



Demos, Labs, & Science Stations Feature:

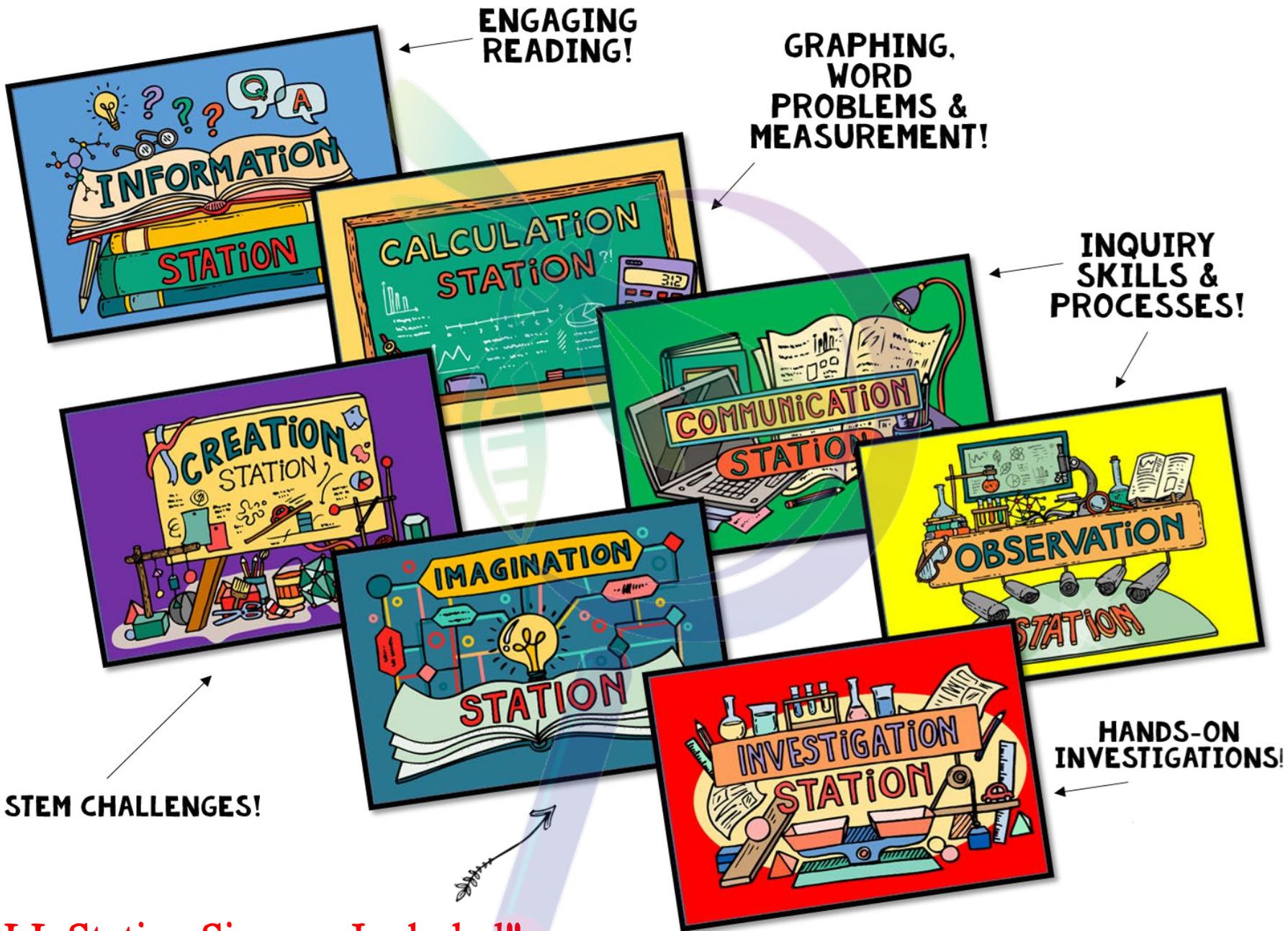
- Hands-on Investigations
- STEM Challenge
- Scientific Literacy
- Inquiry Process Skills

LIFE SCIENCE - 5ENGSS · TEKS

The image shows the cover of a book titled "MICROBIAL WORLD" with a green header. Below the title are several colorful circular icons representing different science stations: "INVESTIGATION STATION" (test tubes), "IMAGINATION STATION" (molecular structure), "SERVATION STATION" (microscope), and "CULATION STATION" (flask). To the right is a clipboard with a worksheet titled "Control of Molds" under the heading "THE MICROBIAL WORLD". The worksheet contains text about mold growth and a list of materials: water, eye dropper, dissecting microscope (hand lens), and marker.

DEMOS, LABS, & SCIENCE STATIONS

HANDS-ON · STEM · CRITICAL THINKING



ENGAGING READING!

**GRAPHING,
WORD
PROBLEMS &
MEASUREMENT!**

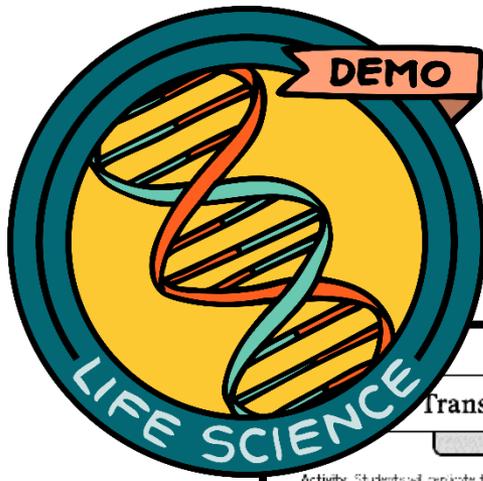
**INQUIRY
SKILLS &
PROCESSES!**

**HANDS-ON
INVESTIGATIONS!**

STEM CHALLENGES!

ALL Station Signage Included!!

Color & Black and White



Teacher guide and answer key offered for every lab!

Easy-to-get materials!



Transmission of Disease
THE MICROBIAL WORLD

Activity: Students will replicate the transmission of disease in your classroom. They will recognize how quickly an outbreak can turn into an epidemic and how diseases are transmitted and controlled.

Materials:

- Test tube holder (one for each student)
- numbered test tubes (one for each student)
- eye dropper (one for each student)
- 2 sterile bottles, one filled with distilled water and the other with a diluted (1:100) phenolphthalein indicator solution

Procedure:

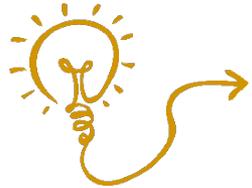
Before Demo

1. Before the start of class, fill all but one test tube with two droppers full of distilled water. These will represent healthy individuals. In the remaining test tube, fill with two dropper fulls of the diluted base. This will represent the infected individual. Make note of the number.

During Class

1. When the situation arises, instruct them to pick up a test tube and an eye dropper.
2. Have your class make four dropper full of solution from their test tube to a classmate's. At the same time, then some classmate is to give one dropper full of their solution. Have students make a note of who they mixed solutions with.
3. Have students repeat step 2 with two other classmates.
4. Walk around the classroom and place two drops of phenolphthalein indicator into each student's test tube. Share with students that one individual in class was representing an infectious person. They will see either their solution is now pink, meaning they are infectious (base solution) or it will be clear, and they are healthy (water solution).
5. Have students chart their encounters with their classmates and cross off the names of healthy students.
6. Allow students to answer who the carrier of the infection was.

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Discussion questions and teacher set-up included!

Control of Molds
THE MICROBIAL WORLD

Name _____ Date _____

In this part of the lab you will compare and make a moldy agar. You will be asked to describe the texture and taste characteristics of moldy agar and how it is controlled due to certain fungi (molds). Today, much of the one-cup agar is a longer shelf life due to the addition of preservatives that most mold growth, such as potassium sorbate and sodium benzoate.

Materials:

- 2 plastic bags
- iodine solution
- 4 1/2" x 6" plastic bag for mold
- 4 1/2" x 6" plastic bag for mold
- water
- eye dropper
- dissecting microscope (hand lens)
- marker

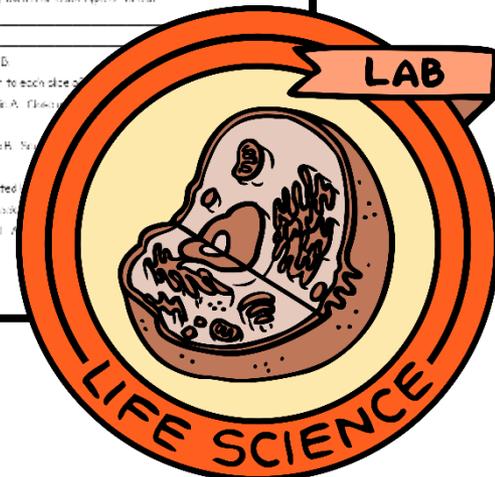
Safety:

Wash the mold in a 10% bleach solution and dispose of it properly. Do not inhale the mold spores.

Procedures:

Part A:

1. While in the lab, make an agar solution of mold growth. For each type of mold.
2. Use the marker to label the baggies as A and B.
3. Use an eye dropper to add 20 drops of water to each baggie.
4. Place the moldy agar in each plastic baggie A. Close the baggie on the marking line.
5. Place the moldy agar in each plastic baggie B. Seal the baggie on the marking line.
6. Place both baggies in a cool, dark area designated.
7. Observe the two baggies of mold growth for a week. Make notes and observations of mold growth. Record your observations with a data.





Group members will read a passage and then complete a task to help increase science literacy and deepen their understanding of the science concept.

A Picnic of Microbes

Can you imagine going on a picnic and only being able to eat foods fermented with bacteria and fungi? You may be surprised once you've opened your picnic basket and found a Forest of pickles, seltzer, sour dough bread, olives, cheese, coffee, and even chocolate for dessert!

Fermentation is a metabolic process used by many organisms, including bacteria and fungi, to obtain energy. When fermenting certain foods like bread, beer, and yogurt, the organisms purposely partially break down the sugar and protein and fatty acids, which marinate the taste and texture and creates compounds like ethanol and lactic acid, which are responsible for the unique flavors.

People have been intentionally infusing food with microbes for centuries. For example, people discovered how to ferment coffee beans, but the fermentation process was not used until the 19th century. Lactic acid production during the process helps create an environment that kills off harmful bacteria, especially important before the 1900s when there were no antibiotics.

Many people could not imagine their lives with chocolate and coffee cherry as a left in the sun to ferment. In Colombia, Hawaii, and Central America, the Andean and Inca cherry goes through a fermentation process of 24-48 hours. The lactic acid bacteria eat the sugars and weakens the cell walls, making the chocolate smoother and more enjoyable to eat. Chocolate is similar to coffee.

Fungi are also used in fermentation. Fungi like blue cheese and kombucha produce the white, fuzzy mold on cheese and kombucha. Kombucha is made by fermenting tea and sugar with a symbiotic culture of bacteria and yeast (SCOBY). When olives are fermented, they are used to make olives. When olives are fermented, they are used to make olives. The very sweet snack.

Experiment: For fermentation lab, you can make bread and pickles and fermented foods.

It is fun to be a famous chef!

A

Describe how microbes benefit people.

B

Identify two reasons people intentionally mix microbes with food.

A. _____

B. _____

C. _____

D. _____

contain lactic acid bacteria and yeast. Give an example of each.

Would you like to be a guest at Chef Chang's restaurant which includes a menu of unique fermented food? Why?

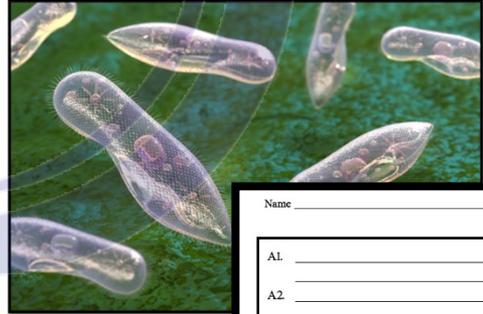
A



B



C



Name _____ Date _____

A1. _____

A2. _____

B1. _____

B2. _____

C1. _____

C2. _____

- How many cells make up a protist?
- Since they are not classified as plants, protists be considered a living organism?

Group members will have images, illustrations, or actual samples at this station that show applications or processes of the science topic.



Group members will work with one another to explore the concept through hands-on activities, so they may practice specific inquiry process skills as they learn.



 A Predict what would happen if all algae disappeared from Earth's water.	 B Explain how antibiotics kill bacteria.
 A A: Most other life would die off since algae provide food and oxygen.	 B A: Many antibiotics weaken the cell walls of bacteria and cause them to burst or die from producing.
Name _____ Date _____	
	
 C A: Mushrooms, which are fungi, are a food source, and they can cause disease in plants. Some fungi are symbiotic with other plants, making lichen.	 D A: Mushrooms, which are fungi, are a food source, and they can cause disease in plants. Some fungi are symbiotic with other plants, making lichen.



Pond Water Survey

Problem: Can you identify microorganisms in a pond water sample?

Materials

- pond water
- eye dropper
- glass slide
- cover slip

Procedure

1. Use the eye dropper to put a drop of pond water on the glass slide.
2. Place a cover slip over the drop.
3. Use the microscope to look for any organisms.
4. Once you spot an organism, use the eye dropper to move it to the center of the slide.
5. Once you have centered your organism, use the eye dropper to move it to the center of the slide.
6. Draw and label at least 10 organisms.
7. Answer the questions on your worksheet.

Name _____ Date _____

Directions: Sketch and label organisms below.

Analyze and Checkback

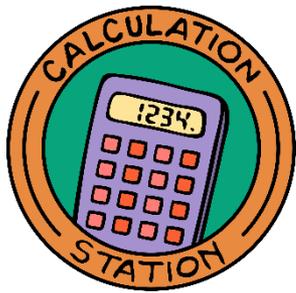
1. How many different organisms did you observe?

2. Were all organisms mobile? If so, how did they move?

3. Explain any organisms' responses you observed (i.e., feeding, encountering a barrier, avoiding another organism, etc.).

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There are three different options for this station: interviews, videos, or group essay. Depending on the option you choose, group members will communicate what they know by answering questions in creative ways.



Group members use their math skills to complete the station challenge. Skills may include graphing, analyzing data, using models, measurement, and calculating formulas or word problems.



Edible Algae

Challenge: Find and make recipe that includes algae to be entered in classroom "Algae Cook-off".

Materials:

- Internet
- Recipe books
- Wrap-around

Procedures:

1. Take the time to search the
2. After choosing some recipe will be making for the class and Turn in the wrap-around
3. Decide how you will prepare ingredients so that everyone

Requirements of Algae Cook-Off:

- Recipe **MUST** contain
- Treaties must apply
- Recipe must be from
- Snacks must be given will be allowed for a
- be history with the alga

Taste Test:

At the time and location given by algae snack along with two maps, vote on snacks and decide which categories for the win.

Name _____ Date _____

Edible Algae Recipe (adjusted for class size)

RECIPE NAME: _____

Ingredients: _____

Directions: _____

The Size of a Virus

Materials:

- straight pin
- scissors
- pencil
- ruler
- sticky stick

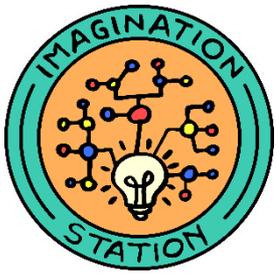
Procedures:

1. Find out how many viruses you think are on your answer sheet
2. For this activity you will assume to estimate the surface area of a virus. Use the model you made in your notebook to represent the diameter of the virus. Use the following formula to find the area of a circle.
3. A typical virus is 100 nm in diameter. If you know the area of a circle, you can find the radius of the virus. Use your virus model to find the area in square centimeters.
4. Find the area in square centimeters of the virus. Use the area of your answer sheet.
5. Divide the area of the pinhead by the area of one of the viruses. The answer is the number of viruses that fit on a pinhead.

Directions: Complete the chart.

Question	Answer
Prediction of number of virus particles on pinhead	
Area of pinhead (m ²)	
Area of virus (m ²)	
Actual number of viruses that fit on a pinhead	

Group members will work together to solve a STEM (Science, Technology, Engineering, Math) challenge by creating models or designs that demonstrate their understanding of the science topic being taught.



This station makes science concepts relevant for students by asking them to imagine scenarios that will bring about discussion and critical thinking.

Achoo!

Directions: Use your imagination to answer the statement below.

IMAGINE you are helping out in a Kindergarten class during cold and flu season.



Write your response on the lines below.

Imagination Station logo in the bottom right corner.

I'm "Lichen" This Relationship

Problem: What is the symbiotic relationship found in a lichen?

Lichens grow in places where few organisms can survive – usually on rocks. However, they can survive in this environment because of the symbiosis of the two organisms that make up lichen – fungus and cyanobacteria (or algae). The alga or cyanobacteria cells are green or blue-green and carry out photosynthesis, providing the fungus with nutrients. The fungus, in turn, hangs around the alga with water and minerals.

Materials:

- lichen
- Petri dishes (Petri dishes)
- microscope
- slide
- coverslip
- water
- colored pencils

Procedures:

1. Tear a small piece of lichen off from the sample provided.
2. Tease the lichen piece apart using the forceps.
3. Prepare wet mount slide of lichen.
4. Observe the lichen under the microscope at low power.
5. Observe the lichen at high power and draw what you see in the area provided. Make sure to label the diagram and make observations.
6. Answer the questions below on your answer sheet.

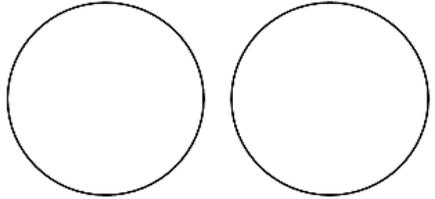
Analyze and Conclude:

1. Identify the symbiotic relationship that exists in lichen. Give evidence to support your answer.
2. Lichens are pioneer species. What does this mean, and how do they affect the environment?

Name _____ Date _____

Data and Observations:

Low _____ High _____



Analyze and Conclude:

1. _____
2. _____

TEACHERS SAVE TIME:
Laminate station pages and reuse for each class and for years to follow!

Inquiry and Process Skills

©NGS

Demo

Guided Inquiry Lab

Science Stations

Inquiry-Based Science Unit: Microbial World	Classifying	Communicating	Compare & Contrast	Creating Models	Gather/Organize Data	Generalizing	Identifying Variables	Inferring	Interpreting Data/Diagrams	Making Decisions	Manipulating Materials	Measuring	Observing	Predicting
Transmission of Disease		X	X			X							X	X
Control of Molds	X	X	X	X	X			X	X		X	X	X	
Information Station: A Picnic of Microbes	X				X	X			X					
Observation Station: Images & Questions	X	X	X			X		X	X	X			X	
Investigation Station: Pond Water Survey	X	X	X		X		X		X	X	X		X	
Calculation Station: The Size of a Virus	X		X				X		X					
Communication Station: Questions		X	X			X		X		X				
Creation Station: Edible Algae		X		X	X		X			X	X	X		X
Imagination Station: Achoo!!		X				X				X				

NGS Magnified promotes scientific inquiry throughout the curriculum. Students become more confident and effective learners while developing problem-solving and critical thinking skills. Process skills, such as planning, organizing, and evaluating, help students to complete projects and assignments. These skills allow students to independently gather information, analyze it, and draw their own conclusions.

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