

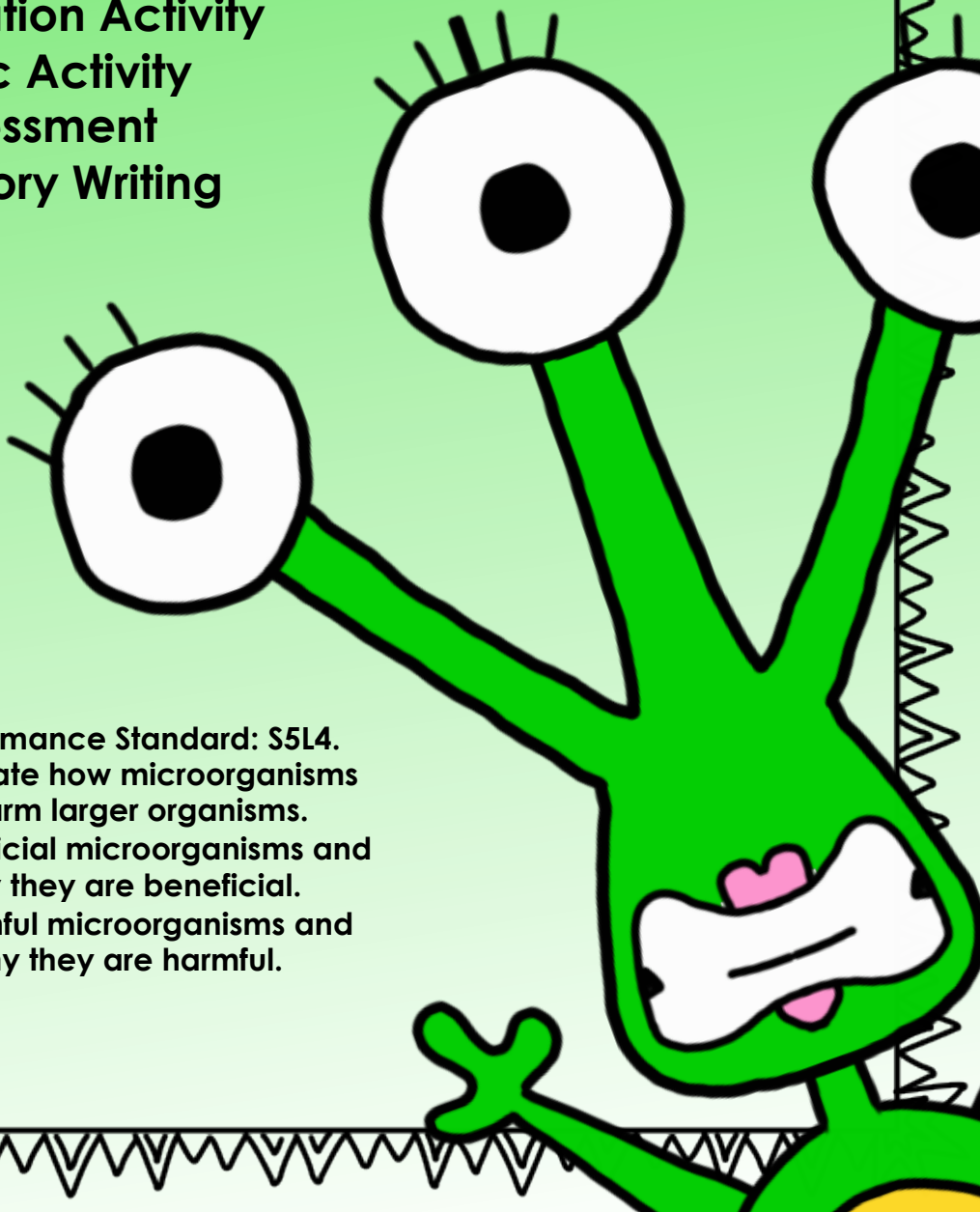
Monster Wrangler Mike Presents

# **MICROORGANISMS**

## **HARMFUL OR BENEFICIAL?**

Card Sort  
Classification Activity  
Comic Activity  
Assessment  
Expository Writing

- Georgia Performance Standard: S5L4.  
Students will relate how microorganisms benefit or harm larger organisms.
- Identify beneficial microorganisms and explain why they are beneficial.
  - Identify harmful microorganisms and explain why they are harmful.

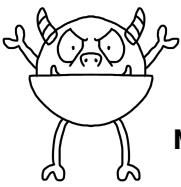


**Highlight any examples of how bacteria are beneficial yellow. Highlight any examples of how bacteria are harmful in green.**

<p>Bacteria are involved in the production of fuel, food, and medication.</p>	<p>Bacteria are used in environmental recycling and clean up.</p>	<p>Methane is a gas produced by bacteria that live in oxygen-free environments like the bottom of swamps and lakes. Methane makes up approximately 20% of Earth's natural gas deposits.</p>	<p>The next time you eat cheese or yogurt, thank bacteria. Bacteria that grow in milk are responsible for the production of products like cheese, sour cream, and yogurt.</p>	<p>Some bacteria are decomposers. That is, they feed on decaying matter and break it down. If it wasn't for bacteria that act as decomposers, the world would be overrun by environmental wastes such as dead animal and plant materials.</p>
<p>Some bacteria are able to eat harmful substances like oil. These bacteria are used to clean up oil spills or gasoline leaks.</p>	<p>The human body is full of helpful bacteria. In fact, if it wasn't for certain bacteria in your body, you would become ill. The human digestive tract is full of these bacteria. Essentially, they serve two purposes – they help prevent other harmful bacteria from growing and they help humans digest their food.</p>	<p>Bacteria cause cholera, an often fatal (deadly) disease.</p>	<p>Dill pickles are cucumbers that have been fermented by bacteria.</p>	<p>A virus causes Polio, which sometimes leads to paralysis. Franklin D. Roosevelt was a U.S. president who suffered from Polio which often caused him to use a wheel chair.</p>
<p>Fungi and bacteria are used to produce antibiotics like penicillin which cure infections.</p>	<p>Yeast is used to make dough rise in the bread making process.</p>	<p>Microbes can cause food to spoil.</p>	<p>A fungus is used to make riboflavin, an important vitamin.</p>	<p>A protozoan causes a fatal form of meningitis.</p>
<p>Bacteria can cause food poisoning.</p>	<p>Sauerkraut is produced by fermenting cabbage with bacteria.</p>	<p>Bacteria cause Tetanus, a serious infectious disease.</p>	<p>One virus is used to vaccinate people against other viruses.</p>	<p>The organism that causes ringworm is a fungus, not a worm. Ringworm spreads easily and grows best on warm, moist skin.</p>
<p>Some algae can suddenly "bloom," or grow very quickly. People call this reddish water a red tide. Some algae in a red tide contain a poison that can kill fish.</p>	<p>Phytoplankton is made of bacteria and protists that live near the surface of water. These organisms use photosynthesis to make their own food. They also release oxygen. Phytoplankton produce at least half of the oxygen in the air you breathe.</p>	<p>Salmonella and E. Coli can make you sick. They grow on raw chicken and other meats, raw eggs, and other raw foods. Cooking kills them.</p>	<p>Some fungi kill crops and rot wood.</p>	<p>Some fungi cause several skin diseases including athlete's foot.</p>

**Highlight any examples of how bacteria are beneficial yellow. Highlight any examples of how bacteria are harmful in green.**

Bacteria are involved in the production of fuel, food, and medication.	Bacteria are used in environmental recycling and clean up.	Methane is a gas produced by bacteria that live in oxygen-free environments like the bottom of swamps and lakes. Methane makes up approximately 20% of Earth's natural gas deposits.	The next time you eat cheese or yogurt, thank bacteria. Bacteria that grow in milk are responsible for the production of products like cheese, sour cream, and yogurt.	Some bacteria are decomposers. That is, they feed on decaying matter and break it down. If it wasn't for bacteria that act as decomposers, the world would be overrun by environmental wastes such as dead animal and plant materials.
Some bacteria are able to eat harmful substances like oil. These bacteria are used to clean up oil spills or gasoline leaks.	The human body is full of helpful bacteria. In fact, if it wasn't for certain bacteria in your body, you would become ill. The human digestive tract is full of these bacteria. Essentially, they serve two purposes – they help prevent other harmful bacteria from growing and they help humans digest their food.	Bacteria cause cholera, an often fatal (deadly) disease.	Dill pickles are cucumbers that have been fermented by bacteria.	A virus causes Polio, which sometimes leads to paralysis. Franklin D. Roosevelt was a U.S. president who suffered from Polio which often caused him to use a wheel chair.
Fungi and bacteria are used to produce antibiotics like penicillin which cure infections.	Yeast is used to make dough rise in the bread making process.	Microbes can cause food to spoil.	A fungus is used to make riboflavin, an important vitamin.	A protozoan causes a fatal form of meningitis.
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Some algae can suddenly "bloom," or grow very quickly. People call this reddish water a red tide. Some algae in a red tide contain a poison that can kill fish.	Phytoplankton is made of bacteria and protists that live near the surface of water. These organisms use photosynthesis to make their own food. They also release oxygen. Phytoplankton produce at least half of the oxygen in the air you breathe.	Salmonella and E. Coli can make you sick. They grow on raw chicken and other meats, raw eggs, and other raw foods. Cooking kills them.	Some fungi kill crops and rot wood.	Some fungi cause several skin diseases including athlete's foot.



## MICROORGANISMS: SUPERHEROES OR VILLAINS?

**Microorganisms can be both beneficial (helpful) or harmful to us as humans.**

**Georgia Performance Standard: S5L4. Students will relate how microorganisms benefit or harm larger organisms.**

**a. Identify beneficial microorganisms and explain why they are beneficial. b. Identify harmful microorganisms and explain why they are harmful.**

Task: You've been selected by DC Comics to come up with a brand new comic book series that teaches kids about the benefits and dangers of microorganisms. Directions: Choose two (one helpful and one harmful) from the attached list and create a comic book superhero (helpful microorganism) and villain (harmful microorganism). You should include a picture demonstrating the hero doing his or her good deed and the villain doing damage or harm. Make sure you write a caption in complete sentences explaining what's happening in your picture, or have dialogue bubbles (like in comics) that provide clear meaning of what's happening.

The space below is for you to do a rough sketch before making your final copy.

<b>Superhero Name:</b>	<b>Villain Name:</b>

544 Students will relate how microorganisms benefit or harm larger organisms.

Heroes

Villains

**Plac-Mat**

Plac-Mat is a microorganism that helps break down organic matter into nutrients for plants.

**Microbe**

Microbes are tiny organisms that live everywhere and help in many ways.

**Boom Bloom**

Boom Bloom is a microorganism that causes disease in plants.

**Mr. Seymour Puss**

Mr. Seymour Puss is a microorganism that causes problems in the environment.

**Finger Fungus**

Finger Fungus is a microorganism that causes skin infections.

**Microbe**

Microbes are tiny organisms that live everywhere.

**Dr. EVIL VITA**

Dr. EVIL VITA is a microorganism that causes disease.

**Microbe**

Microbes are tiny organisms that live everywhere.

**Microbe**

Microbes are tiny organisms that help in many ways.

**Microbe Man**

Microbe Man is a microorganism that helps in many ways.

**Microbe**

Microbes are tiny organisms that live everywhere.

**Microbe**

Microbes are tiny organisms that help in many ways.

**Bacteria Benny**

Bacteria Benny is a microorganism that helps in many ways.

**Microbe**

Microbes are tiny organisms that live everywhere.

**Microbe**

Microbes are tiny organisms that live everywhere.

**Microbe**

Microbes are tiny organisms that help in many ways.

**Microbe**

Microbes are tiny organisms that help in many ways.

**Microbe**

Microbes are tiny organisms that live everywhere.

**the Snack Stealer!**

the Snack Stealer! is a microorganism that steals food.

**Microbe**

Microbes are tiny organisms that help in many ways.

**Microbe**

Microbes are tiny organisms that help in many ways.

**Fungy**

Fungy is a microorganism that causes disease.

**Microbe**

Microbes are tiny organisms that live everywhere.

**Dr. Big!**

Dr. Big! is a microorganism that causes disease.

**Microbe**

Microbes are tiny organisms that help in many ways.

**Microbe**

Microbes are tiny organisms that live everywhere.

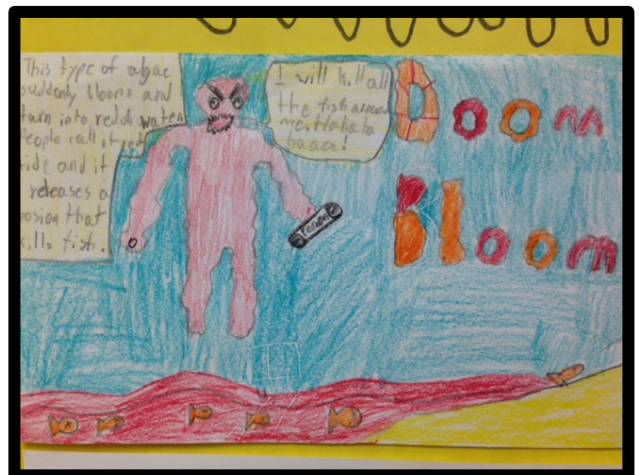
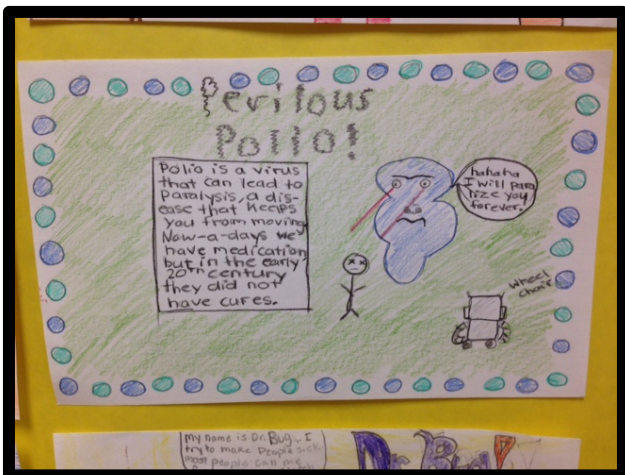
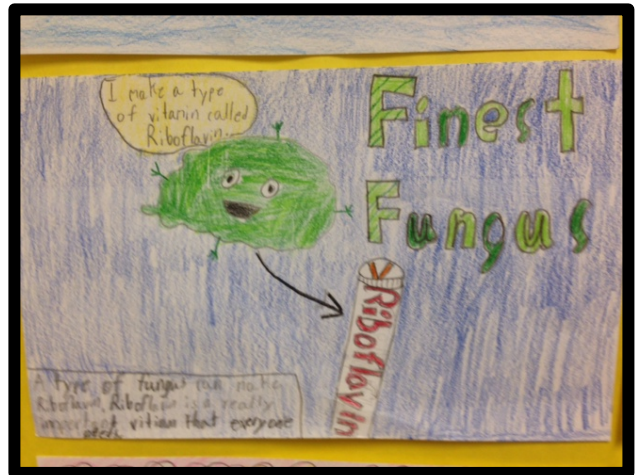
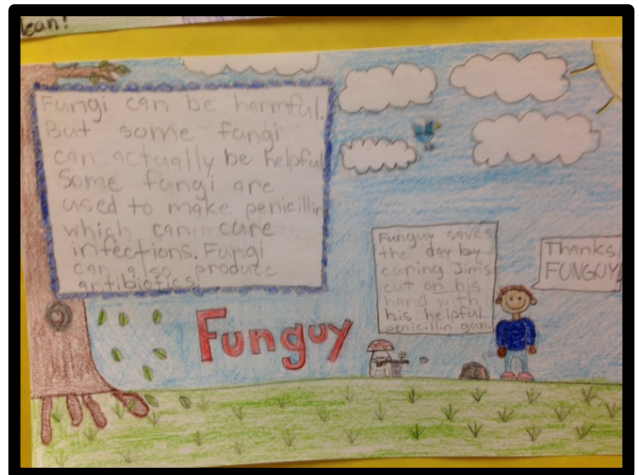
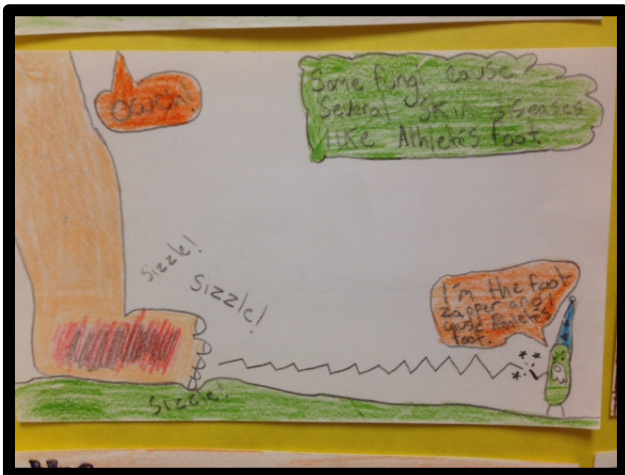
**Microbe**

Microbes are tiny organisms that live everywhere.

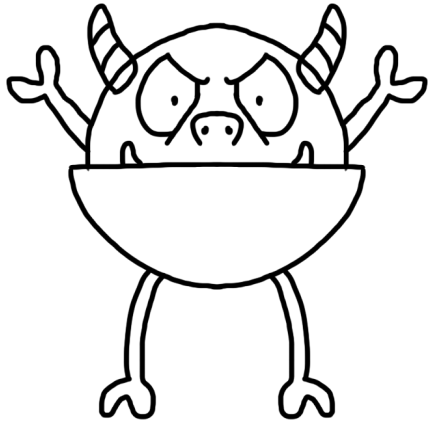
**Microbe**

Microbes are tiny organisms that help in many ways.

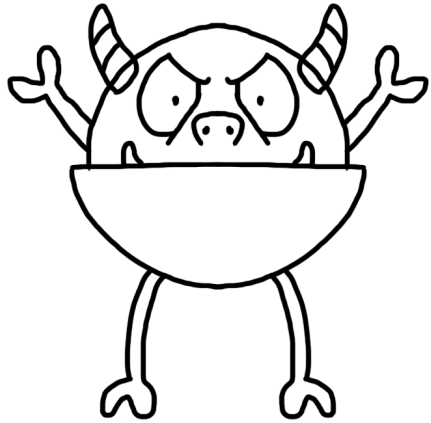
# STUDENT EXAMPLES



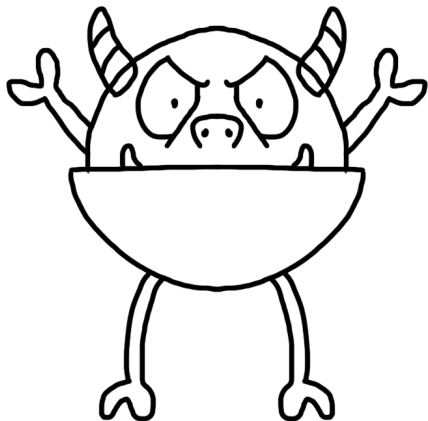
BACTERIA ARE INVOLVED IN  
THE PRODUCTION OF FUEL,  
FOOD, AND MEDICATION.



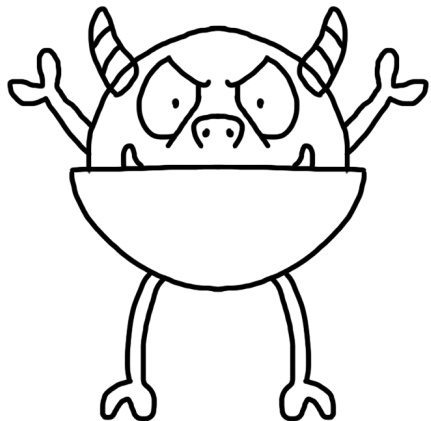
BACTERIA ARE USED IN  
ENVIRONMENTAL  
RECYCLING AND CLEAN UP.



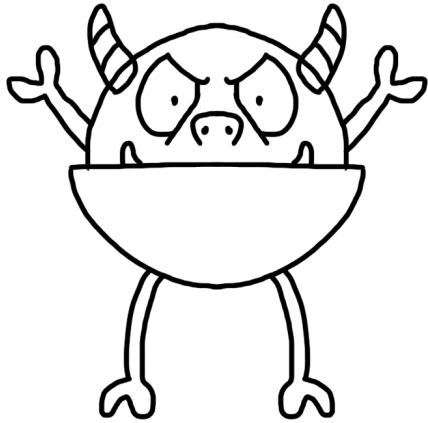
METHANE IS A GAS PRODUCE BY  
BACTERIA THAT LIVE IN OXYGEN-FREE  
ENVIRONMENTS LIKE THE BOTTOM OF  
SWAMPS AND LAKES. METHANE MAKES UP  
APPROXIMATELY 20% OF EARTH'S  
NATURAL GAS DEPOSITS.



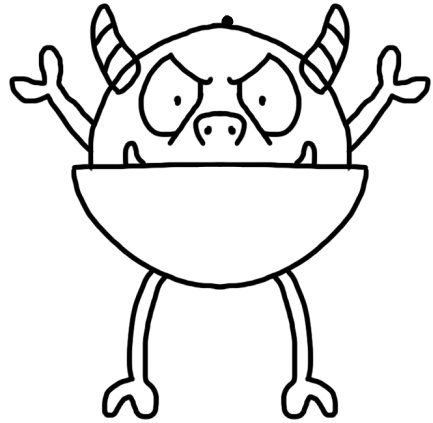
THE NEXT TIME YOU EAT CHEESE OR  
YOGURT, THANK BACTERIA. BACTERIA  
THAT GROW IN MILK ARE RESPONSIBLE  
FOR THE PRODUCTION OF PRODUCTS LIKE  
CHEESE, SOUR CREAM, AND YOGURT.



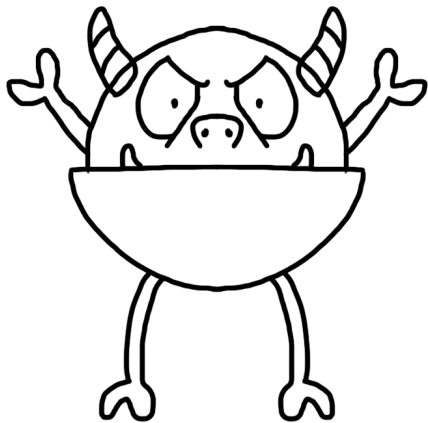
SOME BACTERIA ARE DECOMPOSERS. THAT IS, THEY FEED ON DECAYING MATTER AND BREAK IT DOWN. IF IT WASN'T FOR BACTERIA THAT ACT AS DECOMPOSERS, THE WORLD WOULD BE OVERRUN BY ENVIRONMENTAL WASTES SUCH AS DEAD ANIMAL AND PLANT MATERIALS.



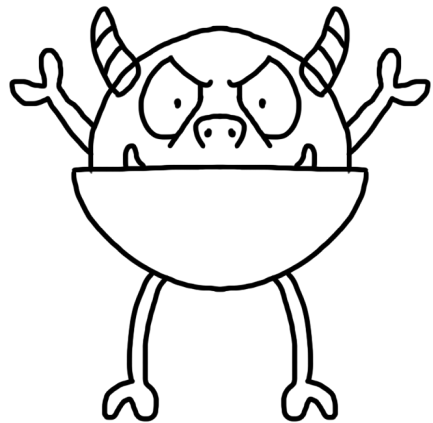
SOME BACTERIA ARE ABLE TO EAT HARMFUL SUBSTANCES LIKE OIL. THESE BACTERIA ARE USED TO CLEAN UP OIL SPILLS OR GASOLINE LEAKS.



THE HUMAN BODY IS FULL OF HELPFUL BACTERIA. IN FACT, IF IT WASN'T FOR CERTAIN BACTERIA IN YOUR BODY, YOU WOULD BECOME ILL. THE HUMAN DIGESTIVE TRACT IS FULL OF THESE BACTERIA. ESSENTIALLY, THEY SERVE TWO PURPOSES — THEY HELP PREVENT OTHER HARMFUL BACTERIA FROM GROWING AND THEY HELP HUMANS DIGEST THEIR FOOD.

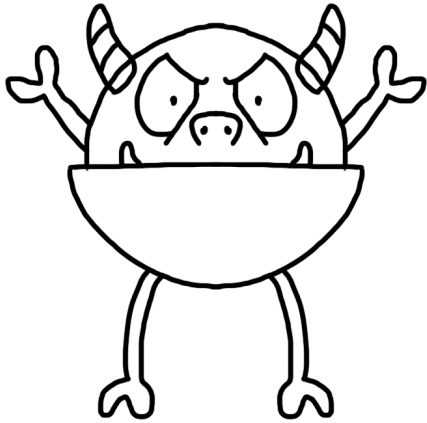


BACTERIA CAUSE CHOLERA, AN OFTEN FATAL (DEADLY) DISEASE.

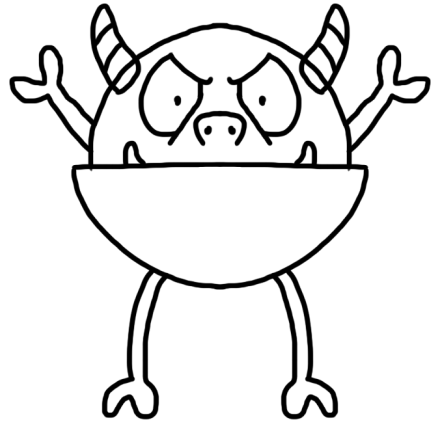




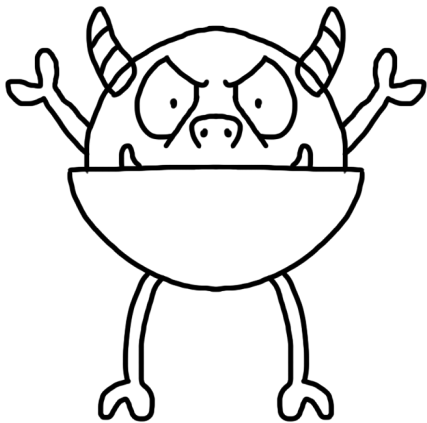
DILL PICKLES ARE CUCUMBERS  
THAT HAVE BEEN FERMENTED BY  
BACTERIA.



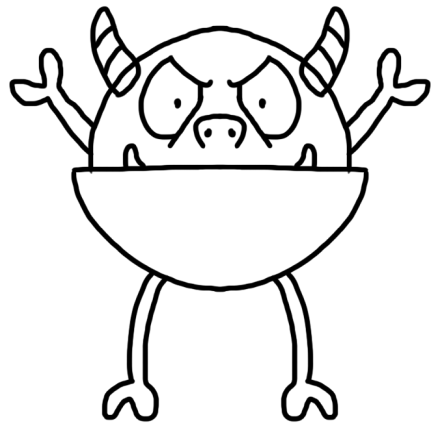
SOME FUNGI KILL CROPS  
AND ROT WOOD.



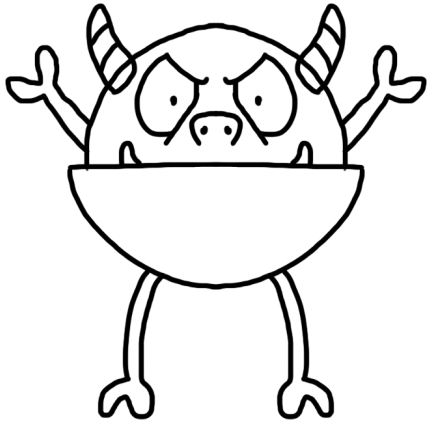
SOME FUNGI CAUSE  
SEVERAL SKIN DISEASES  
INCLUDING ATHLETE'S FOOT.



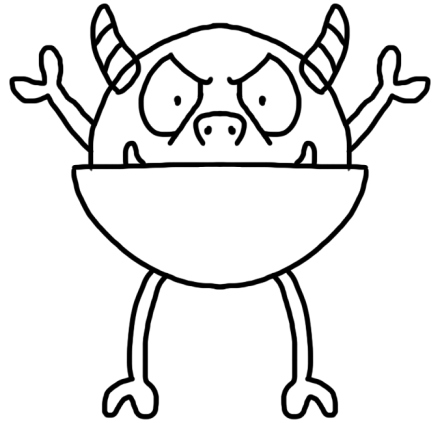
A VIRUS CAUSES POLIO, WHICH SOMETIMES  
LEADS TO PARALYSIS. FRANKLIN D.  
ROOSEVELT WAS A U.S. PRESIDENT WHO  
SUFFERED FROM POLIO WHICH OFTEN  
CAUSED HIM TO USE A WHEEL CHAIR.



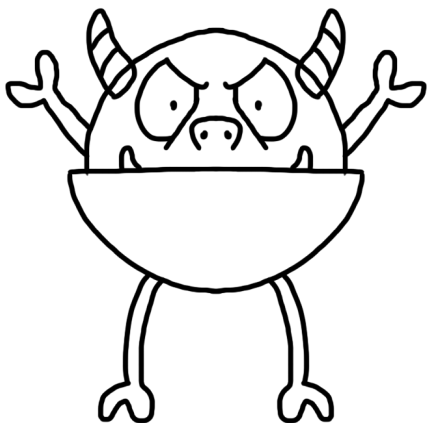
FUNGI AND BACTERIA ARE USED  
TO PRODUCE ANTIBIOTICS LIKE  
PENICILLIN WHICH CURE  
INFECTIONS.



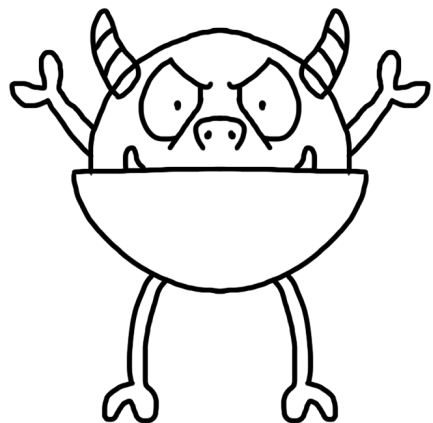
YEAST IS USED TO MAKE DOUGH  
RISE IN THE BREAD MAKING  
PROCESS.



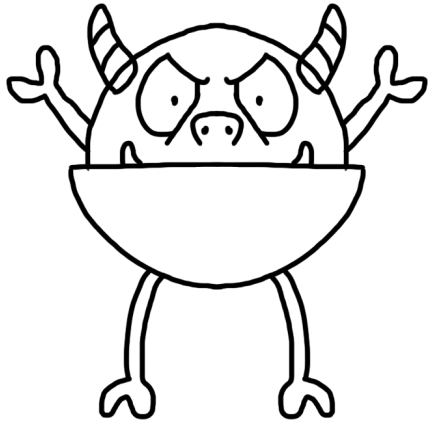
MICROBES CAN CAUSE  
FOOD TO SPOIL.



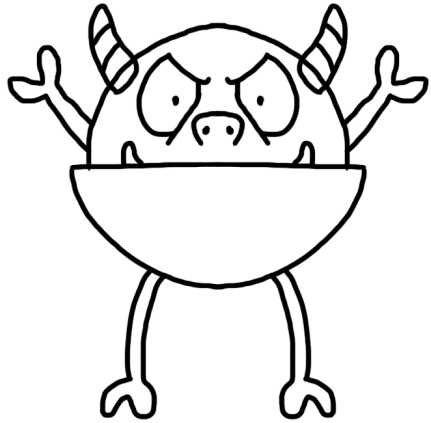
A FUNGUS IS USED TO MAKE  
RIBOFLAVIN, AN IMPORTANT  
VITAMIN.



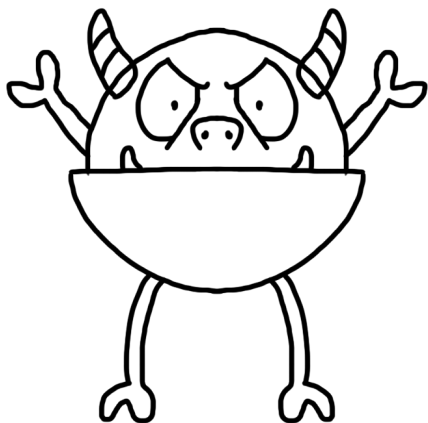
A PROTOZOAN CAUSES A  
FATAL FORM OF MENINGITIS.



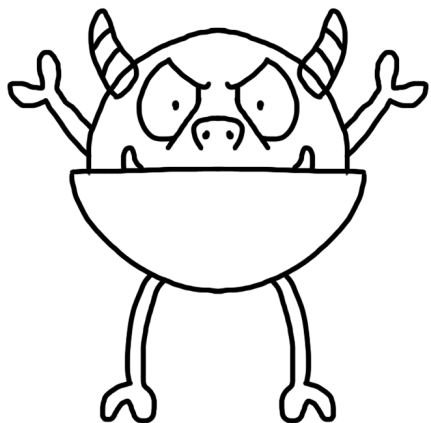
BACTERIA CAN CAUSE FOOD  
POISONING.



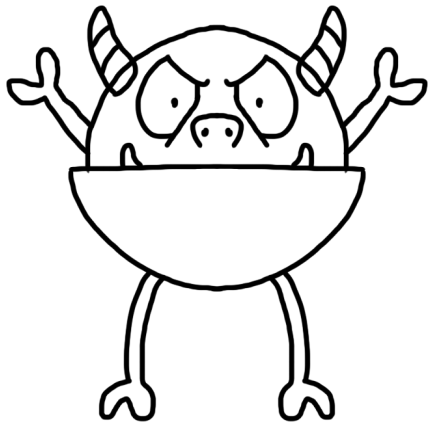
SAUERKRAUT IS PRODUCED  
BY FERMENTING CABBAGE  
WITH BACTERIA.



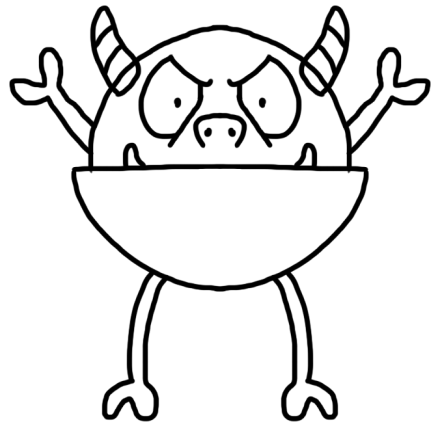
BACTERIA CAUSE TETANUS,  
A SERIOUS INFECTIOUS  
DISEASE.



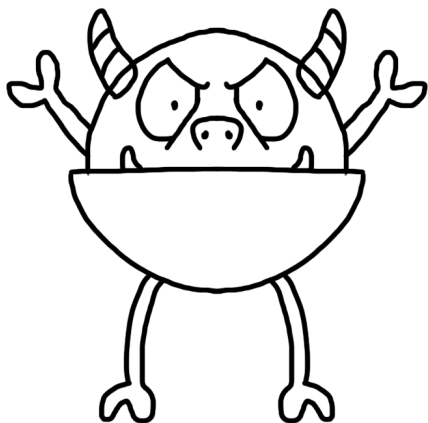
ONE VIRUS IS USED TO  
VACCINATE PEOPLE  
AGAINST OTHER VIRUSES.



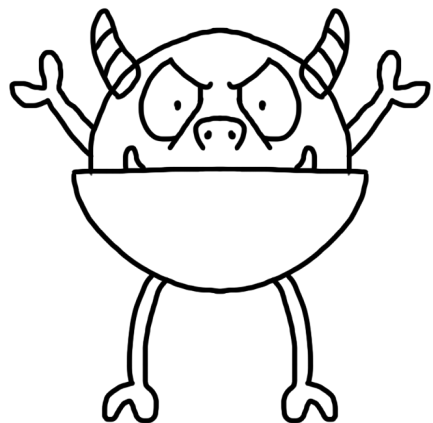
THE ORGANISM THAT CAUSES RINGWORM  
IS A FUNGUS, NOT A WORM. RINGWORM  
SPREADS EASILY AND GROWS BEST ON  
WARM, MOIST SKIN.



SOME ALGAE CAN SUDDENLY "BLOOM," OR  
GROW VERY QUICKLY. PEOPLE CALL THIS  
REDDISH WATER A RED TIDE. SOME ALGAE  
IN A RED TIDE CONTAIN A POISON THAT  
CAN KILL FISH.



PHYTOPLANKTON IS MADE OF BACTERIA AND  
PROTISTS THAT LIVE NEAR THE SURFACE OF  
WATER. THESE ORGANISMS USE  
PHOTOSYNTHESIS TO MAKE THEIR OWN FOOD.  
THEY ALSO RELEASE OXYGEN.  
PHYTOPLANKTON PRODUCE AT LEAST HALF OF  
THE OXYGEN IN THE AIR YOU BREATHE.



## Microorganisms: Beneficial or Harmful

**When we read or hear the word “bacteria” we often think of getting sick. However, not all bacteria are harmful. Some bacteria are very beneficial to humans. In fact, without certain bacteria, human life would be a lot more difficult.**

**Directions: Read each statement below. Decide if the microorganism is beneficial (B) or harmful (H). Highlight or underline key words in the text that helped you make your decision.**

1. \_\_\_\_\_ Bacteria are involved in the production of fuel, food, and medications.
2. \_\_\_\_\_ Bacteria are also used in environmental recycling and clean-up.
3. \_\_\_\_\_ Methane is a gas produced by bacteria that live in oxygen-free environments like the bottom of swamps and lakes. Methane comprises approximately 20 percent of the Earth's natural gas deposits.
4. \_\_\_\_\_ The next time you eat cheese or yogurt, thank bacteria. Bacteria that grow in milk are responsible for the production of products like cheese, sour cream, and yogurt.
5. \_\_\_\_\_ Some bacteria are decomposers. That is, they feed on decaying matter and break it down. If it wasn't for bacteria that act as decomposers, the world would be overrun by environmental wastes such as dead animal and plant materials.
6. \_\_\_\_\_ Some bacteria are able to eat harmful substances like oil. These bacteria are used to help clean up oil spills or gasoline leaks.
7. \_\_\_\_\_ The human body is full of helpful bacteria. In fact, if it wasn't for certain bacteria in your body, you would become ill. The human digestive tract is full of these helpful bacteria. Essentially, these bacteria serve two purposes - they help prevent other harmful bacteria from growing and they help humans digest their food.
8. \_\_\_\_\_ Bacteria cause cholera, an often fatal disease.
9. \_\_\_\_\_ Dill pickles are cucumbers that have been fermented by bacteria.
10. \_\_\_\_\_ A virus causes Polio, which sometimes leads to paralysis. Franklin D. Roosevelt was a U.S. president who suffered from Polio which often caused him to use a wheel chair.
11. \_\_\_\_\_ Fungi and bacteria are used to produce antibiotics like penicillin which cure infections.
12. \_\_\_\_\_ Yeast is used to make dough rise in the bread making process.
13. \_\_\_\_\_ Microbes can cause food to spoil.
14. \_\_\_\_\_ A fungus is used to make riboflavin, an important vitamin.
15. \_\_\_\_\_ A protozoan causes a fatal form of meningitis.
16. \_\_\_\_\_ Bacteria can cause food poisoning.
17. \_\_\_\_\_ Sauerkraut is produced by fermenting cabbage with bacteria.
18. \_\_\_\_\_ Bacteria cause tetanus, a serious infections disease.
19. \_\_\_\_\_ One virus is used to vaccinate people against other viruses.
20. \_\_\_\_\_ The organism that causes ringworm is a fungus, not a worm. Ringworm spreads easily and grows best on warm, moist skin.
21. \_\_\_\_\_ Some algae can suddenly “bloom,” or grow very quickly. People call this reddish water a red tide. Some algae in a red tide contain a poison that can kill fish.
22. \_\_\_\_\_ Phytoplankton is made of bacteria and protists that live near the surface of water. These organisms use photosynthesis to make their own food. They also release oxygen. Phytoplankton produces at least half of the oxygen in the air you breathe.
23. \_\_\_\_\_ Salmonella and E. Coli can make you very sick. They grow on raw chicken and other meats, raw eggs, and other raw foods. Cooking kills them.
24. \_\_\_\_\_ Some fungi kill crops and rot wood.
25. \_\_\_\_\_ Some fungi causes several skin diseases including athlete’s foot.
26. \_\_\_\_\_ Otitis Media, a bacteria, builds up in the ear and causes an infection.

## Microorganisms: Beneficial or Harmful

When we read or hear the word “bacteria” we often think of getting sick. However, not all bacteria are harmful. Some bacteria are very beneficial to humans. In fact, without certain bacteria, human life would be a lot more difficult.

**Directions: Read each statement below. Decide if the microorganism is beneficial (B) or harmful (H). Highlight or underline key words in the text that helped you make your decision.**

1. \_\_\_\_\_ Bacteria are involved in the production of fuel, food, and medications. **B**
2. \_\_\_\_\_ Bacteria are also used in environmental recycling and clean-up. **B**
3. \_\_\_\_\_ Methane is a gas produced by bacteria that live in oxygen-free environments like the bottom of swamps and lakes. Methane comprises approximately 20 percent of the Earth's natural gas deposits. **B**
4. \_\_\_\_\_ The next time you eat cheese or yogurt, thank bacteria. Bacteria that grow in milk are responsible for the production of products like cheese, sour cream, and yogurt. **B**
5. \_\_\_\_\_ Some bacteria are decomposers. That is, they feed on decaying matter and break it down. If it wasn't for bacteria that act as decomposers, the world would be overrun by environmental wastes such as dead animal and plant materials. **B**
6. \_\_\_\_\_ Some bacteria are able to eat harmful substances like oil. These bacteria are used to help clean up oil spills or gasoline leaks. **B**
7. \_\_\_\_\_ The human body is full of helpful bacteria. In fact, if it wasn't for certain bacteria in your body, you would become ill. The human digestive tract is full of these helpful bacteria. Essentially, these bacteria serve two purposes - they help prevent other harmful bacteria from growing and they help humans digest their food. **B**
8. \_\_\_\_\_ Bacteria cause cholera, an often fatal disease. **H**
9. \_\_\_\_\_ Dill pickles are cucumbers that have been fermented by bacteria. **B**
10. \_\_\_\_\_ A virus causes Polio, which sometimes leads to paralysis. Franklin D. Roosevelt was a U.S. president who suffered from Polio which often caused him to use a wheel chair. **H**
11. \_\_\_\_\_ Fungi and bacteria are used to produce antibiotics like penicillin which cure infections. **B**
12. \_\_\_\_\_ Yeast is used to make dough rise in the bread making process. **B**
13. \_\_\_\_\_ Microbes can cause food to spoil. **H**
14. \_\_\_\_\_ A fungus is used to make riboflavin, an important vitamin. **B**
15. \_\_\_\_\_ A protozoan causes a fatal form of meningitis. **H**
16. \_\_\_\_\_ Bacteria can cause food poisoning. **H**
17. \_\_\_\_\_ Sauerkraut is produced by fermenting cabbage with bacteria. **B**
18. \_\_\_\_\_ Bacteria cause tetanus, a serious infections disease. **H**
19. \_\_\_\_\_ One virus is used to vaccinate people against other viruses. **B**
20. \_\_\_\_\_ The organism that causes ringworm is a fungus, not a worm. Ringworm spreads easily and grows best on warm, moist skin. **H**
21. \_\_\_\_\_ Some algae can suddenly “bloom,” or grow very quickly. People call this reddish water a red tide. Some algae in a red tide contain a poison that can kill fish. **H**
22. \_\_\_\_\_ Phytoplankton is made of bacteria and protists that live near the surface of water. These organisms use photosynthesis to make their own food. They also release oxygen. Phytoplankton produces at least half of the oxygen in the air you breathe. **B**
23. \_\_\_\_\_ Salmonella and E. Coli can make you very sick. They grow on raw chicken and other meats, raw eggs, and other raw foods. Cooking kills them. **H**
24. \_\_\_\_\_ Some fungi kill crops and rot wood. **H**
25. \_\_\_\_\_ Some fungi causes several skin diseases including athlete’s foot. **H**
26. \_\_\_\_\_ Otitis Media, a bacteria, builds up in the ear and causes an infection. **H**

## Leads: Ways to Write an Introductory Paragraph to an Expository Essay

**An Amazing or Unusual Fact:** Using an amazing or unusual fact is a great way to capture the reader's attention and draw them into your writing.

**A Question:** Posing a question about the topic can be a way to engage the reader in the topic and make them feel the need to read more.

**A Descriptive Segment:** A good writer may use description with lots of adjectives, details, and figurative language to paint a picture with words.

**A Statistic:** A statistic is a numerical fact (a percent, fraction, decimal, etc.). Numbers can be powerful and illustrate a point.

**A Quote:** A quote from an expert such as a doctor, scientist, teacher, or any other professional or expert on a topic makes the reader want to read further.

**An Anecdote:** The writer creates a short "story" or presents a simple "situation" that helps illustrate the topic.

**Which lead was used in each example below? After examining how these authors wrote their introductory paragraphs, practice writing your own.**

Sick in bed. We've all been there. A fever gives us chills and night sweats; we spend a good portion of our day hunched over a toilet; we sniffle and sneeze until our heads are throbbing and we're buried under a snowy mountain of tissues. It isn't long before we wash down an antibiotic prescribed by our doctor to help ease the pain.

**Microorganisms like bacteria can be harmful to us, but they can also be helpful in many ways.**

Most people have given microorganisms like bacteria – many of which make us sick – a bad reputation. But did you know that although many microorganisms like bacteria can be harmful to us, they can also be helpful in many ways?

According to the Center for Disease Control, 25% of Americans – that's one in every four – suffer from food poisoning each year. Even though microorganisms have a bad reputation for being harmful to us, they can also be helpful in many ways.



# Expository Pillar - Advanced

Introductory Paragraph Topic Sentence: Microorganisms can be both harmful and beneficial.

Paragraph One Topic Sentence: Microorganisms can be harmful.

Detail 1:

Detail 2:

Detail 3:

Detail 4:

Paragraph Two Topic Sentence: Microorganisms can also be beneficial.

Detail 1:

Detail 2:

Detail 3:

Detail 4:

Conclusion Paragraph: Restate the introductory paragraph in a different way.

# Expository Pillar – Offering Support

Introductory Paragraph Topic Sentence: Microorganisms can be both harmful and beneficial.

Paragraph One Topic Sentence: Microorganisms can be harmful.

Detail 1: Sickness/Death

Detail 2: Destroy the Environment

Detail 3: Affect Food

Paragraph Two Topic Sentence: Microorganisms can also be beneficial.

Detail 1: Medical Benefits

Detail 2: Food Benefits

Detail 3: Environmental Benefits

Conclusion Paragraph: Restate the introductory paragraph in a different way.



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