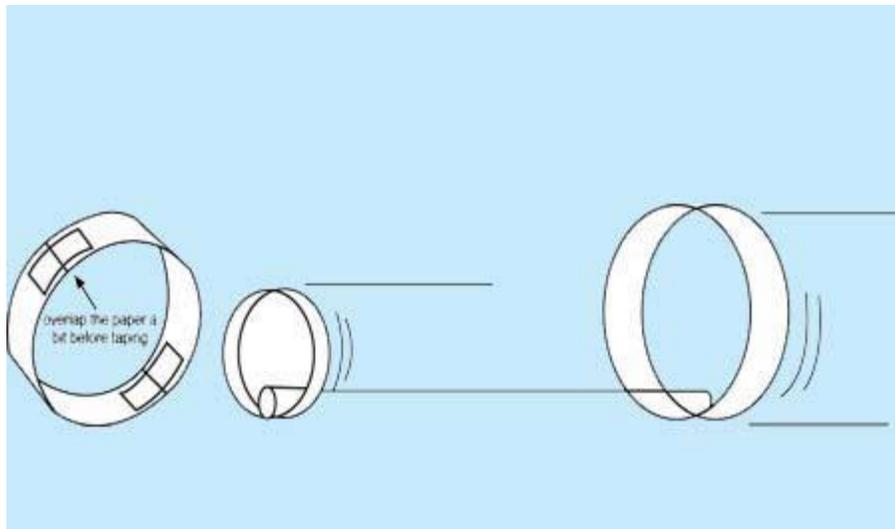


Lesson Plan: The Incredible Hoop Glider

2-4th, 6-10 years old | One 50-minute class period

In this activity students are challenged to build a hoop glider that will glide as far as possible. Working in groups, students will cut and tape various hoops to their straw. They will experiment with various hoops' sizes, placements, and throwing techniques. They will make observations and measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.



Student Activities

- Build a hoop glider.
- Hold experiments and make observations and measurements.

Learning Objectives

- Learn about the principles at work in all fliers.
- Learn about the concepts of lift and gravity.
- Learn how forces are balanced.
- Learn how to hold experiments.

Disciplines

- Physical Science
- Mathematics

Technical skills

- Mechanical engineering

Lesson materials

- [Worksheet](#)

Teacher preparation

Consider these tips to implement the lesson in your classroom:

- Complete each component of the lesson yourself before teaching it.
- Refer to the resources below for background information and to customize the lesson for your classroom.

Introduction/Motivation

Start the conversation by asking kids, "Who is good at building paper airplanes?". Then throw a paper airplane that you made and point out that it's actually more of a glider. Say that today we will be having a competition. We will be building hoop gliders and trying to see which group can get theirs to glide the farthest. (You may also want to point out that special recognition will be made for those with "Awesome" flight patterns :). Tell students there are some designs, like the one they can try in this activity, however, that looks so awkward one might imagine they would not fly at all. Let's find out if it really works.

Tell the students that this challenge will test their groups ability to work together in building a hoop glider that will glide the farthest distance before touching the ground.

On to the Activity

1. You will need to split your students into groups. Encourage groups to build 2 or 3 different hoop gliders to see which one is the best.
2. Show students the materials available to make their hoop glider.
3. Direct students to follow their student instructions sheet.
4. Ask students to get started and follow the steps on their worksheet. You can meanwhile go about the class, walk to each desk one by one and ask questions about why they are doing what they are doing, and offer help to anybody needing.
5. Allow time for each team to construct their own hoop glider.
6. Test each team's hoop glider once built.
7. Tell the students to put their names on a piece of masking tape to mark their best distance on the ground.
8. Hold the competition.

Assessment

Pre-Assessment

Brainstorming: Ask students about different paper airplane designs.

Post-Assessment

Research: Once done with the competition, ask students to research how real-world gliders work. Encourage the students to write down a couple of things they've learned, any questions they still have, and be willing to share it with the class.

Make predictions, ask questions:

1. How did your glider do? Approximately how far did your glider go? If you could change something or perform more trials, what would you change about your hoop glider and why?
2. What do you think would work better, a shorter straw or longer straw? Why?
3. Do you think the small hoop should be the front of your glider or the back?
4. How do you think distance is related to force that is applied on Hoop Glider?

Time-saving options

- Create a paper airplane and a hoop glider beforehand to show it as a model.
- Arrange the materials set wise for all teams,

Activity Extensions

Ask students to carry out research on how life size hang gliders can stay in the air for hours on end. How are they able to do this? Find books about hang gliders at your library or search the internet (with adult permission) for information. Be ready to share your findings with the class.

Assessment

The following rubric can be used as a guide for formative or summative assessment.

Category	4	3	2	1
Problem-solving	Actively looks for and suggests solutions to problems.	Refines solutions suggested by others.	Does not suggest or refine solutions, but is willing to try out solutions suggested by others.	Does not try to solve problems or help others solve problems. Lets others do the work.
Contributions	Routinely provides useful ideas when participating in the group and in classroom discussion. A definite leader who contributes a lot of effort.	Usually provides useful ideas when participating in the group and in classroom discussion. A strong group member	Sometimes provides useful ideas when participating in the group and in classroom discussion. A satisfactory group member who does what is required.	Rarely provides useful ideas when participating in the group and in classroom discussion. May refuse to participate.
Attitude	Never is publicly critical of the project or the work of others. Always has a positive attitude about the task.	Rarely is publicly critical of the project or the work of others. Often has a positive attitude about the task.	Occasionally is publicly critical of the project or the work of other members of the group. Usually has a positive attitude about the task.	Often is publicly critical of the project or the work of other members of the group. Often has a negative attitude about the task.
Focus on the task	Consistently stays focused on the task and what needs to be done. Very self-directed.	Focuses on the task and what needs to be done most of the time. Other group members can count on this person.	Focuses on the task and what needs to be done some of the time. Other group members must sometimes nag, prod, and remind to keep this person on-task.	Rarely focuses on the task and what needs to be done. Lets others do the work.
Working with others	Almost always listens to, shares with, and supports the efforts of others. Tries to keep people working well together.	Usually listens to, shares with, and supports the efforts of others. Does not cause "waves" in the group.	Often listens to, shares with, and supports the efforts of others, but sometimes is not a good team member.	Rarely listens to, shares with, and supports the efforts of others. Often is not a good team player.
Completion of worksheet.	Worksheet was complete with comprehensive answers to all questions.	Worksheet was mostly complete with comprehensive answers to all questions.	Worksheet was incomplete with inconsistent answers.	Worksheet was not complete or represented significant lack of understanding of the lesson activities.