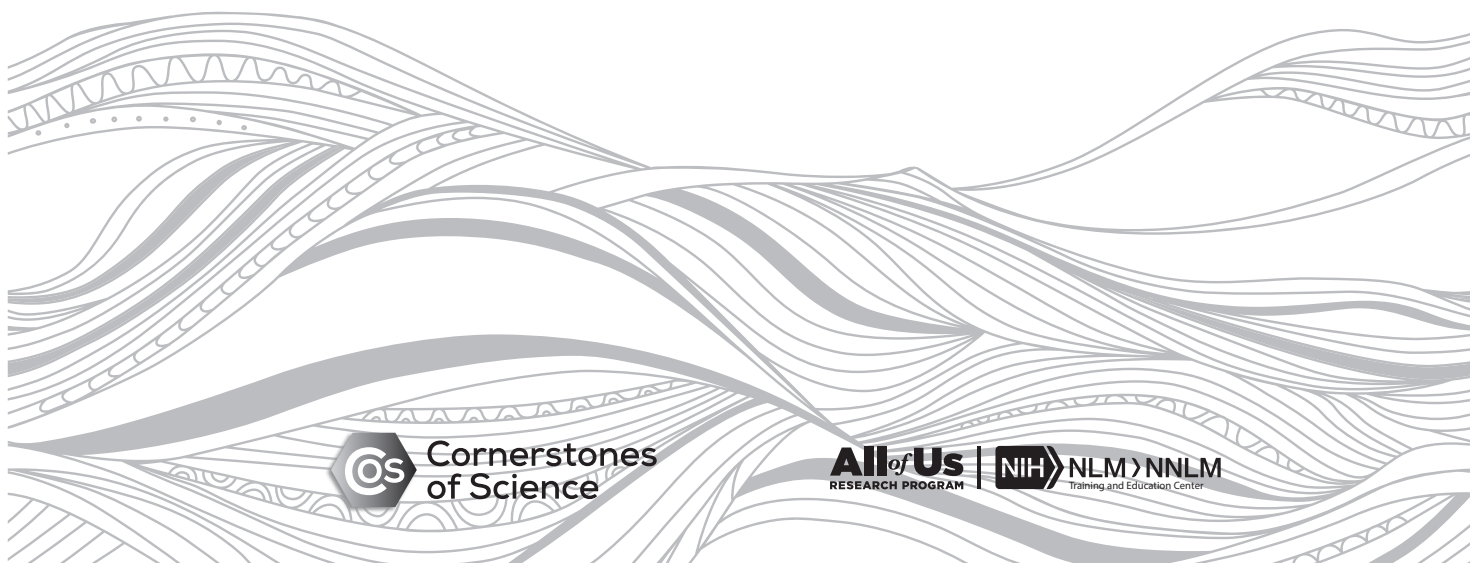


Test The Waters

Family Exploration Kit



Who Made the Test The Waters Kit and Why?

The National Library of Medicine (NLM) and Cornerstones of Science are partnering with the National Institute of Health's *All of Us* Research Program. NLM promotes citizen science as a way to get people engaged in issues affecting community health, environmental health and human genetics and provides access to a variety of resources to support these outreach efforts in your community. Visit www.joinallofus.org for more information and ways you can get involved in your community. Many families, librarians and scientists helped create the **Test The Waters Kit** you are using. Why? Because knowing the facts and becoming aware of the role and importance water is to our lives, you will have the information and resources to keep your family safe and healthy.

We would like to thank:

Lydia Collins and Kirsten Crowhurst – Training Education Center/National Network of Libraries of Medicine

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Dr. Caren Cooper, Principal Investigator, Crowd the Tap Citizen Science Research Project – North Carolina State University

Andrea Castenada – Guadalupe Branch, Maricopa County Library District

Marcela Peres and Sara Groves – Lewiston Public Library

The Amir and Francois Families, from Maryland, who beta-tested the kit and gave us great suggestions to help kids who are visually impaired and blind use the kit.

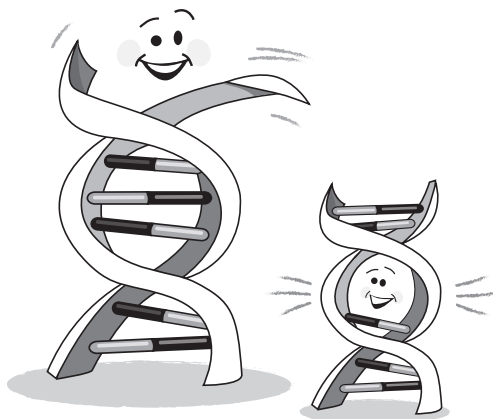


Accessibility guidance has been provided by the Maryland State Library for the Blind and Physically Handicapped. The mission of the Maryland State Library for the Blind and Physically Handicapped (LBPH) is to provide comprehensive library services to the eligible print-disabled residents of the State of Maryland. Our vision is to provide innovative and quality services to meet the needs and expectations of our patrons. Learn more at lbph.maryland.gov.



Double Helix Illustrations: Dan Routh
Graphic Design: Cay Kendrick, Joline Edwards

Test The Waters Kit



Hello! We are the DNA Family. You and your family are all made up of DNA which looks just like us!

- **DNA** are the marching orders that direct our growth, what we look like and how we react to things in our world or environment.
- Everyone's DNA carries thousands of pairs of **genes**, specific traits or features which are passed down from those who have come before us – grandparents to parents to their children.

Your genes plus the world around you can affect and influence your health. The food we eat, where we live, what we drink and our personal habits all play important roles. For example, you may have genes that make you have an allergy to peanuts. However it is not until you **eat peanut butter that is in your sandwich** that your body may have a bad reaction.

We will be your guide as you and your family explore the role water plays to your health, lifestyles and the environment. You and your family will have fun as you get the facts and discover ways to have safe, healthy lives.

What's In The Kit?

ACTIVITY 1 – Part 1: Water for Life (Lifestyle) Families discover just how much water our bodies are made of. Water helps our bodies stay cool, helps the organs of our body, breaks down food so our bodies can use it for energy and keeps our bodies working well.

ACTIVITY 1 – Part 2: Test The Intestines! (Health) Explore the journey of food through the intestines and imagine how water helps this process.

ACTIVITY 2: *Down The Drain (Environment) Find out what storm drains and the clean water you drink have in common. You will see and feel what is going down the drain...and it isn't pretty. ***(NOTE: A story card in this activity may be culturally inappropriate to some as it talks about pet waste, i.e. dog poop. Removal of this story card will not affect the level of fun and information learned. All other stories are appropriate.)**



ACTIVITY 3 – Part 1: Pipe Up! (Environment) Water takes a long journey from a reservoir, stream, or ground water, through pipes in your house, to the faucets and bathtubs. Find out what types of pipes you have running through your home and what they mean for safe drinking water. Learn how your family can become citizen scientists helping researchers find solutions to keeping our drinking water safe at home.

ACTIVITY 3 – Part 2: Get The Lead Out (Environment) Water pipes can be made of different materials. Families will learn how to test and identify pipes in your home.

ACTIVITY 4: Crowd the Tap Citizen Science Experience (Lifestyle) The mission of *Crowd the Tap* is to ensure safe drinking water in the United States. Make your home part of the national inventory of water pipe materials! The inventory will help prioritize areas for tap water testing and infrastructure replacement. Being part of the inventory will connect you with others in your neighborhood and beyond who want to make drinking water safe for all. Please visit <https://scistarter.org/nlm/crowd-the-tap-nlm> for more information.



Family Activity Guide – This guide walks your family through each activity step-by-step. From the information you learn, your family can decide and act upon ways you can keep safe and healthy. If you want more information, a list of web links and other resources are provided in the back of the guide.

ACTIVITY 1 – Part 1

Test your knowledge about the role and importance of water to our health and lifestyles (This activity is engaging for both sighted and visually impaired people).

Materials

- **Human Body Apron with Velcro Organs, Head and Arm Bands**
- **Eight Glass of Water Cards** and fun facts about how water is important to our bodies
- **Human Body Apron Color and Braille Key**

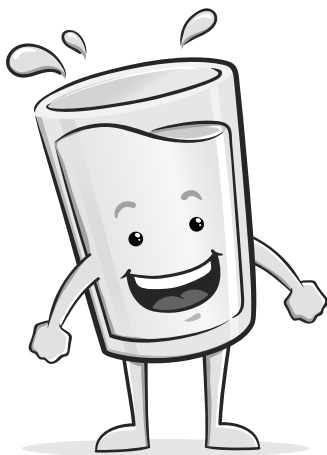


Discover

1. Place the Human Body Apron and head and arm bands on a family member. Place the Glass of Water Cards, glass side up, on the table.
2. Have you and your family pick up and name the different parts of the body, what job they do and fasten the organ to the matching picture located on the person wearing the human body apron. Make sure that all of the organs are fastened onto the human body apron. Do those body parts need water?
3. Have a person pick a Glass of Water Card from the pile. Read the question aloud to everyone. Have family members shout out the answer. The answer can be found at the bottom of the card.
4. The one that shouts out the right answer first gets to stick the card on the organ area of the human body apron that matches the answer.

Decide

1. What was the most interesting fact for everyone?
2. Count the total number of glasses of water pinned to the picture of the human body. That is the number of glasses of water we should have on a daily basis. How many glasses of water does each family member drink now? Based on what you learned, how many more glasses of water do you need to drink?
3. In addition to glasses of water, are there other things your family eats or drinks that also have water?



Act

1. In addition to water, what fruits, vegetables, juice or other ways will your family like to choose to increase the amount of water each of you get every day?
2. **Take the Water For Life Challenge.** Now we know that your body can get water in many different ways. Have your family take the Water For Life Challenge. How many different ways can each of you give your body eight glasses of water a day?

ACTIVITY 1 – Part 2

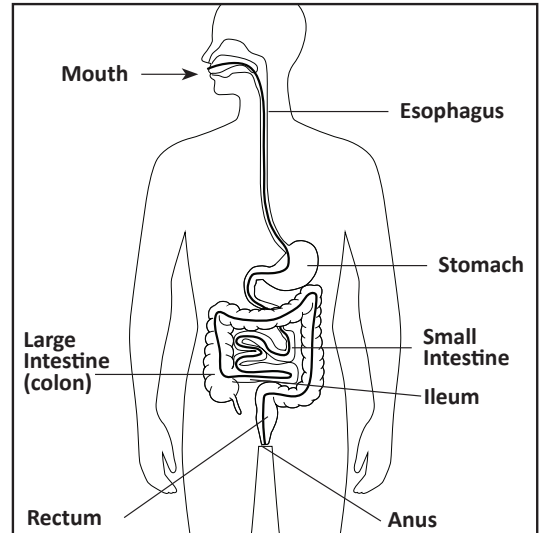
Explore the journey of food through the intestines and imagine how water helps this process.

Materials

- Human Body Apron found in **ACTIVITY 1 – Part 1**
- Five wooden beads, various sizes
- 22 feet plastic tubing

Discover

1. Place the Human Body Apron on a family member. Find the parts of the small and large intestines and place them on the apron (if they are not already on the apron from **ACTIVITY 1 – Part 1**). Each have an important role in the body. With your finger, trace how water moves through both the small and large intestines.
2. Open **ACTIVITY 1 – Part 2** bag and choose one person to hold the end of the pink plastic tube. Have another family member start walking to unroll the plastic tubing to its full length. *That is the length of your small intestine!*
3. At one end of the pink plastic tube, add one wooden bead at a time. Begin to work the bead to the other end of the tube. Keep adding beads to the tube. Push them through to the other end of the tube.



Decide

1. What was the most interesting thing each of you learned?

Act

1. Have everyone at the table say “*Cheers to our large intestines!*” and drink at least one glass of water at dinner knowing that you are helping them get the healthy nutrients from the food you eat to the rest of your body.

Large Intestine

- *Your large intestine is about five feet (or 1.5 meters) long.*
- *The purpose of the large intestine is to absorb water and salts from the material that has not been digested as food, and get rid of any waste products left over.*

Small Intestine

- *By the time food reaches your small intestine, it has already been broken up and mashed into liquid by your stomach. Each day your small intestine receives between one and three gallons (or six to twelve liters) of this liquid.*
- *The small intestine carries out most of the digestive process. Water helps absorb almost all of the nutrients you get from foods into your bloodstream.*
- *The small intestine is actually the longest section of your digestive tube, measuring about 22 feet (or seven meters) on average, or three-and-a-half times the length of your body!*

Environment ^{*}Down The Drain

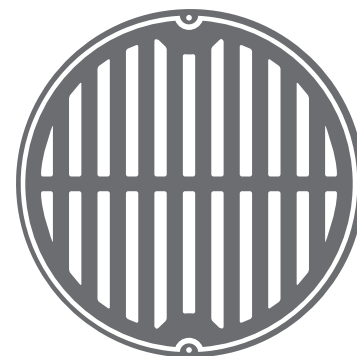
ACTIVITY 2



Not many of us think of storm drains. Some cities do not even have storm drains. What do storm drains and clean water have in common? The water you drink is a combination of surface water and groundwater. Surface water includes rivers, lakes and reservoirs. This water may find its way to the lake you swim or boat in, or where you go fishing. It is also the water that fish, frogs and birds, to name a few, rely on for their lives. See and feel what is going down the drain...or down your street...and it isn't pretty.

Materials

- Storm drain container
- **What's Going Down The Drain** picture (back describes role of storm drains in your community)
- Story card props:
 - Non-toxic color tablet
 - Plastic leaves and twigs
 - Plastic bottle
 - *Rubber scat replica
- Four **Story Cards**



Discover

1. Look at the picture of the storm drain. Have you ever seen one of these before? Have you seen one in your neighborhood? What do you think is the purpose of a storm drain? Does your community have storm drains?
2. Using the props, ask family members if they belong in our water. Ask "Why?" Place all props on the table. **(NOTE: A story card in this activity may be culturally inappropriate to some as it talks about pet waste, i.e. dog poop. Removal of this story card will not affect the level of fun and information learned. All other stories are appropriate.)**
3. Explain to everyone that the clear tub will be the storm drain. Add 2 inches of water to the small storm drain tub saying "*It's raining outside.*"
4. One at a time, have each person pick a **Story Card** and read it out loud. When they finish their story, have them add their prop into the clear tub. **(NOTE: If there are more family members than scenario cards, allow two family members to read the story. Have them introduce each story – one should read the story out loud and the other person can add the matching prop into the storm drain tub when the story is finished.**
5. Observe what happens. The rain water has carried all of the things from the stories down the storm drains. The water from the storm drains travels from the street into our rivers and lakes.



Decide

1. Would you like for this water to be mixed in with the water that you drink? Would you like to swim in this water?
2. What are your thoughts about the problems in these stories?

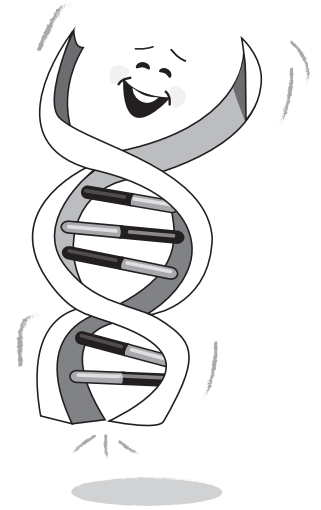
Down The Drain

Decide *(continued)*

3. Do you or do you know someone who has done something similar to one of the stories?
4. Do you think people in the stories know they are harming their water and the environment?

Act

1. What are ways we can keep our street gutters and storm drains clean?
Some suggestions you can make in your neighborhood:
2. Adopt a storm drain.
 - Keep litter, pet wastes, leaves and debris out of street gutters and storm drains—these outlets drain directly to lakes, streams, rivers and wetlands.
 - Apply lawn and garden chemicals sparingly and according to directions.
 - Dispose of used oil, antifreeze, paints and other household chemicals properly—not in storm sewers or drains. If your community does not already have a program for collecting household hazardous wastes, ask your local government to establish one.
 - Clean up spilled brake fluid, oil, grease and antifreeze. Do not hose them into the street where they can eventually reach local streams and lakes.
3. Clean up after your pets.



Credit: This activity was adapted from the Penn State Department of Ecosystem Science and Management ecosystems.psu.edu/youth.

ACTIVITY 3 – Part 1

The water you drink depends on the condition of the source water and the treatment it receives from your local water district. Treatment may include adding fluoride to prevent cavities and chlorine to kill germs (MedlinePlus, National Library of Medicine, medlineplus.gov/drinkingwater). This water travels throughout your home via pipes. Why does knowing about the pipes in your home matter? Do you know what types of pipes, which are connected to your faucets and bathtubs, are in your home?

Installation of lead pipes was banned in the US in 1986, and some water systems and homes have replaced lead pipes. Much of the drinking water infrastructure in the United States still contains lead pipes.

People with private wells can experience lead contamination too. Older wells may have lead in the packer, which is used to seal the well. And certain brands of pumps have components made of brass, which could also contain lead.

Materials

- Pipe Puzzle Board
- Galvanized pipe
- Copper pipe
- PVC pipe
- Simulated lead pipe (*Chalk – which is harmless, is used in this activity in place of a lead pipe, which is harmful to humans.*)

Discover

1. Discover what types of pipes might run through your home using the **Pipe Puzzle Board**.
2. Within the circles, read about how pipes function in the home, the importance of being able to identify them and where water comes into your home from the street.
3. Pick up each pipe segment, identify what type of pipe it is and fit the piece onto the **Pipe Puzzle Board**. Repeat the name of the pipe, out loud, as you fit the piece onto the puzzle.

Decide

1. Do you know the age of your house or apartment? Knowing the age is the first step to tracing the history and types of pipes you may have in your house or apartment.

Act

1. Find out more information about your local city/municipal water sources. The Environmental Protection Agency publishes Consumer Confidence Reports regarding water quality for every state. Check out ofmpub.epa.gov/apex/safewater/f?p=136:102, or go to the Centers for Disease Control which has a list of local and state programs that support childhood lead poisoning prevention. Visit cdc.gov/nceh/lead/programs/default.htm.
2. For more information about water quality, please visit epa.gov/environmental-topics/water-topics.

If your house or apartment was built before 1976, get your home tested for both lead-based paint and lead in your water.

Act (continued)

3. Testing Your Tap Water for Lead – *Healthy Babies Bright Futures* has a program for testing water for lead. The fee is \$65 for the kit to collect tap water samples, to conduct laboratory analysis, and for shipping. Some subsidies are available to make the fee as low as \$12. Please visit <https://www.hbbf.org/lead-drinking-water> for more information.
4. Here are some ways to reduce your exposure to lead:

Reduce Your Exposure To Lead



Use only cold water for drinking, cooking and making baby formula. Boiling water does not remove lead from water.



Regularly clean your faucet's screen (also known as an aerator.)

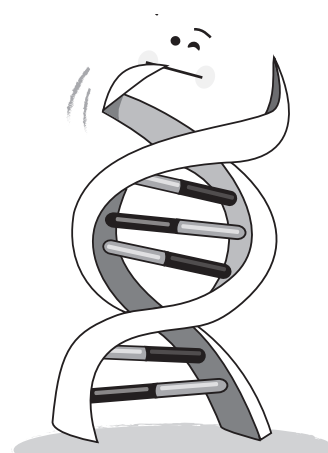


Consider using a water filter certified to remove lead and know when it's time to replace the filter.



Before drinking, flush your pipes by running your tap, taking a shower, doing laundry or a load of dishes.

To find out for certain if you have lead in your drinking water, have your water tested.

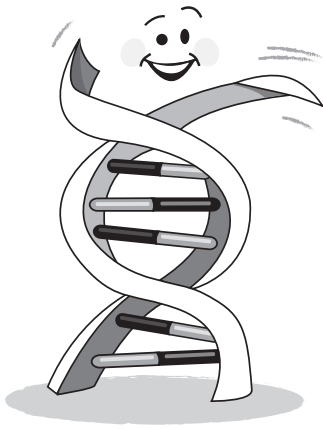


Environment

Get The Lead Out

ACTIVITY 3 – Part 2

This is the first step to helping your family to identify your pipes and other information about your home, what you and your family need to know, and where to find more resources and information.



Materials

- **Pipe Puzzle Board** and pipe pieces from **ACTIVITY 3 – Part 1**
- 1 copper washer
- 1 magnet

Discover

1. Now that everyone is familiar with the different types of pipes, let's experiment with them.
2. Knowing how each pipe reacts to the **Scratch Test** and **Magnet Test** will give you the information to identify the types of pipes in your own home.
3. Using the magnet, have everyone try picking up the pipe. Which pipe does the magnet stick to?
4. Using the copper washer, have everyone scratch each of the pipes. Observe what happens. Notice how the chalk/simulated lead pipe scratches easily. If this was a lead pipe you found in your home, a similar effect would occur if you scratched that pipe with the copper washer.

Decide

1. Looking at the **Pipe Puzzle Board**, where else might you find lead?

FIRST STEP: Get the facts about drinking water in your community and within your house. *There are no safe levels of lead.*

1. If your house was built before 1976, lead pipes and paint were used.
2. Where is your water coming from? If you suspect there's lead in your water, the first thing you should do is contact your water provider for information. Ask your water authority if your water has lead levels above 15 parts per billion (ppb), which is the maximum allowed by the Environmental Protection Agency, the federal agency that oversees clean drinking water. Then ask if the service pipe (or header pipe) at the street has lead in it.

If the lead isn't coming from your water provider, you need to test for lead contamination coming from inside your home.

SECOND STEP: Get your water tested. In addition to lead, there are other heavy metals that may be harmful, such as arsenic, iron, and others. Water quality varies from community to community.

THIRD STEP: Get your children tested for harmful elements such as lead.

FOURTH STEP: Participate in Crowd the Tap and help everyone get clean, safe drinking water.



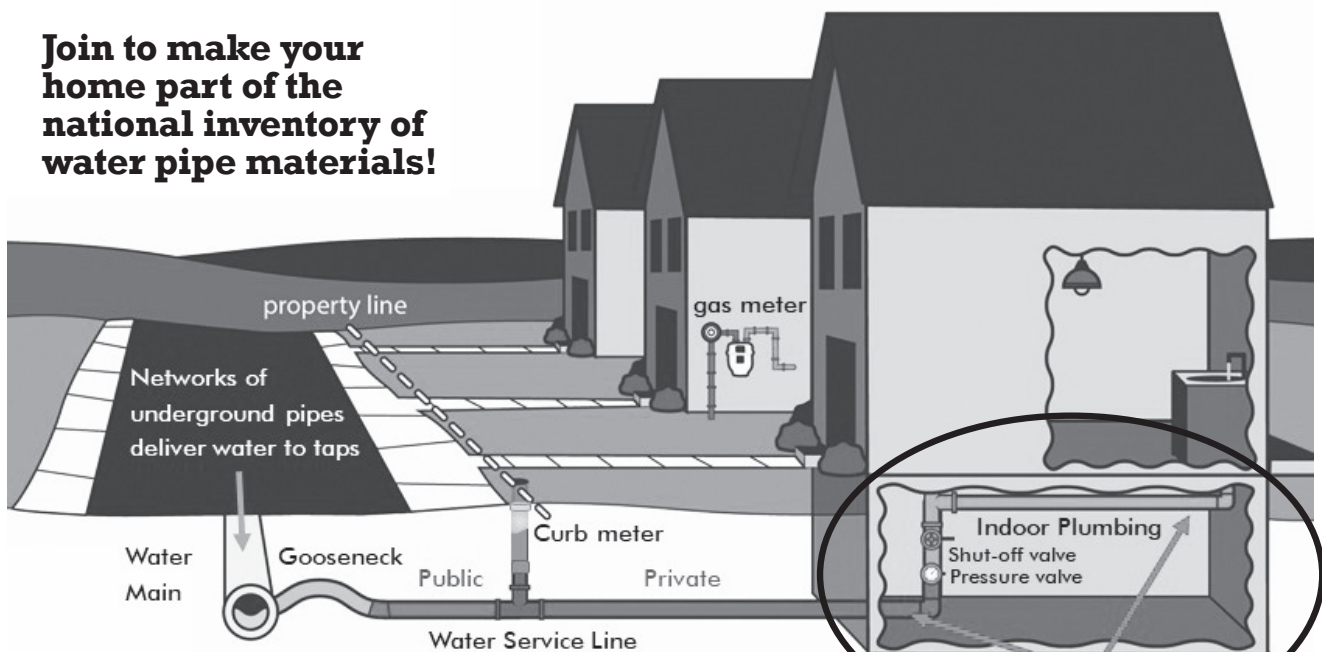
Lead is a natural element with thousands of uses. You cannot see, taste, or smell lead in drinking water. In the United States, it is estimated that half a million children ages 1 - 5 have unhealthy levels of lead in their bloodstreams.

Get The Lead Out

Act

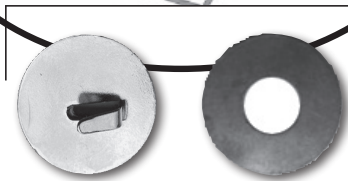
1. Now that you are familiar with the age of your home and the different types of pipes, let's find and test the pipes in your home.
 - Even if your home was built later than 1976, lead may still be present in water from a variety sources: 1) pipe solder; 2) brass faucets; 3) public water service lines; and/or 4) from surface water contamination of your well. Use the Crowd The Tap Insert that is in the kit, and test your pipes and water.
 - By adding the information about the pipes in your home, your family can become citizen scientists and help researchers find solutions to keeping your drinking water safe.
 - Go to the **Crowd the Tap ACTIVITY 4**. Use the Crowd the Tap Flyer to find and test your pipes and visit <https://scistarter.org/nlm/crowd-the-tap-nlm>.
2. For more information regarding lead poisoning and local resources pertaining to your community, please go to **Resources** on page 13 of this Guide.

Join to make your home part of the national inventory of water pipe materials!

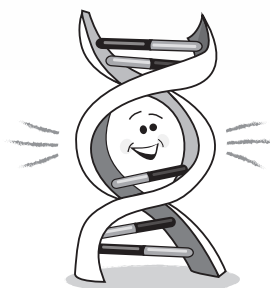


www.CrowdtheTap.org

Not sure of your pipe material? Look below ground for your **service line**, which connects to your main **indoor plumbing**.



Test both sections of pipe with magnet and copper washer.



What is the Crowd the Tap Citizen Science Research Project? The mission of *Crowd the Tap* is to ensure safe drinking water in the United States. Make your home part of the national inventory of water pipe materials! The inventory will help prioritize areas for tap water testing and infrastructure replacement. Being part of the inventory will connect you with others in your neighborhood and beyond who want to make drinking water safe for all. Please visit <https://scistarter.org/nlm/crowd-the-tap-nlm> for more information.

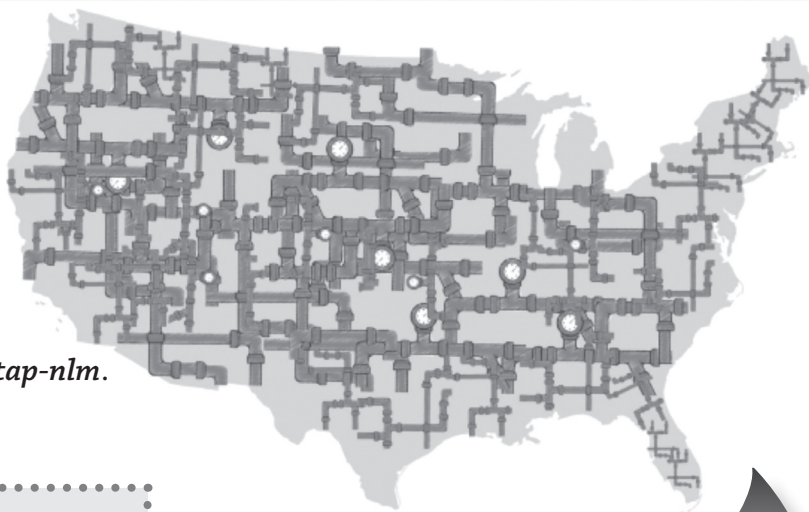


Materials

- 1 copper washer
- 1 magnet
- Computer or smartphone

Discover

This activity will require you to use the internet at <https://scistarter.org/nlm/crowd-the-tap-nlm>.

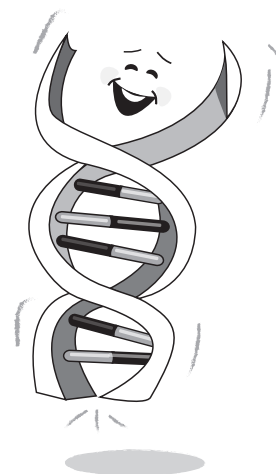


Celebrate Citizen Science Month

What is citizen science? Citizen science is a collaboration between researchers and your family who are curious, concerned and motivated to make a difference. Like Crowd the Tap, people just like you collect and share data to help scientists monitor water quality and help to advance health and medical research, the environment and other scientific fields.

Celebrate with the National Library of Medicine. April 2020 is Citizen Science Month dedicated to introducing families to real scientific research. SciStarter is an online community dedicated to improving the citizen science experience for researchers and participants. Go to scistarter.org/nlm to join today.

Find the "What's In Your Water?"/Crowd the Tap insert in this kit for 3 easy steps to test your pipes and water and, make a difference for your family and community.



Resources

Test The Waters

Where To Find More Information?



For more information on water and your family's health, environmental impacts, safe drinking water and the genetic effects of lead in water, the resources below can help.

National

National Institutes of Health (NIH)

All of Us Research Program is the ultimate citizen science opportunity. Learn about the *All of Us* Research Program and how to get involved: allofus.nih.gov.

Environmental Protection Agency (EPA)

Worried about lead in your home? Talk to a professional about lead, lead hazards, and prevention techniques. Visit the National Lead Information Center's webpage: epa.gov/lead/forms/lead-hotline-national-lead-information-center

Centers for Disease Control and Prevention

The Childhood Lead Poisoning Prevention has great easy-to-follow information on what you should do if you suspect that you might have lead in your drinking water: cdc.gov/nceh/lead/prevention/sources/water.htm

Office of Lead Hazards and Healthy Homes

hud.gov/program_offices/healthy_homes/leadinfo

National Center for Healthy Housing

National Lead Poisoning Prevention Week 2020 – National Lead Poisoning Prevention Week (NLPPW) is October 18-24, 2020. NLPPW aims to help individuals, organizations, and state and local governments to work together to reduce childhood exposure to lead. nchh.org/build-the-movement/nlppw/



State and Local Resources

Find out about the water quality programs in your state by visiting: cdc.gov/nceh/lead/programs/default.htm

SciStarter – SciStarter is an online community dedicated to improving the citizen science experience for project managers and participants. Over 3,000 projects and events are searchable by location, scientific topic, and age level. Join *Crowd the Tap* research project here: <https://scistarter.org/nlm/crowd-the-tap-nlm>

Crowd the Tap – A first step towards safe drinking water is helping create a national inventory of water pipe material. What materials were used to make your water pipes? crowdthetap.org

Did You Know...

Genetic Effects of Unsafe Water on Us

Every person's genetic makeup is unique. As a result, each one of us responds differently to the food we eat, our environment, the medications we take and everything that we come into contact with on a daily basis. This is also true within and around our homes—the paint on the walls, the water we drink and the dirt children play in outdoors.

Here are the side effects of lead poisoning for children:

- Headaches
- Behavioral problems and trouble concentrating
- Loss of appetite

For Adults: Some of the effects of lead poisoning may never go away. Most people with lead poisoning don't have noticeable signs or symptoms. A doctor can test you for lead by testing your blood. Similar to children, an adult's genes can make them more vulnerable to lead poisoning.



One of every six homes has more lead in the water than is safe for bottle-fed infants. The best way to know if your child is dealing with lead poisoning is to get a blood test.

This is something your pediatrician should be able to provide.

The Environmental Protection Agency says 10% to 20% of the typical adult's exposure to lead comes from contaminated drinking water.

- This increased sensitivity can decrease kidney function, increase blood pressure, cause hypertension, memory and concentration problems, create nerve disorders such as tremors, muscle and joint pain, and cause the early development of cataracts.
- For pregnant women, if lead is present in your blood, this will reduce your baby's growth in the first nine months.

For more information on lead poisoning, visit medlineplus.gov/leadpoisoning.html.



Help Us, Help You

All of Us Research Program

All of Us is powered by you. By joining the program, you can help advance the future of health for all. Find out how you can contribute to *All of Us* as a participant and how to sign up. The *All of Us* Research Program is inviting one million people across the U.S. to help build one of the most diverse health databases in history. We welcome participants from all backgrounds. Researchers will use the data to learn how our biology, lifestyle, and environment affect health. This

could help develop better treatments and ways to prevent different diseases. Join us in working to speed up medical breakthroughs that help treat all of us as individuals. For more information, visit: allofus.nih.gov/get-involved/participation.