

SCHOOL NAME Blue Hill Consolidated School

Project Title: All About Arsenic

School: Blue Hill Consolidated School

Grade Level: 7th and 8th

Teacher: Nell Herrmann

Project Partners: Who did you work with for this project? Name your mentor and their institution and any other partners. [Elisabeth Marnik, MDI Biological Laboratory. \(MDI Biological Lab, Dartmouth College, National Institutes of Health/SEPA, AnecData, Tuva.\)](#)

Teacher Profile: A brief biography of yourself. How long have you been teaching? What did you study in school? What are you passionate about inside and outside the classroom? Why are you interested in the All About Arsenic project? [This is my 19th year in the classroom. My background is in biology and ecology. I have two Masters degrees: one in Conservation Biology \(U Penn\) and another in Wildlife and Fisheries Science \(Penn State\). I am interested in this project because I have seen the value of using citizen science with students. Students tend to feel more engaged when they are collecting and manipulating real data.](#)

Summary: Provide a 500-word summary of your project. Describe the curriculum. How were arsenic monitoring and data literacy integrated into that curriculum? Provide specifics (# samples collected, what the samples were analyzed for, etc). [I integrated this project into my middle school physical science curriculum by focusing on NGSS Science and Engineering Practices and specific topics. My students and I collected 68 samples.](#)

[NGSS Science and Engineering Practices:](#)

[P1: Asking questions and defining problems](#)

[P3: Planning and carrying out investigations](#)

[P4: Analyzing and interpreting data](#)

[P5: Using mathematics and computational thinking](#)

[P8: Obtaining, evaluating and communicating information](#)

[Topics:](#)

[1\) Water contamination: biological vs. chemical](#)

[2\) Water underground: aquifers and more](#)

[3\) Background information: arsenic and well water](#)

[4\) Toxicology and Daphnia](#)

[5\) Graphing data/Data analysis](#)

[We analyzed data to answer four questions:](#)

[1\) Does filtered water have less arsenic?](#)

[2\) How much arsenic is in unfiltered water by school?](#)

[3\) What is the prevalence of arsenic in drinking water in participating towns in Maine?](#)

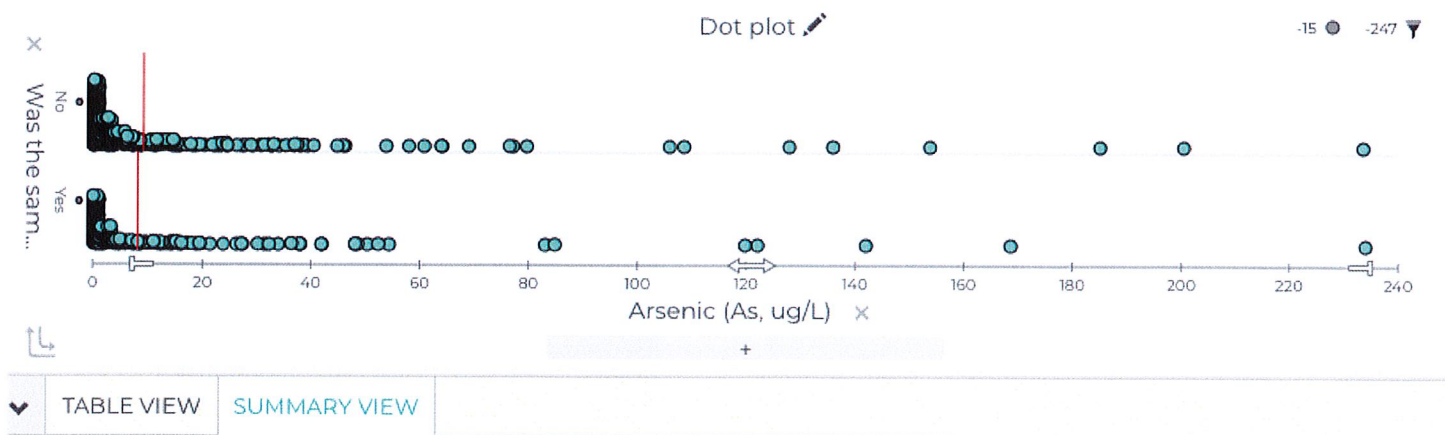
[4\) What proportion of unfiltered samples from Blue Hill were above the 10 ppb threshold?](#)

[Please see attached lesson plans and documents I created to teach these NGSS Practices and topics.](#)

Project Details:

- Detail specific curricular items such as questions, articles, books, YouTube videos, and labs. It's helpful if you provide links. [Please see the attached documents, which I created and used for this project.](#)
- Did you:
 - Collaborate with any other teachers in your school? No
 - Go on any field trips? Why and where? No
 - Conduct any experiments? What kinds of questions did students ask? Yes, we did a toxicology study with *Daphnia*. Students collected data about mortality rate, heartbeats per minute and number of movements/behavior when *Daphnia* were placed in spring water vs. water with 182 ppb arsenic.
 - Use your stipend to purchase anything for your classroom? If so, what, and how did you use it? Yes. I purchased *Daphnia*, an aquarium, sampling tubes and ParaFilm, envelopes for the samples, and copies of *Assessing Toxic Risks* (recommended by Dr. Disney at the workshop) teacher and student guides.
 - Invite any guests to visit your classroom? Dr. Elisabeth Marnik from MDI Biological Lab visited and discussed her work with *C. elegans*. Students had the opportunity to examine *C. elegans* under dissecting scopes.
- How did you use Tuva, both for the arsenic data and for other datasets? [I used Tuva to analyze arsenic datasets with students. Please see data analysis below.](#)

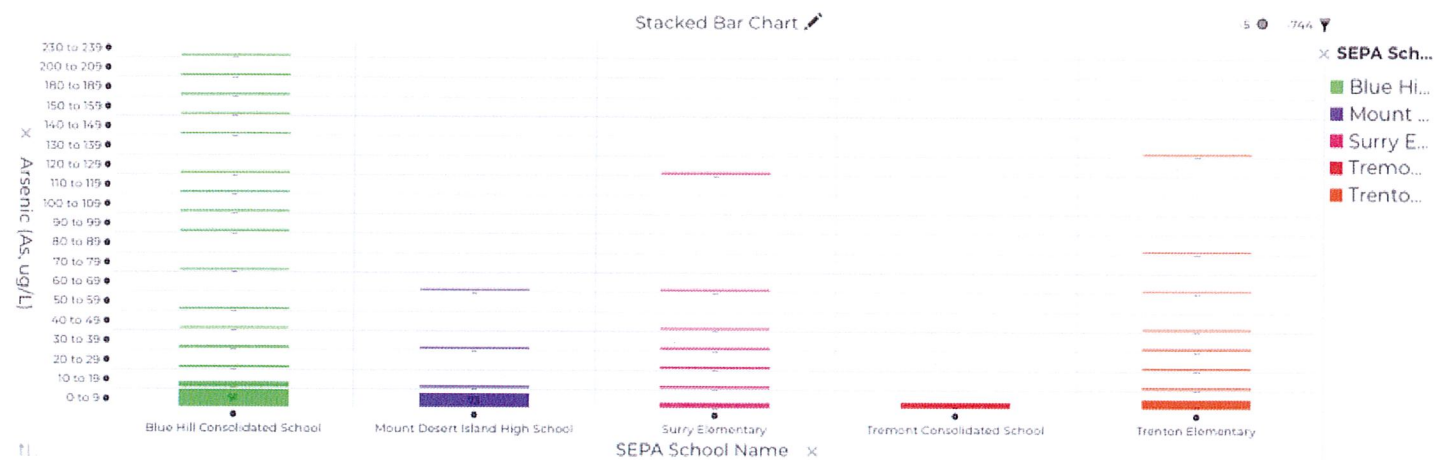
Does filtered water have less arsenic?



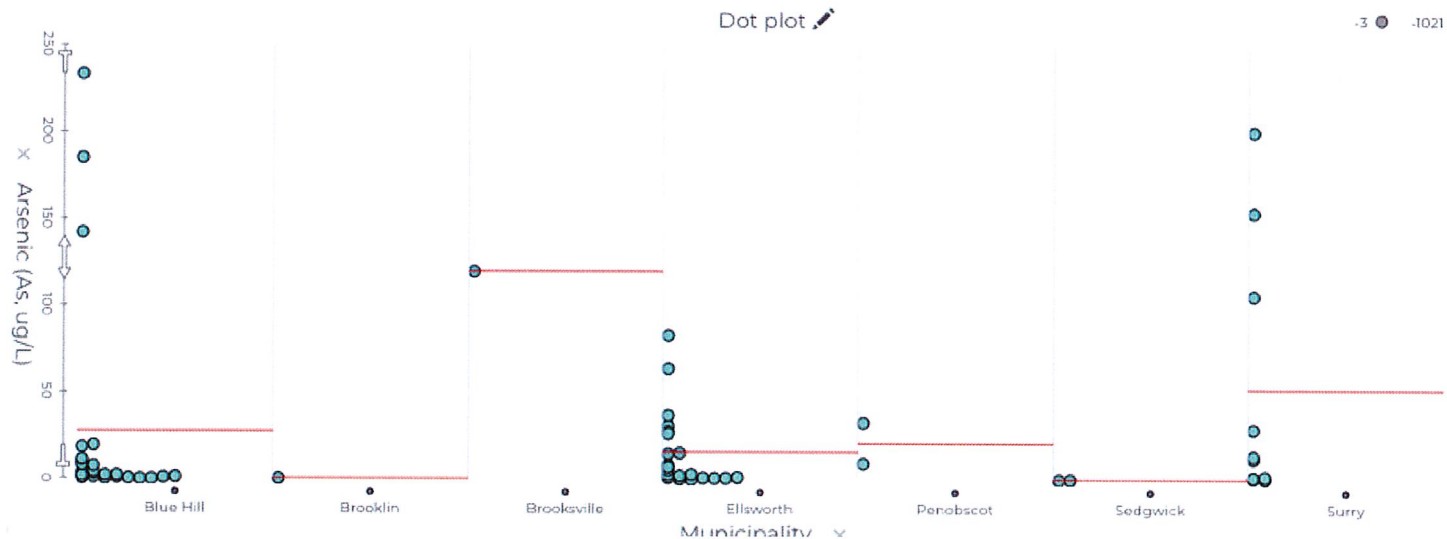
Mean

| | Arsenic (As, ug/L) |
|-----|--------------------|
| No | 9.24 |
| Yes | 8.26 |

How much arsenic is in unfiltered water by school?

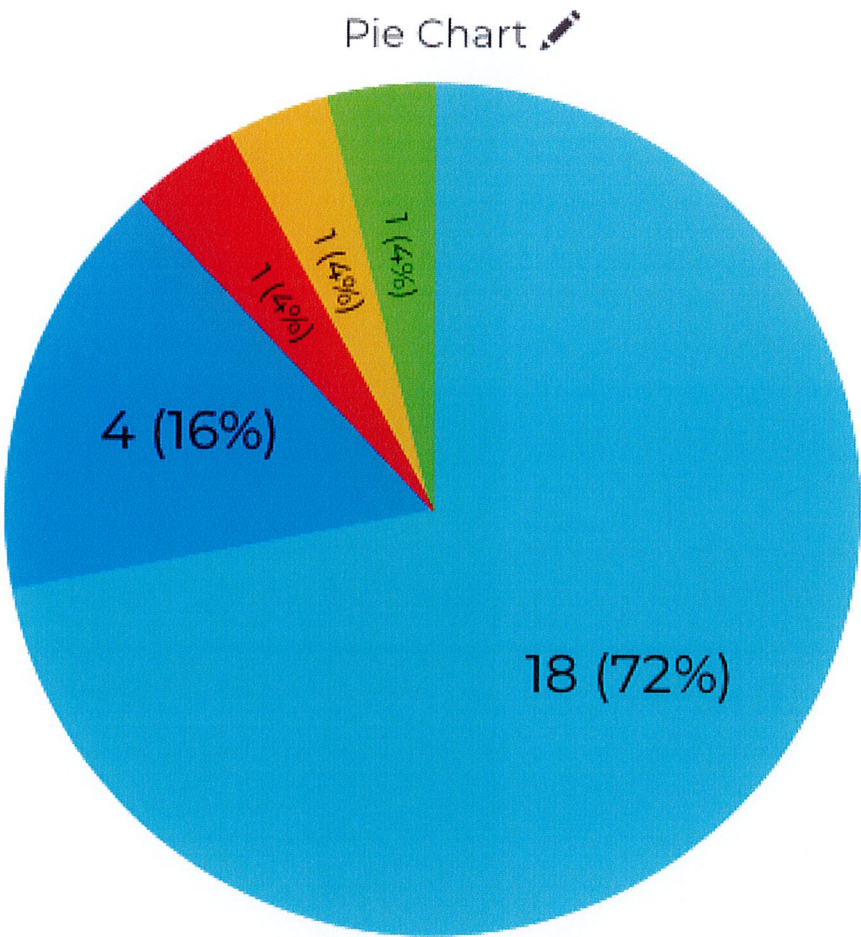


What is the prevalence of arsenic in drinking water in participating towns in Maine?



| | Blue Hill | Brooklin | Brooksville | Ellsworth | Penobscot | Sedgwick | Surry |
|--------------------|-----------|----------|-------------|-----------|-----------|----------|-------|
| Arsenic (As, ug/L) | 27.27 | 0.24 | 119.81 | 15.8 | 20.96 | 0.09 | 51.95 |

What proportion of unfiltered samples from Blue Hill were above the 10 ppb threshold?



| | | |
|---------------|----|-----|
| 0 to 9.99 | 18 | 72% |
| 10 to 19.99 | 4 | 16% |
| 140 to 149.99 | 1 | 4% |
| 180 to 189.99 | 1 | 4% |
| 230 to 239.99 | 1 | 4% |

- How did you plan your community meeting? Based on the experiences I had in 2016, I planned a successful community meeting. We hung flyers, posted a notice on the sign at the school entryway, advertised in the school newsletter, on Facebook and through an e-mail blast.
 - Where was it? Blue Hill Consolidated School Cafeteria
 - What did the students do? Presented a Power Point summary of the project and the results of the data analysis they completed using Tuva. Presented results of their Daphnia research on tri-fold poster displays.
 - How many people attended? 30-35 community members/parents.

- Include any data analyses your students did. [Please see charts and graphs above.](#)

Discussion:

- What did students learn? It's great to include quotes if you have them. [Students learned a great deal about the importance of water testing, water quality safety, science communication, data analysis and citizen science.](#)
- What did you learn? [I learned new techniques in data analysis and gained confidence in my ability to use Tuva.](#)
- What would you do differently? [Next time around, I would have students analyze simple data sets on Tuva first, rather than jumping right in to the arsenic data.](#)

Conclusion: A few sentences to bring everything together. [Thank you for the opportunity to participate in this project. I participated in 2016 and was pleased to see a sharper focus on data literacy this time around. This project was meaningful for my students, for me and for the Blue Hill community. Many parents and community members have expressed their gratitude and several students have told me they found the project, including the community meeting, fun and exciting.](#)

References:

Centers for Disease Control and Prevention. Arsenic and Your Health. Retrieved from:
<http://ephtracking.cdc.gov/showArsenicHealth.action>

Dolasia, M., The Water Crisis in Flint, Michigan. Retrieved from <http://www.dogonews.com/2016/1/20/the-water-crisis-in-flint-michigan>

Lawrence Hall of Science: UC Berkeley. Science Education for Public Understanding Program (SEPUP) textbook series.

Maine Geological Survey, Department of Agriculture, Conservation & Forestry, Maine's Groundwater and Wells. Retrieved from <http://www.maine.gov/dacf/mgs/explore/water/index.shtml>

Prentice Hall (2009). Science Explorer: Earth's Waters. Upper Saddle River, New Jersey: Prentice Hall Publishers.

Trautmann, Nancy. *Assessing Toxic Risk: Student Edition and Teacher Edition*. Cornell Scientific Inquiry Series. NSTA Press.

World Health Organization, Chemical Hazards in Drinking Water: Arsenic. Retrieved from:
<http://www.who.int/mediacentre/factsheets/fs372/en/>

Name _____ Date _____

Water Quality Test

Section One: Use the word bank to fill in the blanks below. SPELLING COUNTS.

| | |
|-------------------|--------------------------|
| cholera | solvent |
| coliform bacteria | solute |
| nitrates | solution |
| arsenic | biological contamination |
| lead | chemical contamination |

- 1) High levels of _____ in water can cause "blue baby" syndrome.
- 2) _____ live in the intestines of humans and other animals. These are used as a measure of the presence of feces in water.
- 3) In a solution, the _____ is the substance in which the solute dissolves.
- 4) A _____ is a mixture that forms when one substance dissolves in another.
- 5) Dr. John Snow studied _____, a bacterial infection caused by the ingestion of contaminated water or food.
- 6) High levels of _____ were discovered in drinking water in Flint, Michigan.
- 7) _____ is caused by living things like bacteria. Two examples are coliform bacteria and cholera.
- 8) _____ is caused by non-living things, for example lead or arsenic, that get into ground water or surface water.

9) High levels of the toxin _____ can be found in some drinking water on the Blue Hill peninsula.

10) The _____ is the substance that is dissolved in a solution. It's usually a solid.

Section Two: Short essay. Answer FOUR of the five questions below on lined paper. Please use complete sentences and number your responses. If you answer all five questions, you will receive EXCEEDS credit.

1) Explain what Dr. John Snow discovered about the Broad Street Pump.
In your answer address:

- What did Dr. Snow do to trace back the outbreak to a single point?
- What was the bacteria that was killing people on Broad Street and how did it get into the water supply?
- What are symptoms of the victims before they died?

2) What are special characteristics of water? In your answer address:

- What are adhesion and cohesion?
- Water is a universal solvent. Explain.
- What is capillary action?

3) Describe the lab we did in which we compared ethanol and water to dissolve different substances.

- What were the solvents used in the lab?
- What were three of the solutes used in the lab?
- What does it mean when we say water is a "universal solvent"?

4) What is the difference between point source and nonpoint source pollution? Give examples of each.

5) How do we get our drinking water in Blue Hill? How is this different from a larger town or city?

Name _____ Date _____

Water Underground Quiz

Directions: Use the word banks to complete the quiz. Because you have word banks, spelling counts! Take your time.

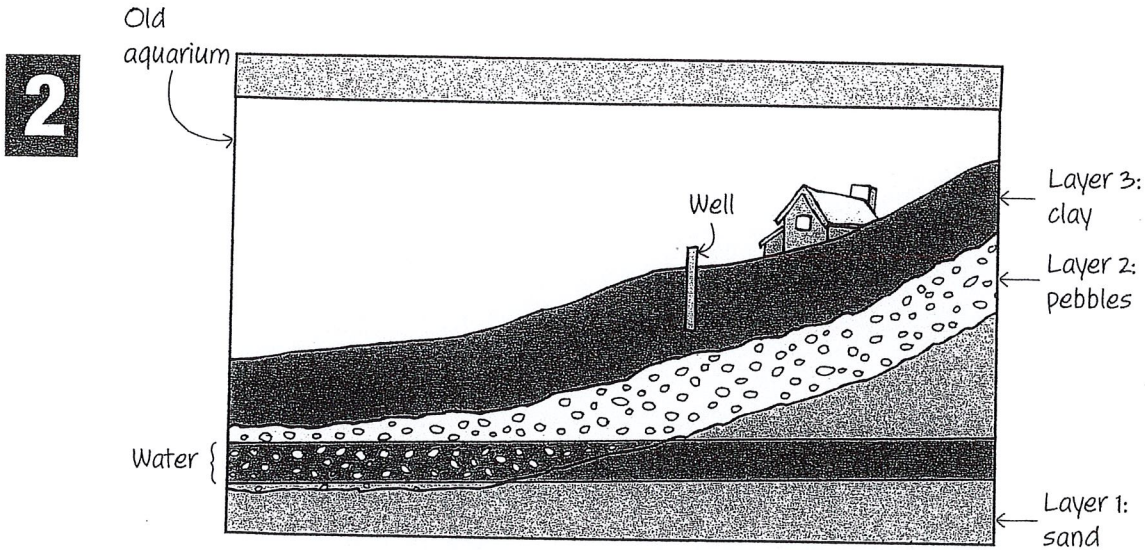
| | |
|------------------|---------------|
| unsaturated zone | geyser |
| water table | artesian well |
| pores | spring |
| saturated zone | recharge |
| permeable | aquifer |
| impermeable | well |

| | |
|-----------------------------------------------------------------------------------------------|--|
| characteristic of materials- allows water to easily pass through them- such as sand or gravel | |
| characteristic of materials through which water does not easily pass, such as clay or granite | |
| top of the saturated zone, or depth to groundwater in an aquifer | |
| layer of permeable rock or soil in which cracks and pores are totally filled with water | |
| layer of rocks and soil above the water table in which pores contain air as well as water | |
| tiny openings in and between particles of rock and soil which contain air or water | |
| well in which water rises because of pressure within an aquifer | |
| new water that enters an aquifer from the surface (usually from rain or snow) | |
| a hole dug into the ground that brings groundwater to the surface | |
| places where underground water bubbles or flows out of cracks in a rock | |
| underground layer of rock and soil that holds water | |
| type of hot spring from which water bursts periodically into the air | |

SECTION 2-5**ENRICH**

A Model Aquifer

Mrs. Cohen's science class is making displays for Parents' Night at the school. One student has decided to make a model of an aquifer. This drawing shows the student's plan for the model.



Write an answer for each of the following questions in the spaces provided.

1. Study the layers in the diagram. How would Layer 3 affect runoff?

2. Would water collect where it is shown on the diagram? Explain your answer.

3. Would the well shown on the plan work in real life? Explain.

4. Redraw the plan for the model, showing any changes you would make. Include the underground layers, the well, and the water table. Label the layers to show the materials you would use if you were building the model.

| | | | |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------|
| 1. adhesion | an attraction between molecules of different substances (water has this property) | 19. pores | tiny openings in rock and soil that hold water or air |
| 2. aquifer | underground layer of rock or soil that holds water | 20. recharge | new water that enters an aquifer from the surface |
| 3. arsenic | high levels of this toxin can be found in some drinking water on the Blue Hill peninsula | 21. saturated zone | layer of impermeable rock or soil in which the pores are totally filled with water |
| 4. artesian well | well in which water rises because of pressure within the aquifer | 22. solute | the substance that is dissolved (usually a solid) |
| 5. biological contamination | living organisms (bacteria, viruses and parasites) that cause contamination | 23. solution | a mixture that forms when one substance dissolves another |
| 6. capillary action | the combined force of attraction among water molecules and with the molecules of surrounding materials (causes water to travel up stems in plants, for example) | 24. solvent | the substance in which the solute dissolves (the liquid part) |
| 7. chemical contamination | the presence of chemicals such as fertilizers, gasoline, oil, heavy metals, or acids introduced into ground water, surface water, land or the atmosphere. | 25. spring | place where groundwater bubbles or flows out of cracks in the rocks |
| 8. cholera | a bacterial infection caused by ingestion of contaminated water or food; cause of an epidemic in London in the 1840s and 1850s | 26. surface tension | tightness across the surface of water |
| 9. cohesion | an attraction between molecules of the same substance (water has this property) | 27. unsaturated zone | layer of rocks and soil above the water table in which the pores contain air as well as water |
| 10. coliform bacteria | bacteria that live in the intestines (including the colon) of humans and other animals, used as a measure of the presence of feces in water | 28. water table | top of the saturated zone, or depth to groundwater in an aquifer |
| 11. Dr. John Snow | traced the source point of 1840's and 1850's cholera outbreaks in London to the Broad Street pump | 29. well | deep hole drilled or dug into the ground to reach a reservoir of groundwater |
| 12. geyser | type of hot spring in which the water is under pressure and bursts periodically into the air | | |
| 13. impermeable | materials through which water does not easily pass, such as clay and granite | | |
| 14. lead | high levels of this toxin have been present in drinking water in Flint, Michigan since 2016 | | |
| 15. nitrites | high levels in water can cause "blue baby" syndrome | | |
| 16. nonpoint source | a widely spread source of pollution that is difficult to link to a specific point of origin, such as road runoff | | |
| 17. permeable | materials that allow water to easily pass through them, such as sand and gravel | | |
| 18. point source | a specific source of pollution that can be identified, such as a pipe | | |

Name _____ Date _____

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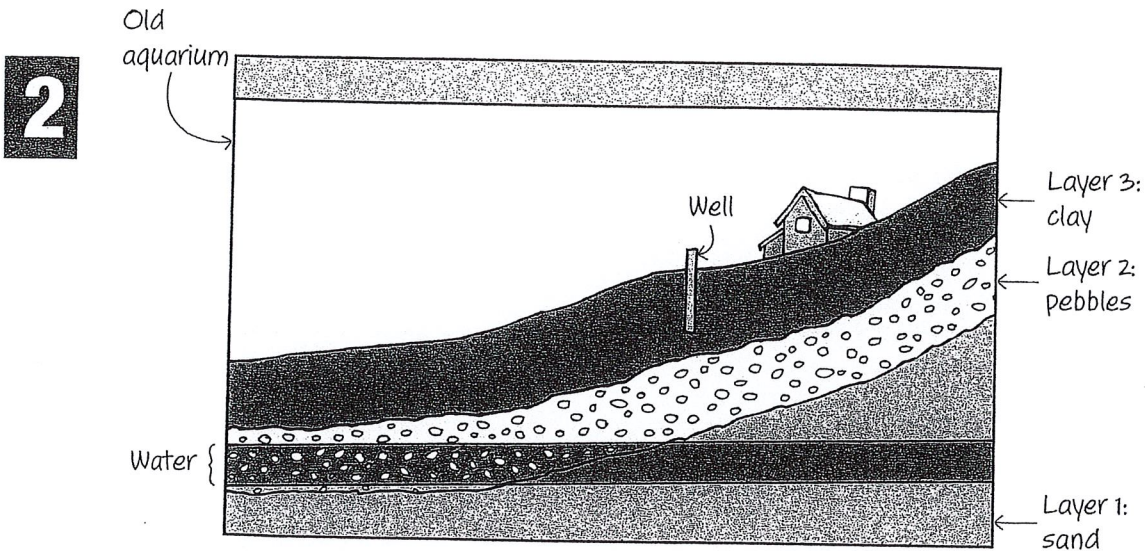
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|------------------|---------------|
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Name _____ Date _____

All About Arsenic: Background Information

Directions: Use the website www.allaboutarsenic.org to answer the questions below.

1) Maine and New Hampshire have among the highest per capita use of private wells for drinking water.

a) define per capita:

b) What % of people in ME use private wells? _____ NH? _____

2) What % of wells in ME have elevated levels of arsenic? _____ NH? _____

3) Complete the following sentence: Arsenic, a naturally occurring contaminant in groundwater is the number one _____

4) Longterm exposure to arsenic can lead to health problems including:

5) The project we are about to begin is a STEM project. What does STEM mean?

6) What is the title of our project?

7) Complete the following sentence: This project will engage you as a citizen scientist and provide you with _____

8) What is the EPA maximum contaminant level for arsenic? _____

9) List the four “Data Literacy” pieces of this project:

10) List the five “Scientific Process” pieces of this project:

11) List the five “Action” pieces of this project:

NAME _____ DATE _____

INTRODUCTION TO ARSENIC

DIRECTIONS: TODAY YOU WILL BE COLLECTING BACKGROUND INFORMATION ABOUT ARSENIC. IN THE COMING WEEKS, WE WILL BE COLLECTING TAP WATER SAMPLES FROM AROUND BLUE HILL AND TESTING THEM FOR ARSENIC. ARSENIC CONTAMINATION IS A SERIOUS PROBLEM ON THE BLUE HILL PENINSULA, SO THIS IS AN IMPORTANT TOPIC FOR US TO STUDY! YOU WILL COLLECT INFORMATION FROM TRIFOLD POSTERS THAT FORMER STUDENTS HAVE MADE, AND FROM A WEBSITE. REFER TO THE SECTION HEADINGS TO KNOW WHERE TO FIND THE ANSWERS.

TRIFOLD POSTERS

POSTER 1: PRIVATE WATER WELLS

- 1) HOW MANY HOMES IN THE U.S. USE PRIVATE DRINKING WELLS?

- 2) HOW MANY HOMES IN MAINE USE PRIVATE DRINKING WELLS?

- 3) THE EPA (ENVIRONMENTAL PROTECTION AGENCY) CONSIDERS LEVELS OF ARSENIC UNSAFE WHEN THEY ARE ABOVE WHAT NUMBER? (PPB IS PARTS PER BILLION.)

- 4) WHAT WAS THE AVERAGE LEVEL OF ARSENIC FOUND BY BHCS STUDENTS IN 2016?

- 5) WHAT PERCENTAGE OF PEOPLE IN HANCOCK COUNTY GET WATER FROM WELLS?

- 6) WHAT PERCENTAGE OF PEOPLE IN MAINE GET WATER FROM WELLS?

POSTER 2: EFFECTS OF ARSENIC ON THE HUMAN BODY

- 1) LIST THREE IMMEDIATE SYMPTOMS OF ARSENIC EXPOSURE.
- 2) LIST THREE LONG-TERM EFFECTS OF ARSENIC EXPOSURE.
- 3) LIST ALL OF THE BODY SYSTEMS AFFECTED BY ARSENIC EXPOSURE.

POSTER 3: WHAT IS ARSENIC?

- 1) ARSENIC IS A _____ ELEMENT.
- 2) WHAT IS THE CHEMICAL SYMBOL FOR ARSENIC?
- 3) HOW DOES ARSENIC SMELL?
- 4) HOW DOES ARSENIC TASTE?
- 5) ARSENIC IS NATURALLY PRESENT AT HIGH LEVELS IN
_____ IN CERTAIN PARTS OF THE
WORLD.
- 6) LIST THE PLACES IN THE U.S. THAT HAVE HIGH LEVELS OF ARSENIC IN
GROUNDWATER.
- 7) LIST THREE COUNTRIES (NOT INCLUDING THE U.S.) THAT HAVE HIGH
LEVELS OF ARSENIC IN GROUNDWATER.

POSTER 4: HOW DOES ARSENIC GET INTO YOUR WELL WATER?

- 1) HOW OFTEN SHOULD YOU TEST YOUR WELL WATER FOR ARSENIC?

- 2) IF YOUR TEST RESULTS FOR ARSENIC ARE ABOVE _____ PARTS PER BILLION (PPB), YOU SHOULD SPEAK TO AN EXPERT.

- 3) LOOK AT THE MAP IN THE CENTER OF THE POSTER BOARD. WHERE ARE ARSENIC LEVELS THE HIGHEST?

- 4) WHAT WAS THE AVERAGE LEVEL OF ARSENIC IN BLUE HILL IN 2016?

- 5) WHAT WAS THE AVERAGE LEVEL OF ARSENIC IN ELLSWORTH IN 2016?

- 6) WERE ARSENIC LEVELS ON MDI SAFE IN 2016? EXPLAIN.

USE THE WEBSITE [HTTPS://KIDSENVIROHEALTH.NLM.NIH.GOV/SUBTOPIC/002/CHEMICALS/019/ARSENIC/](https://kidsenvirohealth.nlm.nih.gov/subtopic/002/chemicals/019/arsenic/) TO FIND FIFTEEN MORE FACTS ABOUT ARSENIC. WRITE YOUR FACTS BELOW AND ON THE BACK OF THIS PAGE. PLEASE NUMBER THEM- IF YOU WRITE MORE THAN 15, YOU WILL RECEIVE EXTRA CREDIT.

Name _____ Date _____

Testing Drinking Water: Part One

Introduction: In the coming weeks, we will be examining many aspects of our drinking water to determine whether or not it is safe. Water contamination can be biological or chemical. Take a moment to think about the difference. Today's lab will examine two types of chemical contamination and one type of biological contamination. You will rotate through four stations and perform a three different tests with your lab table partners. At the fourth station, you will use your iPad to do some simple research about nitrates, pH and coliform bacteria. If you finish your tests at the other three stations and are waiting, work on the research questions on your iPad.

pH Test

Follow the instructions on the card. Run at least two tests at the same time, and compare results with the other people at your lab table. What was the pH of BHCS tap water? _____

Nitrate Test

Follow the instructions on the card. Run at least two tests at the same time, and compare results with the other people at your lab table. What was the nitrate level of BHCS tap water? _____

Coliform Bacteria Test

Follow the instructions on the card. You will only complete one test here. How long does this test take to show a result? _____
Once enough time has passed, how can you tell if your water sample contains coliform bacteria or not?

iPad Research

Use your iPad to answer the questions below:

1) What is pH?

2) Describe the pH scale. What numbers are on it? What is acidic, neutral, basic?

3) What should the pH of drinking water be?

4) Why is it bad if there are nitrates in your drinking water?

5) What is a safe level for nitrates in the water?

6) What is coliform bacteria?

7) If there is coliform bacteria in the water, what does it mean?

Analysis Questions

1) Is the pH of our drinking water at BHCS acceptable? Explain.

2) Is the nitrate level of our drinking water at BHCS acceptable? Explain.

3) Do you predict there will be coliform bacteria in the drinking water at BHCS? Explain.

NAME _____

DATE _____

WATER QUALITY LESSON TWO: THE PROPERTIES OF WATER

INTRODUCTION:

YESTERDAY WE HAD AN INTRODUCTION TO THE NEW WATER QUALITY UNIT. WE LEARNED THAT THE PEOPLE IN FLINT, MICHIGAN HAVE HAD A PROBLEM WITH THEIR WATER SINCE 2016. THE WATER WE DRINK DIRECTLY AFFECTS OUR HEALTH. IT IS IMPORTANT TO UNDERSTAND WHERE OUR DRINKING WATER COMES FROM AND HOW TO FIND OUT WHETHER OR NOT IT'S SAFE. BEFORE WE LEARN ABOUT ALL OF THAT, LET'S LEARN ABOUT SOME OF THE BASICS OF WATER. WHAT ARE THE PROPERTIES OF WATER?

LAB PROCEDURE:

- 1) GET A CUP OF WATER AND A CUP OF VEGETABLE OIL AS DIRECTED.
- 2) CUT TWO EQUAL SIZED STRIPS OF PAPER TOWEL. MAKE THEM ABOUT AN INCH THICK.
- 3) HOLD THE STRIPS SO THAT THE BOTTOM OF ONE STRIP IS IN THE WATER AND THE OTHER IS IN THE OIL.
- 4) AFTER ONE MINUTE, MEASURE HOW HIGH EACH SUBSTANCE CLIMBED UP THE PAPER TOWEL. WRITE YOUR INFORMATION IN THE DATA TABLE BELOW.
- 5) USE A PLASTIC DROPPER TO PLACE A DROP OF WATER AND A DROP OF OIL ON A PIECE OF WAXED PAPER. DON'T COMBINE THE LIQUIDS, BUT PLACE THEM SIDE BY SIDE, ABOUT 3 CENTIMETERS APART.
- 6) OBSERVE THE SHAPE OF THE TWO DROPS FROM ABOVE AND FROM THE SIDE. RECORD YOUR OBSERVATIONS IN THE DATA TABLE. (HINT: DOES ONE LOOK FLATTER THAN THE OTHER?)
- 7) CLEAN UP AS DIRECTED.

| | HEIGHT (CM) TRAVELED UP THE PAPER TOWEL. | OBSERVATIONS: SHAPE OF DROPLET. |
|-------|---------------------------------------------|---------------------------------|
| WATER | | |
| OIL | | |

SCAN = PAGES 24-28 IN THE EARTH'S WATERS TEXTBOOK TO FIND ANSWERS TO THE QUESTIONS ON THE BACK OF THIS PAGE. USE THE BOLD FACE TERMS IN THE BOOK TO GUIDE YOU.

1) LOOK AT FIGURE 6 ON PAGE 24. READ THE CAPTION FOR THE IMAGE. DRAW A PICTURE SHOWING THE ARRANGEMENT OF WATER MOLECULES BELOW. BE SURE TO INCLUDE THE POSITIVE AND NEGATIVE ENDS.

2) THE _____ HYDROGEN ENDS OF ONE WATER MOLECULE ATTRACT THE _____ OXYGEN ENDS OF NEARBY WATER MOLECULES. AS A RESULT, WATER MOLECULES TEND TO _____ TOGETHER.

3) THE TIGHTNESS ACROSS THE SURFACE OF WATER IS CALLED _____.

4) THE COMBINED FORCE OF ATTRACTION AMONG WATER MOLECULES AND WITH MOLECULES OF SURROUNDING MATERIALS IS CALLED _____,

5) A _____ - IS A MIXTURE THAT FORMS WHEN ONE SUBSTANCE DISSOLVES IN ANOTHER. WATER IS GOOD AT DISSOLVING MANY THINGS, SO IT IS CALLED A UNIVERSAL _____.

6) WATER CAN EXIST IN THREE DIFFERENT STATES OF MATTER. WHAT ARE THEY?

* ICE WHICH IS A _____

* WATER WHICH IS A _____

* WATER VAPOR WHICH IS A _____

Name _____ Date _____

Water Underground: Science Explorer Book

Directions- Read pages 68, 69, and 72-74. Give definitions for the vocabulary words and answer the questions.

1) How does underground water travel? _____

2) Define the words below:

pores

permeable

impermeable

saturated zone

water table

unsaturated zone

aquifer

well

recharge

artesian well

spring

geyser

3) Draw a cross section of the ground that includes the following LABELED features:

- permeable layer
- saturated zone
- unsaturated zone
- impermeable layer
- water table

Name _____

Date _____

Cholera Research

Directions: Use the TeensHealth.org website to answer the following. For exceeds credit, go to the **WHO 10 Facts on Cholera** website and summarize the information there on a separate sheet of paper.

1) What is cholera?

2) How do people get cholera?

3) What is the name of the bacteria that causes cholera?

4) What are the symptoms of cholera? (LIST AT LEAST EIGHT SYMPTOMS)

1)

2)

3)

4)

5)

6)

7)

8)

5) When is cholera easy to treat?

6) How long does it take to recover from cholera?

- 7) In what part of the world is cholera mostly found? (LIST FIVE REGIONS)
- 8) What should you do if you are visiting an area that has cholera?
- 9) How does food and water get contaminated with cholera?
- 10) How do flush toilets, sewer systems, and water treatment facilities help to prevent the spread of cholera?
- 11) Why might earthquakes or floods be linked to cholera outbreaks?
- 12) How do doctors test for cholera?
- 13) Why does cholera need immediate treatment?
- 14) What do doctors sometimes prescribe to treat cholera?
- 15) List **three** precautions you can take if you are going to an area that has cholera.