



What does science have to do with *sanitation*?



Company Background

McCain Foods is a global business that has been creating great tasting food for over 60 years! As a privately owned family company with sales in over 160 countries and a global team of 22,000 people, our values are at the heart of everything we do. Our people, product quality, and customer dedication are at the core of our business. The McCainFoods, Appleton facility makes appetizers such as mozzarella cheese sticks, jalapeno poppers, and pickle fries. This location also recycles food waste generated during production with the use of a local digester. Almost all other waste is also recycled, resulting in very minimal waste to the landfill. For more information, visit www.mccain.com

Get Real Science Video Link: [What does science have to do with sanitation?](#) or

YouTube: https://youtu.be/s8UuUN_ceS0

What does science have to do with bearings?

Teacher Note

This lesson is written to accompany the above video. It is recommended that you watch the entire video in advance. This will help you to anticipate student misconceptions and questions and prepare ways to support their sense making.

Lesson Summary

In this lesson students will explore how sanitation plays a role in food safety and conduct a hands-on activity involving hand washing.

Standards Alignment - Next Generation Science Standards Performance Expectations

MS-LS2-1

Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data	LS2.A: Interdependent Relationships in Ecosystems	Cause and Effect

Lab Safety: Do not consume anything in the lab.

Materials

Graphing handout, lab handout, 6 petri dishes per group, masking tape and marker for labels, hand sanitizer, hand soap, access to hot water, science notebooks

Teacher background information:

Exponential growth: rate of growth increases over time. Example used in this lesson is bacterial growth.

Day 1 Procedure:

1. Show the Get Real Science video “Sanitation.”
2. Stop the video at Break 1 (0:59)
 - a. Have a brief class discussion. Ask students: Why do you think it is important to clean materials right after making food? What could happen if you don't clean off the materials right away? Write all ideas down on the board.
3. Restart the video and stop it again at Break 2 (1:23)

**Opportunity for differentiation: Some students might be ready to graph using Google Sheets or MS Excel. Others might need the axes numbered. Three options are provided allowing you to scaffold for your students' learning needs.*

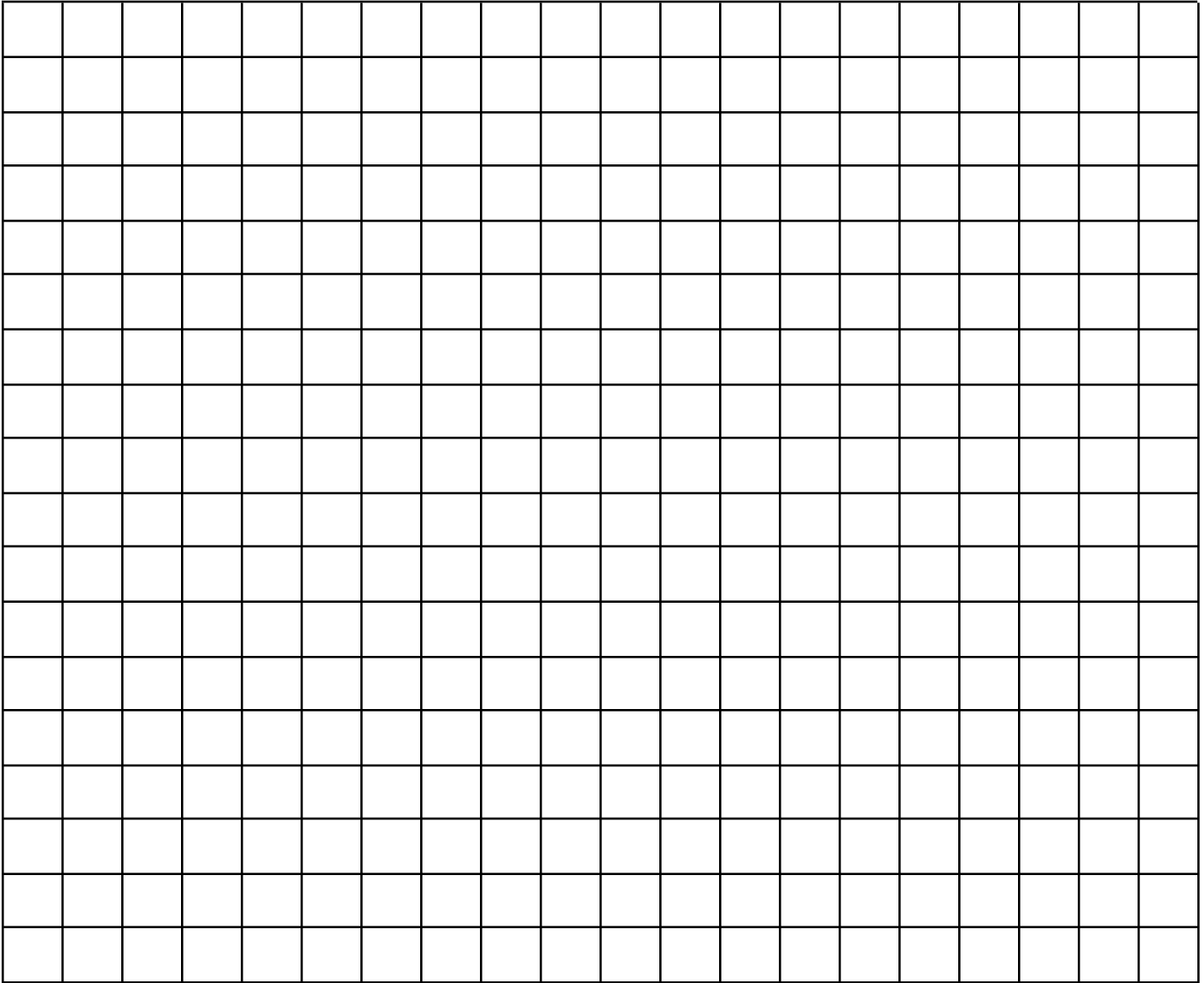
 - a. Hand out the “How bacteria grows” worksheet. If axes labels are needed, students include them.
 - b. Have students graph the data provided for the first 5 hours of bacteria growth.
 - c. Class discussion - what patterns do you notice about how bacteria grow? Press them to use the data as evidence for their claims.
 - d. Ask students to use the pattern to estimate and graph bacteria numbers up to 10 hours.
 - e. Define exponential growth - have students define this term below their graph.
 - f. Predictions - have students predict how many bacteria would be present in 100 hours. Have them make a star on their graph showing the prediction. Some students might say that it will not fit on their graph. Use a spreadsheet or an algebraic expression to calculate the correct number after students have guessed.
4. Restart the video and stop it again at Break 3 (2:47)
 - a. Class discussion and demonstration - what will help remove stuck on food? So far they have rinsed with water and added soap. Find the nearest sink, run your hands under water and add soap to your hands without rubbing them together. Ask students what you should do next. They should respond with “rubbing hands together” and explain that this is an example of physical force.
5. Restart the video and stop it again at Break 4 (5:31)
 - a. Class discussion - a niche point is a small, hard to reach place when cleaning. What are some niche points you have when you wash your hands? What are some niche points you have when you brush your teeth?

Day 2 Procedure:

6. Hand washing experiment
 - a. Have students get into groups of 3 or 4. Hand out the "Sanitation Lab" sheet to each student. Review lab safety with students.
 - b. Each group should have one container full of potting soil in a container that allows for students to interact with the material.
 - c. Give students 30 seconds each to put their hands in the soil and make their hands as dirty as possible.
 - d. Students will then go through each of the steps of the sanitation process and create qualitative observations of the cleanliness of their hands at each step. See attached student lab sheet. Guide students through the following steps:
 - i. Dry pick up - have students try to remove the dirt from their hands by removing pieces of dirt without rubbing their hands together. Have them record observations in the "dry pick up" section of their worksheet.
 - ii. Pre-rinse - have students run their hands under cold water without rubbing their hands together. Create observations.
 - iii. Detergent/soap - allow students to use soap to wash their hands. They can rub their hands together on this step. Do not allow them to rinse off their hands. Create observations.
 - iv. Physical force - provide students with scrub brushes. They can use soap, water and scrub brushes to now wash their hands. Create observations.
 - v. Post rinse - allow students to rinse their hands clean under water. Create observations.
 - vi. Preliminary inspection - have students show you their hands. Use a flashlight if necessary to point out any remaining soil. Provide feedback that they will include in their observations.
 - vii. Sanitizer application - students should use hand sanitizer to now clean their hands. Create observations.
 - e. Students should complete conclusion questions as a group.

Name _____ Date _____

How Bacteria Grows



Data to graph

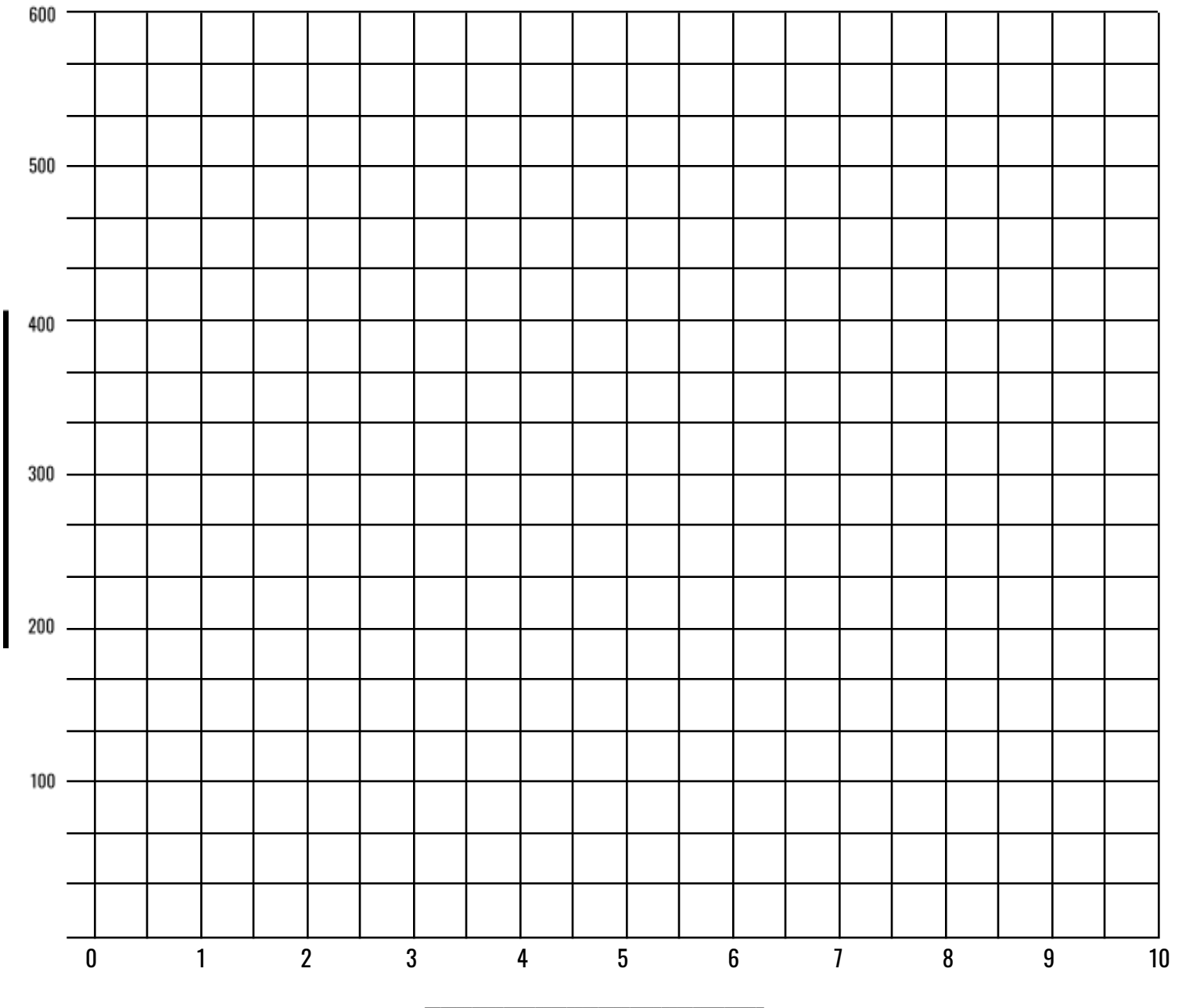
Time (hours)	1	2	3	4	5							
Amount of bacteria	1	2	4	8	16							

Exponential growth:

Prediction at 100 hours: _____ Actual at 100 hours: _____

Name _____ Date _____

How Bacteria Grows



Data to graph

Time (hours)	1	2	3	4	5					
Amount of bacteria	1	2	4	8	16					

Exponential growth:

Prediction at 100 hours: _____ Actual at 100 hours: _____

Name _____ Date _____

How Bacteria Grows

Use Google Sheets or MS Excel to graph the following data.

Use the pattern in the data to determine how many bacteria are present at 6, 7, 8, 9, and 10 hours. Add that data to your graph.

Data to graph

Time (hours)	1	2	3	4	5					
Amount of bacteria	1	2	4	8	16					

Exponential growth:

Prediction at 100 hours: _____ Actual at 100 hours: _____

Name _____ Date _____

Get Real Science
Sanitation Lab

Lab Safety: 1) Do not consume anything in the lab. 2) Avoid touching your eyes and/or face with dirty hands.

Your teacher will guide you through the steps of the sanitation process outlined below. Create and record all observations in the data table provided.

1. Dry pick up - remove the dirt from your hands by removing pieces of dirt without rubbing your hands together.
2. Pre-rinse - run your hands under cold water without rubbing your hands together.
3. Detergent/soap - use soap, water and rub your hands together.
4. Physical force - Use soap, water and scrub brushes to wash your hands. Do not rinse your hands after this step.
5. Post rinse - rinse your hands under water.
6. Preliminary inspection - show your teacher your hands to inspect.
7. Sanitizer application - use hand sanitizer to clean your hands.

Observation Table

Step	Observations
Dry pick up	
Pre-rinse	
Detergent/soap	
Physical force	
Post rinse	
Preliminary inspection	
Sanitizer application	

Conclusion Questions:

1. Which of the steps was most effective at cleaning your hands? Use evidence from the lab to explain your observations.
2. The steps of the sanitation process are in a specific order. What would be the outcome if the order was mixed up? For example, what if "sanitizer application" was the first step?