Activity 5 Improve

Educator Preview

Overview

Youth *improve* their remote sensing devices and start to think about how they will *communicate* the data they collected to the scientists.

Note to Educator:

Designs are successful if youth are able to collect information from the Mystery Moon model landscapes. Groups can *improve* their designs by making them smaller and more compact or changing them to gather more detailed data. **Save each group's design, the Space Screens, and the Mystery Moon Sites for the Engineering Showcase.**

Activity Timing

Introduction:	5 min
Final Launch:	35 min
Presenting the Data:	15 min
Reflect:	5 min
	60 min

21st Century Skill Highlight

Critical Thinking
Creativity
Collaboration

Activity 5 Materials

For the whole group

- ☐ *Engineering Design Process* poster
- ☐ *Optical Filter Investigations* chart from Activity 3
- ☐ *Remote Sensing Definition* chart paper
- ☐ crayons and markers
- ☐ Mystery Moon Sites and Space Screens from Activity 4
- ☐ remaining materials from Activity 4
- ☐ 25 sheets of construction paper
- ☐ 25 sheets of copy paper
- ☐ 50 craft sticks
- ☐ 75 pipe cleaners
- ☐ optional: 4 blindfolds

For each group of 3

- ☐ remote sensing devices from Activity 4
- ☐ 1 pair of scissors
- ☐ 1 roll of masking tape
- ☐ 1 ruler

For each youth

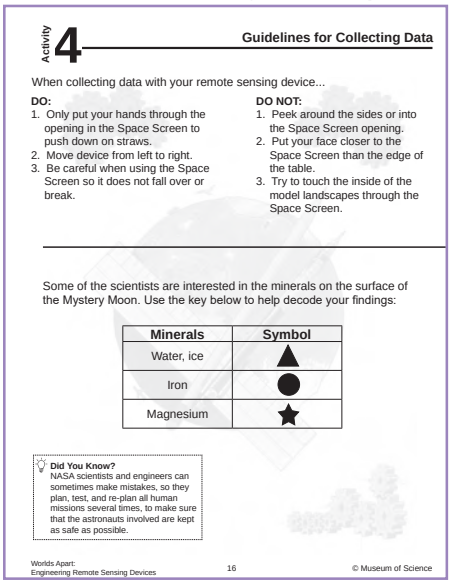
- ☐ Engineering Notebook

Activity 5 Materials Preparation (10 min)

1. Post the *Engineering Design Process* poster.
2. Post the *Remote Sensing Definition* chart paper and *Optical Filter Investigations* chart paper from previous activities.
3. Arrange the Space Screens according to *Space Screen Assembly*, p. 52 of this guide.
4. Create a Materials Table with the remaining materials from Activity 4.
5. Make copies of the *Engineering Showcase* invitation, p. 83 in this guide, for youth to distribute to their family and friends.

Notebook Pages for Activity 5

Guidelines for Collecting Remote Sensing Data, p. 16



Activity 4 — Guidelines for Collecting Data

When collecting data with your remote sensing device...

DO:
1. Only put your hands through the opening in the Space Screen to push down on straws.
2. Move device from left to right.
3. Be careful when using the Space Screen so it does not fall over or break.

DO NOT:
1. Peek around the sides or into the Space Screen opening.
2. Put your face closer to the Space Screen than the edge of the table.
3. Try to touch the inside of the model landscapes through the Space Screen.

Some of the scientists are interested in the minerals on the surface of the Mystery Moon. Use the key below to help decode your findings:

Minerals	Symbol
Water, ice	▲
Iron	●
Magnesium	★

Did You Know?
NASA scientists and engineers can sometimes make mistakes, so they plan, test, and re-plan all human missions several times, to make sure that the astronauts involved are kept as safe as possible.

Worlds Apart: Engineering Remote Sensing Devices 16 © Museum of Science

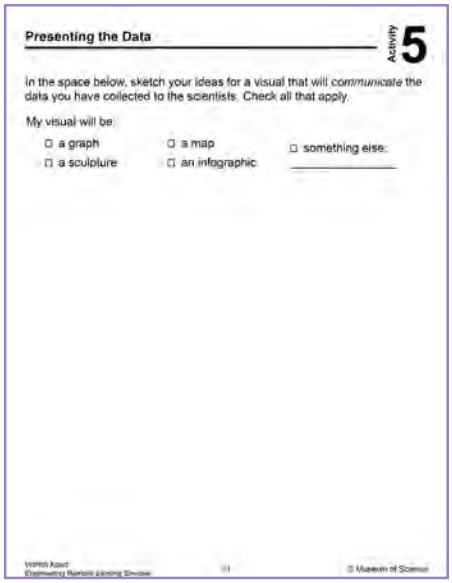
Data Collection: Improve, pp. 19–20

Data Collection: Improve — Activity 5

Use this page to record any data that you collect using your *improved* remote sensing device(s).

Site A

Presenting the Data, p. 21



Presenting the Data — Activity 5

In the space below, sketch your ideas for a visual that will *communicate* the data you have collected to the scientists. Check all that apply.

My visual will be:

☐ a graph ☐ a map ☐ something else: _____
☐ a sculpture ☐ an infographic

Youth will learn:

- The *improve* step allows engineers to reflect upon and alter their designs.

Introduction (5 min)

1. Congratulate youth on their engineering work so far.
2. Have groups volunteer to share their results, discuss problems, or give advice from the last activity. Ask:
   - **Which scientist did you choose to work with and were you able to collect the data they needed?**
   - **What about your design is working well?**
   - **What challenges did you encounter?**
3. Let youth know that today they will *improve* their remote sensing devices to make them even better. They will also start to think about how they will *communicate* the data to the scientists.
4. Remind youth that the *improve* step is an important part of the Engineering Design Process. Let groups know they should *plan* and *test* all the improvements they want to make today, before they share their final design with visitors in the next activity.

Improve (35 min)

1. Let groups know that room on a spacecraft is usually very limited, so one way to improve their remote sensing device is to make it as small and compact as possible.
2. Remind groups that they can refer back to *Remote Sensing Plan*, p. 15 in their Engineering Notebooks, and add notes as they *improve* their designs.
3. Allow groups to collect materials and begin working.
4. As groups are working, ask questions like:
   - **How are you *improving* your design?** *We made it fold up so it can be smaller, tried different straws to change the resolution, focused on one area to get more detailed information.*
   - **Are your improvements working out the way you thought they would?**
   - **What else can you do to *improve* your design?**
5. When groups are ready to launch, have them turn to *Guidelines for Collecting Data*, p. 16 in their Engineering Notebooks, and review the data collection guidelines.
6. Have groups *test* their improved remote sensing devices and

Tip

Have groups check the size of their remote sensing devices by placing them on a folded sheet of construction paper, similar to the way dimensions for carry-on baggage are checked at airports.

Tip

Let youth know that while engineers always strive to *improve* their work, space technologies are much harder to *improve* after they have been launched into space!

Tip

Allow groups to leave their remote sensing devices on their tables. They may realize that they need to collect more data as they make their visuals.

Tip

Data visualizations can take many forms. Encourage youth to be creative in how they display their data; they can use drawings, maps, graphs, or come up with a different way to summarize the data they collected.

record the data they collect about the Mystery Moon on *Data Collection*, pp. 19–20 in their Engineering Notebooks.

7. As groups are working, circulate among them and ask:
   - **What types of data are you collecting?**
   - **What did you learn about the Mystery Moon so far?**
8. Let groups that are still working know when there are 10 and 5 minutes remaining.

Presenting the Data (15 min)

1. Remind groups that the data they collected must be shared with the scientists. Ask:
   - **How do you think you can present your data so the scientists can get the information they need?**
2. Give groups a few minutes to think about how they will make a visual or other representation of the data they collected today. Encourage youth to record their ideas on *Presenting the Data*, p. 21 in their Engineering Notebooks.
3. Allow groups to collect materials and begin working.
4. As groups are working, ask questions like:
   - **What do you want your scientist to know about the Mystery Moon based on the data you collected?**
   - **How will you *communicate* the different types of data you collected?**
5. Let youth know when they have 5 minutes remaining.

Reflect (5 min)

1. Gather the whole group in front of the *Engineering Design Process* poster. Ask:
   - **Which steps of the Engineering Design Process did you use as you were engineering your remote sensing devices?** *We* planned *how we wanted to change our design, then we* created*,* tested *and* improved *them.*
2. Let youth know that in the next activity, they will prepare a presentation to share their designs and the data they collected with an audience. Ask:
   - **What steps of the Engineering Design Process do you think you will use to prepare a presentation?** Communicate.
3. Have groups label their remote sensing devices and visuals and store them in a safe location so they can use them at the Engineering Showcase.
4. At the end of the session, hand out a *Showcase Invitation*, p. 83 in this guide, for youth to share with family and friends.

You're Invited...

ENGINEERING SHOWCASE

WHERE:

WHEN:

WHAT:

Come support your local engineers as they share their remote sensing devices and the data they collected about a Mystery Moon!