
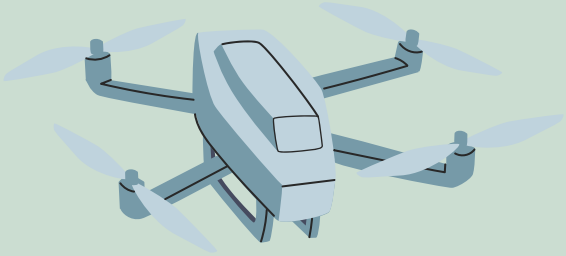


# Dragonfly Drones

**Subject:** Biomimicry

**Grade Level:** *3-12*

**Topic:** Drones

**Time:** 60 minutes

## Learning Objectives

Students will:

- learn that quadrotor drones mimic the flight mechanics of dragonflies.
- explore different types of flight and drone piloting.
- understand the concept of biomimicry.
- create a drone course and navigate it.

## Materials

drones with controllers with charged batteries, obstacle course, Dragonfly Drone slidedeck

## Procedure

**Engage:** To promote student curiosity, *Ask: What is your favorite flying animal? What is your favorite things about space? What is biomimicry?*

**Explore:** Help students build understanding by explaining that biomimicry is applying nature's solutions to current engineering/science problems. Explain that scientists want to explore Titan's (Saturn's largest moon) dense and low-gravity atmosphere using a drone

called Dragonfly. Provide background information about Titan and dragonflies from the slide deck. Share information from these websites (they are different websites with the same title:

Dragonfly NASA Dragonfly Johns Hopkins

**Explain:** Have students begin to show what they have learned. Have a class discussion to allow students to share what they have learned about Titan, Dragonfly, and biomimicry or have students work in small groups to create lists of what they have learned so far.

**Elaborate:** Have students use what they have learned by flying their drones through the obstacle course and observing how the drone performs like a dragonfly.

## Assessment

**Evaluate:** Evaluate student learning by having students answer the following.

- Provide a fact and explanation of the real Dragonfly drone by NASA.
- What is one thing you learned today about drones?
- How did we use biomimicry today?
- What careers study drones and biomimicry?

## Extension Activities

- Have students do a mini research project on Titan or the Dragonfly.
- Create more challenging obstacle courses.

## NGSS Alignment

### *Grades 3–5*

*3*-LS4-3 - Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

*3-5*-ETS1-1 - Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2 - Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints.

## Grades 6–8

MS-LS1-4 - Use argument based on empirical evidence to support an explanation for how characteristic animal behaviors and specialized structures affect survival.

MS-ETS1-1 - Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution.

MS-ETS1-4 - Develop a model to generate data for iterative testing and modification of a proposed object or tool.

## Grades 9–12

HS-LS2-8 - Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

HS-ETS1-2 - Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems.

HS-ETS1-3 - Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs.




Created by the Akron Zoo