



Teacher's Guide for:  
**Loop-de-Loop Flyers**

Note: All activities in this document should be performed with adult supervision. Likewise, common sense and care are essential to the conduct of any and all activities, whether described in this document or otherwise. Parents or guardians should supervise children. Rock-it Science assumes no responsibility for any injuries or damages arising from any activities.

**NOTE:** This is the transcript of a lesson that was videotaped during an actual Rock-it Science class with real students, not actors. The students' brainstorming comments are included on the video but are not transcribed here because they're not part of the lesson presentation.

## Contents:

### Quick Reference Sheets:

- Intro. . . . .page 2
- Experiment . . . . .page 2
- Equipment List . . . . .page 3
- Story, Part 1: *Jack and Jill and the Vultures* . . . . .page 4
- Story, Ending. . . . .page 5

### Video Transcript:

- Intro. . . . .page 6
- Story, Part 1 : *Jack and Jill and the Vultures* . . . . .page 7
- Experiment . . . . .page 9
- Story Ending . . . . .page 11

---

## Title Page of Video

Loop-de-Loop Flyers  
A Rock-it Science Lesson  
Filmed June, 2009

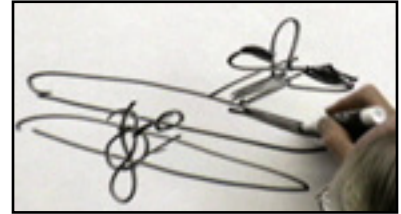
***Rock-it Science***  
2110 Walsh Ave, Unit F  
Santa Clara, CA 95050  
[www.rockitscience.org](http://www.rockitscience.org)

(c) 2012 Rock-it Science Educationally Useful Programs. All Rights Reserved

---

## Intro Quick Recap:

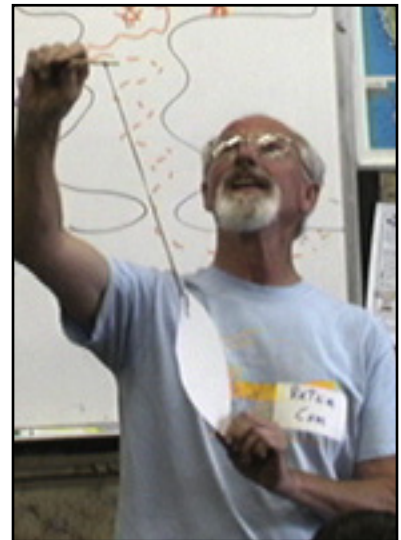
- If you're in an airplane and other airplanes are shooting at you, you want to be able to maneuver really fast.
- In World War I, they had planes with two wings and one engine with a propeller in the center.
- These planes didn't fly fast, but they could maneuver quickly.
- They had a machine gun on them, and the pilot shot the bullets between the propeller blades.
- The planes had dog fights in the air. They discovered that if they made moveable surfaces on the wings and tail, they could make the plane change direction very quickly.
- In today's experiment, we're going to try to make things fly any way except straight.



Airplane with moveable surfaces.

## Experiment Quick Recap: "Loop-de-Loop Flyers"

- For the experiment, we want to make something fly in circles.
- Teacher demonstrates how to construct the flyer before giving supplies to students.
- Start by knotting two rubber bands together. Demonstrate how to put one rubber band on each wrist, then pull each one off with the opposite hand so they come off connected.
- Attach the rubber band to a round wooden dowel by draping one end over the stick and drawing the other end through the loop.
- Cut a piece of lightweight cardboard into a shape, any shape, and punch a small hole through it with a paper punch.
- Insert a bent paper clip through the hole.
- Go outside to test how the cardboard piece flies. Students wear goggles during testing.
- Attach the end of the rubber band to the bent paper clip that's attached to the cardboard, pull back, aim it straight upward, and let it fly.
- If the student doesn't like the way it flies, they can cut or bend it into a different shape.



Sample flyer.

## ***Equipment List: "Loop-de-Loop Flyers"***

### **Items needed for Instructor:**

- Pliers to bend paper clips
- Paper punch

### **Items needed for Students:**

#### **Consumables (per student):**

- Piece of lightweight cardboard (about a foot square)
- Two rubber bands
- One quarter-inch wooden dowel, about a foot long
- One large paper clip, with the end bent up

#### **Other:**

- Scissors
- Goggles

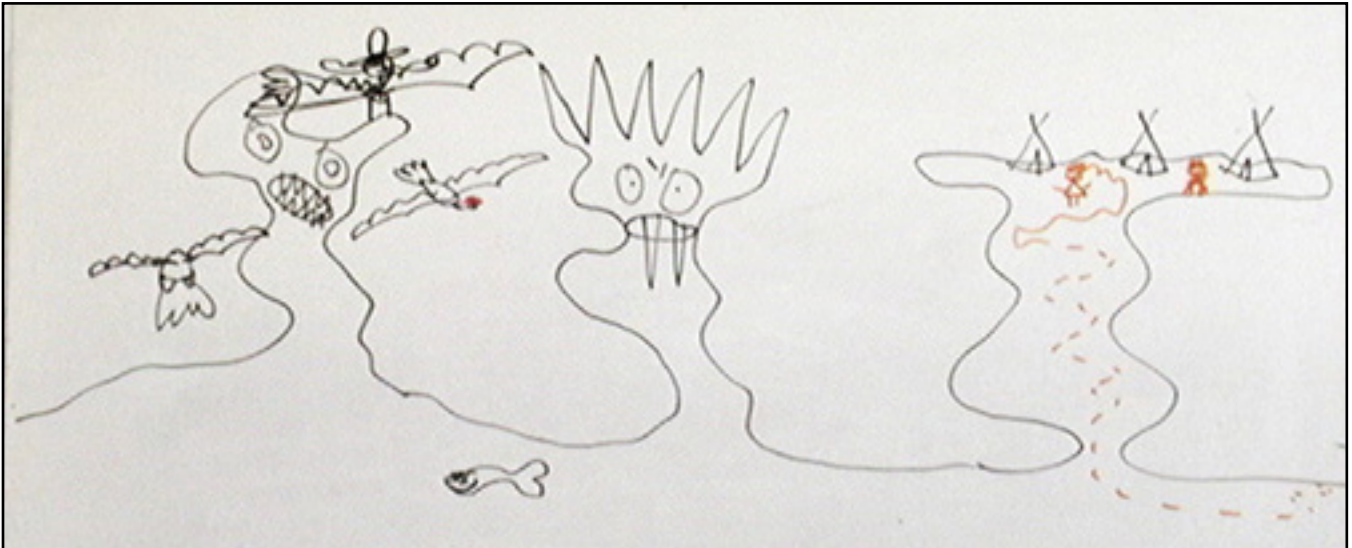
### **Prep Work:**

- Bend paper clips with pliers



Bent paperclip stuck through hole.

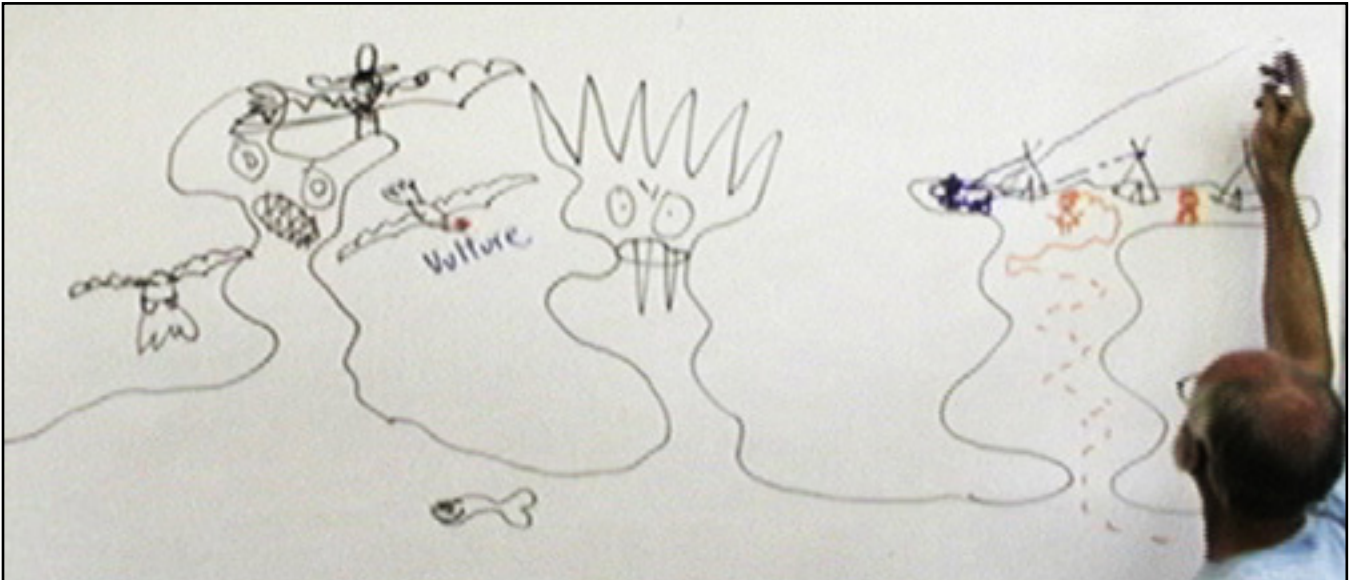
## Story Recap: "Jack and Jill and the Vultures"



### Part 1:

- Jack & Jill are living in the badlands of North Dakota. The mountains have caves with teeth, spikey rocks, and rattlesnakes.
- Jack and Jill were living off the land in tepees. They'd eat bushes, cook lizards, eat raw grasshoppers, and suck tree sap.
- Evil Mister Fred liked it there because it was so hot people and animals would die and the vultures would circle over them and start eating the bodies. Jack and Jill were grossed out by this.
- Evil Mister Fred wanted to be a vulture. He ordered a vulture outfit from the Acme Store of Everything so he could fly around and play with the vultures.
- He also put vulture outfits on his minions, so they were flying around, running into things.
- Evil Mister Fred would fly over Jack and Jill's camp and steal their food. The minions would fly by and knock over their tepees.

## Story Recap (cont.): "Jack and Jill and the Vultures"



### Ending (NOTE: The first sentence of the ending is missing from the video):

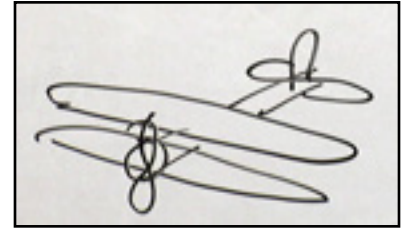
- Jack and Jill called the Acme Store of Everything and ordered a hippopotamus.
- They took Jill's hair, which is very springy, and hooked it the top of two tepees and around the hippopotamus.
- Evil Mister Fred came flying by to grab the hippo so he could eat it.
- Just as he landed on the hippo, Jack and Jill let go of the hippo, and Jill's springy hair made it fly through the air, with Evil Mister Fred attached.
- They flew so fast, they went halfway around the earth.

## Transcript: Introduction

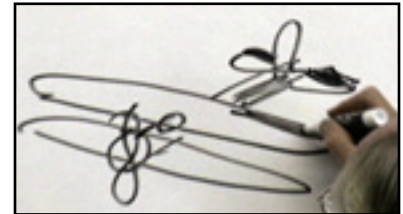
Sometimes, if you're in an airplane, and other people are in airplanes and they're shooting bullets at you, you want to be able to maneuver really fast to get out of their way. During World War I, they had airplanes that had two wings, one on top of the other, and one engine in the middle with a propeller on it, and a tail with a couple of things like that.

And they'd fly around, and they couldn't fly very fast, but boy, could they ever maneuver quickly. They could go up and around, and they could do rolls this way and they could roll that way. And they had machine guns on them. There was only one pilot who sat behind the machine gun, and they shot the machine gun in between the propeller blades.

And they had dog fights -- they called them dog fights in the air -- with these things. They had to find out ways to make the plane turn real fast. And they discovered if you make moveable surfaces on the back and on the wings, surfaces that could go like this [*moves hands up and down*], go up or down, then you could make the plane change directions really quick. But there's other ways to make things change direction in mid-air. And today we're going to do some experiments on how to make things fly anyway except straight. But first we need a crazy story.



World War I Airplane.



Airplane with moveable surfaces.



The plane's moveable surfaces could go up and down, like this.



## Story: "Jack and Jill and the Vultures"

Once upon a time, Jack and Jill were living in the badlands of North Dakota. They were called badlands because the mountains had caves with teeth. And they had spikey rocks. And there were all kinds of rattlesnakes that were living there.

And Jack and Jill were living there in tepees, or wigwams, or conical houses. And they were living off the land. They would eat bushes. They'd cook up lizards, and they'd have lizard stew. They'd eat raw grasshoppers, and they'd suck the sap out of trees.

And Evil Mister Fred loved the badlands of North Dakota because it was so bad out there, somebody would get lost, the sun would come out, the temperature would get up to a hundred and thirty degrees, and they'd die within minutes. And the vultures would circle over and start chewing on their poor dead bodies.

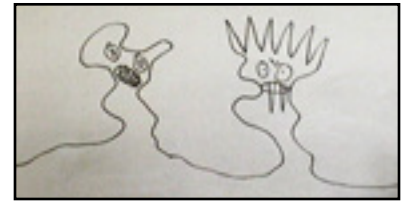
And Evil Mister Fred said, "Yeah! Life doesn't get any better than this!" And he decided he would really like to be a vulture. Vultures have long wings like this. Vultures have kind of chubby bodies, and they have a really ugly head. And it's usually all red, so the blood doesn't show. Like that. And vultures can glide on the wind. They can glide for a hundred miles because they have such long wings. And they're always searching for something dead on the ground.

[Student: "Fish!"]

Okay, it could be a dead fish. There's a dead fish. And the vultures would come on down, they'd fly down next to it, and they'd pick the flesh off its bones and eat it up.

And Jack and Jill were living up there, and when they saw Evil Mister Fred doing all his rotten stuff, they said, "Aw, that's gross! Look at that guy -- he's eating a dead fish!" And it grossed them out completely.

So Evil Mister Fred called the Acme Store of Everything, and he ordered his own vulture outfit so he could fly around and play with the vultures. And he bought himself a big tail, and he bought himself some wings, and he could jump off his cliff and fly around. And he thought, "Man, this is great!" And he put vulture outfits on his minions, too. But minions don't have any arms, so he had to put the wings on their mustaches. And he glued the tails to their feet so they all had to fly backwards. And the minions were flying all around, running into stuff. Didn't hurt them because they have really hard heads.



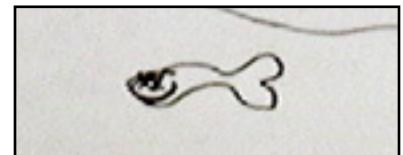
Spikey rocks in the Badlands.



Jack & Jill's tepees.



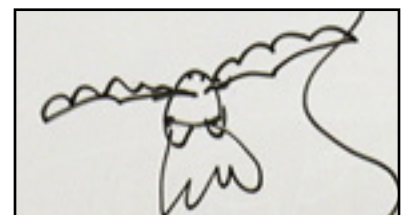
Vulture with a red head.



Dead fish.



Evil Mister Fred wearing his vulture wings.



Minion with wings on its mustache and a tail glued to its feet.

Evil Mister Fred was flying all around, and Jack and Jill were trying to live peacefully over here off the land. And every time Jack and Jill cooked some dinner, Evil Mister Fred would fly by in his vulture outfit and go, "Oooh, food!" And he'd eat all their food. And the minions kept coming in, banging into the tepees, and knocking the tepees over the cliff. And Jack and Jill said, we've got to do something about those two. They're causing terrible problems.

If you were Jack and Jill, what would you do to stop the Evil Mister Fred?

### Imagination and Brainstorming Time

*[Students make suggestions]* (THERE ARE NO WRONG ANSWERS! Whatever they say, you should reply: "That's a good idea," "They might do that," etc. After brainstorming, proceed with the experiments, then finish the story.)

We'll leave this "To be Continued . . ."

---



## Experiment: "Build a Loop-de-Loop Flyer"



Put a rubber band on each wrist, then grab the top of one band . . .

Okay, the purpose of our experiment is to make something fly in circles. Usually things fly straight. But we're going to try to make something fly in a circle. To do that, we need a stick, and we need a rubber band, and we need two rubber bands, and we need them hooked together. To hook them together, you put one on one wrist, and you put one on the other wrist, and you say to yourself, "I'm going to use this mouth and grab the top of this one, and I'm going to use this mouth to grab the bottom of that one." And now you pull, and they're tied together.



. . . and the bottom of the other.



Then hold onto both bands and pull your hands apart.



The rubber bands are now tied!



Lay the tail of the rubber band over the edge of the stick.

And then you put the tail of this rubber band so he's looking over the edge of the stick. He looks down and he sees another rubber band, and he says, "I'm going to eat it!" And he puts it right into his mouth, and you pull it in. And when you pull, and you now have a rubber band on a stick.



Feed the other end through the "mouth."



And pull it tight.

Then, you need a piece of cardboard. Then you take a piece of cardboard and some scissors. You can cut out any shape you want. I'm going to cut out the shape of a football because it's quick and easy. *[Cuts out a shape and punches a hole in one end.]* There's a football with a hole in it. And we'll give you a paperclip. And you hold it by his chin. And it's got this little tongue sticking out. You stick the tongue in the hole. And you've



Bent paperclip stuck through hole.

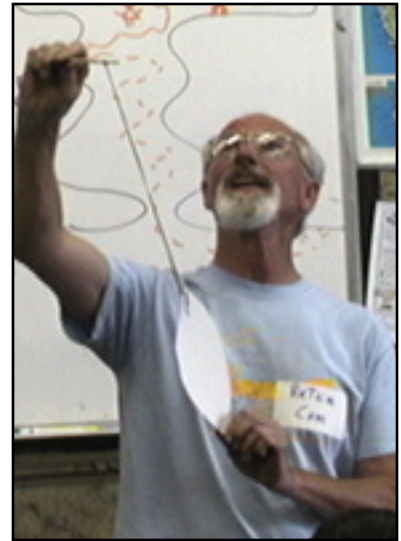
got a paper clip with a bent bottom stuck on a piece of cardboard, and you've got a stick with a rubber band. What on earth could you do with this?

You can shoot it straight up. When we're shooting them, we're going to shoot them straight up -- we're not going to shoot them at anything -- and see how it flies.

Now, the objective is to make it fly in loop-de-loops. So once you make it fly, you can change it any way you like. You can cut it in half, and see if you can make it fly in a loop. There is a certain shape that makes it go whew, whew, whew, whew [*makes loops in the air*] -- fly in perfect loops.

So, you'll each get some cardboard, some scissors, a stick, two rubber bands, and a bent paper clip. When you get something, we're going to take them out in the parking lot, and we're going to shoot them all over the parking lot.

*[Pass out rubber bands and assist students with connecting them if needed. Then give them the dowels and have them attach the rubber bands. Then pass out the cardboard and scissors so they can cut out a shape. When, they're ready, the instructor will punch the hole and give them a bent paperclip. Then students put on goggles and go outside to shoot their flyers. If they don't like the way it flies, they can cut or fold it into a different shape or use their leftover cardboard to make a new shape.]*



Shoot straight up.

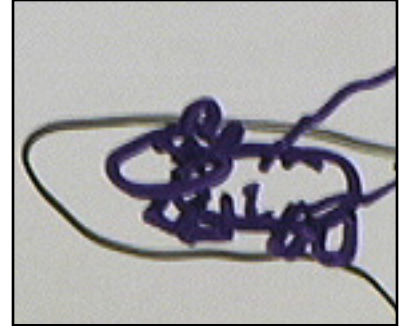
## End of Story

**\* DO NOT \* present this part of the lesson until after the experiments!**

[NOTE: The first sentence does not appear on the video.]

Jack and Jill called the Acme Store of Everything and ordered a hippopotamus. Then they took Jill's hair, which is very springy hair because it's naturally curly, and they hooked it to the top of two tepees and around the hippotamus, like that. And they said, "Gee, I hope Evil Mister Fred doesn't come and TAKE OUR HIPPOPOTAMUS!" And of course, Evil Mister Fred heard that. He said, "Hippopotamus? My favorite dessert! This is great!"

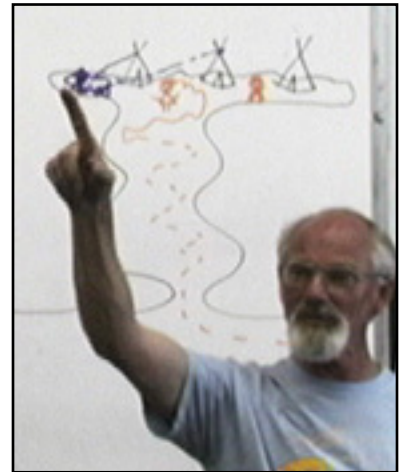
So he flew over there and sure enough, there was a hippopotamus. And Evil Mister Fred zoomed down on it and landed on it and went, "Ahhh -- chomp!" And right then Jack and Jill released the hippopotamus -- zoom! He flew off because of Jill's springy hair. It flew so fast that it went halfway around the earth, leaving Evil Mister Fred attached. And they all lived happily ever after, except Evil Mister Fred.



Jack & Jill's hippo.



Hippo tied to tepees with Jill's hair.



The hippo flew halfway around the earth.

## End of Lesson

*If you have questions about this lesson, please ask them through the [online Teacher Support Forum](#) on our web site.*