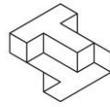


Trash Mover

Lab Related Activity: *Down the Drain*



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This activity is meant to extend your students' knowledge of the topics covered in our Down the Drain lab. Through this activity, your students will design a prototype of a device to remove trash from a storm drain!

Grade Levels: 3-8

Estimated time: 60 minute

Learning Outcomes

Students will be able to:

1. Imagine ways to solve a problem.
2. Draw and build a prototype to solve a problem.

Next Generation Science Standards

**The Earth and human activity standards relate to the weather-related hazard of flooding.*

- Grade 3: Earth and Human Activity 3-ESS3-1
- Grade 4: *Earth and Human Activity* 4-ESS3-2
- Grade 5: *Earth and Human Activity* 5-ESS3-1
- Grades 6-8: *Earth and Human Activity* MS-ESS3-3
- Grades 3-5: *Engineering Design* 3-5-ETS1-1, 2
- Grades 6-8: *Engineering Design* MS-ETS1-2

Common Core ELA Standards

- Grade 3: Speaking and Listening 1. b, c, d; 3, 3.4a
- Grade 4: *Speaking and Listening* 1. b, c, d, 4
- Grade 5: *Speaking and Listening* 1. b, c, d, 4
- Grade 6: *Speaking and Listening* 1. c, d, 4, 6
- Grade 7 & 8: *Speaking and Listening* 1. b, c, d, 4, 6

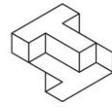
Vocabulary:

Familiarity with these terms and concepts will enhance students' experience in the activity.

- **Pollution:** A substance or thing that when it enters an environment its presence has a harmful effect.
- **Watershed:** The highest point that water can start to the lowest point where it collects. For example, from a mountain top to a lake or ocean.
- **Storm Drain:** A device that allows water to flow away from human developments and back into the watershed to prevent flooding of human communities.
- **Sustainability:** To keep something at a certain level. For example, minimize the use of a natural resource, so it can be conserved for future use.

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Materials:

Below there are categories of materials for students to build with that include suggestions for types of items. Look around your classroom, school, or ask students to bring in the materials you all can use during the design challenge. Each category provides a suggested amount of total items to gather from each category for a classroom of 30 working in groups of 4.

Things that can grab/lift (40 Total)	Things that can swipe (20 Total)	Things that scoop (20 Total)
<ul style="list-style-type: none">TongsBinder clipsChip clips	<ul style="list-style-type: none">Broom headsSqueegees	<ul style="list-style-type: none">CupsFunnels
Long things (40 Total)	General build materials (80 Total)	
<ul style="list-style-type: none">Wooden dowelsChopsticksUtensils	<ul style="list-style-type: none">StringRubber bandsPaper clips	

Set-up:

- Create trash and storm drain for students to test their devices. For classrooms that need a very short prep time for the activity we recommend large pieces of trash like crumpled paper laid out over a masking tape rectangle to represent a storm drain.
- Have students work in teams of 2-4.

Procedure:

- Review the Down the Drain lab with students with a focus on the importance of keeping storm drains clear to prevent flooding. During the lab they worked as a team to keep larger physical trash out of the watershed. Discuss what they would want to try to remove trash from the storm drain grate.
- Have students imagine and draw out ideas for removing trash from the storm drain grate. Encourage them to think about ways people currently remove trash from the streets and storm drains to prevent flooding. (For example: street sweeper machines, brooms, and rakes)
- Introduce the design challenge:

Design Challenge:

Design a tool to remove trash from a storm drain to prevent flooding

Criteria:

- Remove trash from the storm drain grate

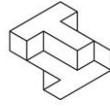
Constraints:

- No hands can be used to prevent injury from any possible sharp trash
- Time:** 30 minutes
- Materials:** Only use the materials provided on the build table

- Give students 30 minutes of build time and test as much as they want. Consider having students work in teams of 2-4 students. Visit each team and ask facilitative questions:
 - What are you designing?*
 - How does this work?*
 - How does your design meet the criteria and constraints for this challenge?*
- Have students create a 1 minute share out where each team member talks and they address:
 - Explaining their design
 - Talk about their challenges

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- What would they do if they had unlimited supplies or time?
6. Lead a class closure where the educator recaps ideas students captured through their prototypes and also from their share outs. If there is time consider allowing for another round of iterations.

Extended Learning

- Research current methods for removing trash from storm drains. Evaluate these methods and then iterate their current design or draw a model of how they would iterate a current method.