

KICK THE CAN ADVENTURE JOURNAL

TAKING ON THE
WORLD, ONE
ENGINEERING
CHALLENGE AT A TIME

PROPERTY OF THE FUTURE ENGINEER,

Cleaning Up Cans



Hey there, GEERlings! The weather here in Baffin Island has sure been miserable lately! I've been curled up inside with good books and hot chocolate so I can stay out of the cold. Because of the bad weather, an oil tanker capsized in Baffin Bay! Thousands of copper barrels spilled into the water, and the whole island is worried about the wildlife living in the bay. I want to keep the bay clean so that the animals that live there will stay healthy. I need to find a way to get the barrels out of the water first. Can you help me design a device that will lift the barrels out of the bay? Then I want to recycle the barrels, but they need to be cleaned first. I have some different liquids I can use as cleaning agents, but I'm not sure which one will work best. Can you help me by making a hypothesis about which cleaning agent I should use and then testing it out? This is a big problem, and I'm feeling a little overwhelmed by it! I know that if you help me, we can solve this problem together. Thanks for being so helpful, GEERlings!

Good luck,

Flynn

Pre Quest Setup

Kick the Can



You will need a storage container (or another large, shallow container) filled with water to represent Baffin Bay. Put 10 pennies in the container to represent the cans you need to retrieve. Have an extra 10 pennies for back up or to use during the cleaning portion of the quest. Try to find as many "dirty" pennies as possible to use in this experiment.

Since there is water involved we recommend laying down a table cloth or a few towels in case of spills or drips!

For the cleaning portion you will need the following amount of solution in a cup:

1/4 cup of water

1/4 cup of lemon juice

1/4 cup of milk

1/4 cup of dish soap

If you want to test other solutions too, go for it!

Instructions for GEERlings

Segment 1— Kick the Can



Hi GEERlings! Can you use these materials to help me clean the barrels out of the bay? We have to keep the bay clean!

Inside Flynn's Supply Sack, there are items that represent the materials Flynn has with her. Her team at Baffin Bay has gathered up these materials. Here's what you have to work with:

Material:

What it Represents:

Paper or plastic cup (1)	⇒	Large Shipping Container
Popsicle Sticks (10)	⇒	Driftwood
Playdough (2 Large Chunks)	⇒	Clay
Duct Tape (1 Roll)	⇒	From Flynn's Supply Sack
Ziploc Bags (2)	⇒	Skimmer
Pipe cleaners (5)	⇒	Industrial Wire
Spools (4)	⇒	Barrels
Straws (5)	⇒	Tree Branches
Toothpicks (20)	⇒	Twigs

You can also use scissors to modify the

Have you ever tried poutine? It is a popular Canadian dish that is made of French fries, cheese curds, and gravy. YUM!

items in any way that you want. Just make sure you make a plan because there are not extra materials! Happy brainstorming!



Your Challenge

Segment 1—Kick the Can



Flynn needs to find a way to remove the oil barrels from the bay, and clean them. It is very important that we keep the bay clean! Can you think of a solution that will help her do this? Design a device that will get as many pennies as possible out of a tub of water. The next sheet has details about cleaning the pennies.

Make sure that you use your own ideas to solve this problem, and only use the materials in your Supply Sack. Good luck, GEERlings!

Before you start working, use the space below to plan out your solution.

My solution will look like this, and I will use these materials to build it:

- Paper or plastic cup
- Popsicle Sticks
- Playdough
- Duct Tape
- Ziploc Bags
- Pipe cleaners
- Spools
- Straws
- Toothpicks

Cleaning Agents Hypothesis and Observations

Segment 1—Kick the Can



Put 1/4 cup of water in a cup, and 1/4 cup of lemon juice in a cup. Make your hypothesis below on what cleaning agent you think will work better.

**Fresh water
Hypothesis**

**Lemon juice
Hypothesis**

Drop a few of the dirty pennies into each solution, and set a timer for 5 minutes. Take notes on what is happening during the experiment and how the pennies are reacting to each of the solutions.

**Fresh water
Observations**

**Lemon juice
Observations**

When the experiment is finished, dry off the pennies, and compare them to a dirty penny. Write your final conclusion below on what worked best.

_____ worked best to clean the pennies.

Let's Engineer It!

Segment 2—Kick the Can



Flynn needs to find a way to clean off the barrels she fished out of the bay so that they can be recycled. Her engineering intuition tells her that she needs to create a chemical reaction to get the barrels clean. What do you know about chemical reactions? Have you ever seen one before?

Today, you will help Flynn by researching and answering the questions below.



Canada produces 77% of the world's maple syrup. My pancakes are super happy about that!

You can use websites to find out more about chemical reactions.

Take notes while you research, but only write notes that make sense to you. Don't write something that you don't understand or can't explain in your own words. If it helps you, you can also draw pictures about the things you learn.

1. What is a chemical reaction?

2. What are atoms?



3. What are molecules? Where do molecules come from?

4. What are some examples of chemical reactions?



5. Why do the pennies in your experiment look dirty? What caused that?

6. What kind of substance will create a chemical reaction that will clean the pennies?



7. What is a controlled experiment?

8. Why is it important to conduct a controlled experiment?



9. How will you make sure you conduct a controlled experiment when you test the cleaning agents?

Cleaning Agents Hypothesis

Segment 1—Kick the Can



Put 1/4 cup of water in a cup, 1/4 cup of lemon juice in a cup, 1/4 cup of milk in a cup, and 1/4 cup of dis soap in a cup. Make your hypothesis below on what cleaning agent you think will work best in cleaning the pennies.

**Fresh water
Hypothesis**

**Lemon juice
Hypothesis**

**Milk
Hypothesis**

**Dish soap
Hypothesis**

Set aside one dirty penny as the control penny in your experiment. This is the penny you will compare your cleaned pennies to at the end of the experiment to decide which solution works best! Drop a few of the dirty pennies into each solution, and set a timer for 5 minutes. Check out the observation portion of the experiment on the next page!

Cleaning Agents Observations

Segment 1—Kick the Can



Take notes on what is happening during the experiment. Write down how the pennies are reacting to each solution, and if there are differences between them.

Fresh water
Hypothesis

Lemon juice
Hypothesis

Milk
Hypothesis

Dish soap
Hypothesis

After 5 minutes, take the pennies out of the solution and dry them off with a towel. Compare the pennies in your experiment to your control penny which is the penny you set aside during the hypothesis segment. By comparing your experiment pennies to your control penny, make a conclusion on what solution worked best to clean the pennies. You can review your observation notes as well to help you come to a conclusion.

_____ worked best to clean the pennies.

GEERling Vocabulary List

Kick the Can



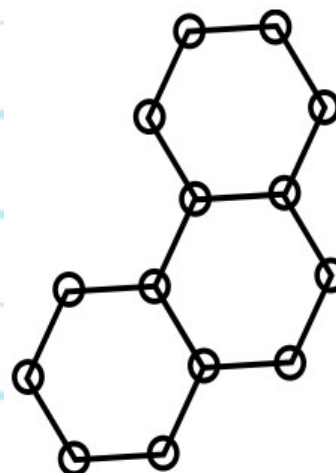
Did you know that 60% of the world's polar bear population live in Canada? They love the cold weather here!

Chemical Reaction:

a change that occurs when two or more substances combine to make a new sub-

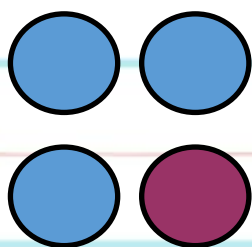


Molecule: two or more atoms that stick together to create a new substance.



Controlled Experi-

ment: When testing a hypothesis, only one factor change at a time to understand which factor is affecting the outcome of the experiment.



Hypothesis: a guess or prediction about what will happen in an experiment.

