Educator Guide

Engineering Activity 9: Sum It Up: Engineering Share-Out

Educator Preview

Activity Snapshot

Learners present their recommendations about remote sensing devices.

Timing | 45 minutes

Get Ready and Team Up	10 min.
Engineering Share-Out	25 min.
Reflect	10 min.
Total	**45 min.**

Prep Snapshot*

Prep Time 40 min.
(several days in advance)

Set up Space Screens and a Materials Table.

Invite community members.

**See Materials & Preparation for full info.*

21st Century Skills

Connection

- Collaboration
- Communication

Habits of Mind

- See themselves as problem solvers.
- Make evidence-based decisions.

Guiding Question

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

Learners Will Do

Communicate design choices to others and support these with evidence.

Learners Will Know

Engineers have valuable knowledge to share about the problem they have solved.

Connecting Across Activities

Activity 8: Spread the Word	Activity 9: Sum It Up	Science Pathway
Last time, learners planned to share their designs at an Engineering Share-Out.	**Today,** they have conversations about their designs and remote sensing.	**Next time**, learners experience the science of this topic in the PLANETS Worlds Apart Science Pathway (optional).

Activity 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-xxvi. Access more PLANETS units, research, and pathways at https://planets-stem.org/.

QR Code for Activity Resources

weblink: https://hov.to/0be34884

Materials and Preparation

Materials

For the whole group

- *Our Ideas* poster (on paper or a shared digital document). See Prep & Setup Guide (PDF)
  Examples | Templates
- crayons and markers
- Model landscape sites and Space Screens from Engineering Activity 7
- remaining materials from Engineering Activity 7
- ways to record ideas, such as chart paper, index cards, or sticky notes

For each group of four

- remote sensing devices from Engineering Activity 7
- presentation materials from Activity 8

For each learner

- Engineering Notebook (PDF)

Activity 9 Materials Preparation (40 min.)

Ahead of Time

1. Invite people from the community, including families and friends of learners, to the Engineering Share-Out.
2. If your Share-Out 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.

In Your Space

3. Place the *Our Ideas* poster in a visible place in your learning setting or prepare to share it digitally.
4. Arrange the Space Screens according to the Space Screen Assembly, pgs. 88-89.
5. Post learners' engineering design process depiction and have chart paper, index cards, or sticky notes available.

Activity Guide

Get Ready and Team Up (10 min.)

1. Ask: **If you did the last activity, what did you do and why?** *(We prepared to share our remote sensing designs in the Engineering Share-Out.)*
2. Share the Guiding Question with learners aloud and in writing on the *Our Ideas* poster (using multiple languages as needed): **How can we share information about our remote sensing device design with others?**
3. Organize learners into the same groups of four as the last session.
4. Give learners five minutes to set up for the Share-Out so they can present in the ways that they have planned.

Engineering Share-Out (25 min.)

5. When learners are ready, invite guests into the room and explain how the Share-Out will proceed. Carry out the steps of the Share-Out as the class has planned.
6. As they experience the Share-Out, 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 learners individually or the event as a whole.
7. If you or other adults ask questions to learners, consider asking the following: **What are some things you investigated to help you solve this problem?** *(Changing the path of light with mirrors, measuring the topography of model landscapes, investigating the minerals on the model landscape, etc.)* **What did you test that worked well? What did not work so well? If you had more time, how would you improve your design? Are there any elements of another group's design that you would incorporate? How did your engineering design process help you reach this final design?** *(Reminding us to investigate so we had all the information we needed; reminding us to iterate rather than sticking to our first designs, etc.)*
8. At the end of the Share-Out, say: **Great job being remote sensing engineers and communicating your findings!** Have learners thank the guests.

Support Learner Differences

- If new learners are joining you, lead an inclusion activity (pgs. xx-xxi) and use other engagement strategies as necessary (pgs. viii-xvi).
- To ensure the Share-Out is accessible as possible, provide tactile, audio, and video resources from throughout the pathway to attendees as appropriate.
- Encourage learners to share in their preferred language. This practice may also help ensure inclusivity for the learners' invited families and guests.

Teaching Tip

Print the list of questions in Step 3 below for your guests to ask the learners after they share.

Reflect (10 min.)

9. Say: **Now that you are done testing remotely, you can visit the Earth-based testing sites.** Uncover the model landscapes for Site A and Site B for learners and guests to examine.
10. Ask: **What similarities and differences do you notice between the information you gathered and the model landscapes?** *(We missed some minerals, we thought the area was steeper than it actually was, etc.)* **How could you further improve your remote sensing devices?** *(We could use smaller straws to get more detail about topography, we could add more scrapers or cellophane to better identify minerals, etc.)*
11. Ask one or more of the following questions: **Which phases of your engineering design process were most helpful to you?** *(The Iterate phase because we could make our devices better, etc.)* **What did you enjoy most about being part of this NASA mission team?** *(Solving problems and working with scientists and other engineers to prepare for a mission to space, etc.)* **Do you consider yourself an engineer? Why or why not?** *(Yes, because I figure out how to make things to solve problems and I help people by designing technologies, etc.)*
12. Say: **Good job working as engineers today! Can you imagine other problems you might solve using your engineering design process?** *(Engineering challenges at home, at school, or in the local community, etc.)*

After the Activity

1. Clean up:
   - Collect the Engineering Notebooks.
   - Decide if you want to keep the *Our Ideas* poster. Term cards can be kept for the future.
   - Reset the space in which you held the Share-Out.
   - Save the model landscape sites, Space Screens, and any unused materials for use when teaching these activities in the future.
2. Take time to reflect on the following educator prompt: What strategies did you use to help learners feel comfortable when sharing their design ideas during this activity? How might these strategies work for other activities in the future?
3. If time permits, read the *PLANETS Remote Sensing* Science Pathway and consider implementing it so that learners can extend their understanding of remote sensing and the relationships between scientists and engineers.

Level Up!

If your learners enjoyed this planetary engineering design challenge, they would also enjoy the Rover Observation and Discoveries in Space (ROADS) student challenges. Show your learners the NASA National Student Challenges weblink. (15 min to review weblink, 10-15 hours per challenge)

Remote Sensing Additional Resources

QR code leads to resources available for this unit.

weblink: https://hov.to/248cf0d9