

Overview

Youth *communicate* their ideas about designing a water reuse process in the Engineering Showcase.

Note to Educator:

Lead this activity in a room with a sink for easy cleanup. Have paper towels on hand in case of spills. The pH strips may stain the tabletop, so have youth place their used strips on a paper towel. The Engineering Showcase is an opportunity for youth to share the engineering work they have completed over the course of the unit. Invite parents, peers, and other staff members to come and see what youth have engineered.

Activity Timing

Introduction:	5 min
Preparing:	15 min
Showcase:	30 min
Reflect:	10 min

60 min

21st Century Skill Highlight

Collaboration
Communication

Activity 6 Materials

For the whole group

- Engineering Design Process* poster
- chart paper and markers
- Remaining materials from Activity 5
- 1 measuring cup, 1/4 cup
- 2 tablespoons
- 8 craft sticks
- 8 jars, 1/2 gallon, with water samples
- 60 plastic cups, 8 oz.

For each youth

- Engineering Notebook

For each group of 3

- 1 foil tray, 12" x 12"
- 1 measuring cup, 1 cup
- 1 packet of pH strips
- 1 pair of scissors
- 1 Secchi disk
- 1 set of *Water Reuse Plan* cards
- 2 Filter Bases

Activity 6 Materials Preparation (15 min)

1. Post the *Engineering Design Process* poster.
2. Create a Materials Table with the materials remaining from Activity 5.
3. If needed, prepare more water samples in the jars using the recipes on *Water Samples for Final Challenge*, p. 52 in this guide.
4. Invite people from the community, including families and friends of youth, to the Engineering Showcase.

Notebook Pages for Activity 6

Communicate, p. 19

Activity 6

Communicate

During the Showcase, you will get to share information about your engineering challenge with people who are not familiar with the problem. What are some things you might want to tell them about engineering a water reuse process?



Testing the Waters:
Engineering a Water Reuse Process 19 © Museum of Science

My Engineering Profile 2, p. 20

Activity 6

My Engineering Profile 2

Think about how you have changed as an engineer, and update your engineering profile.

Communication

- I give valuable feedback to others
- I like giving presentations

Creativity

- I imagine lots of ideas
- I come up with new ways of doing something

Critical Thinking

- I solve problems
- I make sense of complicated information

Leadership

- I lead teams well
- I make sure everyone has a voice

Persistence

- I learn from failure
- I keep trying until I succeed

Teamwork


- I work well in teams
- I like giving and receiving feedback on my work

Technical Skills

- I make things
- I like working with different materials

Which skills did you use?

Which skills have you learned?



Testing the Waters:
Engineering a Water Reuse Process 20 © Museum of Science

Youth will learn:

- *Communicating* with others is an important part of the Engineering Design Process.
- As engineers, they have valuable knowledge to share about the problem they have solved.

Introduction (5 min)

1. Guide youth to review the Engineering Design Process poster and point out the *communicate* step. Remind youth that today they will be *communicating* to others about the water reuse processes they engineered. Ask:
 - **What are the important ideas you think we should present?**
 - **What are some ideas you have about how to successfully *communicate* your work?**

Tip

Instead of giving youth a structure for their group presentation, have them come up with creative ideas of their own. They may want to show a video, or act out different roles in their presentations. As long as they have the inclination and the time, allow them to structure their own presentation.

Preparing the Presentation (15 min)

1. Explain that the Showcase will be split into three parts.
 - First, there will be a whole-group presentation where volunteers explain what they learned about water quality, filter materials, and order, and why these ideas are important for water reuse.
 - Then, they will split into groups and explain their water reuse process. Volunteers from each group will share their designs with the guests, demonstrate the process, and answer any questions they might have.
 - Finally, visitors will have time to explore the designs, speak with groups informally, and ask questions about their water reuse process.
2. The first part of the Showcase will need volunteers to talk about specific things. Write down some possible roles on the board for groups to review:
 - Describe and demonstrate the problem
 - Describe how water reuse and water treatment can help solve the problem
 - Explain the design challenge and the Engineering Design Process
 - Describe and demonstrate how they *investigated* water quality, filter materials, and the order of locations
3. Encourage youth to add topics to the list. Have youth decide who would like to present and assign them roles. Tell youth that they can prepare notes for their group's presentation on

Tip

The presentations should be a time for youth who enjoy presenting, or those who would like to work on this skill, to take a lead role. It is not necessary for all youth to present, though everyone should take part in preparing for the presentation.

Communicate, p. 19 in their Engineering Notebooks.

4. While volunteers are practicing their roles, give groups time to reassemble their water reuse processes or make any other final preparations for the presentation.
5. As groups are preparing, rotate among them and provide support. The process of sharing should be fun and exciting, not stressful!

Engineering Showcase (30 min)

1. When youth are ready, invite guests into the room and explain that they will see a presentation first, and then they will have time to explore the designs and speak with the water resource engineers.
2. Have the volunteers explain the engineering challenge to the visitors.
3. Give each group a few minutes to share their design and demonstrate it by *testing* their process. As groups are *testing*, ask questions like:
 - **What are some things you *investigated* to help you solve this problem?**
 - **What did you test that worked really well? What didn't work so well?**
 - **How did the Engineering Design Process help you reach this final design?**
4. After all groups have shared, allow visitors to walk around to see the water reuse processes and ask the engineers any additional questions they have about the designs.
5. At the end of the Showcase, be sure to congratulate your group on doing a great job with the *communicate* step of the Engineering Design Process and on being water resource engineers. Have youth thank the audience members before concluding the presentation.

Reflect (10 min)

1. Have youth discard used filter materials (except charcoal) and their final water samples, then rinse their Filter Bases and place them in their trays.
2. Remind youth that there is always room for improvement and encourage them to think about what they would do if they had more time with the challenge.
3. Encourage youth to reflect on the Engineering Design Process. Ask:
 - **Which steps of the Engineering Design Process were most helpful to you?**
 - **Can you *imagine* other problems you might solve using the Engineering Design Process?**

4. Congratulate groups on their excellent engineering work.
5. Give youth time to complete *My Engineering Profile 2*, p. 20 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.
6. Gather youth as a group. Ask:
 - **What are you most proud of doing as part of this engineering group?**
 - **Are there other water conservation problems you would like to solve as a water resource engineer?**
 - **Why do you consider yourself an engineer?**

Sustainability Tip

Consider saving materials for when you teach this activity in the future. Rinse and set aside the limestone, charcoal, filter bases, and aluminum trays. Once dry, store any loose materials in airtight containers.

