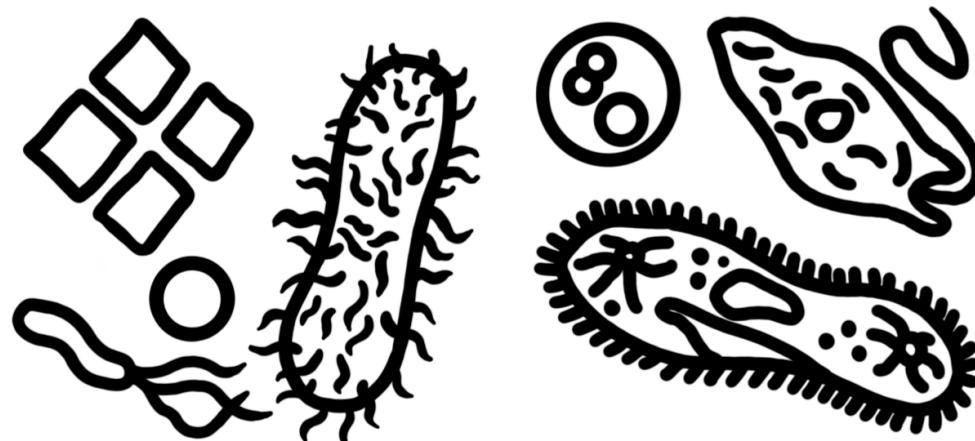


The Brown Junior Research Program Presents

MICROBE MADNESS



VOCABULARY WORD SEARCH

C P F Y D S X B N U C L E U S
O I B L W E N V E L O P E D C
L L W J A R M X B E G E S A P
O U M E O G N N X B U M B V V
N S G D F P E B A C T E R I A
Y O N P M R P L I G X I G R H
G K I V A O D B L Z J K R U K
A Y Q R U T T O L U F I I S E
R R J A J I H G W O M H B E C
B F C F Y S W O K I M V O J A
P H Z H Y T M E G E Y S S S P
H D E Y A S A J O E Q Y O F S
H N C C C E B T L R N K M A U
F M K S J K A Y L V V I E M L
V V T X H M H I L V P H C D E

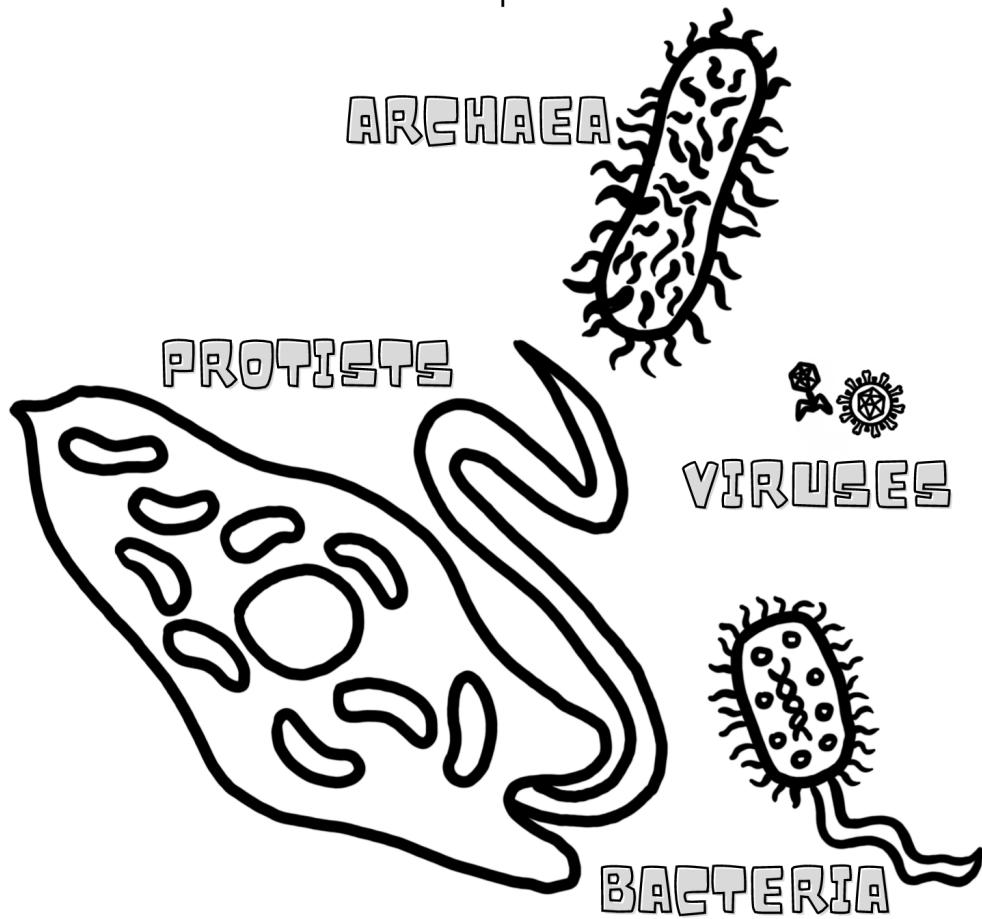
archaea	envelope	pilus
bacteria	flagellum	protists
capsule	nucleus	ribosome
colony	pathogenic	virus

VOCABULARY WORDS

Define each of these terms in your own words as we go!

- archaea:
- bacteria:
- capsule:
- colony:
- envelope:
- flagellum:
- nucleus:
- pathogenic:
- pilus:
- protists:
- ribosome:
- virus:

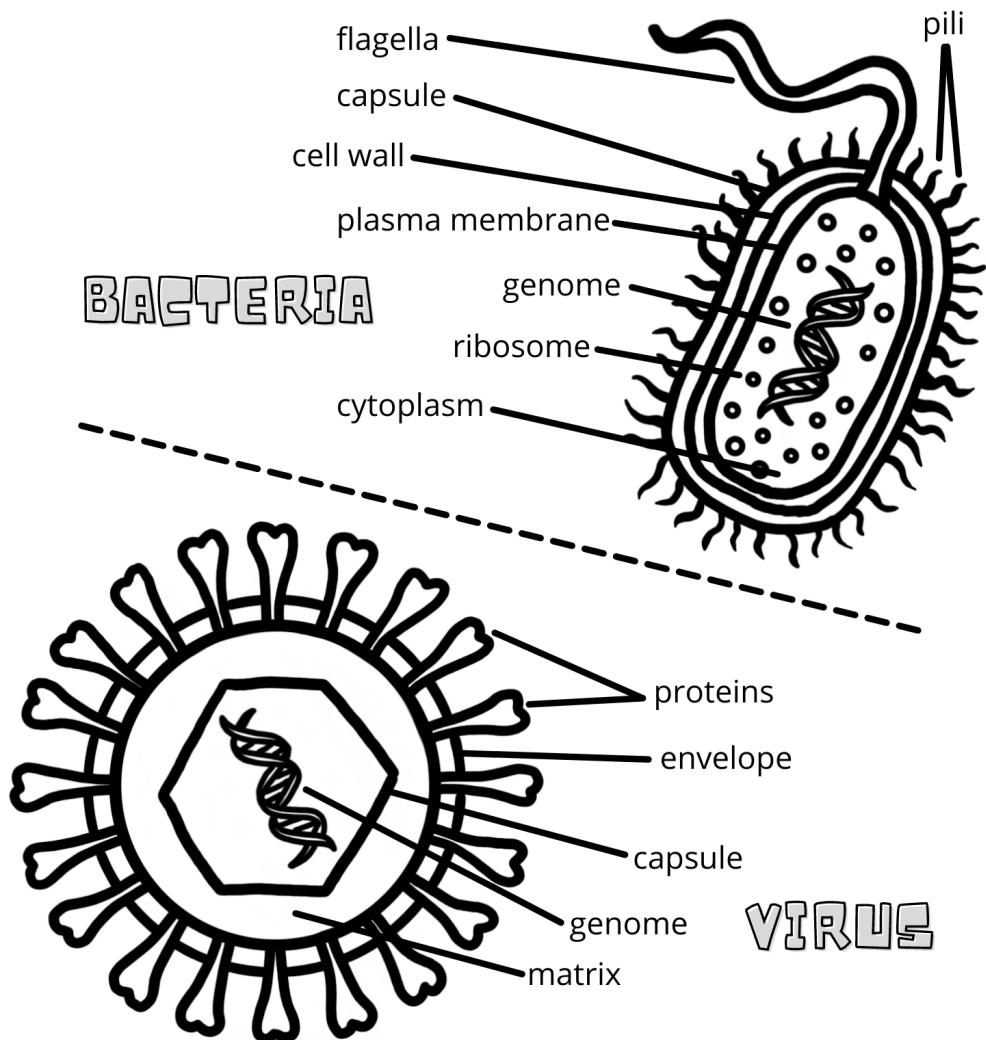
Microbes are tiny organisms that are too small to be seen with the naked eye. Microbes come in all different shapes and sizes.



Bacteria are **10 times** bigger than viruses. The cells in our body are **50 times bigger** than bacteria.

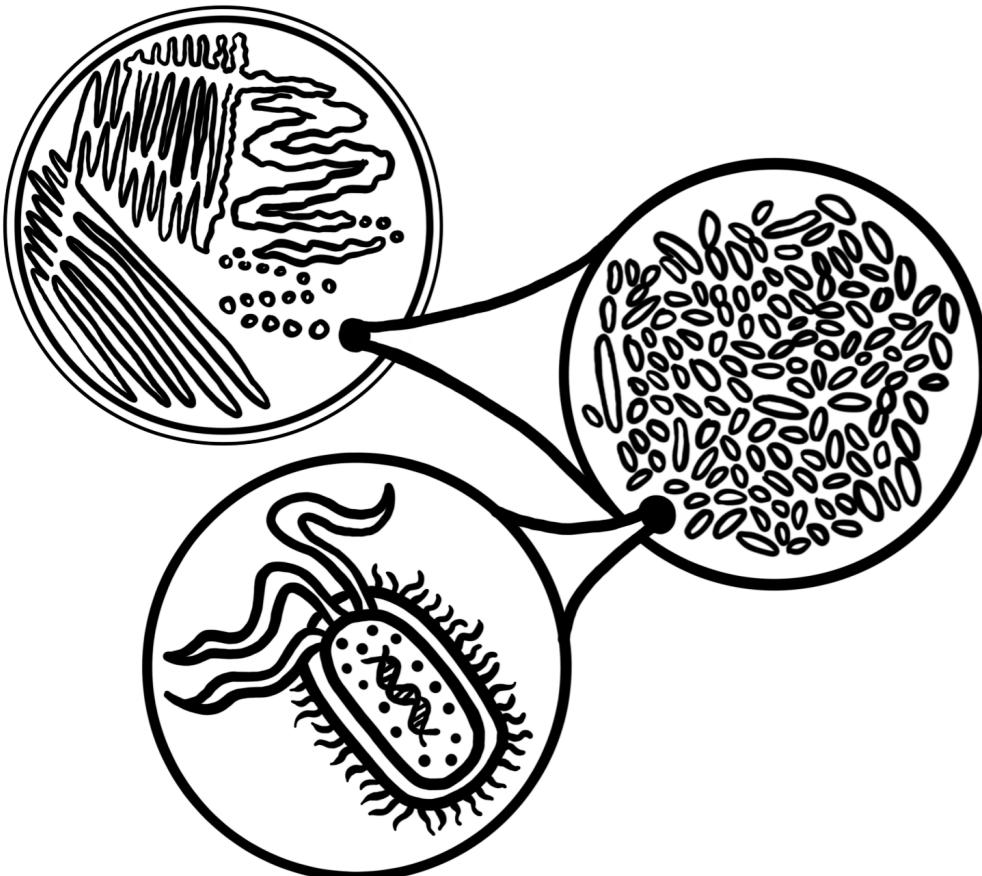
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Bacteria and **viruses** are two of the main types of microbes. They have many different parts that all work together to make the microbe function.



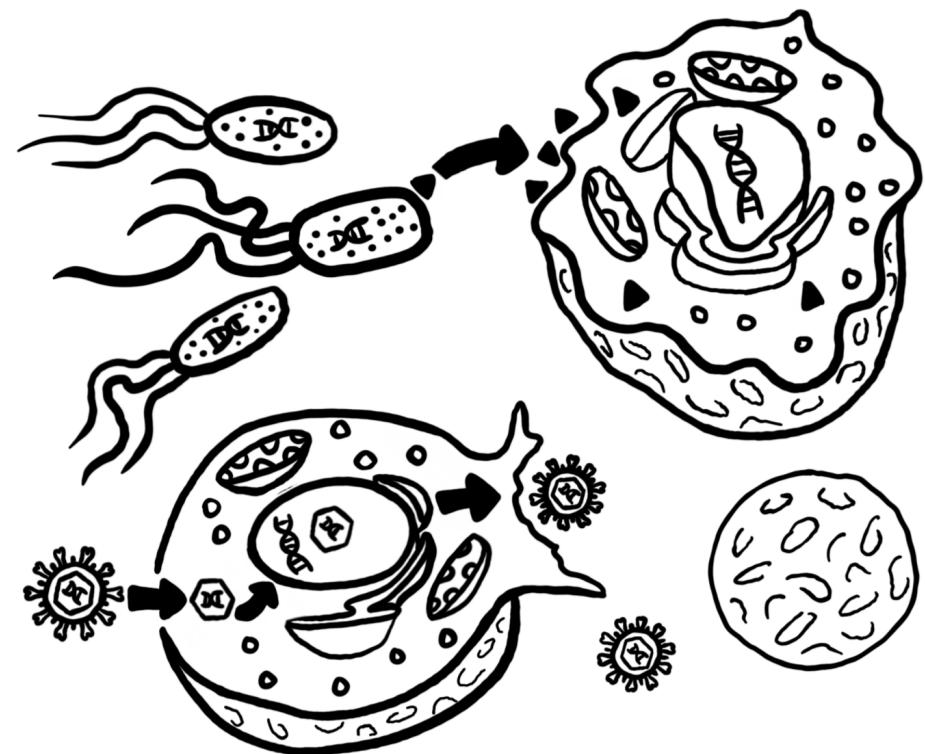
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Sometimes, single celled microbes can multiply together to grow into **colonies**, each containing millions of individual bacterial cells.



Scientists grow bacteria on **agar plates**, and observe the shape, size, and elevation of the colonies.

Many microbes can make us sick, or are **pathogenic**. Some bacteria can make us sick by releasing toxins into our body.



Viruses make us sick by turning the cells in our body into virus making factories, which kills our cells. Luckily, our **immune system** knows how to fight back. Did you know that a fever makes your body too hot for the microbes to grow?

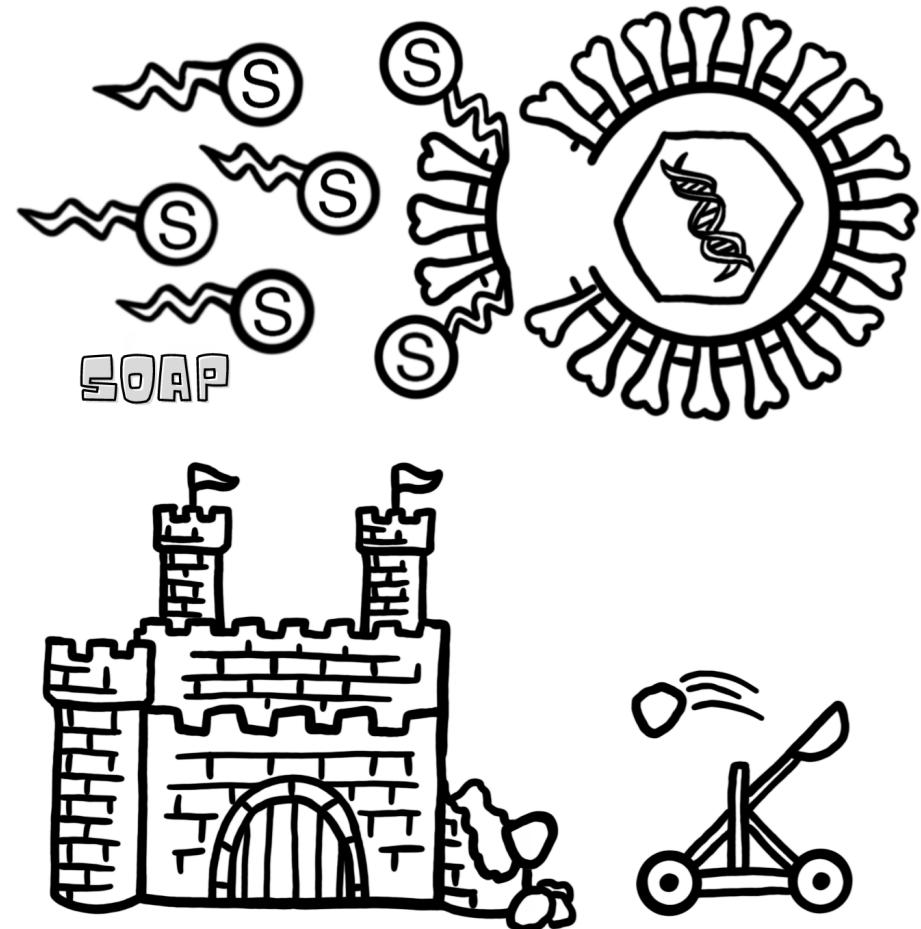
Like all living things, microbes need their environment to be just right in order to grow.

Microbes can live in the air, in the ground, both inside and on top of other living things, and in many more places.



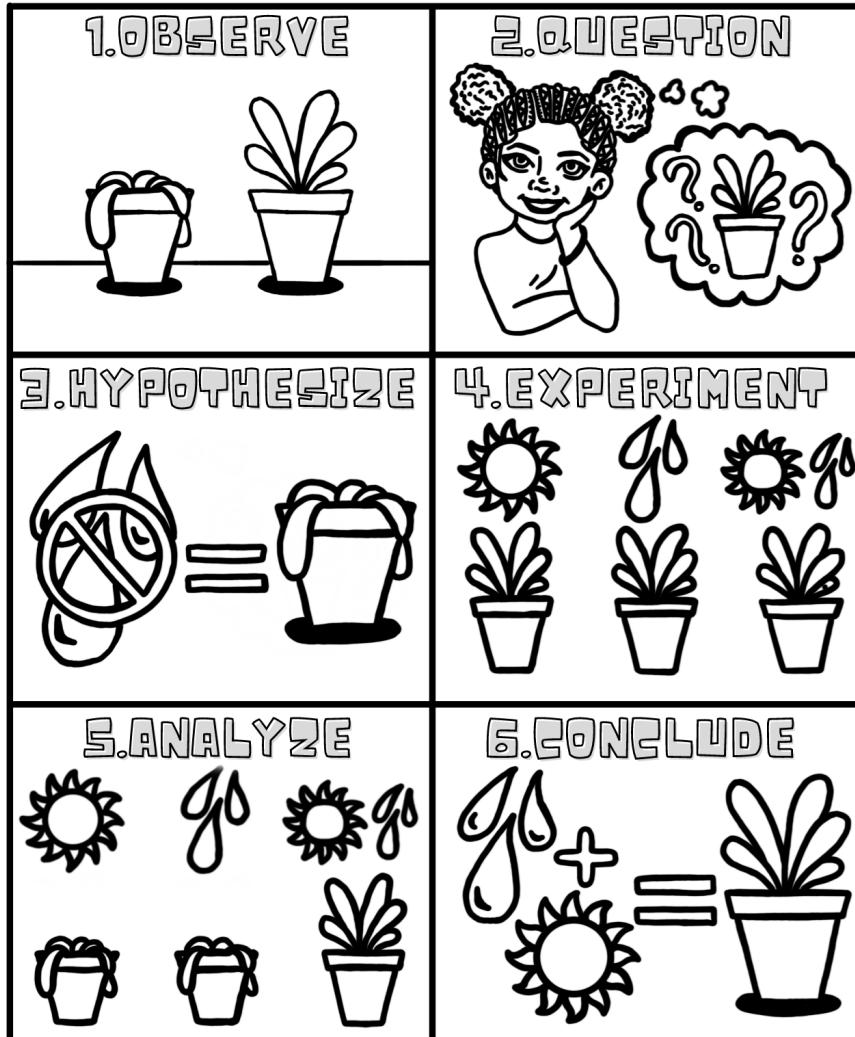
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Other environments can kill microbes.
Disinfectants (like soap) can destroy microbes by breaking down their cell wall, like a catapult breaking down a castle wall.

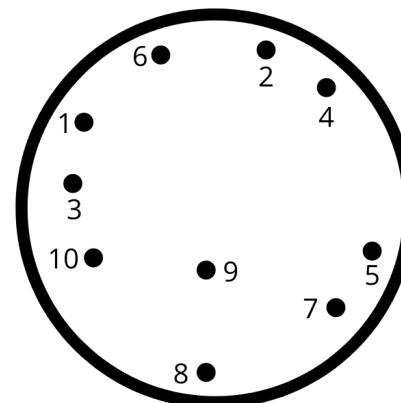


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The Scientific Method is the way that scientists study the world around them and learn things.



Scientists can grow microbes on **agar plates** to test which conditions let the microbes grow best. Connect the dots to practice plating microbes!

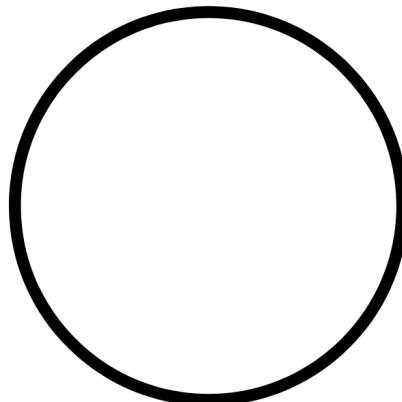


Now it's your turn to be a scientist and grow some microbes on your own plate! The first step to being a scientist is asking a **question**. Write down what question you would like to answer with your experiment.

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What is your **hypothesis**? Explain and draw out what you think your plate will look like.

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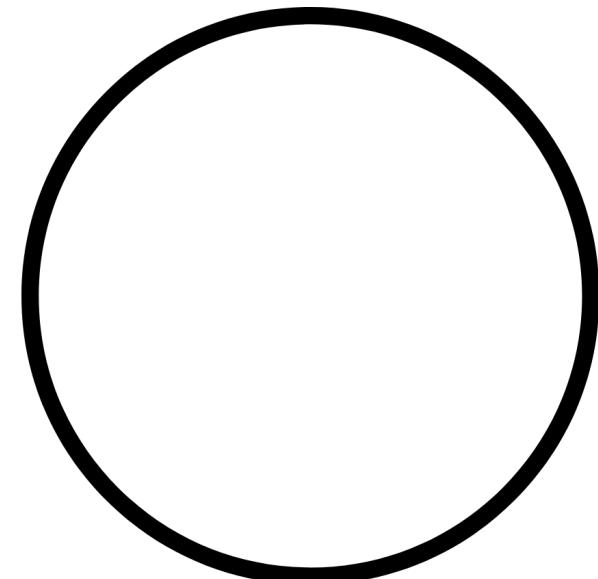


How will you test your hypothesis? What will your **experiment** look like?

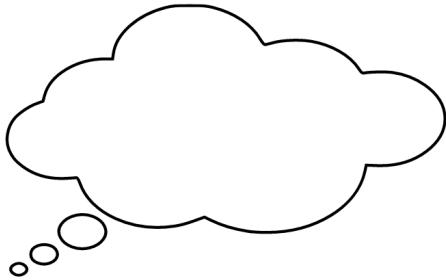
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Now that your plate has grown, what does it look like? Was your hypothesis correct? Draw what your plate looked like, and write down your **results**!

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Congratulations, you're now a microbiology master!
Draw yourself as a microbiologist.



What kind of questions will you ask as a
microbiologist? Write them in your thought bubble!

THANK YOU FOR LEARNING WITH THE BROWN JUNIOR RESEARCHERS!

This coloring book was developed for use in the classroom with national science and reading standards in mind. This book meets the following standards:

Next Generation Science Standards:

- LS1.1: Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
- LS1.2: Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.
- LS1.5: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
- LS2.1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- LS2.2: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
- LS2.4: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

English Language Arts Common Core Standards:

- 5.2: Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
- 5.3: Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- 5.4: Determine the meaning of general academic and domain-specific words and phrases in a relevant text.
- 5.7: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
- 3.10: By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts.
- 3.7: Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).