

Principles of Flight

Grade: 7-12

This lesson is designed for 7-12 grades. This lesson is a project by participants of a summer workshop at the Grant-Kohrs Ranch.

Dan and Cheryl

Science standards:

Content Standard 1 – Students design, conduct, evaluate and communicate scientific investigations.

Content Standard 3 – Students demonstrate knowledge of characteristics, structures and function of living things, the process and diversity of life, and how living organisms interact with each other and their environment.

Content Standard 4 – Students demonstrate knowledge of the composition, structures, processes and interactions of Earth's systems and other objects in space.

Subjects: Science, English, Art and Math

Duration: Three class periods

Background:

Many bird experts have identified four types of flight found in birds. These four types are *flapping, soaring, gliding and hovering*. As the names indicate, these types of flight are different in the number of times that the bird moves the wings up and down during flight. All birds may use different types of flight to take off and land as well as in the air. These flying patterns may look totally different than the pattern of distance flying that the bird might use. A flapping bird can move its wings up and down in a repeated pattern with little time between beats. Most perching birds are flappers. These include robins, starlings and other common birds. A soaring bird can use its wings only occasionally with several minutes between beats. Soaring birds are also champions at using thermals to travel up and down within air columns, rising with warm air and descending with cold air. Many of these birds are birds of prey such as eagles, hawks and vultures. Gliding birds can use their wings by rarely flapping their wings except when taking off or landing. Many sea birds such as albatrosses fit in this category. These birds spend hours riding currents of air without a single wing beat. The hummingbirds and a few others represent hovering birds. Hummingbirds are true hoverers whereas other birds may use a flying pattern referred to as kiting. Time between wing beats for these birds is measured in milliseconds and instead of the up and down wing

pattern of most birds, these birds use a modified figure 8 pattern. Some birds do not fly at all. There are scientific principles involved with flight.

Activity:

What characteristics allow birds, airplanes or any other object to fly?

To see these principles in action go to the following web site:

<http://www.allstar.fiu.edu/AERO/Experiment1.htm>

What body characteristics allow birds to fly?

- 1.
- 2.
- 3.
- 4.
- 5.

Questions for thought (Teacher note: Discuss these questions with the students.)

What do flying birds look like?

If humans had the same body structures and weight as birds, what type of bird would we be? How could you prove this?

There are flightless birds such as ostriches, rheas, emus and cassowaries. Give some reasons why these birds cannot fly using the facts given above.

Penguins also cannot fly. What characteristics prove this fact?

Enrichment:

1.) Draw a sketch of an imaginary bird that represents each type of flight. Accurately use shape, length and width of the wings.

2.) Construct a paper airplane that has the ability to fly using different wing shapes and write a descriptive paragraph about the flight pattern. For help see the following web site.

<http://www.exploratorium.edu/exploring/paper/airplanes.html>