

MINI
MISSION
TEACHER
PACKET
HMNS



HMNS Expedition Center Program

This packet is pre-visit material for a **Mini Expedition Center Mission** at the **Houston Museum of Natural Science**.

OPERATION: LEAPFROG

TO TEACHERS



Dear Teachers,

Thank you for planning a field trip to the Expedition Center (EC) at the Houston Museum of Natural Science. The Expedition Center Program is the most innovative and engaging way for students to experience STEM objectives, and HMNS has 30 years of experience doing so. This packet will help you prepare for a field trip that your students will not soon forget. Our web site will also give you more information and help preparing your students. Go to www.hmns.org/expedition.

Please use the enclosed material to help prepare your students for their mission. This packet is divided into three sections: “**Must Do**” contains the minimum preparation necessary, “**Recommended**” are the activities that will help teachers and students understand and increase the learning potential of the mission, and “**Fun Stuff**” are activities that can get your students more excited about the field trip. The EC uses space flight to make many fields of science exciting and open up scientific career options. As astronauts they will become electrical engineers, chemists, biologists, geologists, environmental scientists, and more. During the mission we will focus on the teamwork, communication, and problem solving skills needed to successfully accomplish goals.

To help teachers prepare for your field trip, the Expedition Center is open for you to visit. We recommend that any teachers who have not previously brought a group to the EC come to see the center and meet with a staff member. To arrange a visit to the EC, call 713-639-4727 or email expedition@hmns.org

We enjoy working with a broad range of students with different abilities. If you have students with learning or physical disabilities, or do not read or speak English, it is helpful if you let us know at the start of each mission so that we can give them the attention they need.

We are here to help make your field trip the best it can be. If you have any questions, call 713-639-4727 or email expedition@hmns.org

We look forward to your visit!
The Expedition Center Staff

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CONTENTS

MUST DO

Preparation that must be done before each mission.

Mission Overview

An outline of your day at the Expedition Center.

Team Descriptions

This is a list of job description and skill sets for each position. Review these with your students and choose who is best for each job. Each team has a different job using different abilities and is based on a career on Earth. There is a Job Application activity in the “Recommended” activity section that you can use to help decide assignments.

Team Assignments

This chart will show which teams should be used for your group size. If a student is absent on the day of your field trip, use it to shift the team assignments before your mission.

Crew Manifest

Use this to assign students to their teams. One Crew Manifest is needed for each mission. Write the names of your students in the team slots. If you have trouble decided how to assign jobs or which teams to use, do not hesitate to call the Expedition Center for help. Bring the Crew Manifest to the Expedition Center for you mission.

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RECOMMENDED

These activities will help your students function more efficiently and understand the mission.

Job Interview

- Team Application
- Performance Review

To help enhance the career aspect of the Expedition Mission, students can apply for the team they want using the Team Application. This will also help teachers decide who to assign to what teams. After the mission, the Performance Review will help summarize the activity.

Extending the Mission

These notes describe the skills that will be emphasized during the Expedition Mission. Teachers should familiarize themselves with this information to know what to watch for during the Mission. Also, each team job is linked to a real-world career. Teachers are encouraged to discuss the use of skills and the careers associated with each team in the days following the visit to the Expedition Center. This information is very helpful in conjunction with the Job Interview activity.

Fun Stuff

Activities that can be added to your mission.

Crew Patch

Your students can design a crew patch for your mission. Select a patch that represents your group and bring it with you to the EC. Your patch will be added to our Crew Patch Database and displayed in the Briefing Room.

Certificate

Make a copy for each student to reward them after their mission.

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MISSION OVERVIEW

When you arrive at HMNS, line your students up in front of the doors to the museum. Your lead teacher must check in at the Box Office. Your group should receive a ticket and bright green ID tags for the chaperones and blue tags for the teachers. If your school is scheduled to arrive early in the morning a staff member from the Expedition Center will meet you at the entrance to the Museum to help you get organized. For missions during the day, your group should go to the Expedition Center (located on the lower level near the Chemistry exhibit) about 10 minutes before your mission is scheduled to start. At the beginning of the mission, make sure you have a Crew Manifest. Also, **please tell the Expedition staff if your students are scheduled for a Giant Screen Theater or Planetarium show immediately after the mission so that we can be sure to finish a few minutes early.** It is helpful if we know of any students that have special needs that may require extra attention. The Expedition Center is completely wheelchair accessible.

Two staff members will work with your group. To start the mission, one of the staff will give a “mission briefing” in which the scenario, goals, and team responsibilities will be reviewed. Then the students will be given specific instructions on how to do their jobs. The Expedition Center Program at HMNS can fly Mini Missions to the Moon or to Mars. We will prepare for a trip to Mars, but can switch to the Moon quickly if you tell us you would rather land on the Moon. As the mission starts, the students on board their ship, the *SS Legacy*, will detach from the Earth-orbiting space station and start their flight toward Mars. Along the way, they must conduct several experiments and work to complete their mission. During the journey, there may be problems or emergencies that the crew will have to work through such as high radiation, explosive gases, power blackouts, air system malfunctions and more. The mission ends with the landing on Mars, and finally with a debriefing to discuss what the students learned.

During the mission we will ask that 2 or 3 teachers or chaperones go into the flight simulator with the astronaut group. Other adults will stay in Mission Control. The involvement of chaperones will be limited during the mission unless there are students that require special attention. If a discipline problem should arise, we will ask that a teacher step in, and if it continues the student will be removed from the program. You are welcome to take as many pictures as you like.

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TEAM DESCRIPTIONS

COMMUNICATIONS TEAM: As a member of the Communications Team, the students will be responsible for all verbal messages between Mission Control and the Space Station. These students should be responsible and cool under pressure. **Skills:** reading and oral communications, work in high stress situations, ability to prioritize.

DATA TEAM: The Data Team is responsible for all written information exchanged between Mission Control and the Flight Simulator. **Skills:** computer keyboard operation, good communication, ability to organize.

MEDICAL TEAM: As members of the Medical Team, the students will study the effects of space flight on the human body, and are responsible for the health of the astronauts. **Skills:** simple math, keyboard operations, and good interpersonal skills.

NAVIGATION TEAM: The navigators will identify constellations, take measurements and make calculations to get the ship into orbit and land on Mars. **Skills:** math, geography, and an interest in astronomy.

ISOLATION TEAM: The Isolation Team will use robot arms to conduct chemistry experiments and analyze test results. **Skills:** using joystick controls, observation skills, patience.

PROBE TEAM: As members of the Probe Team the students are responsible for the assembly, deployment, and monitoring of a satellite. **Skills:** strong mechanical skills, analytical problem solving, deduction skills.

REMOTE TEAM: The Remote Team will operate a simulation program flying jets on Mars. **Skills:** strong hand eye coordination, patience, observation skills.

LIFE SUPPORT TEAM: Students on the Life Support Team are responsible for the environmental conditions on the ship that are required to live. They will monitor the air filtering system, water recycling, and electricity. **Skills:** strong problem solving skills, interest in environmental and biological sciences.

BIOLOGY LAB TEAM: The biologists will analyze the growth of plants in greenhouse systems and study crop and seed samples. **Skills:** interest in biology, observation, measurement.

GEOLOGY LAB TEAM: The Geology Team will study and compare rocks and surface features of the Earth, Moon, and Mars. **Skills:** interest in geology, observation, measurement.

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TEAM ASSIGNMENTS

Use this chart to make the best team assignments for your number of students.

# of Students	Assignments to Each Team
12	1 Comm, 1 Data, 2 Nav, 2 Probe, 2 Iso, 2 LS, 2 Rem
13	1 Comm, 1 Data, 2 Nav, 1 Med, 2 Probe, 2 Iso, 2 LS, 2 Rem
14	1 Comm, 1 Data, 2 Nav, 2 Med, 2 Probe, 2 Iso, 2 LS, 2 Rem
15	1 Comm, 2 Data, 2 Nav, 2 Med, 2 Probe, 2 Iso, 2 LS, 2 Rem
16	2 Comm, 2 Data, 2 Nav, 2 Med, 2 Probe, 2 Iso, 2 LS, 2 Rem
17	2 Comm, 2 Data, 2 Nav, 2 Med, 2 Probe, 3 Iso, 2 LS, 2 Rem
18	2 Comm, 2 Data, 2 Nav, 2 Med, 2 Probe, 2 Iso, 2 LS, 2 Rem, 2 Geo
19	2 Comm, 2 Data, 2 Nav, 2 Med, 2 Probe, 3 Iso, 2 LS, 2 Rem, 2 Geo
20	2 Comm, 2 Data, 2 Nav, 2 Med, 2 Probe, 2 Iso, 2 LS, 2 Rem, 2 Geo, 2 Bio
21	2 Comm, 2 Data, 2 Nav, 2 Med, 2 Probe, 3 Iso, 2 LS, 2 Rem, 2 Geo, 2 Bio
22	2 Comm, 2 Data, 2 Nav, 2 Med, 2 Probe, 3 Iso, 2 LS, 3 Rem, 2 Geo, 2 Bio
23	2 Comm, 2 Data, 2 Nav, 2 Med, 2 Probe, 3 Iso, 2 LS, 3 Rem, 3 Geo, 2 Bio
24	2 Comm, 2 Data, 2 Nav, 2 Med, 2 Probe, 3 Iso, 2 LS, 3 Rem, 3 Geo, 3 Bio

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CREW MANIFEST

Use this **Crew Manifest** for Expedition Mini Missions at the Houston Museum of Natural Science. Each student will become a crew member of one of the teams in the Expedition Learning Center. Use the **Team Assignments** chart for the best team setup. Review the **Team Descriptions** with your students prior to filling out the **Team Application** and **Crew Manifest**.

Teams	Crew
Communications	<hr/> <hr/> <hr/>
Data	<hr/> <hr/> <hr/>
Medical	<hr/> <hr/> <hr/>
Navigation	<hr/> <hr/> <hr/>
Isolation	<hr/> <hr/> <hr/> <hr/>
Probe	<hr/> <hr/> <hr/>
Remote	<hr/> <hr/> <hr/> <hr/>
Life Support	<hr/> <hr/> <hr/>
Bio Lab	<hr/> <hr/> <hr/>
Geo Lab	<hr/> <hr/> <hr/>

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JOB INTERVIEW

TEAM APPLICATION

Key Concepts

In this situation, the teacher acts as a Career Counselor, interviewing their client, the job applicant, about his/her unique skills. The goal is for the teacher to help students reflect on their strengths, as they prepare to apply for a job on the upcoming mission in the Expedition Center. The strong workplace readiness component will help to prepare students as they learn about skills for future careers.

The Scenario

Because each person brings a different mix of skills to the workplace, it is important to identify and take advantage of their unique characteristics when finding the right position. Check the Team Assignments page to find out which teams will be available depending on the number of students.

Procedures

1. Copy and pass out the Team Applications.
2. Make a list of available jobs on the chalkboard and discuss the jobs using the Team Description page of this packet.
3. Students complete the applications.
4. Teacher assigns jobs for the upcoming Expedition Mission.

PERFORMANCE REVIEW

Key Concepts

Now that the students have flown the mission at the Expedition Center, it is time to follow up the pre-mission Job Interview with a simulation in which the client returns to the Career Counselor for an on-the-job performance review.

The Scenario

In the past, people chose an occupation for life. Today, career counselors are advising us not to be surprised when we find ourselves changing jobs and occupations several times during a career. This means that it will become very important to be flexible and to know our strengths so we can prepare for the future. This Performance Review will help the student reflect on the Expedition experience and how it has affected their skills, attitudes, and interests in math, science, and technology.

Procedures

1. Copy and pass out the Performance Review.
2. Students complete the review.
3. Discuss the students' answers.

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TEAM APPLICATION

Name _____
Date _____ Period _____ Grade _____
School _____ Teacher _____

Career Objectives:

I am applying for a position on these teams:

Number your first, second, and third choices.

- | | | | |
|-----------------------------------------|------------------------------------|---------------------------------------|-------------------------------------|
| <input type="checkbox"/> Communications | <input type="checkbox"/> Data | <input type="checkbox"/> Life Support | <input type="checkbox"/> Navigation |
| <input type="checkbox"/> Probe | <input type="checkbox"/> Isolation | <input type="checkbox"/> Remote | <input type="checkbox"/> Medical |
| <input type="checkbox"/> Geology | <input type="checkbox"/> Biology | | |

What qualities do you have for these positions?

What experience do you have for these positions?

References

Name _____
Relationship _____

Name _____
Relationship _____

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PERFORMANCE REVIEW

Name _____
Date _____ Period _____ Grade _____
School _____ Teacher _____

State the responsibilities that you had as part of your mission team.

What problems did you encounter in meeting your objectives during the mission?

What might you do differently or better if you had the job to do again?

From your observations, what other mission work team interested you and why?

Are you more interested in going into science because of having a role on this mission?

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Extending the Mission

Things to look for and discuss after an Expedition Center Mission.

At the end of the Mission, the Expedition Center staff will discuss some of these ideas, but there will not be enough time to cover all of them or go into much detail. Teachers are encouraged to discuss these ideas with their students after returning to school.

Skills

Teachers should watch for these behaviors, and after the Mission discuss with students how they could use the skills to achieve their goals in school.

- Reading
- Listening
- Being responsible
- Prioritizing
- Working on a team
- Communicating
- Problem Solving

In the Expedition Center Program, students will have to use many different skills to complete a successful mission. These skills are an important part of getting the job done. Everyone will have jobs to do during the Mission as astronauts, but they also have real life jobs – being students. By developing skills in this simulated activity, we can promote using the same skills to be a successful student. During the “Mission Briefing”, two goals are set: 1) Land on Mars and 2) Complete assigned work. Each student also has goals at school – improved grades, achieve all A’s, pass standardized tests, etc. The same skills used to meet the mission goals will also help students meet their goals at school. The following explanation of skills compares the importance of each during the Expedition Mission and at school. Teachers should watch for these skills being used during the Mission. After your day in the Expedition Center, the field trip can be used to remind students of the importance of using these skills to achieve their goals.

Reading – Every team will follow step-by-step instructions that tell them exactly how to do their jobs. If the students are reading carefully they will work quickly, get quality work done and understand what they are doing. Mission goal number two, complete assigned work, depends on quality reading by each team. At school, students must read their assignment instructions carefully. If students read carefully, they will understand the assignment better, get better quality work done, and get better grades.

Listening – In order to complete their goals, students must listen carefully to instructions from the Expedition Center staff, and also listen to the messages flowing between the ship and Mission Control. Without this information, students will not understand the tools they will have available or what is going on around them. Also, a team that is not paying attention can potentially slow down the work of other teams that must wait on them. In the classroom, students must listen to lessons and instructions so that they understand their assignments and what is happening in the classroom.

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Being Responsible – In the Expedition Mission, each team is responsible for a different job. Just as astronauts must get their assigned work completed, students must be responsible for their own schoolwork. A student cannot be successful in school without getting his or her work done and getting it turned in on time.

Prioritizing – At times during the Mission things can happen that will need attention before the scheduled work, and students may encounter emergencies that need to be solved. They will need to decide which messages need to be send first and which ones can wait. There will be times when a team will need to take priority over other teams. A good student will also set priorities. For example, when a student wants to go outside with friends or has a favorite TV show coming on, but has a big test the next day, studying should come first.

Working on a Team – No one works alone on a space ship, and astronauts cannot complete their experiments without the information from Mission Control. Each team member must stay on task to complete their work. If students cooperate and share the work they will be able to work more efficiently. At school, students may work on group projects or on sports teams. Working together can help an entire class learn more; however, sometimes teamwork is not allowed, like on a test!

Communicating – Astronauts and Mission Control will communicate with each other by verbal and text messages sent through the Communications and Data Teams. Good communications is two-sided; it requires a clearly spoken message or good handwriting, and someone listening or reading carefully on the other end. Also, to understand a message students must be able to hear it. Listening is an individual task – each person is responsible for his own ears. Hearing is a group task – the noise volume of a group must be low enough for the message to be heard. Students will quickly find that if they are unable to communicate with each other they will not be able to complete their work. In the classroom, students that can ask questions clearly, listen carefully, have good handwriting, and can hear information will find it easier to get their schoolwork done.

Problem Solving – An Expedition Mission is full of problems; some small, some “life threatening”, but all have a solution. Students may need to think through what to do when a part isn’t fitting right, or when the crew is about to fail the mission. Sometimes they will just need to put their heads together to do some critical thinking, or they may take top priority in sending messages to ask for help. In school, students will need to solve problems, some small and some big. Many times they will need to ask for help in solving the problem, just as astronauts will have to ask their mission controllers for help. In both space travel and school, giving up is not an option.

Throughout the Mission, students should work to improve at these skills and the efficiency of their work should increase. At the beginning, students will not know much more than the basics- read your instructions and listen carefully. During the Mission, students will be learning how to do their work and will show that they can work smarter and more efficiently as they progress.

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Careers

The Expedition Center Program promotes science, technology, engineering and math careers that are attainable by anyone who sets their mind to it. The teams in the Expedition Center all match careers that will be in high demand in the future. (Note: An astronaut's job is so specialized and so unique that we don't promote it as a career).

People will never pursue a career that they have never experienced – someone will not become a chemist that has never been shown what chemistry is, and no one grows up to become an engineer without first learning what engineering is. The experience of an Expedition Mission is also a sample of the careers that match each team.

Engineering is the science of designing and building things. An engineer produced everything man-made, from cardboard boxes to rockets. The Probe Team models electrical engineering and the Isolation Team uses robotic engineering. Engineering can be paired with all sorts of other interests: someone who likes the outdoors could become an environmental engineer and someone who likes the city could be a civil engineer. The United States is not producing enough engineers to meet future demand; therefore, the job outlook of those going into the engineering fields is excellent.

Many teams emulate fields of research science. Life Support demonstrates environmental science. The astronauts are testing the air and water quality on board the ship. Back on Earth scientist must track our air and water pollution, especially in a large city like Houston. The Biology Team studies the living animals and plants on the ship. Healthy ecosystems are important to the health of the human population on Earth. Because of the energy industry, geology is one of the most important sciences for the city of Houston. Geologists that locate fossil fuels have a good job outlook with the energy companies. The Isolation Team must conduct laboratory experiments under strict sterile conditions with great safety precautions. Many fields of science from cancer research to studying moon rocks use these same techniques.

In the entire space mission scenario, the Navigation Team is the only one using astronomy. Houston is Space City, USA. There are many programs within NASA that look at space from Earth, or Earth from space. Whether it's sending a probe through the solar system or planning a future Moon colony, we will need to know where we're going.

The Medical Team is also part of the heart of Houston. Our Medical Center is home to some of the best hospitals in the world, and because of the aging US population the medical field will be expanding in the future.

In the Expedition Mission, there are two teams that handle information: Communications and Data. The Communications Team does all the talking and handles information being spread to other people, just like a Public Relations department. The Data Team is the Information Technology department of the Mission. The Data Team must keep information flowing smoothly, just like an IT department that keeps email systems and data transfer running.

Teachers are encouraged to describe the career models in the Expedition Mission to their students. It may just be the spark needed to help a student find a rewarding and valuable career.

This certifies that

has successfully

LANDED ON MARS
ABOARD THE SS LEGACY



HMNS
Expedition Center
Program

Teacher signature

Date

This certifies that

has successfully completed

MOON LANDING
ON BOARD THE SS LEGACY



HMNS
Expedition Center
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Teacher's signature

Date

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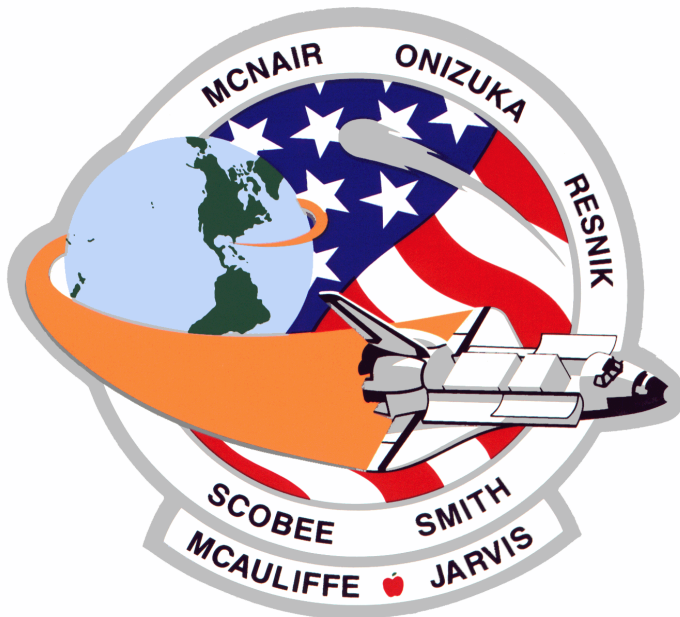


CREW PATCH

Your students can design a crew patch for their mission. Bring one patch to the Expedition Center. It will be added to our Crew Patch Database, and displayed in the Briefing Room.

Patch Specifications:

- Patch should be on 8 ½" x 11" paper.
- Design should include the name of the school and the year.
- Designs should be colorful and represent the school or the class.
- One patch per Mission. Students can design the patch together, or students can each design a patch then the group votes for one to represent them.



51-L Mission Patch

This patch symbolizes the mission to fly, to explore, to teach. The shuttle, being launched from the United States of America, encircles the planet to signify its U.S. presence in space to explore new frontiers. The shuttle in flight with open cargo doors represents the 51-L mission to launch a communications satellite to collect data from Comet Halley and to conduct scientific experiments. The apple next to the teacher's name signifies the educational mission of the crew to touch the future through the lessons taught in space. The scene is encircled by the surnames of the crew members. They were astronauts Francis R. (Dick) Scobee,

Commander; Michael J. Smith, pilot; Ron McNair, Ellison Onizuka and Judy Resnik, all mission specialists; Greg Jarvis, payload specialist; and Christa McAuliffe, teacher.