

Engineering Activity 6: Engineering Showcase

Educator Preview

Activity Overview

Youth recommend a remote sensing device to be sent on a spacecraft.

Activity Timing		Prep Snapshot	21st Century Skills
Introduction	5 min	Prep Time 15 min	Connection
Showcase Preparation	20 min	Set up Space	<ul style="list-style-type: none"> • Collaboration • Communication
Engineering Showcase	30 min	Screens and	Habits of Mind
Landscape Reveal and Family Connections	10 min	Materials Table.	<ul style="list-style-type: none"> • See themselves as problem solvers. • Make evidence-based decisions.
Reflect	5 min	Invite community members.	
Total	70 min		

Guiding Question	Youth Will Do	Youth Will Know
How can we share information about our remote sensing device design with others?	<ul style="list-style-type: none"> • Discuss what they have learned with members of their community. 	<ul style="list-style-type: none"> • Communicating with others is an important part of an engineering design process. • As engineers, they have valuable knowledge to share about the problem they have solved.

Connecting Across Activities

In the previous Activity, youth improved their remote sensing devices. In this Activity, they meet with community members at an Engineering Showcase to have conversations about their designs and remote sensing. Next, youth can participate in *PLANETS Remote Sensing: Science Series* to learn more about the science of remote sensing.

Educator Resources

Access Activity resources using link or QR code.

Activity Resources

QR code leads to resources available for this Activity.



<https://planets-stem.org/betars-activity-a6/>

Family Connection

If time permits, have youth ask the following questions to their Elders, families, or mentors before the Activity:

Q: Can you tell me a story about a time when you showed others something you built or created?

Materials and Preparation

Materials

For the whole group

- engineering design process depiction created in the Engineering Prep Activity
- crayons and markers
- Model landscape sites and Space Screens from Engineering Activity 5
- remaining materials from Engineering Activity 5
- ways to record ideas, such as chart paper, index cards, or sticky notes

For each group of 4

- remote sensing devices from Engineering Activity 5

For each youth

- Engineering Notebook

Activity 6 Materials Preparation (15 min)

1. Create a Materials Table with the materials remaining from Engineering Activity 5.
2. Arrange the Space Screens according to *Space Screen Assembly*, page 103 of this guide.
3. Invite people from the community, including families and friends of youth, to the Engineering Showcase.
4. If your Showcase includes asking the scientists' questions, invite family, peers, and other staff members to play the roles of the scientists using the Scientist Cards, or plan to ask questions on behalf of the scientists yourself.
5. Post youth's engineering design process depiction and have chart paper, index cards, or sticky notes available.

Activity Guide

Guiding Question: How can we share information about our remote sensing device design with others?

Post the question somewhere accessible, such as on chart paper or a shared document, so that youth can refer to it throughout the activity.

Introduction (5 min)

1. If you sent youth home with the Family Connection question, ask:

Q: If anyone talked with their families about showing things they built or created to others, would you like to share about it?

A: Accept all responses.

2. Have youth consider their engineering design process depiction and think about the step(s) related to sharing or communicating with others. Share the Guiding Question with youth:

Q: How can we share information about our remote sensing device design with others?

3. Remind youth that today they will communicate what they learned about remote sensing technologies and talk about why their remote sensing device design should be included on NASA mission spacecraft during the Engineering Showcase. Ask:

Q: What steps of your engineering design process do you think you will use to prepare for the Showcase?

A: Responses will vary. Possible responses include share and communicate.

Teaching Tip

Let groups know that they will have a few minutes to finish their designs, if needed, before they start preparing for the Showcase.

Showcase Preparation (20 min)

1. Remind groups that they need to explain how their devices work because NASA needs to choose devices that gather information from a distance. Having these devices on spacecraft helps scientists answer their questions. Ask questions such as the following:

Q: What are the important ideas you think we should share?

A: Accept all responses. Possible responses include our engineering design process; the problem of gathering information from a distance; the definition of remote sensing; technologies for remote sensing; how our devices solve the problem of collecting information from a distance; the types of data our remote sensing devices collect; and the criteria our devices meet, including size restrictions.

Q: How do you think we should share our findings?

A: Accept all responses. Possible responses include designing posters; drawing, illustrating, mapping, or graphing our findings; recording a video or audio message; staging a performance; and writing a description.

To support youth understanding of different methods of presenting information, have youth recall or share examples of different sharing methods they have used in the past.

2. As a group, agree upon a structure for the Showcase. Possible structures include the following:
 - Gallery Walk where different groups stand at their stations and explain posters, graphs, maps, writing, drawings, audio or videos on small devices, or other artistic depictions.
 - Screening of whole-group video or audio files.
 - Performance in which some people play the three scientists and ask questions. You can develop script cards to include adults in the play.
 - Discussion in which youth and community members share their knowledge.

3. Give groups a few minutes to think about how they will represent their designs and the information they gathered. Encourage youth to record their ideas on *Communicate*, page 40 in their Engineering Notebooks.

Supporting Learner Differences

This discussion can be a strategic opportunity to have youth share and learn from one another about what methods of sharing their findings feels most comfortable. They can celebrate the diversity of ways in which they can communicate.

4. Allow groups to collect materials and begin working. Tell youth that they can prepare notes for their group's presentation on *Communicate*, page 40 in their Engineering Notebooks.
5. Rotate among the groups to provide support as needed. Ask questions such as the following:

Q: What do you want everyone to know about your device?

A: Responses will vary. Possible responses include how our device works and what information it can collect about the landscape or the minerals.

Q: How will you communicate the different types of information your device collected?

A: Responses will vary. Possible responses include drawing a map of the model landscape sites and demonstrating how the remote sensing technologies work.

6. As groups are practicing, give them time to finish creating their remote sensing devices.
7. Let youth know when they have five minutes remaining.

Engineering Showcase (30 min)

1. When youth are ready, invite guests into the room and explain how the Showcase will proceed. Carry out the steps of the Showcase as the class has planned.
2. As they experience the Showcase, invite families and other guests to think about their family, cultural, or other knowledge related to what they observe here today and share that knowledge with youth individually or the event as a whole.

Supporting Learner Differences

If you have youth who are emergent multilingual learners, encourage them to share in both English and their non-English languages if they feel more comfortable that way. This practice may also help ensure inclusivity for the youths' invited families and guests.

3. If you or other adults ask questions to youth, consider asking the following:

Q: What are some things you investigated to help you solve this problem?

A: Responses will vary. Possible responses include changing the path of light with mirrors, measuring the topography model landscapes, and investigating the minerals on the model landscape.

Q: What did you test that worked well? What did not work so well?

A: Accept all responses.

Q: If you had more time, how would you improve your design? Are there any elements of another group's design that you would incorporate?

A: Accept all responses.

Q: How did your engineering design process help you reach this final design?

A: Accept all responses. Possible responses include reminding us to investigate so we had all the information we needed and to improve rather than sticking to our first designs.

Landscape Reveal and Family Connections (10 min)

1. Gather youth together and explain that now they are done testing, they can visit the testing sites. Display the model landscapes for Site A and Site B for youth and guests to examine.
2. Encourage youth to think about the similarities and differences between the information they gathered and the model landscapes. Have them think about how they might be able to further improve their remote sensing devices.
3. Invite guests to share their family, cultural, or other knowledge about what they observe here today.
4. At the end of the Showcase, congratulate your group on doing a great job being remote sensing engineers and communicating their findings. Have youth thank the guests.

Reflect (5 min)

1. Have youth reflect on the Guiding Question:

Q: How can we share information about our remote sensing device design with others?

A: Responses will vary. Possible responses include by talking, writing, or drawing; discussing with others; and making records such as videos and audio recordings.

2. Give youth time to complete *My Engineering Profile 2*, pages 42 – 43 in their Engineering Notebooks. Giving youth time to record their thoughts will help them reflect on and wrap up the experiences they had throughout the unit. As youth are working, take time to complete [My Educator Profile 2](#).

Teaching Tip

If time is short, end this Activity after Step 2.

3. Encourage youth to reflect on engineering and their engineering design process. Ask one or more of the following questions:

Q: What did you enjoy most about being part of this NASA mission team?

A: Accept all responses. Possible responses include solving problems and working with scientists and other engineers to prepare for a mission to space.

Q: Do you consider yourself an engineer? Why or why not?

A: Accept all responses. A possible response is yes, because I figure out how to make things to solve problems and I help people by designing technologies.

Q: Which steps of your engineering design process were most helpful to you?

A: Accept all responses.

Q: Can you imagine other problems you might solve using your engineering design process?

A: Accept all responses. Possible responses include engineering challenges at home, at school, or in the local community.

4. Congratulate groups on their excellent engineering work.

After the Activity

1. Take time to reflect on the following educator prompt.

Q: What strategies did you use to help youth feel comfortable when sharing their design ideas during this activity? How does this strategy work for other activities in the future?

2. If time permits, read *PLANETS Remote Sensing: Science Series* and consider implementing it so that youth can extend their understanding of remote sensing and the relationships between scientists and engineers.

Remote Sensing Unit Resources

QR code leads to resources available for this unit.



<https://planets-stem.org/betars-unit-landing-page/>

Engineering Activity 6

My Educator Profile 2

Record your teaching strengths. You can write, draw, or check off boxes below.

Cultural Responsiveness

- I give youth opportunities to work on topics that are meaningful to them.
- I value the assets that youth bring to their learning.

Experiential Activities

- I help youth make meaning through active engagement.
- I help youth reflect on their experiences.

Local Relevance

- I connect topics to the local community.
- I give youth chances to use their local knowledge.

Multilingual Learning

- I use strategies to support youth of all linguistic backgrounds.
- I focus on what youth can do at all levels of language learning.

Real-World Relevance

- I demonstrate how topics matter in the world.
- I help youth understand how different careers help people, animals, the environment, and society.

Subject Integration

- I make connections between academic subjects.
- I give youth opportunities to use their knowledge from other subjects when learning.

Universal Design for Learning

- I plan for learner variability among youth.
- I provide youth with multiple means to engage, represent information, and express themselves.

Record teaching areas where you want to learn or develop. You can write or draw below.

