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# K-12 Partnership Lesson Plan

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# *How Do Birds Fly?*

## Overview

The ability to fly is a fascinating biological phenomenon. In this short activity, students will identify characteristics of birds that allow them to fly, and how these characteristics are different from other animals that cannot fly. Many of these characteristics are listed in this lesson for teacher use, including how bird wings are arc shaped, causing decreased air pressure above the wing compared to below. Students also will learn that not all birds are able to fly.

**Objectives**

At the conclusion of the lesson, students will be able to:

* Understand that gravity is a force that pulls objects toward the center of the Earth
* Understand that not every bird can fly.
* Explain several reasons for why birds are able to fly and many other animals can not fly

**Length of Lesson**

30 minutes

**Grade Levels**

Elementary

**Standards covered (NGSS)**

Disciplinary Core Ideas:

* **4-LS1-1**: construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Cross Cutting Concepts:

* Structure and function

***Previous Michigan Standards Met:***

* **II.1.e4 (R 4):** develop an awareness of sensitivity to the natural world
* **III.2.e1\* (LO 1\*):** recognize structures that serve different life functions in survival and reproduction of living things
* **III.4.e2 (LE 2):** explain how physical and behavioral characteristics of animals help them to survive in their environments

**Materials**

* Picture of a bird
* Picture of a squirrel
* Bird feathers (optional)
* Bird bones, skeleton or mount (optional)

**Background**

### *Strategy:* *theoretical or empirical storyline*: connected knowledge; *theoretical storyline*: applying principles to processes in systems

###  *Observations, patterns, and explanations*

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| --- | --- | --- |
|  Observations or experiences (examples, phenomena, data) | Patterns (laws, generalizations, graphs, tables, categories) | Explanations (models, theories) |
| Birds can fly whereas many other animals cannot fly. | Many physiological and anatomical properties set birds apart from other animals. | Many different bird traits are required for the ability to fly |
| Application: Model-based Reasoning |
| Inquiry: Finding and Explaining Patterns in Experience |

###  *Introduction/Anticipatory Set*

Students must understand gravity in order to realize that flying is no easy task. Students will be asked to share some ideas they have about gravity, followed by a discussion to make sure everyone understands. The teacher may also want to ask students if there are any objects that gravity does not act upon.

### Activities of the session

1. First, two pictures will be taped to the board or shown on a screen. One picture is of a bird and one is of a squirrel, both of which are sitting on a branch. The students will be asked how they think the two animals were able to get to the branch up in a tree. Before proceeding, the class should conclude that the bird flew and the squirrel climbed.
2. If the classroom has a window, take a few minutes to look outside for flying birds. The students can think about what is important for flight amongst the birds they are viewing.
3. Ask the class to brainstorm about what they know about birds that might be important for flight. Suggestions can be written on the board. At the same time, pass around any bird props. Almost any bird characteristic is important, as the body works together to allow flight. Answers could include:
	1. Birds have feathers and a very fast metabolism. They lay eggs and have wings. Bird feathers are hollow in the middle, making them light. Bird wings are shaped in the form of an arc, which is caused by the feathers. Birds have a lightweight beak that varies with its food source. Birds have fewer bones than most animals, which are hard, thin and light. Many bones are fused together in a bird which allows for just a few strong muscles to be used in flight. Birds can see incredibly well and have ears that are very sensitive to sound and are required for balance during flight. The organs of a bird work tremendously fast and a bird’s food are very high in calories (seeds, nuts, fruits, fish, and rodents) to allow high energy use during flight. Hummingbird metabolism is 50 times faster than humans and their body temperature is 7-8 degrees higher than humans.
	2. Specifically, bird wings are in the shape of an arc called an airfoil. As the air flows past the wing, the air going over the top of the wing must go faster than the air underneath the wing because it has to move a farther distance, creating reduced air pressure (Figure 1). Wing flapping allows birds to gain speed in order to allow forward movement. This concept may be too difficult for 2nd grade, so it may be wise to explain that their wings are shaped just for flight.



Figure 1. Air flowing above a bird’s wing must travel farther than the air below the bird’s wing. This causes the air pressure above the wing to be less than below, effectively allowing the bird to lift above the ground. The same is true for airplane wings. Picture taken from the website: <http://wings.avkids.com/Book/Animals/intermediate/birds-01.html>.

**Conclusion**

* Ask students if they know of any birds that cannot fly (ostrich, penguin, emu, etc.). How might they be different than other birds?
* Conclude that all of the characteristics of a bird are important for allowing flight.

**Assessment**

In a science journal, students should draw a picture of a bird. They should label at least two aspects of their drawing that are important for flight among birds.

**Post-lesson Comments and Reflection**

*12.11.06*

*This lesson did not work as well as I had hoped. It was not very exciting for the kids and consisted mostly of just me talking. I would have preferred to do a simulation where the kids act out different characteristics of birds or dress up as birds. This would require more time.*

*It might also work better for students older than the second grade.*

*One student also mentioned that reindeer can fly, which caught me off-guard. The 2nd grade teacher explained that certain reindeer are magical and that is how they can fly.*