



# Time of Day

## Teacher Lesson Plan Nocturnal Animals Pre-Visit Lesson

**Duration:** 40-50 minutes

**Minnesota State  
Science Standard**

**Correlations:**  
3.4.1.1.2.

**Wisconsin State  
Science Standard**

**Correlations:**  
B 4.6, C.4.1, C.4.2

**Supplies:**

- 1) Smart Board or Dry Erase Board and Markers
- 2) Can or Hat
- 3) Nocturnal and Diurnal Animal Pictures (Appendix I) - one picture per student
- 4) Crepuscular Animal Pictures (Appendix II)
- 5) Pencil and Paper

**Overview**

Students will become familiar with characteristics animals have that help them adapt to being nocturnal, diurnal, or crepuscular.

**Objectives**

- 1) Students will be able to describe the adaptations nocturnal and diurnal animals have and how those adaptations help them adapt to their environment.
- 2) Students will be able to identify what time of day animals are most active by observing their physical characteristics.

**Background**

One way scientists categorize animals is by the time of day they are most active. Animals are considered to be nocturnal, diurnal, or crepuscular. Each category of animals uses different adaptations to survive in their environments; however, not all animals in each category share the same physical characteristics.

**Nocturnal Adaptations**

Many nocturnal animals have large eyes with more rod cells and fewer cone cells as well as a tapetum lucidum to reflect light back to the retinas. Some may also have large ears to pick up and funnel more sound. Many nocturnal mammals have long white whiskers to feel their way through the dark and nocturnal birds may have feathers on their beak called vibrissae that act like whiskers. Echolocation is used by some animals to find their way and catch prey in the dark. Many rely on sound to communicate. Silent movement can also be used so they are not heard by predators or prey. Snakes can have organs such as heat pits to sense the body heat of their prey.



## Background Continued

### Diurnal Adaptations

Diurnal animals generally have smaller ears and smaller eyes with more cones for better color vision. Their eyes are usually lighter or brighter in coloration because they are out during daylight. Some birds have brow ridges above their eyes to shade from sunlight. Diurnal mammals usually have smaller, darker-colored whiskers or no whiskers. Diurnal birds often do not have as many feathers on their beak (vibrissae). Diurnal animals found in groups more commonly rely on visual cues to communicate.

### Crepuscular Adaptations

Crepuscular animals tend to have characteristics of both nocturnal and diurnal animals. Their eyes can be large or small, but they usually have more cones than nocturnal animals. Mammals can have either dark- or light-colored whiskers or a combination of both. The whiskers can be long or short. Birds can have feathers on their beak (vibrissae). They can have large ears or smaller ears. They will use either sound or visual cues or a combination of both to communicate.

## Procedure

- 1) Introduce the terms "nocturnal" and "diurnal" to the students and write each term on the board with room under each term to list the characteristics.
- 2) Explain to students what an adaptation is (see important terms) and that animals have different adaptations depending on whether they are diurnal or nocturnal. Ask students to think of physical characteristics (color, shape, size of different body parts, whiskers/no whiskers, etc.) animals have that help them to be able to avoid predators and find food at night or during the day. Write all the characteristics on the board under the correct categories. If the students don't guess them all, fill in the rest of the characteristics for them.
- 3) Explain to students that they will be drawing pictures of animals out of a can/hat. Each picture will have a sound written underneath. The students will make the sound and try to find another student making the same sound. Once they locate someone with a matching sound, that student will be their partner. When they find their partner, they will need to get out a pencil and a piece of paper and find a place to sit. Option: If you want a silent game, the students can find each other by showing their pictures instead of making the same sound.
- 4) Once students have located their partners, have them examine their pictures and write down the physical characteristics of the animal.
- 5) Using the physical characteristics they have written down, have them compare the physical characteristics they found with the adaptations on the board and then guess what time of day their animal is most active.
- 6) Once all the groups have guessed, write the correct answers on the board (see answer key) and briefly explain what adaptations each animal has to help it survive being either nocturnal or diurnal. You can display the pictures on the Smart Board while you talk about each animal.
- 7) Now have each group find another group whose cards have the same color text box. The color of the text boxes indicates whether the animal is nocturnal or diurnal.
- 8) Have the groups compare their animals' adaptations to see how animals that are active at the same time of day can have very different characteristics.

## Time of Day

- 9) Then, as a group, put up pictures of crepuscular animals (Appendix II) on the Smart Board. Don't tell the students these animals are crepuscular yet.
- 10) Ask the students to look at the pictures and guess what time of day these animals are active. You can have them raise their hand if they think the animal is nocturnal and then raise their hand if they think the animal is diurnal.
- 11) Once they have had time to guess, tell them the answer is neither, that these animals are crepuscular (active at dawn and dusk). Not all animals always fit into a nocturnal or diurnal category, so crepuscular animals have adaptations of both nocturnal and diurnal animals.

### Assessment

- 1) Name two nocturnal animals? *Bat, owl, flying squirrel, red fox, raccoon, skunk, bobcat, frogs, some snakes, etc.*
- 2) What are two characteristics nocturnal animals have? *Large eyes or very small eyes, eye shine (tapetum lucidum), large ears, whiskers, silent movement, echolocation, good sense of smell, heat sensing pits.*
- 3) Name two diurnal animals? *Woodchuck, parrot, eagle, monkey, chipmunk, red squirrel, gray squirrel, etc.*
- 4) What are two characteristics of diurnal animals? *Smaller eyes, smaller ears, fewer whiskers, lighter in color, brow ridges on birds.*
- 5) What time of day are crepuscular animals active? *Sunrise and sunset.*
- 6) What are the adaptations of crepuscular animals? *A mixture of diurnal and nocturnal adaptations.*

## Answer Key

### Diurnal

- a) **Ring-tailed lemur** - Small dark whiskers, light in color, live in groups, use vision to communicate with each other.
- b) **Woodchuck** - Small dark whiskers, smaller eyes with more cones for color vision.
- c) **Bald eagle** - Brow ridge, no feathers on their beak (vibrissae), smaller eyes with more cones for color vision.
- d) **Black-headed caique** - (pronounced "kai-eek") Colorful, live in groups, no feathers on their beak for feeling, small eyes.

### Nocturnal

- a) **African straw-colored bat** - Large eyes to let in more light, communicate through sound, dark in color (Note: fruit bats don't use echolocation like insect-eating bats do.)
- b) **Great horned owl** - Large eyes, feathers on beak (vibrissae) for feeling, dark colors, disc-shaped face for collecting sound, communicate through sound. (Note: feathers on top of head are not ears or horns, just feathers.)
- c) **Burmese python** - Heat sensing pits, poor eyesight, tongue for "smelling."
- d) **Red-eyed tree frog** - Communicate through sound, large eyes, green skin to blend in with leaves while sleeping during the day.

### Crepuscular

- a) **Pallas cat** - Large eyes, white whiskers, solitary, are not nocturnal because their prey isn't nocturnal.
- b) **Brown bear** - Small eyes, small white whiskers, solitary, small ears.
- c) **White-tailed deer** - Large eyes, small white whiskers, large ears.
- d) **Rabbit** - Large eyes, large ears, small white whiskers.

## Important Terms

**Adaptation** - Changes made by living things in response to their environment (where they live).

**Amphibian** - A cold-blooded (ectotherm), vertebrate animal that lays many soft, jelly-like eggs which allow for water and air to enter. Young are born with gills and metamorphose into adult animals that breathe through their skin. This group includes frogs, toads, salamanders and newts.

**Bird** - A warm-blooded (endotherm), vertebrate animal that lays hard-shelled eggs, is covered in feathers, has wings, and breathes through lungs. This group includes raptors, penguins, water fowl and songbirds.

**Cones** - Cells in the retina of the eye which are responsible for color vision as well as eye color sensitivity; they function best in bright light, as opposed to rod cells that work better in dim light.

**Crepuscular** - Most active at dawn and dusk.

**Diurnal** - Most active during the day.

## Time of Day

**Echolocation** - Locating objects by reflecting sound.

**Ectotherm (cold-blooded)** - Animals that rely on outside temperature for their body heat. They may raise their body temperature by moving to a sunny spot or lower their body temperature by moving to a cool spot.

**Endotherm (warm-blooded)** - Animals that generate their own body heat. They are able to raise their body temperature by shivering or eating to increase energy, or lower their body temperature by sweating or panting.

**Fish** - A cold-blooded (ectotherm), aquatic, vertebrate animal that lays many soft-sided, jelly-like eggs which allow water to enter. They are covered in scales, breathe through gills and have fins. This group includes sturgeon, lamprey, and carp.

**Insect** - An invertebrate animal with 6 legs and an exoskeleton. They breathe through holes in their exoskeleton and reproduce by laying eggs which then undergo either complete or incomplete metamorphosis until they reach adulthood.

**Invertebrate** - An animal without a backbone.

**Mammal** - A warm-blooded (endotherm), vertebrate animal with fur/hair that gives birth to live young, feeds its young milk, and breathes through lungs. This group includes dogs, cats, bears and cows.

**Nocturnal** - Most active at night.

**Reptile** - A cold-blooded (ectotherm), vertebrate animal that is covered in scales, lays soft shelled eggs, and breathes through lungs. This group includes turtles, snakes, lizards and crocodilians.

**Retina** - The light sensing part of the eye that also holds the rods (vision at low light levels) and cones (vision at high light levels, color vision).

**Rods** - Cells in the retina of the eye that work better in dim light.

**Tapetum Lucidum** - A layer of reflective cells in the eye just behind the retina, present in most nocturnal and crepuscular animals. This is what causes "eyeshine" at night.

**Tactile** - Sensing with touch.

**Vertebrate** - An animal with a backbone.

**Vibrissae** - Hardened hairs or feathers connected to nerves for tactile sense.