



Grade Level
3rd -5th Grade

Lesson Length
90-150 Minutes

STEM Careers

- Zoo Keeper
- Wildlife/Conservation Officer
- Animal Scientist
- Lab Technician

Life Skills

- Critical Thinking
- Decision Making

Related Activities

- Cricket Experiment

Learn More

- Visit Raising Nebraska raisingnebraska.unl.edu

Virtual Fun

- <http://omahazoo.com>

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ANIMALS OUT OF THE LIGHT

Animal Science

This grab and go lesson will focus on nocturnal animals and provide examples of some.

LEARNING OBJECTIVES

By the end of the lesson, students should be able to:

- Compare and contrast between nocturnal and diurnal animals
- Research and report on a nocturnal animal
- Discuss other impacts light has on animals

EDUCATIONAL STANDARDS SUPPORTED

- NE 2010 5.3.3.c Recognize the living and nonliving factors that impact the survival of organisms in an ecosystem
- NE 2010 5.3.4.a Describe adaptations made by plants or animals to survive environmental changes
- NGSS 4-LS1-2 Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

MATERIALS LIST

- 6 small jars (pint size or smaller) or containers
- 6-12 cotton balls/pads
- 6 different smells (examples: vanilla, almond, lemon, mint, orange, strawberry, grape, garlic oil, etc.)
- Sharpie and/or Tape (to label jars)
- What's That Smell sheet (end of lesson)

Two Options:

- PAPER VERSION: Poster Board, Construction Paper, Crayons or Markers, Scissors, Glue
- ELECTRONIC VERSION: Tablet or Computer per student or pair of students (with piktochart, canva or power point on it)
- Animal Investigation Sheet (end of lesson)

PREPARATION

- Prepare 6 jars/containers with 6 unique scents. (Potential scents listed above.) Using extracts or oils, dip 1-2 cotton balls in the scent
- List of nocturnal animals for youth to research

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INTRODUCTION

Nocturnal Animals

There is a large percentage of animals that are nocturnal, or active at night due to advantages that activity at night allows. It is fascinating how these animals survive with little or no light. Some advantages nocturnal animals have over diurnal (active during the day) animals include: reduced competition for food, water, shelter and space, avoid the heat of the day and water loss by being active at night when it is cooler and to avoid predators that are diurnal.

How are nocturnal animals able to function in the dark? Many nocturnal animals have adaptations for better night vision, and the other senses are much more developed in nocturnal animals than in diurnal animals. For example, they use their hearing, smelling, tasting, touching, and vision to navigate through the night. Some species also have extra sensory adaptations such as echolocation in bats and heat-sensing pits in pythons.

What appears as pitch black to a human may be dim light to a nocturnal animal. The reason lies in the structure of the eye itself. Nocturnal animals tend to have proportionally bigger eyes than humans. They also tend to have pupils that open more widely in low light. So, at the outset, nocturnal eyes gather more light than human eyes do. Some nocturnal animals such as bats have special eye cells called rods. These rods help them capture more light when it is dark.

Special auditory (hearing) adaptations allow nocturnal animals to hear quite well. The use of smell and scent-marking is an important communication tool for nocturnal animals; many nocturnal animals have a special organ in the roof of their mouth (called Jacobson's organ) that improves their sense of smell. Some animals such as snakes, use their tongues as a primary sense for navigation and location of prey. Some nocturnal animals have hairs with sensory receptors that aid in navigation and finding food. In mammals, these take the form of whiskers. In arthropods, they take the form of hairs covering the animal's body. Spiders also use webs as sensory tools to tell when prey have been caught.

Key Concepts

Nocturnal animals use their senses to function at night. These include:

- Hearing
- Sense of smell
- Vision
- Sensory receptors
- Tasting
- Touching

Vocabulary

Nocturnal animal- an animal that is most active during the night

Diurnal animal – an animal that is most active during the daylight

Adaptation – a special feature or characteristic possessed by a living thing that helps it survive in its environment

Did You Know?

Bats are creatures of habit and will return to the same roost for many years.

OPENING QUESTIONS

- What is meant by nocturnal and diurnal?
- What are examples of each type of animal?
- What adaptations do nocturnal animals have in order to function at night?

Today you are going to be a zoo keeper and explore what animals are mostly active at night so you can take care of them well. Let's get started...

ACTIVITY 1: WHAT'S THAT SMELL?

Ask students about their daily/nightly routine. How are you able to navigate yourself throughout the day? How do you know where your desk is at school? How do you know where your toothbrush is? (using your senses)

Let's do an activity testing out one of your senses. There are 6 jars with unique scents in each jar. You are tasked with smelling each jar, writing down what scent you think is in the jar on the "What's That Smell" sheet.

How many of you correctly identified all of the scents?

Which senses did you use? (smell, some might have used eyes if the scents colored the cotton balls)

What are other scents you use every day to make decisions? (hearing, vision, touch)

Just like animals, we all use our senses to function. One of the senses that nocturnal animals use quite well is their ability to smell, see, hear as well as a good memory.

Discuss

Nocturnal Animals-

Mole, owl, badger, bat, toad, mouse, hamster, cat, hedgehog, red fox, coyote, cricket, firefly, lion, white-tailed deer

Diurnal Animals-

Most birds, cows, humans, river otters, squirrels.

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Watch a TED-Ed video that explains how nocturnal animals' eyes are able to see in the dark at <https://youtu.be/t3CjTU7TaNA>

Facts

Some bat species eat insects and consume up to their weight in food each night.

A colony of bats can eat literally tons of insects every night. Bats also consume insects that damage crops.

Bats live in a variety of places such as under tree bark, caves, tree cavities, hollow trees, abandoned mines and crevices under bridges.

Bats are foot for owls, hawks, falcons, opossums and raccoons.

ACTIVITY 2: THE INVESTIGATION

There has been a whole section of the zoo devoted to nocturnal animals. As a zookeeper or animal biologist, it is your task to investigate this animal's needs so it can live in the zoo.

As a group, let's create a list of what we need to research for these animals. Create a list on the board or where all youth can see and copy down for their report.

These might include:

- Eating habits and food
- Where it lives and its habitat
- Type of animal (amphibian, bird, fish, insect, mammal, reptile)
- Height, size, weight
- Fur/feather/skin and color
- Predators
- Lifespan
- How it functions as a nocturnal animal
- Other interesting facts
- Animals it can come along with

You can either allow youth to select an animal of their choosing or have a prepared list and have them draw from that list.

Depending on the resources you have available, youth could create this report as an infographic or similar design using piktochart, canva or other tool of your choosing. If you do not have access or time for this, youth can draw this or make a paper-type poster.

After youth have completed this assignment, they can share it to the class, as a group or let them share a couple of interesting facts they'd like to share with the group.

ACTIVITY 3: LIGHT MATTERS

Seasonal Reproduction

Some animals are impacted by the period of time during the day when there is sunlight (photoperiod). These animals are called seasonal breeders. Animals in the wild have a breeding season that is initiated at a time when the environment will allow for the best survival of the young. This is usually during the spring season.

Domestication has stopped seasonal breeding in cattle and swine. In regards to farm animals, sheep and horses are still seasonal breeders. Photoperiod determines the reproductive cycle in seasonal breeders. The effects of photoperiod are caused by the stimulation of the retina by the amount of light present.

Assessment Tip

Having youth collectively create a list of what they need to research animals will allow you to show them what components to their report they need to include. Youth have essentially created their own scoring rubric.

For example, if youth (and instructor) decide the investigation report on each animal should include everything suggested to the left, youth should include those in their report to receive full credit. This helps youth have more ownership of the report expectations.

Important Note

Online tools like piktochart.com and canva.com will require Internet access. Both of these sites are free, but it does require users to create an account to create infographics or other graphical representations.

Determine what account youth will use prior to starting this lesson.

June 21 is the longest day of the year and known as the summer solstice; it is 16 hours of day length. December 21 is known as the winter solstice and the shortest day of the year with 10 hours of day length.

Knowing the impact the sun has on animals and their behaviors and patterns, what do you think will happen during a total solar eclipse?

In pairs, have students talk about normal behaviors of both diurnal and nocturnal animals. Ask, what do you think they do during a total solar eclipse?

Note: Predictions or past observations include:

- Birds stop singing and go to their roosts.
- Pets and farm animals may look for a place to sleep.
- Ants might return to their nests and grasshoppers stop making their clicking sounds.
- Nocturnal insects such as crickets could begin their night calls.
- Other animals will become nervous as there is normally a gradual decrease in the intensity of the sun and not a rapid change in light as during a total solar eclipse.

Optional: This could be only a class discussion, or youth could work in pairs or groups to find research on what happens, although the literature is very sparse. For the 2017 total eclipse, the Nashville zoo plans to document behaviors through photos, video and written observation.

Facts

Research shows that dairy cows exposed to 16-18 hours of light per day (or a long day photoperiod) produced more milk than cows with a typical light schedule of natural photoperiod plus additional light to accommodate a 12:12-hour milking schedule.

In other words, animals as well as humans can be impacted by the amount of light received. There have been studies that show people who develop seasonal depression (usually during winter hours when there is less light), can benefit from bright light therapy which can lift their moods.

Did You Know?

Bats are helpful to us because one bat alone can eat more than 1,000 mosquitoes in an hour.

Terminology

Photoperiod - the period of time during the day when there is daylight.

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Determine how an animal reacts to a solar eclipse. One place to get started is by checking out <https://www.eclipse-chasers.com>

More information on eclipses, including videos can be found at <http://www.neok12.com/Eclipse.htm>.

Fun Fact

Local animals and birds often prepare for sleep or behave confusedly during totality.



REFLECT

Let's review what we have learned...

What are examples of nocturnal animals?

- Mole, owl, badger, bat, toad, mouse, hamster, cat, hedgehog, red fox, coyote, cricket, firefly, lion, white-tailed deer

What are examples of diurnal animals?

- Most birds, cows, humans, river otters, squirrels,

What adaptations do nocturnal animals have in order to function at night?

- Improved sense of hearing, sense of smell, vision, sensory receptors, tasting, touching

What does the term photoperiod mean and how does it impact some animals?

Photoperiod- the period of time during the day when there is daylight.

- Some animals breed during longer periods of light and some have improved performance with more light present.

Draw/write down what you have learned about nocturnal animals on your animal investigation sheet.



APPLY

Now that you have successfully identified how certain nocturnal animals live, you are on track to being a great zookeeper or even an animal scientist – someone who studies animals.

What are key reasons some animals are nocturnal?

- Some advantages nocturnal animals have over diurnal (active during the day) animals include: reduced competition for food, water, shelter and space, avoid the heat of the day and water loss by being active at night when it is cooler and to avoid predators that are diurnal.

In recent years, animals have had to adapt due to human interference.

In fact, some animal species have not been able to adapt fast enough to changes caused by humans which in turn has brought some animals near extinction. What are some examples of human impact on animals and how has it changed that animal's way of life.

- Some animals have adapted to becoming nocturnal to have less

interaction with humans.

What are some examples that might limit the amount of sunlight an animal will receive?

- Total Eclipse, even just for a short amount of time; Length of sunlight in a day, in summer there are more hours of sunlight, etc.

What types of tasks would a zookeeper or animal biologist do?

- Take care of the animals (feed, water, clean pens), study their behavior, care for overall well-being

What are other careers that relate to animals other than what we have discussed?

- Animal breeder, geneticist, animal scientists, nutritionist, researcher, veterinarian, etc.

References

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We want to hear from you!

Let us know what you thought of the lesson or send us a picture of youth participating in the lesson.

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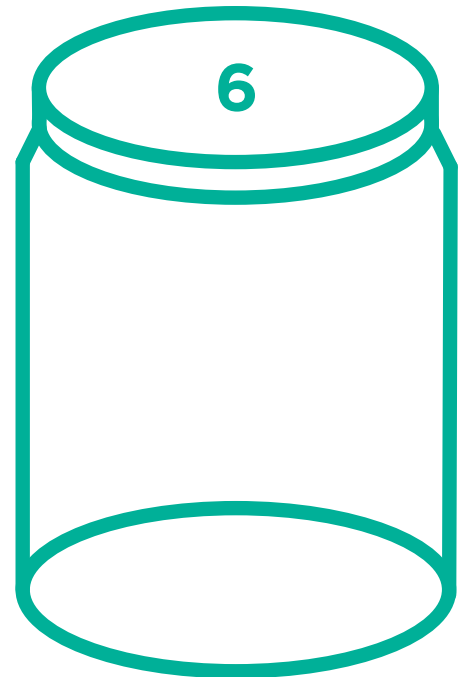
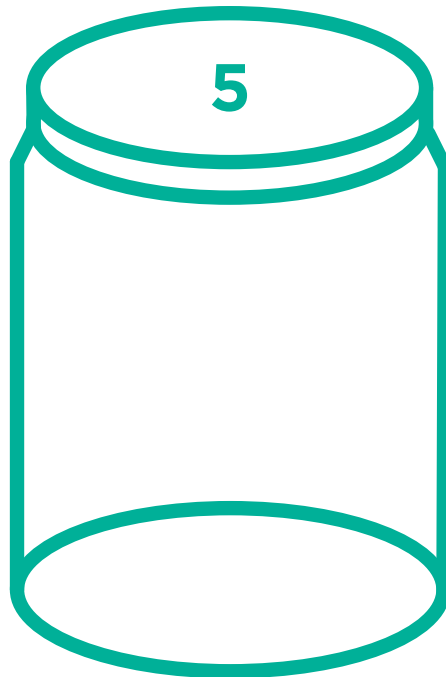
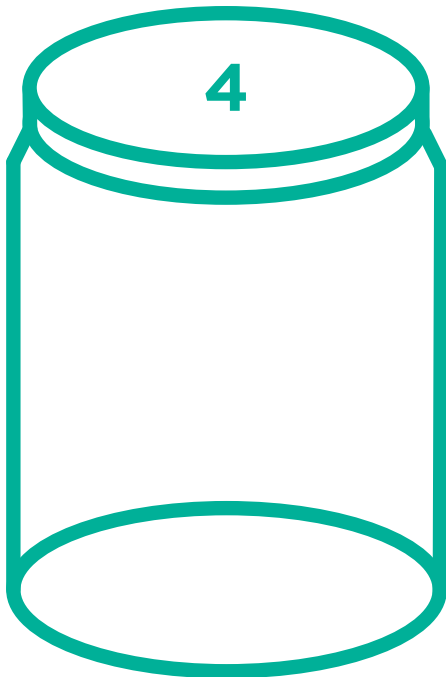
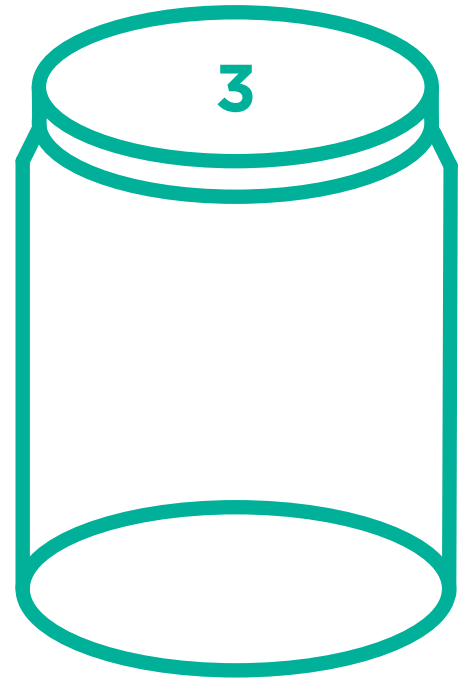
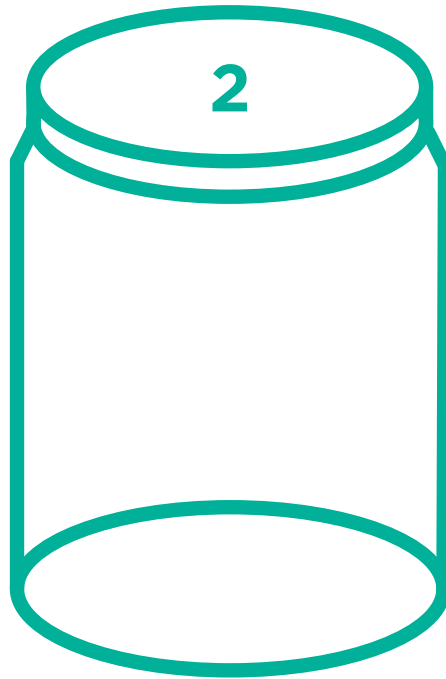
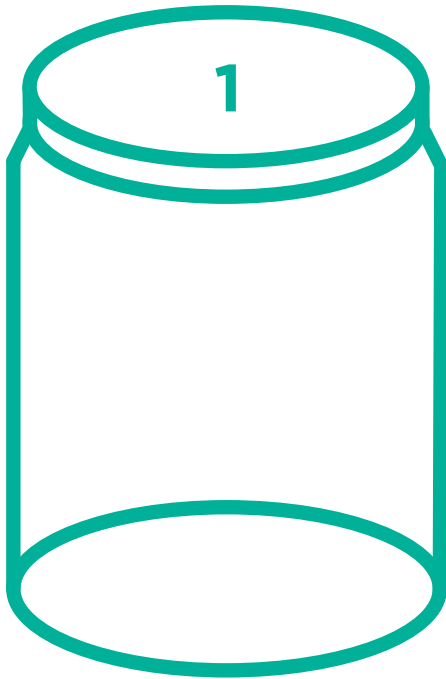
WHAT'S THE SMELL?

Animals of the Night

NAME

DATE

Write the type of scent you think is inside the numbered jar.



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ANIMAL INVESTIGATION JOURNAL

Animals of the Night

NAME

DATE



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