

Feathers to the Stars Grades 3-5



Contents

Teacher Resource Guide	2
Pre-Field Trip Activity	5
Post-Field Trip Activity	11
Student Field Trip Guide	15
Field Trip Exhibition Facilitation Cards	17

Questions? Ready to book your field trip? | Please visit: <u>www.frostscience.org/fieldtrips</u>





Flamingo in flight



Early flight design drawing



Space shuttle launch

<u>Overview</u>

Students will explore the evolution of flight, from dinosaurs to the future of space travel. Along the way, they will learn how natural flight has inspired human flight. They will also learn how human flight has developed with new innovations and discoveries in many fields of science, technology and engineering.

Educational Standards

3rd Grade

- Big Idea 1 The Practice of Science
 - SC.3.N.1.1 Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.
- Big Idea 5 Earth in Space and Time
 - SC.3.E.5.4 Explore the Law of Gravity by demonstrating that gravity is a force that can be overcome.

4th Grade

- Big Idea 1 The Practice of Science
 - SC.4.N.1.1 Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.

5th Grade

Big Idea 13 - Forces and Changes in Motion

 SC.5.P.13.1 Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects.

Background Information

"Through research, inspired humans can overcome any challenge." Dr. Jorge Perez-Gallego Feathers to the Stars Exhibition Developer



From feathered dinosaurs to space travel and beyond, *Feathers to the Stars* is a journey over millions of years, from the distant past, to the present day, and into the future. The exhibition has three areas to explore: inspiration from nature, manned flight, and space travel. In each area, students will discover how nature has played a role in inspiring man-made advances in science, technology and engineering that have allowed us to travel the sky and explore the universe.

Looking back at feathered dinosaurs, students can explore the principles of how flight first evolved in nature, leading to the many flying creatures of today. Next, students can explore the trial and error of early pioneers in flight and the basic physics principles of flying. Lastly, students can explore the progress humans have made to travel off of our own planet and project where we may be going in the future.

Feathers to the Stars Exhibition Key Questions

- How do animals fly?
- How do humans fly?
 - How are human and animal flight connected?
- What makes space flight different than flight on Earth?
 - What's next?

Pre-Activity

See pages 5 - 10 for pre-activity instructions and presentation.

Field Trip Experience

All Museum field trips are a three-hour experience, offered Monday through Friday, beginning at 9:30 a.m. or 10:00 a.m. Each field trip includes three experiences of the teacher's choice and time for lunch. Upon arrival, the teacher will be provided with a specific schedule for his/her visit based on the three chosen experiences. Additional information regarding field trip logistics is provided in the field trip package that each teacher will receive upon booking a field trip.

During the field trip, students will encounter a variety of experiences. To enhance these learning opportunities, facilitator cards are provided at arrival for all teachers and chaperones who would like to use them (please see pages 17 - 19 for a sample). The facilitator cards include prompting questions, additional content, and exhibition location maps which show where in the exhibition one can find content related to that card. Additionally, a student guide that corresponds to the exhibition prompting questions are available in this document on pages 15 - 16. Please print a student guide for each student in advance of your arrival to the museum, and bring pencils; student guides and pencils will not be provided by Frost Science.

Post-Activity

See pages 11 - 14 for post-activity instructions and presentation.

Select Recommended Extensions

Grade 3: Paper Airplanes Away! <u>http://www.cpalms.org/Public/PreviewResourceLesson/Preview/34337</u> Grade 4: Florida's Space Industry <u>http://www.cpalms.org/Public/PreviewResourceUpload/Preview/13472</u> Grade 5: Bottling Rockets <u>http://www.cpalms.org/Public/PreviewResourceUpload/Preview/150377</u>



Pre-Field Trip Activity: Explanation Game (A Visual Thinking Routine)

Overview

Students will participate in an activity to prime their curiosity and imagination around different forms of flight. In the Explanation Game, students examine three different images related to different forms of flight (animal, human, and space). Students make observations and formulate ideas about the connections and comparisons between the three images and their forms of flight.

Objective

Students will make observations to build an explanation and interpretation of how three different forms of flight are connected.

Materials

- Computer, white board and projector
- Optional: poster paper
- Sticky notes provide three different colors, if possible
- Feathers to the Stars Grades 3-5 Pre-Field Trip Presentation (pages 6 10)

Activity Steps

- 1. Draw a chart on the white board (or poster paper) for students to post their ideas.
- **2.** Test the presentation on your computer: open the document, go to "View" on the menu bar, then click the full screen option ("Enter Full Screen" or "Full Screen Mode").
- 3. Give each student several sticky notes.
- 4. Use the presentation to guide the activity.
- **5.** Conclude with a class discussion about the completed chart. Please see sample chart on page 10 for reference.
- 6. Save the chart to use in the Post-Field Trip activity.



Frost Science | Feathers to the Stars Pre-Field Trip Activity | 3RD – 5TH Grade

THE EXPLANATION GAME Name It – Explain It – Compare It











Look at the three images and name and describe what you see.
Write your names and descriptions on sticky notes.
Place your sticky notes in the Name It space on the chart.









Think of as many ideas as you can to explain what you see in each image.
Record your explanations on sticky notes.
Place your sticky notes in the *Explain It* space on the chart.









How do you think the images are related to each other? What makes you say that?
Record your explanations on sticky notes.
Place your sticky notes on the *Compare It* space on the chart.

Sample Pre-Field Trip Chart





Post-Field Trip Activity: "I Used to Think... But Now I Think..." (A Visual Thinking Routine)

<u>Overview</u>

After the field trip, students reflect on what they have observed, explored and learned. Students will complete the "I Used to Think... But Now I Think..." Visual Thinking Routine. This activity can be used when students' initial thoughts, opinions, or beliefs are likely to have changed or expanded as a result of an experience. The students can also share and explain their shifts in thinking as a classroom group for further group learning opportunities.

Objective

Students will reflect on their experience at Frost Science and how their thinking about flight has changed.

Materials

- Computer, white board and projector
- Optional: poster paper
- Sticky notes provide two different colors, if possible
- Classroom chart developed during the Pre-Field Trip activity
- Feathers to the Stars Grades 3-5 Post-Field Trip Presentation (pages 12 14)

Activity Steps

- 1. Display the Pre-Field Trip Activity Chart.
- 2. Draw a chart on the white board (or poster paper) for students to post their ideas.
- **3.** Test the presentation on your computer: open the document, go to "View" on the menu bar, then click the full screen option ("Enter Full Screen" or "Full Screen Mode").
- 4. Give each student several sticky notes.
- 5. Use the presentation to guide the activity.
- 6. Conclude with a class discussion about the completed chart.
- **7.** Optional Extension: Have students write a short reflection on their experience and how it has changed their understanding of flight.



Frost Science | Feathers to the Stars Post-Field Trip Activity | 3RD – 5TH Grade



How has your thinking changed?



What did you think about flight BEFORE the field trip?

- What do you think NOW about flight, after the field trip?
- Place your sticky notes on the post-field trip classroom chart.

Sample Post-Field Trip Chart





FEATHERS TO THE STARS

3RD - 5TH Grade Student Guide

Hi, future flyers! We need volunteers to fly in the future!

Your mission is to complete the activity on the back of this page, then make, test and improve the design of your paper airplane. Make a paper airplane and show your aeronautical engineering design skills!

The Basics



1. Fold paper in half length-wise.



4. Repeat step 2 by folding the upper corners to meet the middle crease.

Make It Your Own

7. Test your airplane. How well did it go?



2. Fold down the upper two corners to meet the middle crease.



5. Fold in half at the middle crease.

8. Make adjustments to improve your design.



3. Fold down top triangle.



- 6. On each side, fold down the top flap so that the angled edge meets the middle (bottom) crease.
- 9. Test again. Did your airplane fly better?

A

Name your favorite flying animal.

Draw it! Then circle the features that allow it to fly.



Look at the four flight forces that are labeled on the airplane below. Now label the two missing forces on the rocket as it lifts off!





D

Astronauts and pilots work in teams with people of different skills.

What types of skills and knowledge would be helpful for a team member to have in order to improve flight in the sky or in space?

CHECK IN

Animal Flight

Say:

"Flight has evolved in different ways in the animal world, and we can see the evidence by observing insects, pterosaurs, birds, and bats."

Explore and use the Student Guide

Discover the features that allow animal flight.

Discuss:

How do animals fly?

Some possible answers include...

- Lightweight wings attached to muscles on insects
- Long flight feathers on birds
- Skin stretched over long fingers like the bat
- Hollow bones that make a bird's body light



FROST SCIENCE | FEATHERS TO THE STARS FIELD TRIP



CHECK IN

Human Flight

Say:

"Humans were inspired by birds to fly in the sky."

Explore and use the Student Guide

Discover the different ways humans fly.

Discuss:

How do humans fly?

Some possible answers include...

- Providing lift by changing the wing shape
- Using the thrust of an engine to move forward
- Gliding through the air like birds



What is a connection between how humans and animals fly?

Some possible answers include...

- They both use wings to get lift.
- Both are affected by gravity and drag from the atmosphere (air).
- They use thrust to move forward.

FROST SCIENCE | FEATHERS TO THE STARS FIELD TRIP



Space Flight

Say:

"Nature provided the inspiration for humans to find ways to fly. Finding ways to fly in space, without examples from nature, was our next big challenge."

Explore and use the Student Guide

Explore how humans get to space and the differences between Earth and space flight.

Discuss:

What makes space flight different from flight on Earth?

Some possible answers include...

- Without air, the laws of aerodynamics don't apply.
- There is nothing to imitate from nature.



What's next?

Some possible answers include...

- Find ways for humans to visit another planet.
- Make airplanes go farther, faster, or greener (solar, hydrogen fuel, etc.).
- Have airplane wings move like birds.

FROST SCIENCE | FEATHERS TO THE STARS FIELD TRIP

