

Name _____ Date _____

Activity 30: Can You Taste the Difference? SEPUP pages C-4 to C-6

CHALLENGE: _____

Directions: Read the procedure in your book and record your data in the tables below. When you are finished, answer the analysis questions.

Water Sample	Appearance	Smell	Taste	Predicted Sample Identity
A				
B				
C				

Sample	Predicted Identity	Actual Identity
A		
B		
C		

Analysis

1) Which water sample tasted best to you, and why?

2) Would you spend the extra money on bottled spring water, after your taste-test experience? Why or why not?

3) Some people might disagree with your decision for Analysis Question 2. What reasons do you think they would give for their opinion?

4) Reflection: What other information about spring, tap, and distilled water would you like to investigate further before you decide which water to drink?

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Freshwater Pollution

Directions: Read pages 97-104 in the Science Explorer book to answer the questions below.

1) What is water pollution?

2) What are the major sources of water pollution?

3) What is point source pollution? Give an example.

4) What is non-point source pollution? Give an example.

5) What was Dr. Snow's discovery?

6) How do we dispose of sewage in rural areas like Blue Hill? How can this be a problem when it comes to drinking water?

7) Give three examples of industrial waste that may pollute water.

8) Give an example of an agricultural chemical that may pollute water.

9) How can runoff from roads pollute water?

10) Give examples of ways pollutants are removed from freshwater bodies through natural cleaning processes.

11) How can YOU help prevent pollutants from entering water?

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Dissolving Duel: Solubility

Background: Today's lab will focus on the idea that water is the 'UNIVERSAL SOLVENT.' There are many steps to this lab and it's fun, but you must follow directions carefully for it to work correctly. Safety goggles must be worn during this lab.

Procedure: At your table, decide who is going to do the experiment with ethanol and who is going to do it with water. You will need to share results at your table to complete the data table. Follow the steps below.

- 1) Put 1 spoonful (use the white spoon marked 1.0 g) of cornstarch in a large well of the SEPUP tray.
- 2) Add two spoonfuls of the liquid (ethanol or water) you are testing to the well containing corn starch.
- 3) Use a toothpick to stir.
- 4) Does the corn starch dissolve? Record your results in the data table.
- 5) Repeat for each of the solutes (sugar, sodium chloride, iron chloride, Lauric acid, copper sulfate, neroline yara yara).
- 6) You will need to rinse your tray between trials. Do this carefully at the sink.
- 7) When you finish, be sure to rinse and wipe out your tray. Clean up completely so that the next class can complete the lab easily.

	Does it dissolve in ethanol? Yes or no	Does it dissolve in water? Yes or no
Cornstarch		
Sugar		
Sodium chloride		
Iron chloride		
Lauric acid		
Copper sulfate		
Neroline yara yara		

Analysis Questions- You may use your iPad to help you find answers.

- 1) Water is the "universal solvent." Google that. What does it mean?
- 2) How does the idea that water is the "universal solvent" apply to today's lab?
- 3) What does solubility mean?
- 4) Define solvent.
- 5) Define solute.
- 6) Define solution.
- 7) Give one example of a solvent from today's lab.
- 8) Give one example of a solute from today's lab.

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Using Daphnia to Monitor Water Toxicity

Directions: Go to the website Ms. Herrmann sent you. It's on the "Science Buddies" site, and titled: Using Daphnia to Monitor Water Toxicity.

(https://www.sciencebuddies.org/science-fair-projects/project-ideas/EnvSci_p043/environmental-science/using-daphnia-to-monitor-water-toxicity#summary)

1) Click the **Background Information** tab.

A. What is a watershed?

B. What are threats to watersheds?

C. What is a bioassay?

D. List five facts about *Daphnia magna* below:

2) Click the **Materials** tab.

A. Think about which substance you might like to test on Daphnia. Write your ideas below.

B. What materials are needed for this lab?

3) Click the **Procedure** tab.

A. Why shouldn't you use tap water for Daphnia?

4) Click the **Make it Your Own** tab.

A. Do you have ideas for how you could alter this experiment?

B. What are things about Daphnia you could count or measure?

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Daphnia- Toxicology Experiment

Before you begin your experiment, you must have a plan. Answer the questions below and get a signature from Ms. Herrmann before proceeding with your experiment. Solutions available to you are: salt+ water, sugar+ water, arsenic+ water, and ethyl alcohol + water.

Step One: Which chemical(s) are you going to study for your experiment? Remember, you cannot combine chemicals in this experiment.

Step Two: How many treatments are you going to have? List them below. The control (plain water) is already listed for you.

Control- Plain Water

Treatment one: _____

Treatment two: _____

Others?

Step Three: What are you going to count or measure (circle one or write down a different idea). Heart beat? Movements? Mortality rate? Other?

Step Four: What is your hypothesis? In other words, what do you think will happen?

Step Five: Set up your data table below. How will you record data?

Ms. Herrmann's signature: _____

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Instructions: Daphnia Lab Report

1. Open a new Pages document and save it as, "Your Name: Daphnia Lab Report."
2. Make the following headings, so you know what sections you'll need:
 - Research Question
 - Hypothesis
 - Experiment Description
 - Data Table
 - Graph
 - Conclusion

-
- Research Question: What were you testing? (For example: The effect of ethyl alcohol on Daphnia heart rate.)
 - Hypothesis: What did you predict?
 - Experiment Description: Explain exactly what you did. This should be four or more sentences long.
 - Data Table: Insert a data table, showing the data you collected.
 - Graph: Complete a graph (most likely this will be a bar graph).
 - Conclusion: What does your data show? Was your hypothesis correct? This should be three or more sentences long.

Each section of this lab report is worth 5 points. Your final score will be out of 30 points.

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Graphing Stations Lab

Ball toss Part One- Set a timer for one minute. Have two people from your lab table sit at opposite ends of the table. Use your dominant hand to toss a ball back and forth. You do not need to hurl the ball at each other; toss it gently. The people who are not tossing the ball will be the data recorders. Record the number of times you throw the ball and the number of times it was caught below. You may have to start over if you lose track of the number of tosses and catches.

Number of times ball was tossed	Number of times ball was caught	Percentage caught	Percentage missed

In the space below, make a graph of your data. Be sure to:

*Choose the appropriate type of graph (line, bar or pie).

* Make a title for your graph.

Ball toss Part Two- Set a timer for one minute. Have the same two people who did the ball toss in Part One sit at opposite ends of the table. Use your non-dominant hand to toss a ball back and forth. You do not need to hurl the ball at each other; toss it gently, the same way you did in Part One. The people who are not tossing the ball will be the data recorders. Record the number of times you throw the ball and the number of times it was caught below. You may have to start over if you lose track of the number of tosses and catches.

Number of times ball was tossed	Number of times ball was caught	Percentage caught	Percentage missed

In the space below, make a graph of your data. Be sure to:

- *Choose the appropriate type of graph (line, bar or pie).
- * Make a title for your graph.
- * Make a key or legend as needed.

Which hand had a higher success rate- the dominant or the non-dominant hand?

Dice roll- Roll the dice ten times. Record the number you roll for each trial in the space below.

Trial #	Number rolled (1-6)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

In the space below, make a graph of your data. Be sure to:

*Choose the appropriate type of graph (line, bar or pie).

* Make a title for your graph.

* Label the x-axis and y-axis.

* Make a legend or key as needed.

Coin toss- Flip the coin ten times. Record heads or tails for each trial.

Trial #	Heads or Tails?
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

In the space below, make a graph of your data. Be sure to:

*Choose the appropriate type of graph (line, bar or pie).

* Make a title for your graph.

* Label the x-axis and y-axis.

* Make a legend or key as needed.

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Graphing Test: Study Guide

Independent variable	The "cause" variable. In an experiment you control this variable by choosing the values for it. It is the "before." Goes on the x-axis.
Dependent variable	The "effect" variable. This is the variable being studied or measured. Its values depend on those you chose for the independent variable. It is the "after." Goes on the y-axis.
Constant variables	These are all the other variables that must be kept identical (constant) so that they don't affect the results.
Line graph	A graph that uses points connected by lines. Used to track changes over short and long periods of TIME.
Bar graph	A graph that uses bars to show comparisons between CATEGORIES of data.
Pie chart	A circle chart divided into slices to display data, information, and statistics. Good for PERCENTAGES and FRACTIONS.

"SULTAN"	<ul style="list-style-type: none"> • Scale • Units • Labels • Title • Accuracy • Neatness
Scale	The numbers on the axes of the graph. Must show logical spacing (ex.- 0, 2, 4, 6, 8).
Units	Relays what the numbers stand for. (ex.- m, s, cm, mL).
Labels	Describes what is being measured on each axis.
Title	Placed across the top of the graph. Clearly states the purpose of the graph. Includes information about the x and y axes.
Accuracy	Points, bars, or percentages are precise.
Neatness	Graph is clear and easy to read.

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Science: Graphing Test

Part One: Fill in the Blank

1) SULTAN helps you remember what must be included on a graph. What does the "U" stand for?

2) This variable goes on the x-axis.

3) This variable goes on the y-axis.

4) This type of graph tracks changes over TIME.

5) This type of graph shows comparisons between CATEGORIES of data.

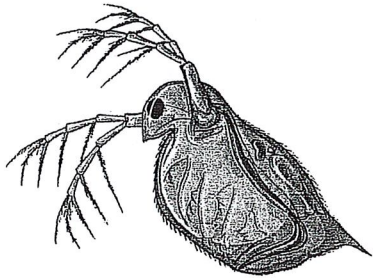
6) This type of graph is good for PERCENTAGES or parts of a whole.

7) This variable is kept the **same** from one trial to the next.

8) Your research question is: How does type of liquid put on a penny affect the number of drops it will hold? What is the **independent variable**?

9) Your research question is: How does type of liquid put on a penny affect the number of drops it will hold? What is the **dependent variable**?

10) You are doing an experiment to determine which brand of soil makes tomato plants grow tallest. You are testing three types of soil: 1) Miracle Gro Potting Mix, Tru Organic Potting Mix, and Fox Farm Potting Mix. Give an example of a **constant variable** in this experiment.



daphnia

An experiment was conducted to answer the question: **How do different concentrations of arsenic affect daphnia heart rate?** Five dishes were filled with the same amount of water containing different concentrations of arsenic. One daphnia was placed into each dish and the number of heartbeats per second was recorded.

Identify the following:

1) Constant: _____

2) Independent variable: _____

3) Dependent variable: _____

Data was collected and recorded in a table (below):

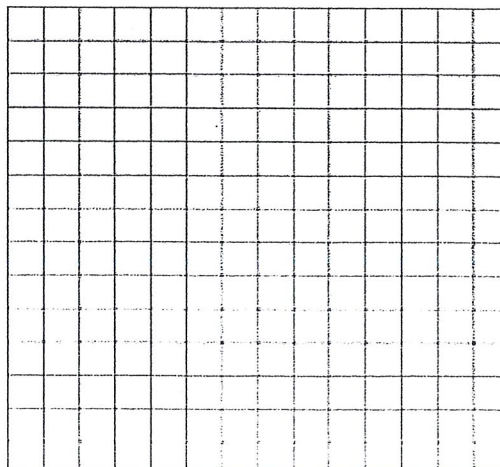
Arsenic concentration (parts per billion- ppb)	Heart rate (beats per second- bps)
0	10
5	8
10	4

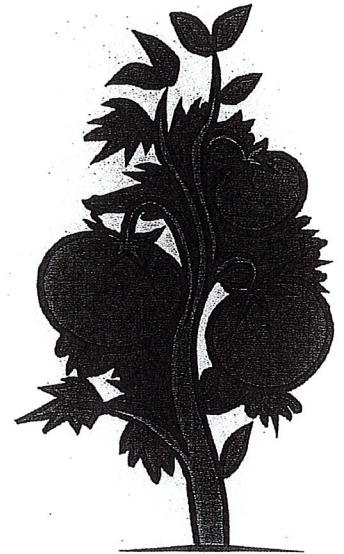
What is the best way to graph this data? _____

Please graph the data below. Remember to:

- use an appropriate scale
- include units
- label x-axis and y-axis
- include a title

Title: _____





An experiment was designed to answer the question:
How does time affect the growth of a tomato plant?
One plant was studied for 10 days.
The plant received the same amount of water every day.

Identify the following:

1) Constant : _____

2) Independent variable: _____

3) Dependent variable: _____

Data was collected and recorded in a table (below):

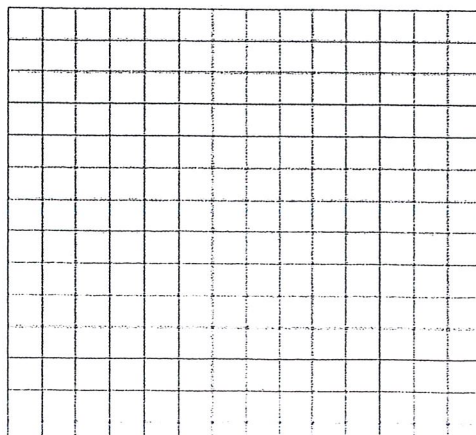
Day	Height (cm)
2	3
4	4
6	7
8	8
10	11

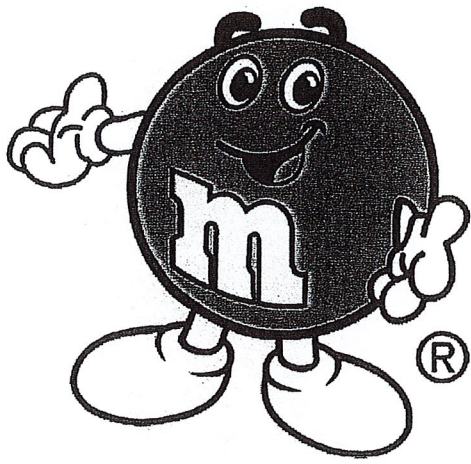
What is the best way to graph this data? _____

Please graph the data below. Remember to:

- use an appropriate scale
- include units
- label x-axis and y-axis
- include a title

Title: _____





An experiment was conducted to answer the question: **What percentage of m & m's are red?** Data was collected and recorded in the table below.

Color	Percentage
Red	25%
Other	75%

What is the best way to graph this data? _____

EXCEEDS QUESTIONS:

- 1) This process allows you to make an estimate between or among data points you already gathered.

- 2) This process allows you to predict what your data might look like in the future.

- 3) Which variable is the "cause" variable?

- 4) Which variable is the "effect" variable?

- 5) What does the acronym SULTAN stand for? (It can help you remember important things about graphing.)

S _____

U _____

L _____

T _____

A _____

N _____

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Graphing Arsenic Data

On your iPad, go to <https://arsenicdata.tuvalabs.com> to answer the questions below.

- Click on Explore Arsenic Datasets, then Drinking water data 2016-2019. You should work with a partner.
- One person can read the directions out loud, while the other makes the graphs.
- Be sure to take a screen shot of each graph.
- Between graphs, hit RESET.

1) Does filtered water have less arsenic?

Directions:

- Drag and drop **Arsenic (As, ug/L)** onto the x-axis.
- Drag and drop **Was the sample filtered?** onto the y-axis.
- Click the pencil next to **Was the sample filtered** and uncheck **I don't know** and **N/A**.
- Click on **stats** at the top and choose MEAN.
- Click on **summary view** at the bottom and fill in the table below.
- Take a screen shot of your graph.
- Fill in the table below.

	Arsenic (As, ug/L)
No	
Yes	

2) How much arsenic is in unfiltered water by school?

Directions:

- Drag and drop **SEPA School Name** onto the x-axis.
- Click the pencil next to Arsenic (As, ug/L). Where it says **Type**, choose **Categorical: Numeric Intervals**. Where it says Order, choose **Descending**.
- Under **Type**, by **Start** put 0. By **Width** put 10.

- On the top, where it says **Graph** choose **Stacked Bar Chart**.
- Take a screen shot of your graph.
- Click **Summary View** on the bottom to answer two questions.

For BHCS, how much arsenic did most samples have? _____

For BHCS, how many samples were in the 10 to 19 range? _____

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

Directions:

- Drag and drop **Municipality** onto the x-axis.
- Click the pencil next to **Municipality** and clear all towns. Re-check: Blue Hill, Brooklin, Brooksville, Ellsworth, Penobscot, Sedgwick and Surry.
- Drag and drop **Arsenic (As, ug/l)** onto the y-axis.
- Click on the pencil by **Was the sample filtered?** Uncheck **I don't know, N/A, and Yes**.
- Be sure Type is **Numerical** and Order is **Ascending**.
- Under **Stats** click Mean.
- Click the **Summary View**.
- Take a screen shot of your graph.

What is the average level of arsenic for Blue Hill? _____

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

Directions:

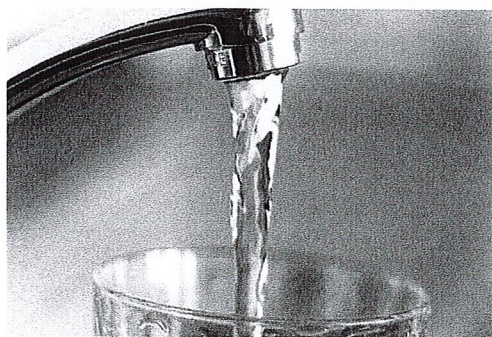
- At the top, where it says **Graphs**, choose Pie Chart.
- On the left, click the pencil by **Arsenic (As, ug/L)**.
- For **Type**, click **Categorical: Numeric Intervals**, Start 0, Width 10. For **Order**, click **Ascending**.
- On the left, click the pencil by **Municipality** and uncheck every town except Blue Hill. You can do this by hitting Clear. Then recheck Blue Hill.
- Be sure **Arsenic (As, ug/L)** is highlighted.
- Under **Stats**, click **Percent by Pie Section**.
- Take a screen shot. What % of samples were below 10 ppb? _____

Arsenic Community Meeting

*Wednesday, 5/15 @ 5:00 p.m.

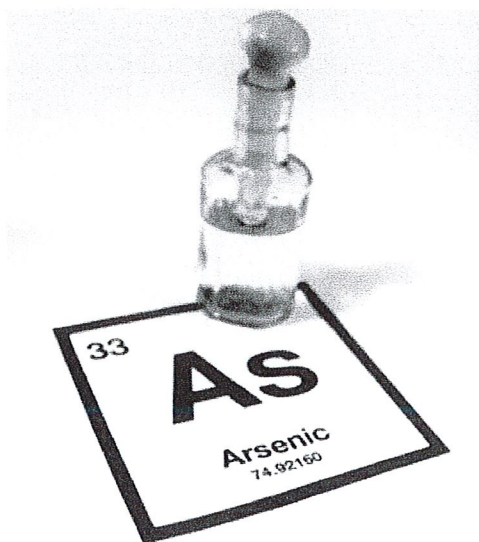
*Blue Hill Consolidated School Cafeteria

*7th and 8th Grade Presentation



Did you know?

Arsenic in drinking water is a health concern in regions of the United States where bedrock contains high levels of arsenic, including the Blue Hill Peninsula.



What is arsenic?

- *Arsenic is a semi-metallic element on the periodic table.
- *Arsenic occurs naturally in bedrock, soil and water that comes in contact with bedrock and soil.
- *Arsenic is tasteless and odorless and is a cancer-causing agent.