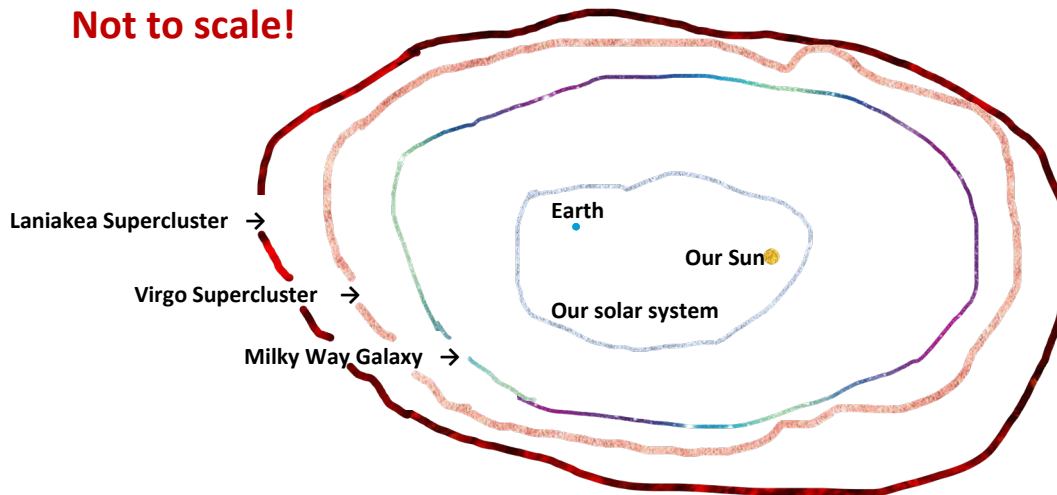
The night sky is a fascinating site – hard for us to see in this area due to light pollution and hard for young kids with reasonable bedtimes to stay up for. Fortunately, the Internet comes to the rescue! This Experience can be adapted for primary through high school. See [Lift the Level](#) below.

Be an Astronomer – Dark Skies, Our Solar System and Beyond

Astronomers are scientists who study the world beyond Earth. The International Dark Sky Association certifies places where you can see the night sky well. They have a long list, few of which are in the Eastern U.S., none in New Jersey. But you can use the Internet to see plenty.

We are all a part of a galactic **system**. Here's a *super simplified* way to think about it:

Not to scale!



Our solar system – our sun plus the planets we know – is one part of a bigger system called the Milky Way Galaxy. You can see part of the galaxy at night in a dark sky. It looks like a milky, cloudy streak. That's how it got its name. Some ancient people thought it was a path to heaven. The Italian astronomer Galileo Galilei developed a telescope that let him see details in the streak. In 1610 he proved that it was made up of stars. It also contains dust and other particles. Remarkably, until less than 100 years ago, scientists thought that the Milky Way contained all the stars there are. In 1924 another astronomer, Edwin Hubble, proved that there are lots of galaxies. The Hubble Space Telescope was named for him.

You can observe the night sky directly. A star map is very helpful if you aren't an expert. You can find a good one at #2 under STEM Online. But if you're near the city or it's cloudy or past your bedtime, you can learn a lot from Internet observations.

STEM Online

- Start with the Dark Sky website for beautiful pictures of the Milky Way: <https://www.darksky.org/our-work/conservation/idsp/parks/>.
- Then see the night sky at various times of the year: <https://stellarium-web.org/> Note the 24-hour clock at lower right (20:00:00 = 8 p.m.). You may want to watch for awhile to see that the sky changes as Earth rotates throughout the night. Click on the Constellations (triangle) at the bottom of the screen. Then Click on the person with a star head symbol to see an artist's view of what Europeans have made up over centuries to explain the constellations. Other cultures have used the stars to create figures from their traditions. You can change the scale or perspective by pinching or expanding on a mousepad. There is also an app.
- Another site with NASA links is <https://www.space.com/16149-night-sky.html> Click on one of the video links to see current night sky information.
- Look at awesome pictures of our galaxy and beyond taken by the Hubble Space Telescope at <https://hubblesite.org/>. To start, scroll down to Hubble Favorites.

Lift the Level You can make this lesson deeper and/or suitable for older students and adults by any of the following:

- Read more about these topics at https://en.wikipedia.org/wiki/Milky_Way or <https://bgr.com/2020/03/30/milky-way-galaxy-astronomers-have-found-the-farthest-edge/>
- Make a chart of the relative distances from Earth of our Moon, the planets in our solar system, the Sun, and other significant stars (start with Proxima Centauri, Polaris, Sirius, Betelgeuse, Pollux, Deneb, Arcturus). Make sure all of your measurements are in the same units.
- Extend your chart to include data such as when each planet is visible during the year, how long it would take conventional space craft to reach each planet, a specific star, the outer edge of the Milky Way Galaxy or another galaxy. There is a great deal of data available at: <https://www.timeanddate.com/astronomy/night/>
- Write a fiction story about being the first group of people to travel to a planet – Mars is the most likely choice.
- Read about some of the heros of space observation and exploration: besides the men mentioned here, consider Katherine Johnson, John Decker, Sally Ride, Beth A. Brown, Peggy Whitson, Benjamin Banneker, Henrietta Swan Leavitt, or Neil deGrasse Tyson. What did they contribute to what we know about space? What did they have to conquer on Earth in order to do their work?
- Create a realistic model of our solar system (the planets aren't really "lined" up as we usually see in textbooks, that just makes them fit on a flat page). The distances you calculated above will help you. You'll also need to know the size (diameter) of each planet if you make a 3-D model. Kids should get an adult's help. Papier mache is useful for making the planets and sun. You'll need strips of newspaper and a very smooth mix of equal parts flour and warm water (plus some extra water as it can stiffen when it sits). Make sure there are no lumps. Cover your

workspace with sheets of newspaper or a plastic bag or tablecloth. You can tint a small amount of the flour-water mix for each planet or paint them after they're dry. Wear gloves if you tint the mix. You can hang the finished planets and sun from strings or put them on wire like pipe cleaners or hangers.

- When you can go to a park or large outdoor space, get a sense of the relative distances of the planets from our sun by making a TP Planet model: You will need a roll of toilet paper perforated into sheets about 4.5 inches long. If it seems wasteful to use TP, you can measure distances in inches. Also, planetary orbits are not circular/spherical so distances are averaged. Think of this as a rough idea of relative distances. *Thanks to Mrs. Jo-Linda Keith for this idea.*

Planetary Body	Distance from the Sun in TP Sheets	Distance from the Sun in Inches Scale 4.5 in:17.5M mi
Sun	0	0
Mercury	2	9
Venus	3.7	16.65
Earth	5.1	22.95
Mars	7.7	34.65
Jupiter	26.4	118.8
Saturn	48.4	217.8
Uranus	97.3	437.85
Neptune	152.4	685.8
Pluto	200	900

You can convert inches to feet or yards or meters if you wish.

- Travel (when that's an option again!) to a Dark Sky site. You'll have better viewing on the NJ-PA border or in upstate New York than we have in the metropolitan area. Some Dark Sky sites on the East Coast include: Cherry Springs State Park in Pennsylvania and James River and Staunton River State Parks in Virginia.

Bonus On April 7, 2020, there was a full moon, the first of three Supermoons in a row! A supermoon looks bigger and seems brighter than usual because it is closer to Earth. The moon's orbit around Earth is an **ellipse** (think rugby or American football). This means that it is closer to Earth sometimes (perigee) and farther away at other times (apogee). Long ago, people gave names to the full moons. Some of the names for this full moon are Pink (Phlox flowers, not the moon's color), Sprouting Grass, Fish, Hare, and Egg. The date of this full moon is used to calculate the dates for Easter and Passover. Ramadan is determined by a crescent moon.



Source: The Sun, a News UK Company 7 April 2020

NJ Student Learning Standards

K-, 3-, 4-, and 5-ESS2 Earth's Systems, 1-, 2-, 4-, and 5- ESS1 Earth's Place in the Universe, MS-ESS1 Earth's Place in the Universe, MS-ESS2 Earth's Systems, HS-ESS1 Earth's Place in the Universe, and HS-ESS2 Earth's Systems.