

# A STEM in the Park

## Take Home Activity

# STEM

in the **PARK**™

Science, Technology, Engineering, and Mathematics

# Monarch Butterfly Gliders

## ***What You Need***

- Monarch Butterfly glider pattern
- Scissors
- Rubber cement/glue
- Tape
- 2 pennies



## ***What To Do***

1. Cut out body/wing and fuselage templates.
2. Fold fuselage on all creases. Fold center crease of fuselage section so that flaps point up, then fold outside creases A and B down.
3. Place a penny on each side of the fuselage front and tape them in place. This should also seal the front of the fuselage.
4. Cover the entire top of both fuselage flaps with rubber cement/glue.
5. Allow rubber cement/glue to dry.
6. Crease body/wing section to form a dihedral.
7. Crease wing elevons to an upward position.

## ***Launching***

1. Hold front area of fuselage between thumb and index finger.
2. Throw with a firm toss.
3. Adjust creases between flights, if necessary.

***Continued on back***

## ***The Science***

Flight in nature is fascinating to watch. Some of the most mesmerizing fliers are butterflies. With their erratic twists, turns and dips, their flight pattern may appear downright whimsical. However, it is far from random. Consider how precisely one can locate and land on a flower or evade a persistent butterfly net. There are many very intricately connected muscles that allow butterflies to do this. The physics behind flight in insects, especially butterflies, is just beginning to be understood thanks to the use of high speed cameras and other research techniques.

Monarch butterflies can travel approximately 80-90 kilometers (50-55 miles) per day during their migration. This trip is only possible because monarchs are expert gliders; they can sustain periods of flight without actually flapping their wings or using energy. They are one of the few insects that can glide so effectively. This allows them to take advantage of thermals (updrafts of warm air) and favorable winds, limit damage to their wings and conserves energy. Observing gliding flight in birds and insects led humans to invent ways to glide themselves, using aircraft similar to airplanes but without engines. In fact, some glider pilots have reported seeing migrating monarchs gliding among kettles (circling flocks) of hawks at heights near 1,500 meters (about 5,000 feet) above the ground!

In this activity you will experiment with paper glider designs that mimic the monarchs' shape and the angle of their wings when gliding. If possible, go outside during the monarch migration to view their gliding patterns. Concentrate on the angles of the wings, and work at reproducing these angles.

At first, use the standard directions and design provided. Then you can try to modify and improve this design to increase flight distances. Your goal should be to make the champion butterfly glider – the one that can glide the longest distance when released from the top bleacher in the gym or when thrown outdoors on a calm day.

Visit [www.monarchlab.org](http://www.monarchlab.org) to learn about citizen science projects with monarch and more lessons like this.

***This activity is brought to you by Robinson Elementary School***

