

# EDUCATOR *GUIDE* | Activity 4

## Mitigate Hazards for your Mission (55 min)

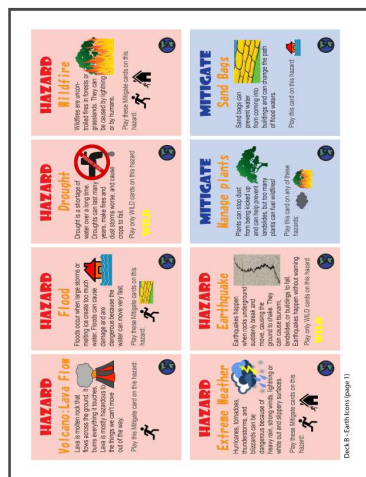
### Overview

Youth choose one of 4 proposed NASA missions and present what hazards, mitigation strategies, and other factors NASA needs to consider and employ. The missions youth are considering are both human and robotic. They launch on Earth, and visit the Moon, Mars, or asteroids.

Youth will learn:

- » Some hazards are different between the Earth, Moon, Mars, and asteroids and some are the same.
- » Human versus robotic missions must mitigate different hazards.
- » Different types of missions have different hazards.

### In this activity



Hazards Cards  
(Decks B, C, & D)



Science Notebook

# EDUCATOR *GUIDE* | Activity 4

## Educator Preparation (10 min)

1. Have access to the educator background guide ready if youth inquire as directed in the science notebook.
2. For each group of 3 or 4 youth: Combine card decks B, C, & D (all icon combinations) into full decks for each group.

## Introduction (5 min)

- » Explain to youth that NASA needs Health and Safety Officers for their upcoming missions. A Health and Safety Officer identifies and comes up with a plan to mitigate hazards. Let youth know that today they will use what they have learned so far about hazards and survival on Earth and space to prepare a presentation for NASA as Health and Safety Officers.
- » Pass out card decks B, C, & D to each group.

## Assign Mission (5 min)

Explain Assign each group one NASA mission (described below and in Student Notebook) according to group dynamics. They are listed in increasing order of complexity.

1. We're launching a rocket! What Earth hazards might be present on the launch day at Kennedy Space Center in Florida, and how can we mitigate them? What other chance factors might impact the launch?
2. We're going back to the Moon! Technology has improved a lot since the Apollo missions of the 1960's and 1970's, and once we get there, we need to identify and mitigate hazards with a fresh new take.
3. We are sending a person to Mars for the first time ever! What hazards and chance factors should the Mars team plan for and how should they mitigate them?



# EDUCATOR *GUIDE* | Activity 4

4. We want to land an unoccupied spacecraft on an asteroid, get samples, and bring them back to Earth. What should we know that will keep the spacecraft and robots safe from damage?

## Identify Hazards and Mitigations for Your Mission (10 min)

» Explain the process. Let youth know that as they review their cards, they should keep in mind that they will need to share their results with the whole group.

1. We're launching a rocket! What Earth hazards might be present on the launch day at Kennedy Space Center in Florida, and how can we mitigate them? What other chance factors might impact the launch?

2. Sort through all the Mitigate cards by icon to identify which apply to your hazards.

3. Sort through all the Chance cards by icon to identify what other factors might either help or hurt your efforts to mitigate the hazards.

4. **Optional:** Based on available technology, consider having youth do additional online research about their mission in addition to the cards.

**Tip:** It's important to highlight that there might be hazards on other planets we don't know about yet since we have never been there. We also may not know if mitigation strategies we use in other places will work on every planet.

## Prepare for the Presentation (15 min)

1. Ask groups to make a list of hazards, mitigations, and chance factors using the table in their Science Notebooks. They may use this list, brainstorm new ideas, and take notes to use for their presentation. Alternatively, youth can arrange or display their cards in a way that they can follow for the presentation.

2. As groups are working, help guide their thinking by asking:

a. Which hazards do you think are the most likely? Which do you think are the least likely?

# EDUCATOR *GUIDE* | Activity 4

**Tip:** The presentation is a chance for youth to explain their thinking and reflect on what they learned about space hazards throughout the unit. Youth can present and share in a variety of ways, including:

- » Invite youth to rank the hazards by most likely to least likely and mitigate cards by easiest to hardest on a poster board.
- » Ask youth to write a compelling argument to NASA about what to consider and read it aloud.
- » Invite youth to organize a play that acts out the top three hazards and mitigations. A group of 4 could have one role for the Hazard, 2 for Mitigate, and one for Chance. Repeat for the next 2 sets.
- » Youth could also write and act out a play or draw a comic that has astronauts and mission control mitigating hazards.

c. Which mitigations do you think are the easiest, cheapest, or apply to the most hazards?

## Share Out and Discussion (25 min)

Explain to youth that each group will present to NASA as Health and Safety Officers for their mission.

Ask groups to share which mission they were assigned and what hazards, mitigations, and other chance factors they identified.

Try pulling in outsiders as an authentic audience and having groups address the crowd as NASA mission control or astronauts.

## Reflect (5 min)

Lead a discussion about the different hazards and strategies presented between the groups



# EDUCATOR *GUIDE* | *Activity 4*

using 2 or 3 of the following questions:

- » What hazards did the human missions (Earth launch, Moon, and Mars) often have to mitigate?
- » Did anyone use robotics to mitigate a hazard during a human mission?
- » If you had a robotic mission, what were the hazards you identified and how did you mitigate them?
- » What place would you most like to visit in the solar system and why? Have youth share a few examples.
- » Do you think we should send people or robots to those places? Why?

Congratulate youth on their excellent scientific work. Let them know that identifying hazards and mitigations in advance is important so that no one gets hurt and the mission can succeed.