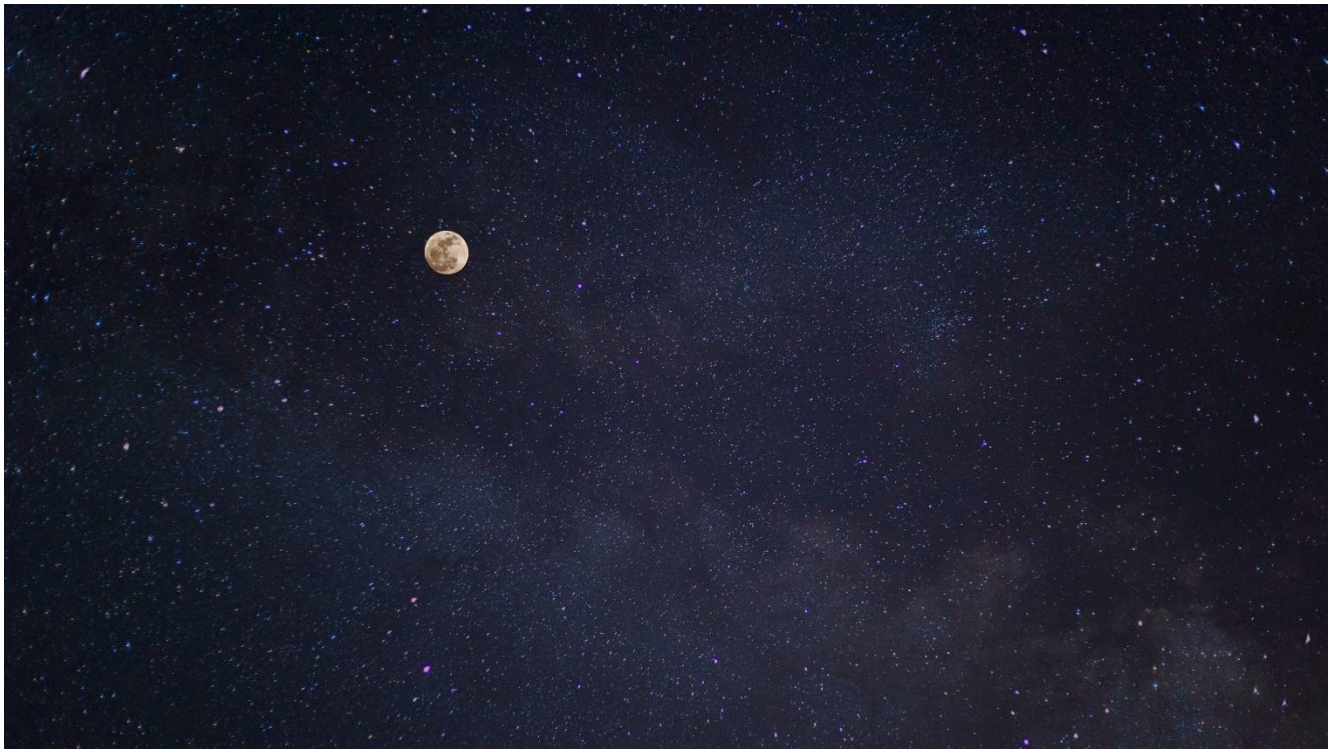
After the sun goes down, there are still many nature-based adventures for families to enjoy.



Lesson Contents:

Duke Farms

After the Sun Goes Down

BINGO

for kids!

A _____ RACCOON	A MOTH _____ TO A LIGHT	A _____ CAMPFIRE 	A _____ BEETLE	A SHOOTING STAR
THE BIG DIPPER CONSTELLATION	THE _____ MOON	A _____ SKUNK	_____ TREE LIMBS	AN OWL _____ 
A CRICKET _____ 	A _____ FOX	GET OUTSIDE! Duke Farms	A _____ FIREFLY	A _____ PLANET
A _____ HAWK	THE _____ WIND	_____ GNATS	A _____ SPRING PEEPER 	A _____ BAT
A _____ SPIDER	A _____ OPOSSUM 	A RABBIT _____	_____ CLOUDS	A _____ DEER

Word Bank

Searching				Wriggling
Shooting	Chirping	Hiding	Rushing	Writhing
Swaying	Waddling	Running	Walking	Stumbling
Hooting	Creeping	Hissing	Jumping	Bolting
Crackling	Crawling	Buzzing	Flailing	Staggering
Shining	Passing	Swimming	Stirring	Twitching
Singing	Hunting	Climbing	Squirming	Whistling

BINGO Guiding Questions

These activities can be completed as a Think-Pair-Share.
Think and write down your answers yourself. Exchange answers with a partner. Share with the larger group.

1. You may not be able to find all the items on the Bingo Board. Name some that you are unable to find and explain why.

2. Which objects in the Bingo Board were the easiest to find? Why do you think these things are more common?

3. Create a story by using the items in the Bingo Board and the "ing" words you have chosen.

4. Which objects in the Bingo Board can also be seen during the day?

MY VERY OWN BINGO BOARD!

THEME:

		GET OUTSIDE! Duke Farms		

Duke Farms

Nocturnal Animals

Think and Respond: Without any additional resources, answer the following questions to the best of your ability.

1. Are you diurnal or nocturnal? If you're not sure what diurnal means, think about what nocturnal means and take an educated guess at the definition of diurnal.

2. Name some nocturnal animals. Think about some nighttime animals you see outside or on tv.

3. Think about the nocturnal animals that you wrote down. What sorts of adaptations do they have? If you're stuck, pretend you are nocturnal, what adaptations would you need to survive?

4. What are some advantages of being nocturnal?

5. How does human activity affect some nocturnal animals?

Read and Respond Again: Now, use the following resources to answer these questions in more detail.

- https://www.sciencenewsforstudents.org/article/scientists-say-nocturnal-and-diurnal
- https://www.scienceabc.com/nature/animals/how-do-nocturnal-animals-hunt-their-prey.html
- https://www.earth.com/earthpedia-articles/why-are-some-animals-nocturnal/
- https://www.nps.gov/articles/nocturnal_earthnight.htm
- https://www.darksky.org/light-pollution/wildlife/
- http://nsrangers.tripod.com/nocturnal.htm

1. Are you diurnal or nocturnal?

2. What are some nocturnal animals?

3. Think about the nocturnal animals that you wrote down. What sorts of adaptations do they have?

4. What are some advantages of being nocturnal?

5. How does human activity affect some nocturnal animals?

Answer Key

1. Most of us are **diurnal.** Meaning that we are active during the day and sleep at night. Some people who work long overnight shifts may consider themselves nocturnal because they get their work done at night.

2. What are some nocturnal animals?
    a. Foxes
    b. Opossum
    c. Bats
    d. Moths
    e. Racoons
    f. Skunks
    g. Owls
    h. Coyotes
    i. Fireflies

3. What are some adaptations of nocturnal animals?
    a. Foxes – Impressive eyesight at night
    b. Opossum – Heightened sense of smell
    c. Bats – Echolocation to help them find food at night
    d. Moths – Nighttime navigation by use of the night sky
    e. Racoons – Impressive eyesight at night
    f. Skunks – Dark fur to help them blend in
    g. Owls – Large eyes to help them see better in the dark
    h. Coyotes – Heightened sense of smell
    i. Fireflies – Produce their own light

4. What are some advantages of being nocturnal?
    a. Less competition
    b. Fewer predators
    c. Blending into the darkness so they are less detectable
    d. Stay cool at night

5. How does human activity affect some nocturnal animals?
    a. Light pollution from humans can harm and confuse nocturnal animals
    b. High amounts of human activity during the day can encourage diurnal animals to be more active during the nighttime.

Our Night Sky: Part 1, The Night Sky and Wildlife, The Moon, Constellations, and Shooting Stars & Satellites

SECTION 1. The Night Sky and Wildlife

There are a lot of things to see in the night sky, but we are going to focus on how wildlife uses night to survive, the moon, constellations, and shooting starts and satellites.

1. Why is the night sky important for some animals?

2. What does nighttime offer that daytime doesn't?

3. Can you guess which nocturnal animal are hiding in the darkness of the night sky below?

Answer Key

1. Why is the night sky important for some animals?
   The night sky provides protection in the darkness and allows animals to use the moon and stars as their own compass.

2. What does nighttime offer that daytime doesn't?
   Nighttime provides a dark background for both predators and prey to move around safely. Predators can hunt in the dark because they have adaptations that allow them to survive in the dark. It also allows prey to move more stealthily in the darkness.

3. Can you guess which nocturnal animal are hiding in the darkness of the night sky below?

Moth	Fox	Owl	Raccoon

SECTION 2: The Moon

Our moon has 8 phases, and each one looks different. Each phase lasts about 3 days. See what the phases look like below.

Understanding the Terms:

- A **waxing moon** is when the right side of the moon is visible, and the illuminated side will continue to grow, up until the full moon.
- A **waning moon** is when the left side of the moon is visible, and the illuminated side will continue to fade, up until the new moon.
- A **crescent moon** is when the moon is showing more than a new moon and less than a half moon.
- A **gibbous moon** is when the moon is showing more than a half moon but less than a full moon.
- A **waxing half-moon** is also known as a first-quarter moon or half-moon.
- A **waning half-moon** is also known as a third-quarter moon or a half-moon.

Moon Activities:

1. Journal Entries: Every 3 nights or so, look outside your window or go outside to find the moon. Study it. Can you tell what phase it's in? Keep track of what you notice in you're a journal.
2. Drawing the Phases: Take a piece of paper and draw the moon phases in order and label them. You can color them in and color the background to make it look like they're actually in the night sky!

SECTION 3: Constellations

Hundreds of billions of stars make up the night sky. Constellations are multiple stars that, when looked at, make up an identifiable pattern and are given a name. There are 88 recognized constellations in the Milky Way. Most constellations are named after gods and goddesses, animals, and other parts of stories from ancient civilizations including Roman, Greek, and Middle Eastern.

Constellation Activities:

1. 3-D Constellations: You can represent the constellation is a 3-D way by constructing them out of toothpicks and marshmallows. Just as the stars do not lay flat in the sky, your constellation models will look more realistic. As an alternative, pipe cleaners can also be used.
2. Constellation Wall: To create your own constellation on construction paper. Punch holes for the star. If you make the room dark and hold the paper over a light, your stars will glow.
3. Blacktop Constellations: For a full classroom or family activity, use sidewalk chalk on a blacktop to draw a full sky-full of constellations.

SECTION 4: Shooting Stars and Satellites

Shooting stars aren't stars at all. They are bits of rock from space that fall into Earth's atmosphere, also known as meteoroids. Sometimes we have predicted meteor showers which means you can see a lot of shooting stars all in one night, or even over the span of multiple days. Though, shooting stars can be seen all the time! All you need to do is find a comfy spot outside on a clear night and look up. No equipment is needed to look for shooting stars, they can be seen just with the naked eye.

While you're looking for shooting stars, you might also see some satellites moving up there. Thousands of manmade satellites have been launched into space to orbit and document different planets.

How can you tell the difference between a satellite and a shooting star? You will only be able to spot a shooting star for a few seconds. They shoot into the atmosphere and then in an instant, they're gone. They look like a streak in the night sky, some are small streaks, and others can be long and bright. Satellites, on the other hand, can be followed with your eye until they are out of sight. They orbit the planet in a straight line at a constant speed.

Learn more about satellites here.

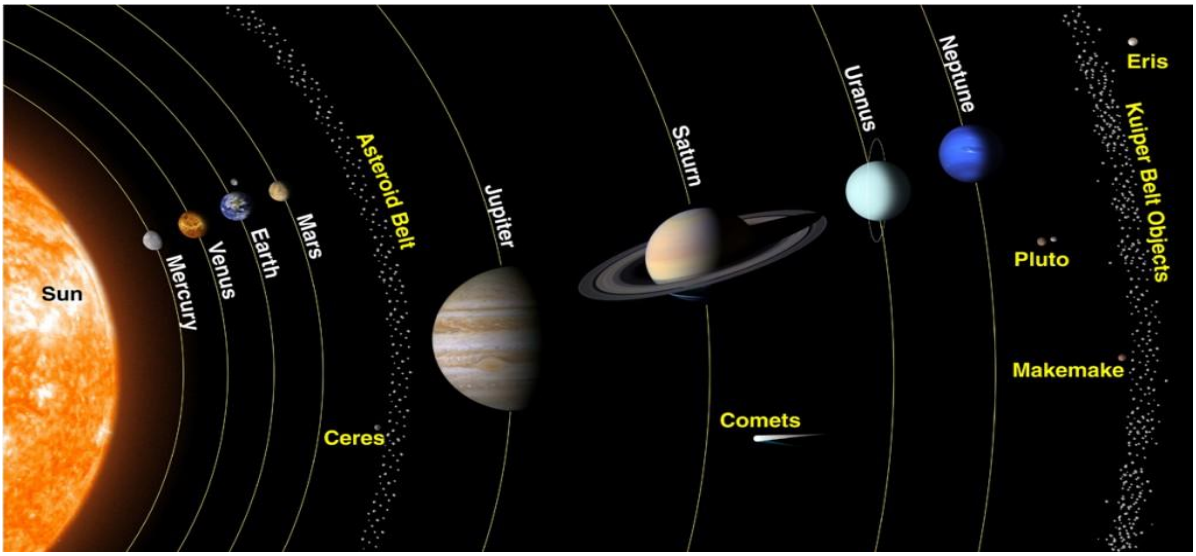
Extra: Just like how you can see stars in the night sky, planets are also visible with the naked eye. Mercury, Venus, Mars, Jupiter, and Saturn can all be seen! To help you locate different planets, stars, and constellations, you can use this free night sky viewing app for Apple and Android.

Our Night Sky: Part 2, The Solar System, Galaxies, and the Universe

SECTION 1: The Solar System

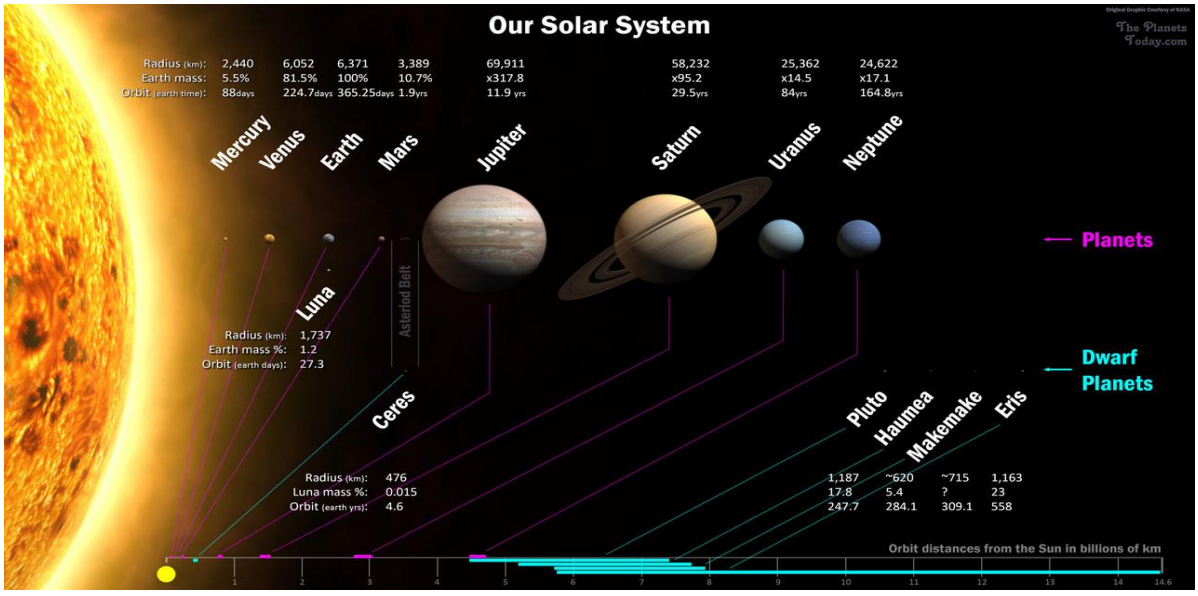
Our solar system is made up a really big star, called the Sun, 8 planets, 5 dwarf planets, over 200 moons, asteroids, comets, and meteoroids.

Look at the photo below and figure out what each planet, including the Earth, orbits around. In other words, what is the center of our solar system?



Answer: Our star, the Sun

The 8 planets in our solar system, starting from the Sun, are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. The 5 dwarf planets, starting from the Sun, are Ceres, Pluto, Haumea, Makemake, and Eris, shown below.



[Check out this article from NASA about planets and dwarf planets.]

SECTION 2: The Galaxies

Beyond our solar system is our galaxy. Basically, our solar system lives within our galaxy. But what is a galaxy? NASA's definition is this, "a galaxy is a huge collection of gas, dust, and billions of stars and their solar systems, all held together by gravity."

Our galaxy is called the Milky Way, but there are over 200 billion galaxies in the Universe. And that number increases the better our technology gets and the more we explore the cosmos.

Below are 2 photos of the Milky Way that were taken from Earth. Try to paint your own Milky Way. You can also get more creative by naming and painting your own unique galaxy!

Want to learn more about galaxies and current discoveries? Check out this article from NASA.

SECTION 3: The Universe

There are so many aspects of space to explore, and even discover! It isn't just us and the Earth. So, let's begin with the universe. If you had to write a definition of "the universe" what would your definition be? Write it below.

Here's a simple explanation of the universe from NASA - "The Universe is a big, open place. You are in the Universe. Things you can't see are in it, too. The biggest stars are in it. Even the smallest things on Earth are part of the Universe. We don't even know how big the Universe is!"

Basically, the universe is EVERYTHING! Every single living and non-living thing. Things you can see, and things you can't. Even things that we don't know exist from the deepest part of the sea, to the farthest part of space.

Additional Resources
There are many books about the nocturnal animals. These are some favorites:

Night Animal by Gianna Marina
In this book, various nocturnal animals meet each other although some characters are afraid of the dark. A fun book for young learners that introduces some common nighttime creatures. Listen here.

While the World is Sleeping by Pamela Duncan Edwards
While taking a whimsical ride aboard an owl, a boy is introduced to animals of the night including racoons, mice, fish and a fox. Listen here.

The Big Dipper, Franklyn Branley
Glow in the Dark Constellations, CE Thompson
Galaxies and Galaxies, G Gibbons
A Child's Introduction to the Night Sky, Michael Discoll
Our Stars, Anne Rockwell

Learning Standards
A few sample learning standards that may apply to these activities.

Next Generation Science Standards

- 2-ESS1 E-1 Earth's Place in the Universe. Use information from various sources to provide evidence that Earth's events can happen quickly or slowly.
- MS-ESS1-1 Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases.
- 3-LS4-3 Construct and argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

NJ ELA/Literacy

- W.2.8 Recall information from experiences or gather information from provided sources to answer a question.

NJ Mathematics: The study of the solar system offers many opportunities to integrate areas of mathematics.

- MP.2 (MS-ESS1-3) Reason abstractly and quantitatively
- 7.RP.A.2 Recognize and represent proportional relationships between quantities.

For more information about multi-disciplinary activities to be integrated with areas included in this packet, please contact Kate Reilly, Manager of Education at kreilly@dukefarms.org.