

Getting to Know the PLANETS Educator Guide: Core Features and Teaching Supports

This infographic provides a visual tour of the PLANETS Educator Guides.

Educator Guide: Front Matter

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Example of the Table of Contents from the Space Hazards Unit



Welcome to [the unit]!

Introduction to unit objectives and PLANETS program overview.



Unit Overview

Comprehensive overview of the unit's Engineering and Science pathways.



Connecting Across Science and Engineering

An overview of the connections between the work of scientists and engineers that learners will see as they engage in the PLANETS curriculum.



Educator Resources for Supporting Learning

Several key resources to support inclusive teaching and learning. These include:

- Explicit strategies for inclusive and equitable STEM learning, especially for:
 - Indigenous learners
 - Multilingual learners
 - Learners experiencing differing physical and/or sensory abilities
- Instructional Tips for Learning
- Ideas for Inclusion Activities
- Inclusive Grouping Strategies
- Ideas for Building Family & Community Connections



Materials List

A detailed list of all required materials for each pathway to plan ahead and ensure all necessary items are available.



Advance Preparation

Step-by-step instructions for setting up activities and experiments to streamline the preparation process.

Embedded Accessibility Features

Screen Reader Compatibility

Youth-facing materials are designed to be fully compatible with screen readers, supporting blind and low vision learners.

Translation-Enabled Content

Content can be translated into multiple languages, supporting emergent multilingual learners.

QR Code Access

QR codes provide quick access to additional resources and youth-facing materials.

Additional Supports in PLANETS Lessons

- PLANETS lessons in the Space Hazards unit are called adventures.
- PLANETS lessons in the Remote Sensing and Water in Extreme Environments units are called activities.
- Snapshots from all units are used to illustrate the supports available below.

Snapshots from the Water in Extreme Environments Unit

Educator Guide

Ready, S.E.T. (Science, Engineering, Technology), Go!

Science

Engineering

Technology

Educator Preview

Activity Snapshot
Learners investigate water. As scientists, they figure out where water is located. As engineers, they design a technology to get the water.

Timing | 45 minutes

Prep Snapshot*

21st Century Skills

Get Ready & Team Up 10 min.

Plan & Create (S.E.T.) 25 min.

Reflect (Go!) 10 min.

Total 45 min.

Level Up Activities 5–30 min. each

Prep Time 90 min.

- Space Need: Sink
- Read unit.
- Print Notebooks.
- Prepare containers.
- Make *Our Ideas* poster.

*See Materials & Preparation for full info.

Connection

- Critical Thinking

Habits of Mind

- Use a structured problem-solving process.

Science Practices

- Planning and Conducting Investigations

Guiding Question

How can we identify where there is water? How can we get it?

Educator Preview

Each Adventure Snapshot breaks down the learning experience for you. You'll find:

- A quick look at what learners will do during their adventure
- The step-by-step flow and timing of activities
- A list of everything you need to gather and prepare
- The key skills learners will focus on throughout
- The guiding question that shapes each adventure

EDUCATOR GUIDE

Learners Will Do
As scientists, identify which containers hold water. As engineers, design a way to get the water out.

Learners Will Know
Water is a limited natural resource, but scientists can figure out where water is, and work with engineers to get it and use it.

Connecting Across Activities

Ready, S.E.T., Go!	Activity 1: Sharing Experiences
Today , learners start exploring water. As scientists, they figure out where water is located. As engineers, they design a technology to get the water.	Next time , learners will share experiences with and stories about water.

Framing the Learning

Each adventure opens with three key sections:

- **Learners Will Do:** All the hands-on activities and experiences they'll dive into
- **Learners Will Know:** The essential concepts they'll master along the way
- **Connecting Across Adventures:** How this learning builds on what came before and sets up what's ahead

Materials and Preparation

Materials

For the educator

- *Our Ideas* poster (on paper or a shared digital document)
- [Examples & Templates](#)
- index cards
- markers
- scissors
- tape

For each learner

- [Science Notebook \(PDF\)](#)
- safety gloves and goggles (optional)

For the whole group

- 1 cup sand
- 1 permanent marker
- 6 to-go coffee cups (or other opaque containers) with lids
- 21 felt dots (or other raised adhesive objects for labeling containers, optional)
- soda water (or water and non-medicated seltzer tablets)
- vinegar
- water
- additional substance such as water ice, dirt, or rocks
- Disinfecting wipes (to clean lids)

For each group of 4

- 1 cup, clear plastic
- 1 square foot of aluminum foil
- 1 square foot of plastic wrap
- 1 to-go coffee cup (or other opaque container) with lid
- 5 cotton balls
- 5 craft sticks
- 5 feet of string
- 5 index cards
- 5 paper clips
- 5 straws



Teaching Tip

If you think learners will benefit from having more space in the Notebook, print one-sided or add sheets of blank paper as you make the Notebooks.

Ready, S.E.T., Go! Materials Preparation (90 min.)

Ahead of Time

1. Read through the PLANETS Science Pathway [Educator Guide Introduction](#), pgs. iii-xxv, to learn more about the science content in this unit.



Teaching Tip

This activity is the same in both the Science and Engineering Pathways. If your learners have already done this activity in one pathway, you do not need to repeat it.
This activity can stand alone as a brief single-session program.

Materials and Preparation

The Materials and Preparation section sets you up for success with:

- A clear list of everything you'll need to gather
- Materials organized by activity type:
 - Whole group supplies
 - Small group materials (for groups of 4)
 - Individual student materials
- Step-by-step instructions for preparing both printed resources and hands-on materials

Adventure Guide

Get Ready & Team Up (5 min.)

1. Give each learner an Engineering Notebook. Say: **This Notebook is a place to record your observations and ideas.**
2. Have learners read the *Ready, S.E.T., Go! Comic*, pgs. 2-6 in their Notebooks, to set the context for the adventure. Say: **Today you are going to investigate and solve the problem of space trash.** Share the Guiding Question with learners aloud and in writing (using multiple languages as needed): **How does space trash damage spacecraft and can we design ways to protect against it?**

Plan & Create (S.E.T.) (50 min.)

3. Ask: **What kinds of trash might be in space?** (*Pieces of old rockets and satellites.*) **Why could space trash be a problem for people?** (*Space trash can hit astronauts and hurt them.*)



Support Learner Differences

- ★ If learners are new to you or each other, have them share their names, name pronunciations, and other important parts of their identities. These introductions are important for all learners and can be especially relevant for Indigenous learners, multilingual learners, and learners with different physical abilities. You can also distribute index cards and have learners write anything they want you to know but do not want to share with the whole group, such as resources that will help them learn. If everyone knows each other's names, ask if anyone has a middle name or nickname you could learn to pronounce. Invite them to share about it.

For more strategies to engage learners, refer to [Designing Instruction to Reach Diverse Learners, pg. x](#).

- ★ You can project a [digital version of the comic](#) or share it so learners using text-to-speech technology can access the comics.

- iOS or macOS users should enable text-to-speech or voice-over.

- Windows users should use JAWS or NVDA at [NV Access](#).

Be sure to read carefully and leave a visual shortcut to exit the program, or have your learner restore settings when they are done.

- ★ Have learners talk about places in outer space they know about and if any of those places are important to them. (*Possible responses include planets, moons, comets, and the Sun. Learners may have seen particular objects with family or community members, or they may know stories about those objects.*) If you have learners who speak multiple languages, encourage them to share in their preferred languages.



Teaching Tip

Throughout this guide, information for you to say to students appears in **bold**. You can say the bold sentences exactly as they are written or paraphrase them.



Level Up!

Instead of using the premade *Engineering Design Process*, you can have learners make their own.

1. Give each group index cards, markers, and one set of cards cut from [Engineering Ready, S.E.T., Go! Phase Cards Handout, \(PDF\)](#). Explain that they should choose the phases they used to solve the trash problem. They can choose some or all of the phase cards, and they can write or draw their own cards (one phase per card). They should put the phases in the order they used them. (Note that the options shown on the phase cards are intentionally different from the phases of the *Engineering Design Process* (EDP) in the *Engineering Notebook*, to avoid implying that the EDP in the Notebook is the "correct" answer.)
2. When writing their own phases, learners may describe specific actions, such as "We folded the index cards." Through discussion, encourage learners to come up with terms to describe each phase of the process more generally, such as "We talked about it" and "We tested the materials." If learners speak multiple languages, encourage them to discuss in their preferred languages.
3. Give groups copies of the [Engineering Ready, S.E.T., Go! Engineering Design Process Example Handout, \(PDF\)](#) for inspiration.
4. Gather the group and compare processes. Organize all the cards in groups on a poster to create a whole-group engineering design process of between three and ten phases. (For example: ask, imagine, plan, create, test, improve.) Save this [Engineering Design Process poster \(PDF\)](#) for use in future adventures.
5. Say: **You have just designed a set of phases like the ones engineers use to solve problems: an engineering design process.** Ask: **How can you use your engineering design process to solve the problem of trash or litter here or in your neighborhood?** (*We can use our process to make tools for picking up the trash.*)

Note: If you've used this Level Up, skip step #23 that follows.

Step-by-Step Guidance

Each adventure guides you with a structured but adaptable approach:

- Clear, numbered steps walk you through leading each activity and discussion
- **Bold text** provides suggested words to use with your learners
- *Italic text* shows typical learner responses you might hear
- The scripting serves as a roadmap while leaving room for your own teaching style

Instructional Support Tips

Peppered throughout the Educator Guide are tip boxes that offer instructional advice to guide you through each adventure's key teaching moments.

Support Thinking tips provide language to build collaboration, social-emotional skills, and STEM identity as learners work together.

Teaching Tips help you manage materials, group learners effectively, and guide investigations smoothly.

Support Learner Differences tips ensure activities work for all learners, with specific supports for Indigenous learners, emergent multilingual learners, and learners with differing abilities.

Connecting Across Activities tips show how learning links across pathways and STEM disciplines.

Level Up tips help you adapt and extend activities beyond the base adventure.