California ScienCenter
Amgen Center for Science Learning

Hi!

Thank you for volunteering to be a chaperone on your school's visit to the California Science Center. Your lead teacher has chosen a *Think SCIENCE! Pathways* program to enrich the trip. As a chaperone, you are very important to the success of the day.

You lead students through the gallery.

Pathways are field trip experiences in which the chaperones lead small groups of students in discussions and activities within the exhibit galleries. Yes, you are the key to helping the students through the field trip. But don't panic! We have created Chaperone Sheets and included a map to help you along.

Use the Chaperone Sheet to guide you.

Take a look at the Chaperone Sheets on the following pages. They were created to help guide your group and get them to explore exhibits. The Chaperone Sheets are not sequential. You can start at any area in the gallery.

Don't worry! You don't need to be an expert.

Don't worry! You are a facilitator, not an expert. The activities and questions are used to push students to look for information in the exhibits. Some questions are there to stir the kids' imaginations and do not have specific answers. Encourage discussion...and feel free to take part.

Visit the live demo.

Be sure to check out the live demo on the first floor in the Air and Space Gallery. It runs Monday through Friday from **10 am - 1 pm**. The demonstration highlights basic concepts of this *Pathway*.

Talk to your teacher.

Review the day's schedule with your teacher and find out what he/she would like the students to get out of the day. Ask how the field trip will connect to what the kids are doing in class.

Keep these things in mind on the fieldtrip.

- Students are expected to exercise appropriate behavior in the Science Center. There are no food or drinks allowed in the galleries.
- The Air and Space Gallery does not have any bathrooms. Work with your teacher to coordinate bathroom breaks. Science Center staff can point out the nearest facilities.

Log on to www.casciencectr.org to learn more about *Think SCIENCE! Pathways*.

Destination: Space

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Assign students the role of engineers with the job of designing equipment and spacecraft that keep astronauts safe. In order to do their job, they need to investigate the exhibits and watch the live demonstrations to see how real spacecraft and spacesuits tackle the problem.

members of group:

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Group Name

Main Topic

Humans must protect themselves from 5 major hazards while exploring space:

- micrometeoroids
- extreme temperatures
- radiation
- vacuum
- microgravity

The first four, called acute hazards, can kill a person quickly, while microgravity produces harmful, long-term effects.

Tips

- Ask the students what they know about the topic before you begin.
- If the students are not familiar with the 5 hazards, the information is introduced in the live demo or the text panel located on the first floor between the two space capsules.
- Decide where to begin as a group.
- Feel free to investigate other parts of the gallery and make connections to the main topic.

Go to: **The Live Demo** on the first floor near the Gemini capsule

Now that you have seen what happens to objects when there is no air around them, list some items that you think would protect an astronaut from the lack of air in space.

Astronaut Protection Equipment

1) _____

2) _____

3) _____

4) _____

more?)

Suggested Sighting

In space, even eating can be a hazard. Bits of food can float around in the micro-gravity environment of the capsule. These crumbs can get lodged in the craft's sensitive electronics causing them to malfunction. Locate the astronauts' menu listed near Gemini 11. How does it look different than food on Earth? How do you think it was changed to overcome hazards in space?

Discussion Questions about the Demo

How does the temperature of liquid nitrogen compare to the temperature of space?

Is extreme cold the only temperature hazard is space? Why does the temperature vary? How are space suits and spacecraft made to protect against these extremes? What materials are used?

Can microgravity kill you instantly? Why is microgravity a hazard?

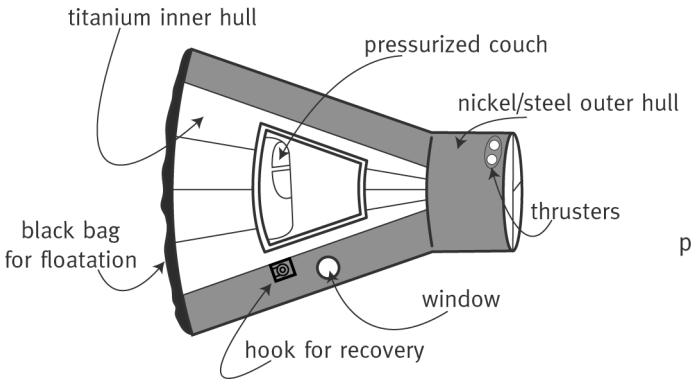
Fascinating Facts

- The temperature in space rises to 120°C (250°F) in the sunlight and drops to -157°C (-250°F) in the shade.
- Many synthetic materials, such as Gortex®, Mylar®, Kevlar®, and Teflon®, now used everyday, were invented to protect astronauts.

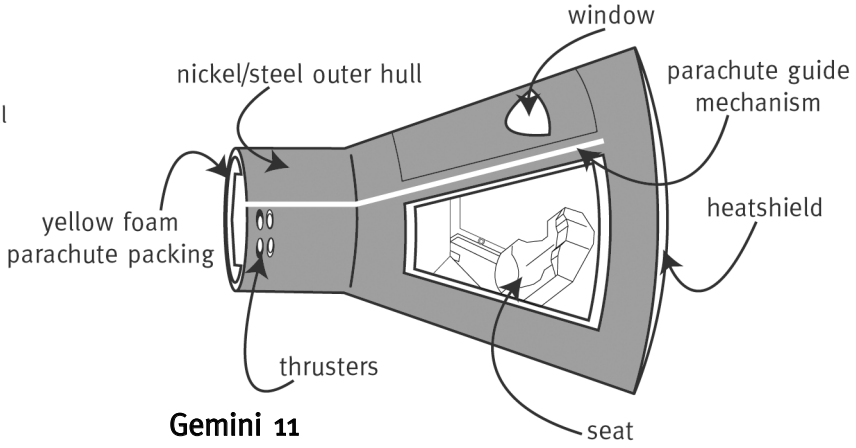
Go to: **Gemini 11 and Mercury 2 capsules** on first floor

The spacecraft, whether a capsule or the Space Shuttle, is an important part of protecting the astronaut from the hazards of space.

Allow students to look at the two capsules. Note any initial questions they may have and look for answers in the text surrounding the spacecraft. Ask students to look for the items labeled below. Students should try to identify items that they think help protect an astronaut from the hazards of space. Ask them why they think an item may help an astronaut.



Mercury 2



Gemini 11

Fascinating Fact

The total living space for astronauts in Gemini capsules was 80 cubic feet. That's about as much space as a box 4.3ft X 4.3ft X 4.3ft or the space inside a clothes dryer box.

Have a student draw the pattern on the heat shield of Gemini 11. Why does it look like this?

Discussion Questions about the Capsules

Who were the astronauts who flew in these two capsules? Were they all human?

Take a look at the layers of metal skin, or the hull, of Mercury and Gemini. The shiny, inner metal is titanium and the gray, outer layer is a mix of nickel and steel. How do you think these layers protected the astronauts from acute hazards?

Look at the text panels around the capsules. Notice the diagram of the flight path of Gemini 11. At what part of the flight was the heat shield important? Notice the layers of the heat shield and their structures. What tiny shapes do you see? How do you think that the overall shape of the heat shield protected the astronauts?

How did the Mercury capsule land? Walk around it and identify the structures that protected the astronaut during landing. How did they work?

The astronauts in the Gemini capsule wore space suits during their flight. Ham was in a different kind of space suit — a pressurized couch — that is still in the Mercury capsule. Find it.

Look up toward the space probes hanging from the ceiling. They also need to be shielded from hazards in space. How do they look different form spacecraft meant to protect humans?

Suggested Sightings

- On the console between the seats of the Gemini capsule is a joystick and large knob. What does the knob control? From what hazard of space does it protect?

- Notice the small circular windows in the Mercury capsule. Windows are a luxury item on a spacecraft because they present a unique set of problems related to the hazard of depressurization. They cannot be too big, or the difference in pressure between the inside and the outside of the capsule will cause the glass to break. Also, the seam around the window has to be carefully sealed to prevent air leaks. Find the sealant around these windows. What does it look like?