About Family and Community Learning
PBS KIDS Family and Community Learning (FCL) with Ready Jet Go! is a series of sessions that engage families in active, hands-on learning experiences. Designed for families with kids aged 5–8 (and younger/older siblings), the sessions use creative play and exploration to introduce kids and grown-ups to digital and hands-on tools to spark interest in science and engineering and develop science inquiry and engineering design practices and mindsets. Through child-centered activities and experiences, the sessions aim to foster collaboration, communication, and problem-solving skills among family members.

Why is PBS KIDS FCL Important?
Children are innately curious and creative and want to make sense of the world around them. Early STEM (Science, Technology, Engineering, and Math) education should be a direct extension of that curiosity, exploration, and creativity. It should champion active engagement, giving kids the opportunity to take the initiative for their own learning, ask questions, make observations, investigate, express themselves, and share their ideas as they grow and learn.

PBS KIDS Family and Community Learning is a way to demystify early STEM as families engage in fun, creative, and interest-driven learning. As families explore and learn together, facilitators support the experience by modeling, discussing, and pointing out science concepts and inquiry skills being used while providing experiences, tools, and strategies that grown-ups can use to support their children’s learning in this FCL.

About Ready Jet Go!
The PBS KIDS series follows two neighborhood kids: Sean, who has an all-consuming drive for science facts, and Sydney, who has a passion for science fiction and imagination. They both befriend the new kid on their street, Jet Propulsion, whose family members happen to be aliens from the planet Bortron 7. Together, they explore the solar system and the effects it has on the science of our planet, while learning about friendship and teamwork along the way.

Hi, educators!
I am Dr. Arionna Ralleigh, an educator with over 15 years of experience. Currently, I am the Curriculum Design Manager at Nine PBS. My passion for classroom equality is seen in everything that I do.

We welcome all of you who are interested in connecting with Nine PBS in a meaningful way. Let’s explore how the kids of our region can learn and grow together.

Please feel free to email me at aralleigh@ninepbs.org
Your Role

1. Encourage families to share, collaborate, and learn from one another. Try to keep conversations flowing so no one dominates (not even you!). You want all families to bring and share their opinions, thoughts, and ideas.

2. Be sure the information you are delivering is clear.

3. Use positive reinforcement to support families’ ideas. For example, walk around the room to engage families and validate their comments.

4. Prepare to navigate challenging situations, such as when:
   - A participant tries to divert the conversation or spends time on a tangent.
     - “Perhaps we can come back to this topic at the end or see me after the workshop…”
   - “I appreciate how excited you are to share with us. Thank you! Let’s see if anyone else has something to add.”
   - Group members are hesitant to participate.
     - “How might you adapt this to work for you?”
     - “From this activity, what looks like the most interesting part for you to do at home?”
   - A participant (in particular, a parent) feels they are not doing enough.
     - “Sometimes we feel we should be doing so much more. Remember that even small additions to your routine at home can make a big difference!”
   - “You are doing an awesome job participating and allowing others to contribute!”

5. Build capacity for facilitators to support the learning of both grown-ups and kids through the use of PBS KIDS resources, tools, and face-to-face experiences.

Facilitator Role

As the facilitator, you play a key role in helping parents and children engage in the workshops. Your role has two main goals:

1. Create and support safe and comfortable social learning environments where people participate freely.

2. Deliver information in a clear way as you use your facilitation skills to meet the workshop objectives.

Nine PBS and Partner Roles

1. Build capacity for Nine PBS and partners to support educators, families, and kids within their communities.

2. Strengthen the relationships between stations or partners and the communities they serve.
Science and Engineering Practices and Processes

Drawn from the PBS KIDS Learning Framework, each lesson in this facilitator guide taps into a number of science and engineering practices. These practices are integral to children’s development of the skills, thinking, and language of scientific inquiry and engineering design. These practices focus on identifying real-world problems and designing solutions to the problem. These practices engage children in observing, comparing and contrasting, identifying patterns, measuring, predicting, checking, recording, and reporting.

The Science Inquiry Process

The science inquiry process is a cycle of many different practices. It is not a linear, step-by-step process like tying your shoes. First, planning, and carrying out investigations to test those predictions and, depending on the evidence they find, discovering if their ideas make sense or need to be rethought and tested again. These different science inquiry practices can occur in any order and, sometimes, at the same time!

The Engineering Design Process

Children are natural engineers. Their early design and building skills can be seen in their play as they use simple tools and a variety of materials to create and build creations, including block towers and sand castles. Children use simple tools and technology every day when they use a pencil to write, a spoon to eat, and a computer to gain and share information.
The Process

Define a Problem

All engineers begin by defining a simple problem that can be solved through the design of a new or improved tool or technology. Asking questions, making observations, and gathering information are helpful in thinking about problems, and it is important to clearly understand the problem before beginning to design a solution.

Imagining and Plan

There's rarely only one right answer or a single way to approach a problem, which means it's important to take some time to think about the possibilities before providing guidance to the team and everyone starts building. We are helping them become creative problem-solvers. Designs can be conveyed through sketches, drawings, or physical models to communicate ideas for a problem's solutions to other people.

Create

It's always good practice to build incrementally, one piece at a time, and to test as you go. This is where they can put their plan into action by building and creating a new or improved product or tool.

Test and Approve

Engineers test their creations regularly throughout the building process to make sure the ideas work. Testing as you go—and fixing whatever isn't working—saves time in the long run. Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

Communicate

Soliciting feedback from fellow campers throughout the design and build process is a great way to get new insights and ideas. Engineering is a collaborative process during which ideas can be exchanged and shared with others while defining a problem and working to design, test, and revise a solution.

General Session Checklist

- **Review the lesson**
  - Read through the lesson. Next, review the lesson until you feel familiar with the content and timing of activities. The more you know ahead of time, the more comfortable you'll feel when leading the session with a lot of younger and eager Space Scouts!

- **Gather materials**
  - For the hands-on activities, we selected materials that are easily available. Find or purchase these materials at least a week in advance. Other equipment such as iPads or smartphones and optional supplies such as space-themed books are not required but may add extra value to activities. Your community partners may also be able to provide or contribute some materials as a request to check-out.

- **Invite guest speakers (optional)**
  - You can invite guests to visit your site in person or with a virtual connection such as a video call via Skype or Zoom. When looking for speakers keep in mind that all children benefit from meeting guests of different genders, ethnicities, cultures, and languages but that it's important that children see themselves reflected in the guest speakers.

- **Materials and preparation**
  - If guest speakers ask what you'd like them to do, suggest they find an age-appropriate book or video clip related to their job or hobby. Ask them to show it and encourage campers to ask questions about the topic. Then ask them to talk about what they know and how they learned that information. You can also ask guests questions about their background, what they do for fun, and what they like about their job. Allow time for questions from campers.

- **Practice run**
  - Planning and practicing a run of show before each lesson will help increase your confidence when facilitating. During this time, you can make adjustments you see fit based on your resources and the needs of your group. Get comfortable with the vocabulary and content and feel free to come up with your own questions to ask students. This is a great opportunity to get excited about the session and plan out how to express that enthusiasm to students during the real session. Feel free to be creative and have fun!
Mission 1: Spacesuit Designer

Campers identify problems that humans would have in the challenging environment of space and build a spacesuit to solve these problems.

Learning Goals

- Investigate how people change their environment to meet their needs.
- Observe and test different materials to determine which are best suited for an intended purpose.
- Identify a problem and build a device that provides a solution to that problem (engineering design process).

Vocabulary

- Spacesuit: A garment designed to help an astronaut survive in space.
- Atmosphere: The air that surrounds a space object (like a planet).
- Engineer: A person who designs and creates things to solve a problem.
- Exploration: Learning about something new, like a new place, a new idea, or how to build something.
- Data: Information that you collect.
- Tool: An item used to help finish a task.

Recommended Books

- If You Decide to Go to the Moon by Faith McNulty (grade level: prek-3)
- Star Finder! A Step-by-Step Guide to the Night Sky by DK (grade level: 3-7)

Getting Ready to Lead

Eat

Have food and paper goods set out and tables ready with tablecloths for when families arrive.

Have materials organized and ready for families to easily pick up upon entering.

- Family space journals
- Name tags
- Sign-in sheet and pens
- Pencils
- Table tent cards for session 1
- Tablecloth (reusable, if possible)
- Paper goods (made from recycled materials when possible): napkins, plates, utensil, cups
- Aluminum foil
- Trash bags, trash can

Education books are a great way to further ignite campers’ curiosity about space, science, and engineering. If your budget allows, consider purchasing enough books to send one home with each camper at the end of each day. Alternatively, you can purchase a few copies of each book and set up a library corner that campers can access after lunch!
Explore
Have a computer and projector set up and ready to show the video to the group.
If available, make sure tablets have the Space Scouts app downloaded.
- *Ready Jet Go!* video clip from episode Mindy Turns 5, Part 2
- Tablets
- Paper
- Colored pencils, markers, crayons
- Family space journals
- Pencils
- 1 stuffed animal per group
- Various materials for spacesuit, cut into easy-to-use portions, if necessary
- Materials for spacesuit features (e.g., paper tubes, pipe cleaners, construction paper)
- Tape, glue, or faster drying alternative to glue such as Velcro glue dots or poster putty
- Scissors
- Spacesuit designer stickers
- Recycled materials, such as paper towel tubes, plastic cups, cereal boxes

Make
Prepare workstations for engineering design activity.
- Family space journals
- Pencils
- Take-home handouts and materials
- Take home book: *A Big Mooncake for Little Star* by Grace Lin

Rundown
Eat (20 minutes)

Greet (5 minutes)
- Welcome and greet families.
- Ask families to sign in and instruct them to pick up one family space journal as well as badges for each family member (“Flight Commander” name tags for adults and “Space Scout” name tags for children).

Invite families to get food and eat.
- Place a Session 1 table tent cards on each table. Table tents feature a daily vocabulary word and an icebreaker question to get families talking.

Say something like: Welcome to the *Ready Jet Go!* PBS KIDS Family and Community Learning series. Please sign in and pick up a Flight Commander name tag for yourself and a Space Scout name tag for each child. Also take one family space journal for your whole family. Then grab a meal and find a place to settle in. I will set up a table tent on each table that has a question to get your family warmed up and thinking about what we will do today.

Day 1: What is Space Exploration?

Gather and Get Ready (20 minutes)
- Welcome campers.
- Help campers put away their belongings and get ready for their first day of Space Exploration Camp!
- Have campers take a lanyard and name tag before sitting down. Tell campers, “Write your name on your name tag and personalize it with things that you like. You can use your favorite colors, draw a soccer ball if you like playing soccer or draw your favorite animal or favorite planet!”
Warm up (15 minutes)

- Create table tent cards for each table to inspire discussion. Put one of the day’s vocabulary words on the tent card along with a question. Tell campers, “You can get ready for our first day of camp by thinking about the question on the table tent, “What places have you explored?” Exploration means learning about something new, like a new place or idea. Try to answer the question and, if you like, share your ideas at your table. If campers get stuck, suggest they think about an indoor place like a library or an outdoor place like a park.

- If you’re not using table tents, set out some of the materials for the day before the session begins. As the campers arrive, say, “Look around the room. Do you see any clues about what you will be doing on your first day of Space Exploration Camp?

Introduce (15 minutes)

- **Give a brief overview of the program**, explaining how it will be conducted and what parents can expect from the sessions. Over the course of four workshops, families will explore space, share experiences with other families, and have fun as a family!

- **Say something like**: PBS KIDS Family and Community Learning programs are a series of interactive sessions where families explore, play, and learn together with PBS KIDS media and fun hands-on activities. This program is called the Ready Jet Go! Family and Community Learning series. We will be exploring Earth and space science over four workshops. Each workshop is 2 hours in total and has 4 parts:

Welcome to Camp (10 minutes)

- Welcome campers to Ready Jet Go! Space Exploration Camp – Day 1! Say, “Hello, Space Scouts! My name is ______, your flight commander for this week-long adventure!”

Explore (35 minutes)

Gather (10 minutes)

- Gather children and parents on separate sides of the room for this quick introduction activity. Say something like: “Now we’re going to start our first activity! Flight Commanders, we’re going to move to one side of the room and learn a little about each other. Space Scouts, you’re going to move to the other side of the room with Senior Flight Commander ____ (other facilitator’s name) and share what we already know about space.”

Eat

- You can relax, share a meal, and get to know the other families at your table.

Explore

- Parents, you’ll have the opportunity to talk together while your children engage in fun activities to learn about Earth and space. Then you’ll come together as a family at the tables and use media, technology, and activities to explore space together.

Make

- You will work together with other families in an engineering activity.

Share

- You will end the day by sharing and reflecting on today’s experiences.
Introduce yourself to the groups, acknowledge their efforts to get there, and thank them for coming. Say your name and something you would take to space using the first letter of your name.

Explain the significance of the badges. Say something like: During the Ready Jet Go! Family and Community Learning program, each of you will earn a badge at every session. Badges are stickers that match the hands-on project we complete each day. You can place the sticker wherever you like. You can earn a total of four badges. Today you will earn the Spacesuit Designer badge!

Transition to learning about space by watching a Ready Jet Go! episode as a family.

Media and technology are effective tools when families use them together to support learning. At this workshop, I’ll show you ways to do that. Your family can try the ideas at home.

Say: Children

Guide children to either sit in a circle or remain in their chairs, depending on the set up of your space.

Once children are settled down, find out what they already know about space by either asking questions or going on a guided space journey.

(Ask questions) Say something like: Jet and his friends spend their days exploring space. Over the next four workshops, we’ll be exploring space, too! Let’s figure out what we already know about space.

∙ What do you think space is?
∙ Is there gravity in space?
∙ Is there oxygen?
∙ What do we need to breath in space?

Close your eyes and take a deep breath. For just a little while, we’re going to pretend that this room is actually a spaceship. Strap yourself tightly to your seat. Close your eyes and prepare for take-off . . . 5, 4, 3, 2, 1, lift off!

End the guided space journey by saying: When I count down from three, open your eyes! Find a partner at your table and talk about what you imagined.

Pass out pencils with erasers and a full range of colored pencils for each table.

Children will draw their own representation of space. Say something like: What do you picture when you hear the word “space?” Do your best to draw what you are imagining. If children went on the guided space journey, you could say, “Now, we’re going to draw what we just imagined!”

Move around the room to ask children questions about their drawings. You can ask questions like:

∙ Tell me about this object you drew. What do you call it?
∙ That’s an interesting detail to add. Why did you draw a person wearing a helmet?
∙ I like the color of this planet. Why did you choose that color?
∙ You drew some amazing things that exist in space! Are there other details you could add to your drawing?
∙ After this activity, let the kids know that they will be reuniting with their families to watch a Ready Jet Go! episode and learn more about space.

Plan on older and younger siblings not in the 5-8 range attending sessions with their families. Preplanned activities may not be age-appropriate for these siblings; they may become unengaged or distracted. Offer older and younger siblings age-appropriate tasks or activities to redirect their attention and help the whole family stay engaged with the session.

Older siblings can fill roles with more responsibilities to help their younger siblings; for example, serving as a recorder of ideas, scissor handler, or area organizer.

For younger siblings, provide materials for a few simple activities each day. For example, a space themed puzzle, Ready Jet Go! coloring sheets and crayons, black paper with star stickers and metallic markers, or a simple sensory experience like playdough or kinetic sand.
Watch (10 minutes)
https://pbskids.org/readyjetgo/videos

- Have families gather together.
- Before showing a clip of the Ready Jet Go! episode Mindy Turns 5, Part 2 (full clip, 2:45 mins), provide some information to orient families to what they’re about to watch.
- Mindy wants to have a tea party on the Moon for her birthday. But the Moon and the Earth are very different. While you watch the video, try to come up with three differences between the Moon and the Earth!
- After the episode, ask families to volunteer sharing differences they found between Earth and the Moon. Examples include temperature, gravity, and amount of oxygen.
- Transitions to the “Make” activity.

Make (40 Minutes)

Each family will work together as engineers to build a spacesuit for a stuffed animal. Have families discuss at their tables about what problem spacesuit will solve.

You can say something like your spacesuit can protect an astronaut who is standing on the surface of chilly Mars from getting too cold. Or how can you keep your from the blazing sun from getting too hot.

Prepare (10 minutes)

- Families will use their Family Space Journal to imagine and plan a design for a spacesuit.
- There are lots of possible ways to go about designing and creating your astronaut’s spacesuit. Sketch, draw, and share ideas in your journal!
- Introduce the selection of building materials to families. Make sure families have completed designing the astronaut spacesuit.

- Then, instruct families to gather their building materials and begin building.
- Walk around the room to provide assistance.
- Validate family work.
- Ask questions about how they might test and/or improve their design. Ask questions like:
  - Can you describe how your spacesuit solves the problem you identified and keeps astronauts protected?
  - Why did you add certain features on his suit?
- Flight Commanders and Space Scouts receive a Spacesuit Designer badge!

Blast Off: Engineering and Design Process (10 minutes)

- Give families the assignment to build a spacesuit out of recycled materials for a stuffed animal.
- Brainstorm how the spacesuit will protect an astronaut. This is the first step of the Engineering Design Process. Families can use what they learned in the episode and their own background knowledge to help them brainstorm. Try offering information or solutions only if families get stuck.

Each family will work together as engineers to build a spacesuit for a stuffed animal. First, talk at your table about what problem your spacesuit will solve.

What is the Engineering Design Process?

Engineering is a process of identifying and developing solutions to problems. The Engineering Design Process is a series of steps that engineers use to identify a problem to solve. An engineer makes observations and gathers information to clearly understand the problem and then designs and creates solutions. For more information, look at the Engineering Design Process graphic and explanation earlier in the guide.
Share (15 minutes)
- Ask families to share their spacesuit with the whole group.

Family Space Journal (15 minutes)
- Prompt children and parents to reflect on today's workshop with their own families. Ask families to jot down answers to the questions in their Family Journals.
- Walk around the room to ensure that each family understands the instructions and to answer any questions.
  - What I found interesting today about space.
  - Questions I have about space.
  - Something I could design and build at home.
- Ask family Flight Commanders to share thoughts with the whole group.
- Validate parent comments and ask for a round of applause for the entire group.
- Encourage families to try new ideas from this experience when they go home. They can practice the ideas by doing the take-home activity as a family, which will be mentioned before the end of the session.
- Collect Family Space Journals until the next session.

Preview Next Session and Explain Take-Home Activity (5 minutes)
- Take-home activity: Making a paper astronaut helmet.
- Tell families they can share the results of the take-home activity at the next session. Give parents the option to bring in a video log of their take-home activity or photos of another activity they did together as a result of their experience in the session today.

If families decide to work together to make a paper helmet for the astronaut, have them share the building process by recording a video log! This is optional; it is not homework, so if your family prefers to continue learning by reading or doing another activity related to today’s activities, that works, too.
If your budget allows, give each family a STEM book to add to their home libraries. Preview the book. Read the title, author’s name, and a brief description. Flip through a few pages to show families the illustrations. Today’s book is “A Big Mooncake for Little Star” by Grace Lin. This book for young readers illustrates the phases of the Moon.

Thank parents for coming and invite them to come to next week’s session.

Introduction from Jet

Hello, facilitators! Jet Propulsion here. Your mission is to support the Flight Commanders to lead their Space Scouts to build and improve rockets. Go forward and develop the next generation of rocket scientists! Ready Jet Go!

Today’s Mission: Rocket Launcher

Today families are blasting off into space! Families will explore the forces and motion involved in launching a balloon rocket and make improvements so the rocket travels farther.

Learning Goals

- Ask questions, observe, and discuss ideas about what makes something move and how the movement can be controlled and changed.
- Explore the effects of forces like pushes and pulls by making and testing predictions.
- Use drawings, pictures, movement, and 3D materials to represent ideas and make sense of everyday experiences.
- With guidance, plan and investigate (science and engineering practice)
- Analyze data to decide if a design solution works (as intended) and improve a design based on information gathered through testing and interpretation of results (Engineering and Design Process).

Vocabulary

- Force: A push or pull on an object
- Rocket: A statement about what you think might happen in the future based on what you already know
- Prediction: A push or pull on an object

Getting Ready to Lead

Eat

- Name tags
- Sign-in sheet and pens
- Table tent cards for session 2
- Tablecloth (reusable, if possible)
- Paper goods (made from recycled materials, when possible): napkins, plates, utensil, cups
- Aluminum foil
- Trash bags, trash can
Explore
- Ready Jet Go! video clip from episode Lone Star 2: Rocket Kids!
- Paper tubes
- Scissors
- Balloons
- Flipchart or whiteboard

Make
- Arrange chairs in an open space for the balloon rocket experiment.
- Family space journals
- Pencils
- Two chairs per group
- String
- Scissors
- Paper tubes
- Straws
- Balloons
- Measuring tape or rulers
- Masking tape
- Rocket launcher stickers

Share
- Have take-home materials organized and ready for pickup.
- Family space journals
- Pencils
- Take-home handouts and materials
- Take-home book (optional)

Rundown

Eat (20 minutes)

Greet (10 minutes)
- Welcome and greet families to the second session.
- Ask families to sign in and pick up their Family Space Journals.
- Invite families to get food and eat.
- Place a session 2 table tent on each table.

Review and Preview (10 minutes)
- Welcome families back and have new families introduce themselves.
- Briefly review last week’s session in one or two sentences.
- Encourage families who have not spoken before to share if they are comfortable doing so.
- Introduce the daily topic and the day’s activities. Today, Flight Commanders and Space Scouts will earn the Rocket Launcher badge by exploring forces and motion and building a rocket. First explore by watching a Ready Jet Go! video clip from episode Lone Star 2: Rocket Kids!

Explore (10 minutes)

Watch (10 minutes)
- Gather families to watch together.
- In this episode, Jet and his friends explore how rockets work and learn about the history of rockets in their town. After watching, ask families questions such as:
  - What is pushing the rocket up?
  - What is a force?
  - How does force work?
- Ask families how the force (pushes and pulls) or motion of their balloons and the rocket from the episode are the same or different.
Lead into activity

∙ Pass out a balloon to each parent. Ask about latex allergies.

∙ In small groups, practice blowing the balloon and letting go.

∙ Say something like: If I blow it up and let go, what will happen?

∙ In a small group, come up with questions you have about balloons.

Make (35 minutes)

∙ Transition into the Make activity
Build a rocket using a balloon and solve a problem: how do we make our balloon and solve a problem. How do we make our balloon rocket go as far as possible? As a family, they will build a rocket along a string and focus on testing and improving balloon rockets.

Activity (35 minutes)

∙ Ask families to look at the diagram in their Family Space Journals to set up the balloon rocket. A diagram is a picture showing how something works. Sometimes, engineers start out following a common design but then they make improvements to the design to make it even better.

∙ They will lace string through a paper tube or straw and tie the string between two chairs. They will inflate a balloon, tape it to the bottom of the paper tube or straw and let it go.

∙ Look at the balloon rocket diagram on page 11 of your Family Space Journal. A diagram is a picture showing how something works. Sometimes, engineers start out following a common design but then they make improvements to the design to make it even better.

∙ Ask families to test their designs and use tape to mark the distance it traveled. Address the whole group. Ask families if they noticed any elements that they might be able to change to improve their balloon rocket design. Now let’s test our rockets and mark with tape how far they travel. Walk around the room to support families.

∙ Families return to their rockets, this time investigating how changing elements of the balloon rocket affects how far the rocket travels.

∙ Encourage any questions, observations, or predictions you hear.

∙ End the activity by asking families what observations they made about their balloon rockets and what questions they asked to test and improve their balloon rocket.

∙ Flight Commanders and Space Scouts earn a Rocket Launcher badge!

∙ Clean up all materials and gather families in a circle or back to their chairs/tables.

Share (15 minutes)

∙ Ask if one or two families will volunteer to share their balloon rocket process.

Family Space Journal (10 minutes)

∙ Prompt families to reflect on today’s workshop with their own families. Ask families to jot down answers to the questions from their Flight Commander Reflection Log in their Family Space Journals.

∙ Walk around the room to ensure that each family understands the instructions and to answer any questions.

  ∙ What I found interesting today about rockets.

  ∙ Questions I have about space travel.

  ∙ Something I could improve at home.

∙ Ask family Flight Commanders to share thoughts with the whole group or with other families at their table.

∙ Validate comments and ask for a round of applause for the entire group.

∙ Encourage families to try new ideas from their experience during the session when they go home. They can practice these ideas by doing the take-home activity as a family, which will be mentioned before the end of the session.

∙ Collect Family Space Journals until the next session.
Preview next session and explain take-home activity (5 minutes)

- Introduce the take home activity, which is making paper straw rockets!
- Tell families they can share their take-home activity at the session. Give parents the option to bring in a video log of their experience.
- Share what activity they did together as a result of their experience in today's session.
- In the next session, we’re going to design a control panel and explore with rovers! We hope you’ll join us again to continue this space adventure. While we’re having fun, remember, we’re also learning how to support your young children with knowledge about Earth, space, and exploration.
- Say something like: Thank you! See you all next week!

Session 3
Engineer a Rover

Today’s Mission: Control Panel Pilot

Today families will engineer a control panel for a rover to explore Mars. Then they will practice controlling a rover and experience what it is like to be a rover through a cooperative, team-building activity.

Learning Goals

- Learn how to give effective and efficient instructions/directions.
- Identify a problem that can be solved through the construction of an object.
- Build a device that provides a solution to a specific problem.

Vocabulary

- **Navigate**: To plan and direct the path of a ship, aircraft, or another form of transportation
- **Control panel**: An electrical device with buttons, switches, dials, and meters that controls other electrical devices
- **Command**: An instruction given by a person to a machine telling it to do something
Getting Ready to Lead

Eat
Have paper goods set out and tables ready with tablecloths for when families arrive.
Have materials organized and ready for families to easily pick up upon returning.
  - Name tags
  - Sign-in-sheet and pen
  - Table tent cards for session 3
  - Tablecloth (reusable if possible)
  - Paper goods (made from recycled materials when possible): napkins, plates, utensils, cups
  - Aluminum foil
  - Trash bags, trash can

Explore
  - Ready Jet Go! video clip from episode: Mindy and Carrot Bake
  - Lots of index cards or construction paper
  - Tape
  - Cardboard boxes
  - Scissors
  - Recycled CDs
  - Different surfaces (tinfoil, bubble wrap, sandpaper, etc.)
  - Things that roll (like paper tubes)
  - Legos
  - Stickers
  - Recycled boxes (cereal, crackers, etc.)
  - Glue
  - Water bottles and caps
  - Crayons
  - Markers

Make
Prepare workstations for Engineering Design activity.
  - Family space journals
  - Pencils
  - Flipchart or whiteboard
  - Construction paper
  - Cardboard boxes
  - Materials for control panel (popsicle sticks, poster board, paper cups, pipe cleaners, etc.)
  - Recycled materials: CDs, spools, plastic lids, cardboard, Styrofoam containers, bottle tops
  - Tape, glue (or other fast-drying alternative to glue such as Velcro glue dots or poster putty)
  - Scissors
  - Crayons, markers
  - Bubble wrap
  - Rover engineer stickers

Share
Have take-home materials organized and ready for pick-up.
  - Family Space Journals
  - Pencils
  - Take-home handouts
  - Take-home book (optional)
Rundown

Eat (20 Minutes)

Greet (10 minutes)

- Welcome and greet families to the third session.
- Ask families to sign in and pick up their Family Space Journals.
- Invite families to get food and eat.
- Place a session 3 table tent on each table
- Spend a minute or two reviewing vocabulary for the mission using a slide deck or the Space Exploration Journal (MISSION 4 OVERVIEW page 27).

Review and Preview (10 Minutes)

- Welcome families back and have new families introduce themselves.
- Briefly review last week's session in one or two sentences.
- Ask if families would like to share their straw rockets from the take-home activity. Encourage parents to share their experience when putting what they learned last week into practice. Introduce the daily topic and the activities families will take part in today. Families will use the engineering design process to build a control panel. Share that next week is graduation day!

Explore (35 minutes)

Have families open the Family Space Journals to the picture of the Mars rover. Ask parents to talk with their children about what the surface of Mars is like (based on the picture) and what challenges the rover might have there.

Gather (10 min)

- Gather families
- Say something like: In this episode, Mindy and Carrot learn how to fly the spacecraft with its new buttons, even though they do not know how to use them yet.

Watch (10 minutes)

https://pbskids.org/readyjetgo/videos

- Watch Ready Jet Go! episode Mindy and Carrot Bake (11 minutes)
- Ask questions like: What is a control panel? What would you do if you had a control panel, but you did not know how the buttons worked?
- Transition to the next activity by saying: Just like Mindy and Carrot, you will have the opportunity to work together as a team to figure out what your control panel buttons mean and then learn how to use them!

Make (35 minutes)

Transition to the Make activity

Have families open the Family Space Journals to the picture of the Mars rover. Ask parents to talk with their children about what the surface of Mars is like (based on the picture) and what challenges the rover might have there.

You can say something like: Look at the picture of the Mars rover. What problems or obstacles might rovers have when exploring Mars?

What do you notice about the surface of Mars?

Ask families to share their answers to the questions and record answers on a flipchart or whiteboard.

Activity

- Divide everyone into groups of 3–5 people, depending on the number of total participants.
- Each group has 10 minutes to build a tower that is as tall as possible and stands on its own using only the materials provided: paper and tape
- You can use the materials in any way you want, but the structure needs to be able to stand on its own. This means no one can hold it up, and it cannot lean against anything. Keep communicating with each other as you work as a team!
Introduction from Jet

“Hi, facilitators! It’s Jet Propulsion, again, with more fun space adventures for you and your campers to explore. We have learned about some amazing space themes, like space exploration and rovers. It’s time we turned our attention to the topic that will be important for future generations of astronauts, sending human beings to live on other planets and moons. The first Moon landing was over 50 years ago, and today, your Space Scouts are returning there to build a Moon base! Your mission is to introduce the properties of the Earth’s Moon, so they can successfully land and settle on its surface.

Today’s Mission: Base Builder

Campers will investigate how humans survive by changing their environment and design and build a Moon base model.

Learning goals

- Investigate how humans change their environment to meet their needs.
- Collaborate with peers to share ideas while planning, creating, and improving an object that solves a problem (engineering design practice)
- Share design ideas with others in oral and written forms using models and drawings (engineering design practice)
- Compare models to identify common features and differences
- Graduation!

Vocabulary

- **Shelter**: A structure that gives protection against weather or other dangers
- **Model**: A representation of something that describes how it looks or shows how it works, usually on a smaller scale and made of less expensive materials
Getting Ready to Lead

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**Eat**

Have paper goods set out and tables ready with tablecloths for when families arrive.

Have materials organized and ready for families to easily pick up upon returning.

- Name tags
- Sign-in sheet and pen
- Table tent cards for session 3
- Tablecloth (reusable if possible)
- Paper goods (made from recycled materials when possible): napkins, plates, utensils, cups
- Aluminum foil
- Trash bags, trash can

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**Make**

- Ask families to examine the materials at their tables and imagine how they can use them to build a base builder. Divide everyone into groups of 3–5 people, depending on the number of total participants.
- Each group has 10 minutes to build a tower that is as tall as possible and stands on its own using only the materials provided: paper and tape
- You can use the materials in any way you want, but the structure needs to be able to stand on its own. This means no one can hold it up, and it cannot lean against anything. Keep communicating with each other as you work as a team!
- Share and Graduate

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**Share and Graduate (30 minutes)**

**Reflection (10 minutes)**

- Ask parents to reflect on their experience in the Ready Jet Go! Family and Community Learning workshop by responding to three questions. Parents can share their answers on post-it notes that they place on chart paper (write the questions on the chart paper) or share their answers aloud.

- Validate parent comments and ask for a round of applause for the entire group.

- Reinforce the importance of parents' direct participation in their children's science inquiry and engineering design process learning.

- Say something like: You can help support this learning at home by replicating the activities we just did today with your family at home or by encouraging the following:
  - Discuss different kinds of weather with your child.
  - Talk about things in the sky.
  - Discuss fog, sun, and rain with your child.
Graduation (20 minutes)

- Transition into graduation by playing graduation music.
- Wrap up the session with a celebration! Say something like, I’m so proud of all your great work. In each session you explored space, practiced new science and engineering skills, and worked as teams. Excellent job everyone!
- Call up one child at a time and present them with certificates.

Wrap Up

- Families leave the final session with a handout that provides suggestions for both digital and nondigital ways to continue their family-focused, creative learning efforts in the future.
- Encourage families to continue to engage at home as a family with all the information and resources they gained throughout these four sessions. They can also continue to meet with other families outside these sessions or connect with other partners for additional resources and questions.