

Name: _____

Mission to Mars



Log Book



NORTH DAKOTA SPACE GRANT

Space Camp, 2016

Launch Windows

The launch window, or the only time when you can leave Earth to go to Mars (or Mars to Earth), occurs once every **two years**. Once your teams' analyses and science experiments are complete and you're ready to leave, you'll need to prepare your launch vehicle for departure.

The angle at which you need to arrive back to Earth is very specific. If the reentry angle is too steep, you'll burn up in Earth's atmosphere. If the reentry angle is too shallow, you'll skip out of the air, back into outer space – just like a rock skipping on water.

Your cargo is very precious – six human lives (raspberries) are onboard your spacecraft. Be very careful to protect your payload and get them all home safely!

What was your design?

Did it work? Explain: _____

If you did this again, what would you change, if anything?

Mission Log: _____

Team Name

What to Include?

Hi space explorers! In this journal, you will send your procedures, reports, and other messages back to **Mission Control**. Are you keeping your fellow astronauts safe? Is your crew working together? What steps would you change for future Mars Mission? Future generations will read your journal – probably in museums!

*“Mars is there, waiting to be reached.” —
Buzz Aldrin*

Your trip to Mars

Congratulations! After months of training, you are ready to go to Mars! The 7-month-long journey will be arduous, tiring, yet so rewarding!

You'll need to stay entertained for 7 months nonstop! What music will you bring with you?

What movies will you bring with you?

Choosing Your Crew

You are very brave to embark on a trip to the Red Planet. One of the most difficult things about any journey is selecting the appropriate **personality types** of your companions.

Your craft can only hold **6 crew members**. Before you depart from Earth, your team must select the **most valuable occupations**.

Your teams' decisions will determine whether all of your astronauts

survive the trip. Think about the jobs you'll need to perform on the entire mission, including working on the surface.

Refer to your "Crew Selection" Handout.

What are your teams' final six occupations?

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____
- 6) _____

Did your team agree? Did your team argue at all? Why?

Preparing for Landing

Before you get ready to land on Earth in your reentry vehicle, you have to jettison, or get rid of, your trustworthy command and service module. Make sure all of your astronauts are on board before you let go of it!

In order to turn on the computer in the reentry vehicle, you have to turn on the new circuits that control the mainframe computer.

It is up to you to your Mission Control team to relay the appropriate steps to your astronauts!

Your role: _____

What does your circuit board look like? Sketch below.

Were your astronauts able to successfully replicate your

design? _____

What was difficult about this mission? _____

What advice would you give future astronauts about this

challenge? _____

Sample Return EVA

As you enter a crater, you notice samples that are buried in clay. Because clay is a signature clue to water, you want to retrieve as many samples as possible. The only way to quickly gather all of the samples is by using a robotic arm!

Refer to the Robotic Arm Worksheet

In our scenario, the rocks are represented by pieces of candy.

How many pieces were you able to retrieve?

Would you make any changes to your design in the future?
Explain.

What did the winning team's design look like?

Choosing Your Materials

Once you leave Earth, you only have the materials that you already have with you. You have to plan ahead and bring all the supplies you need to keep the entire crew alive in space for years at a time. What supplies do you feel are necessary to have on board your space ship in order to survive your mission? List 10 of your teams' most important supplies. *Rank the supplies by the most important (#1) to the least important (#10)*

Refer to your "Materials Selection" Handout.

What are your teams' final ten materials?

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

7) _____

8) _____

9) _____

10) _____

Did you all agree? Did your team disagree? Why?

Space Craft Emergency

As seen in real life (Apollo 13), real emergencies occur in outer space! It's difficult to get assistance from Earth when astronauts are millions of miles away, but through teamwork, hard work, and dedication, help can still be provided through the radios. After watching the Apollo 13 clip, see how successful your team performs in an "emergency situation"!

"Failure is not an option." —Apollo 13 film, 1995

Teamwork is everything!

Was your team able to save your astronauts? How difficult was this task?

What was the most difficult part of the situation? Why do you think that is?

What would you do differently if this happened again?

Meteorites!

Take a look at your team's meteorite and draw a sketch below:

Write down some of its features so NASA's mission control can analyze it remotely. (Describe the size, color, texture, shape, etc.)

Where do you think it came from?

How is it different than a rock on Earth?

Clean the Solar Panels

You team must create devices (individually) that will clean the solar panels that power your habitat. Without the electricity that the panels produce, the air, power, and other life support systems will stop working!

Create a **bristle bot** that will brush off the regolith, or Martian topsoil, that has blown in by the wind and covered the panels' surfaces.

Draw a sketch of your robot here:

Did it work? Explain:

What would you have done differently if you could restart this activity?

You're on your way!

Mars Bound!

Whew! Good thing that emergency is over! Take a look out that window!



Teamwork is everything!

What are your first thoughts when you see the Red Planet?

Did you bring a geologist? What other subjects should you study?

Landing on Mars

How do you decelerate after traveling millions of miles through space? After watching the NASA videos, design a device that will soften the impact upon landing. Your egg must survive the fall – or else your astronauts will not survive the landing. Outcomes will be based on three things:

- 1) Is your eggshell (or capsule) intact?
- 2) Did the yoke (or astronauts) survive?
- 3) How high did you egg fall from?

Eggs that survive with more difficulty will earn more points.

Sketch your design below:

What materials did you use for your landing gear? _____

What happened to your egg? _____

What would you have done differently if you replicated this _____

mission? _____

Selecting a Site

Have your team analyze the **satellite imagery cards** to find a prospective landing site. Where are you going to set up your base? What are the features that make it seem safer than the rest? Are there resources there that you can use?

Final destination: _____ #

Did any other crew select your spot? _____

Why did you chose your spot? _____

Mars in a Minute: Landing on Mars

White Boards: How dense is Mars' atmosphere compared to Earth?

Seven Minutes of Terror: The Challenges of Getting to Mars

White Boards: How long does it take for a signal sent from Mars take to reach Earth?