

# Hoop Glider

Students explore the concepts of science, engineering and arts as they build gliders out of paper and straw.

## Necessary materials

A4 paper  
Plastic straws  
Masking Tape  
Scissors

## Optional materials

Construction paper A5 sheet  
Popsicle sticks

*Note: Underlined materials are to be shared among the students*

## Curiosity

Divide students into groups of 2-3 each. Do a short activity to get students curious about the lesson. One idea is given below.

Throw a plastic straw in front of the class. The straw won't glide and will simply flip in the air and fall to the ground. Then challenge them with the task of making the straw glide.

## Activity

### Scaffolding

Help students get ideas to get started. Asking leading questions will help.

- *What kind of flight do you want your glider to have?*
- *What are the roles of the different parts of the glider?*

If students seem stuck, ask questions to get them thinking about their designs. For example,

- *Can you tell the purpose of the design you have used for your glider?*

### Experimentation

Ask questions, or provide structures to help students experiment. For example,

- *What might happen if we bring the hoops closer or take them farther?*
- *What might happen if we attach a wing to the glider?*
- *What do you want to try?*
- *I wonder what happens if \_\_\_\_\_*

## Suggestions for the facilitator

We found these insights and tips to be helpful while facilitating this session.

- There are many variables to experiment with in this content, such as hoop radius, hoop length, distance between hoops. Students might find it difficult to connect causes and effects with so many variables at play.
- The glider is quite sensitive and can malfunction if minor adjustments go wrong. Some examples are given below:
  - Students are unable to properly fly the glider when the larger hoop is placed at the front. The glider works well only when the smaller hoop is placed at the front.
  - If the hoops aren't aligned properly the flight is often turbulent. Depending on the type of misalignment, the glider can turn sharply, wobble or not fly at all.
  - The shape of the hoops needs to be circular. If the paper is already creased, the shape of the hoop will be distorted.
- Students will require a clear space to test their gliders and retrieve them. It might be difficult for students to see how their gliders function if they keep colliding with objects and walls.
- Ask students to test frequently, after each small change. It will be easier to observe cause and effect relations this way.

## Thinking

### Reflection

Ask questions to help students reflect on their learning.

- What kind of design worked well for you?
- What did you find most difficult about glider making? Why was it so?

You can also provide structures to support their thinking.

- Two things I learnt are \_\_\_\_\_
- Something I now wonder about is \_\_\_\_\_
- I want to learn more about \_\_\_\_\_

### Think like a . . .

Ask thought provoking questions to make students think from the perspective of a professional

#### Think like a scientist

- What is the difference between a plane and a glider?
- How do the hoops make the straw glide?

#### Think like an engineer

- Why doesn't the glider fly properly if the larger hoop is placed at the front?
- What might be the function of wings in a plane?

**Think like a historian**

- How did the design of gliders help the design of airplanes?

## Sample lesson plans

### 1. A 60 minute class

#### Learning Objectives

To get students to playfully explore the concepts related to flight by building a glider using paper and straw. The emphasis is on them enjoying the process and thinking critically about their observations.

#### Classroom context

This sample lesson is designed for grade 6 students. The time available is 60 minutes.

#### Lesson Flow

##### Curiosity (5/5 mins)

Talk about airplanes to get students interested in the activity. Ask students to talk about what they find most fascinating about airplanes. Get students to share ideas. Then inform them that this session will revolve around building gliders, which are basically airplanes without engines.

##### Activity (45/50 mins)

###### Building

Ask students to refer to the student guide. Distribute the materials and give them 15 minutes to build their first draft of the glider.

###### Experimentation

Ask students to conduct experiments with their gliders and note the observations. Give them 20 minutes for this

###### Sharing

Ask the groups of students to pair up with their neighbors and share the design of their gliders and the results from the experiments.

##### Thinking (10/60 mins)

Ask questions or provide structures to help students think about their learning experience.

- How might the design of gliders have influenced the development of airplanes?
- Complete the sentences:
  - Something I now wonder is \_\_\_\_\_

- Two things I learnt are \_\_\_\_\_

## 2. Two 45 minutes classes

### Learning Objectives

To get students to playfully explore the concepts related to flight by building a glider using paper and straw. The emphasis is on them to experiment with the glider.

### Classroom context

This sample lesson is designed for grade 9 students. The time available is two sessions of 45 minutes each, not necessarily consecutive.

### Lesson Flow

#### Class I

##### Curiosity (5/5 mins)

Demonstrate throwing a plastic straw in front of the class. The straw won't glide and will simply flip in the air and fall to the ground. Ask them if they can make this straw glide. Let them bounce ideas before jumping into the activity.

##### Activity (35/40 mins)

##### Building

Ask students to go through the student guide before they start building. Distribute the materials and give them 10 minutes to build their first draft of the glider.

##### Sharing and feedback

Ask students to pair up with their neighboring group and share their work. Encourage them to exchange feedback in the following form:

- One thing we like about your glider is \_\_\_\_\_
- One thing you can do to make your glider better is \_\_\_\_\_

##### Second iteration

Ask students to improve on their existing model of the glider. Give them 10 minutes for this. Ask them to test their gliders once they are done.

##### Thinking (5/45 mins)

Ask questions or provide structures to help students think about their learning experience.

- What new questions do you now have?
- How did the design of your glider change after testing and feedback?

## Class II

### Recalling (5/5 mins)

Ask students to be seated in the same groups as in the previous class. Ask them to talk to their group members about the things they recall from the previous class. Once they are done, get a couple of students to share the things they recalled with the whole class.

### Activity (30/35 mins)

#### Experimentation

Ask students to refer to the worksheets, conduct some experiments with their gliders and note the observations. Give them 20 minutes for this

#### Sharing

Ask the groups of students to pair up with their neighbors and the results from the experiments.

### Thinking (10/45 mins)

Ask questions or provide structures to help students think about their learning experience.

- How might the design of gliders have influenced the development of airplanes?
- Complete the sentences:
  - Something I now wonder is \_\_\_\_\_
  - Two things I learnt are \_\_\_\_\_