Extraction Challenge

Thank you for downloading the science and mathematics activity packet! Below you will find a list of contents with a brief description of each of the items. This activity packet contains all the information (including any handouts) you will need to run this activity in your own classroom or at a science festival.

Please note: some activities might require the need for a facilitator to be present to oversee the activity. Activities that require a facilitator will be clearly noted.

-Community Resources for Science

Extraction Challenge

ACTIVITY PACKET CONTENTS

1. Organizer Instructions for the person running the activity
    - Print suggestion: 1 for the facilitator
    - Includes information for setup prior to the event (e.g., materials prep)
    - Estimated cost for one set of supplies, excluding common household items
2. Participant Instructions (tabletop sign/printout)
    - Print suggestion: 1-2 to put in a plastic sign holder

Extraction Challenge

ORGANIZER INSTRUCTIONS

Grade(s): K-5

Standard connections: CCSS.Math.Practice

- **MP.2 -** Reason abstractly and quantitatively
- **MP.5** - Use appropriate tools strategically

Next Generation Science Standards:

- **Constructing Explanations and Designing Solutions:** Use tools and/or materials to design and/or build a device that solves a specific problem or a solution to a specific problem
- **Cause and Effect: Mechanism and Explanation:** investigate and explain causal relationships and the mechanisms by which they are mediated

Objective: students must build a device that allows them to extract an object from within a circle of string

Activity overview and background: Students will be given a bag of supplies and challenged to build a device that allows them to extract an object from within a circle of string. The object can be varied to make the challenge easier or more difficult. Placing the object inside a container (a box, cup, trash can, etc.) can make the challenge even more difficult.

Estimated cost of supplies: $18

Materials:

- Gallon size zip-lock bags ($4/50 ct box)

In a gallon sized zip-lock bag – 1 per group

- Popsicle sticks ($3/150 ct pack)
- Masking tape
- Straws ($2/50 ct pack)
- Rubber bands
- Plastic spoons ($6/100 ct pack)
- Index cards ($1/100 ct pack)
- Markers
- String ($2/100 yards

Materials available for everyone

- Ping-pong balls (or another object the students can extract from the string circle; $2.50/6 ct)

- A length of string with the ends tied together to make a circle. You can make circles of various sizes to allow for different levels of challenge
- A bucket or other container to place the ping-pong balls in if you want to increase the difficulty of the challenge
- Stopwatches (if you want to challenge students to extract the item(s) as quickly as possible

Setup:

1. Assemble kits in the zip lock bags
2. Lay out kits and other materials along with the instructions and materials

Instructions

1. Your goal is to build a device that will extract an object from within a circle of string
2. Layout the string circle and place the material to be extracted in the middle of the circle
3. The only thing that can cross over the circle is the device you build
    - You can't use your arms to reach further into the circle
4. Draw pictures of the ideas you have. Put all these ideas down, even if they seem impossible or a little unusual.
5. Using the kit, build your first prototype.
6. Test your creation
    - *Can you get the Ping-Pong ball out of the circle?*
7. If your prototype can be improved go back and redesign your device and test it again
8. Want a more difficult challenge?
    - *Make the circle larger or place the objects into a container*