

Science Adventure 4: Dangerous Planet: Earth Hazards

Educator Preview

Adventure Snapshot

Learners play a card game to learn about hazards on Earth and how people mitigate some of them.



Timing | 60 minutes

Get Ready & Team Up 5 min.
 Hazards on Earth 50 min.
 Reflect & Wrap Up 5 min.
Total 60 min.
Level Up Activities 5–45 min. each



Prep Snapshot*

Prep Time 55 min.
 Print, cut, and assemble Card Decks C and D for each small group.
**See Materials & Preparation for full info.*



21st Century Skills

- Connection**
- Critical Thinking
- Science Practices**
- Analyzing and Interpreting Data



Guiding Question

What natural hazards do people on Earth face and how do they mitigate them?

Learners Will Do

Match mitigation strategies with hazards in a card game.

Learners Will Know

Scientists learn about natural hazards to think about ways to mitigate them.



Connecting Across Adventures

Adventure 3: Hazards Where We Live	Adventure 4: Earth Hazards	Adventure 5: Hazards in Space
Last time , learners explored hazards near their community and considered how people mitigate those hazards.	Today , learners learn about hazards on Earth and explore ways to mitigate them.	Next time , learners will learn that hazards also exist in space, some are the same as on Earth, and some are different.

Adventure Resources

Access videos and digital resources using the link or QR code below. More information for teaching this curriculum is available in the [Educator Guide Introduction, pgs. iii-xxv](#). Access more PLANETS units, research, and pathways at <https://planets-stem.org/>.



weblink: <https://hov.to/32d85156>

Materials and Preparation

Materials

For the educator

- Scissors or paper cutter to prepare cards
- Small bags to contain each deck of cards
- [Science Adventure 4 Hazards Card Game Rules Handout, pgs. 44-45](#)
- [Playmat \(PDF\)](#) from Adventure 2 to show for game configuration (optional)

For each group of 3 or 4 learners

- *Hazards Cards* [Deck C \(PDF\)](#) and [Deck D \(PDF\)](#)
- [Science Adventure 4 Hazards Card Game Rules Handout, pgs. 44-45](#)
- [Playmat \(PDF\)](#) (optional)

For the whole group

- *Our Ideas* poster (on paper or a shared digital document) [Examples](#) | [Templates](#)
- [Science Adventure 4 Hazards Card Game Rules Handout, pgs. 44-45](#)

For each learner

- [Science Notebook \(PDF\)](#)

Adventure 4 Materials Preparation (55 min.)

Ahead of Time

1. Review the “In-Use Example” in the [Prep & Setup Guide \(PDF\)](#) to help you think about what to add to the *Our Ideas* poster during the discussions in this adventure.
2. For each group of 3 or 4 learners:
 - a. Optional: Print one copy of the *Playmat* and tape it together. See diagram below (*Gameplay Orientation*).
 - b. Set out *Hazards Cards* Deck B–Blank Cards, learners’ written or drawn cards from Adventure 3 (3 cards per learner or pair).
 - c. Print *Hazards Cards* Deck C–Earth Icons (in color if possible) (11 cards).
 - d. Print *Hazards Cards* Deck D–Earth and Space Icons (in color if possible) (16 cards).
 - e. Cut Decks C and D out by hand or with a paper cutter.
 - f. Combine Decks C and D to make stacks of 27 cards each. Keep Deck B separate.
 - g. Print the *Science Adventure 4 Hazards Card Game Rules Handout*, pgs. 44-45.

In Your Space

3. Place the *Our Ideas* poster in a visible place in your learning setting or prepare to share it digitally.
4. Set up to display and share the [video How to Play the Space Hazards Card Game](#).



Teaching Tips

- ✦ For Adventure 2, you prepared one deck of *Hazards Cards* (Deck A). For Adventure 3, you prepared blank cards (Deck B) for each learner or pair of learners. For Adventure 4, you’ll prepare two decks of cards (Deck C and Deck D) and one set of rules for each small group. (If you used the *Playmat* in Adventure 2, you can re-use it as a whole-group display for how the game is set up.)

For ease of sorting, note that deck labels align with the planet icons on the cards. Deck C has only Earth, Deck D has Earth and other planets, and Deck E (used later) has only other planets. Learn more about the cards and game play in the video [How to Play the Space Hazards Card Game \(2:51\)](#).

- ✦ If learners will understand what to do, they can play without a *Playmat*.
- ✦ Print [Hazards Cards Deck E–Space Icons \(PDF\)](#) (20 cards) to save time in Adventure 5.
- ✦ If learners like to move quickly, you can combine Adventures 4 and 5 into a single session.



Support Learner Differences



For blind/low-vision and multilingual learners, choose the BLV Deck version of the cards to provide QR codes on the backside of each card. Each QR code is linked to a [unique webpage](#) designed to be easy to use with text-to-speech and translation technology.

- [Accessible Version of Deck C \(PDF\)](#)
- [Accessible Version of Deck D \(PDF\)](#)
- [Accessible Version of Deck E \(PDF\)](#)

To help orient blind/low-vision learners, place a thick sticker on the back of each card, centered along the top so that it's easy to tactically orient the cards right-side up and front-facing. This may take five additional minutes per deck.

Add Wikki Stix or other raised lines to the playmat to help blind/low-vision learners orient to the mat. Remember to allow room between tables for all mobility equipment when setting up, and to consider the arm reach and leg space needs of wheelchair users when setting up the *Playmat*.

A [limited tactile version of the card decks \(weblink\)](#) and [playmat \(weblink\)](#) also available. An estimated 5–10 minutes is required to punch holes in all the required areas per deck with a one-hole punch. In this deck, learners can match cards by site and by aligning tactile holes. Note that not all cards are included in these decks.

Adventure Guide

Get Ready & Team Up (5 min.)

1. Invite learners who did Adventure 3, Hazards Where We Live, to share what they did in small groups. *(They made cards showing hazards where they live and mitigations that protect people from those hazards.)* Offer learners the *Our Ideas* poster to help them explain the activities to any peers who missed the prior adventure. Encourage learners to share in their preferred languages.
2. Say: **Today you will play another card game to explore natural hazards on Earth.** Share the Guiding Question with learners aloud and write it on the *Our Ideas* poster (using multiple languages as needed): **What natural hazards do people on Earth face and how do they mitigate them?** Say: **The new cards show hazards from nature in many different places and how people deal with them.**
3. Organize learners into groups of 3 or 4 and distribute Science Notebooks.

Hazards on Earth (50 min.)

4. Say: **You will play a card game about mitigating natural hazards on Earth.** If necessary, review their definitions of *hazard* and *mitigate* on the *Our Ideas* poster. Give each group *Hazards Cards* Deck B (the drawn or written cards created in Adventure 3), Decks C+D combined (Only Earth Icons and Earth+Space Icons), and the *Science Adventure 4 Hazards Card Game Rules Handout*, pgs. 44-45. Show the video [How to Play the Space Hazards Card Game](#), which explains the rules of the game. Review the rules with learners and demonstrate as you do so.
5. For learners who were present last time, have each group replace at least one Hazard card from the combined Deck C+D with a Hazard card from their own cards (Deck B). Have them replace at least one matching Mitigation card from the combined Deck C+D with two Mitigation cards from their own cards (from Deck B). Use this replacement to increase relevance. For example, if there aren't volcanoes where you live, this card can be replaced.



Support Learner Differences

If new learners are joining you, lead an [inclusion activity](#) (pgs. xx-xxii) and use other [engagement strategies as necessary](#) (pgs. viii-xviii).



Support Learner Differences

Group learners in a way that lets each learner use their self-identified strengths. If you have learners who speak multiple languages, consider grouping learners with the same preferred language so they can share with each other in that language.



Teaching Tip

The *Hazards Cards Explanation* on pg. 46 explains how to interpret the cards.



Level Up!

- ★ Have learners brainstorm natural hazards they have witnessed or heard about. (5 min.)
- ★ If you want the game to last longer, you can simply add the Deck B cards without removing any Deck C+D cards.

6. For new learners, ask them to view the created cards (Deck B) and think of their own hazard and mitigation examples. They can use them to replace cards in the deck. Add any new key vocabulary on the *Our Ideas* poster under the Earth icon in the “Natural Hazards on Earth” category.
7. Have each group talk about the roles they like to play during group work. Have learners select roles (or assign them yourself).
8. Start gameplay. Check that each group understands rules.
9. As learners play, revisit the Guiding Question: **What natural hazards do people on Earth face and how do they mitigate them?** Have learners record the Hazards they face and Mitigations they play on *Earth Hazards*, pg. 15 in their Science Notebooks.
10. Ask learners to think in pairs about which of these hazards are easier or harder to mitigate in real life. Have them arrange the cards in a spectrum, with those that are easy to mitigate in real life on one end and those that are hard to mitigate in real life on the other. Then you can have them share with the whole group. As they share, capture the descriptive vocabulary that they use, such as *easier* or *harder*, on the *Our Ideas* poster.



Support Learner Differences



Suggested group roles are listed on the *Science Adventure 4 Hazards Card Game Rules Handout*, pgs. 44-45. Change the role names and responsibilities to work for your group, and swap roles for each adventure. Check out the [Intentional Grouping Strategies](#), pg. xxii.



If you have learners who speak multiple languages, have them share words for any new hazard and mitigation strategies in their preferred languages. You can prompt them by sharing words you know.



Acknowledge the importance of consensus in decision-making with Indigenous learners. Tell them they will have a chance to practice this skill in the game because they must work together to win.



As necessary, pair learners so they can support each other in completing the *Earth Hazards* game.



Support Thinking

If learners want more background on particular hazards, you can show the [Educator Science Background \(weblink\)](#) and or the videos [Earth Hazards and Climate Change \(1:19\)](#) and [Volcanic Hazards \(until 0:32\)](#).



Level Up!



You can make the game even harder by discarding the Hazard cards you mitigated into the discard pile and reshuffling them into the draw pile along with the other cards.



If learners will benefit from more movement, play a version of the game in which some learners play the role of hazards and others play the role of mitigations, and all learners move around making corresponding hazard-mitigation pairs. Be mindful of learners' mobility, as described in the video about [supporting learners with diverse physical abilities](#).

Reflect & Wrap Up (5 min.)

11. Gather learners and ask: **What do hazards on Earth and in space have in common? Which mitigations might work in both places?**
12. Say: **Next time, you will learn about space hazard mitigation.**

After the Adventure

1. Clean up:
 - Keep the *Our Ideas* poster for use in Adventure 5.
 - Keep the *Hazards Cards* and *Playmats* for use in future Adventures.
2. Plan for Science Adventure 5. See [Science Adventure 5 Preparation on pgs. 48–49](#).
3. Take time to reflect on the following educator prompts:
How did you connect the topics in this adventure, such as weather, climate, and geography, to learners' prior knowledge and experiences? What strategies can you use again in the future?

Space Hazards Additional Resources

Resources include All Downloads, All Videos, Family Connections, and more.



weblink: <https://hov.to/940428f7>




Level Up!

- ✦ Have learners think about how different Earth hazards might be affected by climate change, then show the video [Earth Hazards and Climate Change](#) to help them learn more. (5 min.)
- ✦ NASA spacecraft don't deal with hazards only in space: they have to escape hazards on Earth first! The first Artemis mission was set to launch on November 12, 2022, but Hurricane Nicole had other plans. Launching during a hurricane would have been too dangerous for the Orion capsule and fuel tanks, so NASA mitigated this hazard by delaying the launch to November 16, 2022. *Artemis I* successfully launched and completed its mission of orbiting the Moon. Learn more about *Artemis I* here: ["NASA Prepares Rocket, Spacecraft Ahead of Tropical Storm Nicole, Re-targets Launch – Artemis"](#) (5 min.)
- ✦ Invite a family or community member to come in as a special guest and share their knowledge about hazard-related topics. (45 min.)
- ✦ Ask this story prompt: **Can you tell me a story about a time when you mitigated a natural hazard in your neighborhood?** (Possible responses include shoveling walkways after a blizzard, keeping storm drains clear to avoid flooding during rainstorms, and preparing for hurricanes and typhoons.) Have learners share with a partner. Tell learners, if anyone asks them what they did today, they can tell them "We played a card game to learn about hazards and how to mitigate them, or make them less bad" and ask them the above story prompt. Consider returning to learners' ideas at the start of the next adventure. (5 min.)

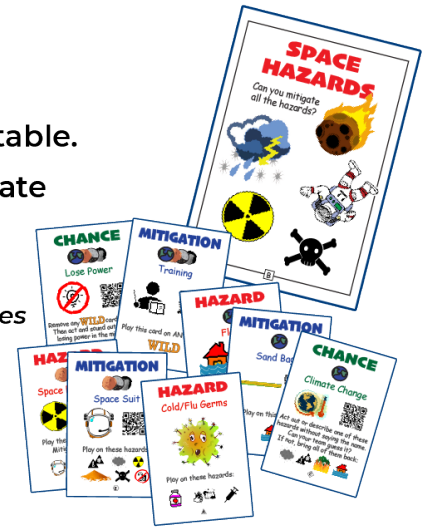
Hazards Card Game Rules

1

Setup

1. Deal 6 Hazard cards face up in the middle of the table.
 2. Shuffle all remaining Hazard cards with the Mitigate and Chance cards to make a draw pile.
 3. Deal 2 cards face up to each player.
 4. Choose a player to go first.
- card examples*
- 

card
examples



2

PHASE 1: PLAY A CARD

1. If you have any Chance cards, play 1 and do what it says.
2. If you don't have any Chance cards, play 1 Mitigation card on a matching Hazard.
3. If you can't play a card, discard your hand and draw 2 cards.

PHASE 2: DRAW CARDS

1. All players draw cards until they have 2 cards in their hands.
2. If a player draws a Hazard card, they play it and draw again.
3. If the draw pile runs out, shuffle the discard pile to make a new draw pile.



Group Roles

You can choose a role for each player.

MISSION DIRECTOR

The Mission Director makes sure everyone's ideas are heard and keeps the team focused on goals.



REFEREE

The Referee deals cards and makes sure everyone takes turns.



RULES EXPERT

The Rules Expert answers questions about game rules. They also record the team's ideas.



COMMUNICATIONS OFFICER

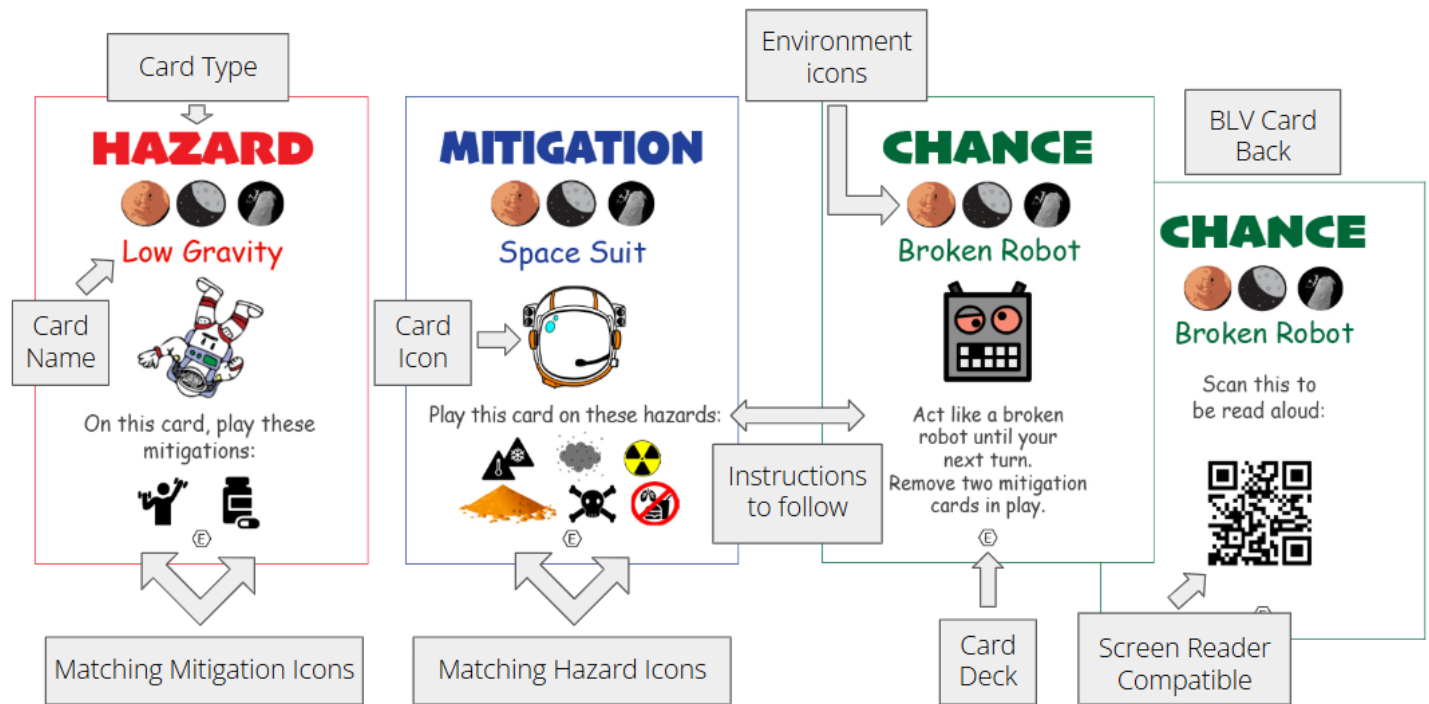
The Communications Officer lets the educator know if there is a word the group needs help understanding. They also keep track of choices in the game and share ideas with the larger group.



How to Win

1. When a Hazard card has 2 Mitigation cards on it, flip it face down. Discard the Mitigation cards.
2. When there are no face-up Hazard cards, you win!

Hazards Cards Explanation



Icons

Each card has its own large icon. Mitigation cards and some Chance cards have small icons along the bottom that indicate their matches for hazards. The top row indicates what environments the card applies to. For example, some cards have only an Earth icon, meaning they are applicable only on Earth, but others have an icon for the Moon, Mars, or an asteroid. Letters at the bottom of the cards allow them to be sorted into Decks C (Earth icons only), D (Earth+Space icons), and E (Space icons only).