

GROW YOUR PALS PROGRAM GUIDE



THE NATIONAL FFA MENTORING PROGRAM

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LESSON 3.2

Cooling Counts

Unit:
FOOD AND NUTRITION

PRECEPTS

- J. Mental Growth
- J6. Persuade others

NATIONAL STANDARDS

- FPP.01.01.02.b. Discuss the issues of safety and environmental concerns about foods and food processing (e.g., Genetically modified organisms, microorganisms, contamination, irradiation)
- NL-ENG.K-12.4 – Communication Skills
- NL-ENG.K-12.12 – Applying Language Skills
- NS.K-4.3 – Life Science



Lesson Type:
Large Group

STUDENT LEARNING OBJECTIVES

As a result of this lesson, the student will ...

- Describe the ideal temperatures for *microorganisms* to grow.
- Identify what causes *microorganisms* to grow on food.
- Identify safe good-handling practices.





TIME

Instruction time for this lesson: **50 minutes.**



RESOURCES

Hypothesis. (n.d.) In Ask.com, www.dictionary.reference.com/browse/hypothesis. Retrieved from <http://dictionary.reference.com/browse/hypothesis>.

Partners for Food Safety Education. (2006). Fight Bac! Keep Food Safe From Bacteria. Retrieved March 4, 2010, from: <http://www.fightbac.org/index.php>.

National FFA Organization. (2003). LifeKnowledge Precepts and Signs of Success.



TOOLS, EQUIPMENT AND SUPPLIES

- ✓ Hot water
- ✓ Measuring cup
- ✓ Shallow container
- ✓ Tall container
- ✓ Food thermometer
- ✓ Paper and pencil
- ✓ One 8 ounce cup
- ✓ Room temperature water (*about 70 degrees*) - 1/2 cup sugar
- ✓ One package of dry yeast
- ✓ Two 12 ounce clear plastic bottles
- ✓ Two balloons
- ✓ Two large deep bowls
- ✓ Warm water (*about 110-120 degrees*)
- ✓ Ice water (*below 40 degrees*)
- ✓ PALS3.2.LG.AS.A- cut up
- ✓ PALS3.2.LG.AS.B- one per student
- ✓ PALS3.2.LG.AS.C- one per student; different colors for pairing
- ✓ PALS3.2.LG.TM.A
- ✓ PALS.3.2.LG.TM.B

KEY TERMS



The following terms are presented in this lesson and appear in ***bold italics***:

Microorganisms

Hypothesis



CONTENT OUTLINE

Objective 1. | Describe the ideal temperatures for *microorganisms* to grow.

1. What is a *microorganism*?
 - A. A small life form that can cause disease. (examples include: Bacteria, fungus, parasites)
2. Yeast balloon blow-up activity
 - A. Record observations
 - B. Temperature where the yeast actively responded

Objective 2. | Identify what causes *microorganisms* to grow on food.

1. Cooling counts activity
 - A. Make *hypothesis*
 1. An assumption or guess
 - B. Record observations
2. What causes *microorganisms* to grow on food?
 - A. Improperly cooked food
 - B. Failure to keep food hot
 - C. Handling cooked food after handling uncooked food

Objective 3. | Identify safe good-handling practices.

1. How should food be handled to avoid **microorganism** growth?
 - A. Clean
 - B. Separate
 - C. Cook
 - D. Chill

INTEREST APPROACH

Prior to class, copy and cut apart PALS3.2.LG.AS.A to ensure each student will have one section of the assignment sheet. Copy and cut enough sections so each student will be paired with another.

*Write the word **microorganism** on the white board. After students have entered the room, have them define that word.*



Direct our eyes to the front of the room where we will find a word:
MICROORGANISM. Take the next thirty seconds to try to define this word.

*Allow students a slight moment to define **microorganism**. At the conclusion of thirty seconds, encourage at least three students to share.*



Who will share their definition of a **microorganism**?

Following a short share, write the definition on the white board and have students record the definition on a piece of paper.



A **microorganism** is a small life form that can cause disease. Examples include fungus, parasites and bacteria. Please record this definition on a sheet of paper.

*After students have finished recording the definition, inquire about why we should be concerned about **microorganisms**.*



How do **microorganisms** like fungus and bacteria affect us?

*Responses should relate to the fact that **microorganisms** like fungus and bacteria can grow on the food we eat and cause illness.*



That's correct. **Microorganisms** can certainly be harmful to us. It's important that we be able to protect ourselves against these harmful life forms.

Prior to class, copy and cut apart PALS3.2.LG.AS.A to ensure each student will have one section of the assignment sheet. Copy and cut enough sections so each student will be paired with another. Pass out these sections now, having each student take one section.



Each of us has just been given a small sheet of paper. On this paper is a word. There is another student that shares the same word on their sheet of paper. When I say GO, take thirty seconds to find that person, sit next to them and return your attention to the front of the room.

GO!

Give students thirty seconds to find their partner.



When I say FOOD, take one minute to answer the following question using the word on your sheet of paper: How can **microorganisms** grow on this piece of food? What clarification is needed?

FOOD!

Give students one minute to brainstorm ways in which **microorganisms** will grow on their specific food. Responses should include being left out at room temperature, not being refrigerated, being kept in a warm place, etc.



Let's hear how **microorganisms** are able to grow on our food products. Who will share first?

Let each group share their ideas about how **microorganisms** will grow on their food products. Responses should resemble those listed above.



Today we have the opportunity to more deeply explore how **microorganisms** grow on food products. We will discover at what temperature **microorganisms** grow, identify what causes their growth, and combat their growth by identifying safe handling practices. Let's not waste any more time!

SUMMARY OF CONTENT AND TEACHING STRATEGIES

OBJECTIVE 1. | Describe the ideal temperatures for **microorganisms** to grow.



Gather the following supplies for the yeast balloon blow-up activity: one 8 ounce cup, room temperature water, $\frac{1}{2}$ cup sugar, one package dry yeast, two 12 ounce clear plastic bottles, two balloons, two large deep bowls, warm water, ice water and a thermometer.



Here is our task for today.

Display PALS3.2.LG.TM.A as steps to the activity are shared with students. Assign students specific tasks in order to complete the activity.

After completing the activity, give students PALS3.2.LG.AS.B to record their observations after five minutes. Set a timer for another 15 minutes to ensure students will not miss their 20 minute observation.



Who will be the first to share their observations?

Responses should conclude that the yeast was more active with the higher temperature water than with the cold water.



Why do you think the yeast responded in this way?

*Responses should relate to the fact that **microorganisms** need a warm environment to grow, therefore causing the yeast to activate.*



We are certainly on the right track. The yeast needed a warm environment to grow, and we provided that when we put it in the warm water. **Microorganisms** can grow in a number of ways; let's do another experiment to see if we can identify some of these alternatives.

OBJECTIVE 2. | Identify what causes **microorganisms** to grow on food.



Gather the following supplies for the Cooling Counts activity: hot water, measuring cup, shallow container, tall container, and a food thermometer.



Let's dive deeper into determining what causes **microorganisms** to grow on our food. Before we begin, though, we should have a grasp of a very important word: **Hypothesis**. What is a **hypothesis**?

Listen to responses.



Correct, a **hypothesis** is an assumption or a guess. Before we begin this next experiment, we will each make a **hypothesis** about what the end result will be. Here we have a shallow container and a tall container. Hot water is being poured into each of these containers. Using your activity sheet, make a **hypothesis** about which container will cool fastest and why. We will meet back for discussion in two minutes.

At the conclusion of two minutes, discuss with students why the temperature of the water is so important to microorganism growth.



In three minutes we will take our first reading and see if we are on track with our hypotheses. We just established that microorganisms like bacteria need a warm environment in which to grow. This "danger zone" is between 40 degrees Fahrenheit and 140 degrees Fahrenheit. If harmful bacteria grow on our food while it's in between these temperatures, what effects might we feel?

*Solicit responses from the class concerning what effects harmful bacteria and **microorganisms** can have on us.*



That's right; if we come in contact with harmful **microorganisms** we are susceptible to diseases and food borne illnesses.

Take the next few minutes to record observations from the cooling counts activity and yeast balloon.



Let's check back in with our experiments. Record your observations from the two containers of water. Which had the coolest temperature after five minutes? Next, revisit the balloons and record the twenty minute observation. We will meet back in five minutes to report on our findings.

*After five minutes, have students share their observations and **hypothesis** conclusions.*



Who will be the first to share their twenty minute observation from our balloon activity?

Allow two or three students to share their results.



Whose **hypothesis** was correct about the cooling counts activity? What did we observe?

Allow two or three students to share their results and hypotheses.



Given what we have just seen and heard from our classmates, what can we conclude about how **microorganisms** are allowed to grow on our food?

Responses should include something along the lines of food being kept at the wrong temperatures, not cooked long enough, etc.



There are a number of ways in which **microorganisms** can grow on our food. Record two of these ways on the bottom of your activity sheet.

Display PALS3.2.LG.TM.B. Have students record two of these methods at the bottom of PALS3.2.LG.AS.B.



Use the Hieroglyphics e-Moment® to draw a picture or icon to illustrating two ways **microorganisms** can grow on food.



Give students one minute to finish the Hieroglyphics e-Moment®.

OBJECTIVE 3. | Identify safe good-handling practices.



We know there are a number of ways **microorganisms** can grow on our food, but now let's discover how we can safeguard our food against these substances.

Copy PALS3.2.LG.AS.C on various colors of paper. Use enough colors so students can easily be paired by matching colors after given the activity sheet. Hand out PALS3.2.LG.AS.C to each student.



Take the next 30 seconds to find the other person with the like-colored activity sheet, sit down, and direct your attention back to the front of the room.

GO!

Give students thirty seconds to find their new spot and partner.



We have just received an activity sheet with four words on it. These are four ways we can prevent **microorganisms** from coming in contact with our food. When I say SAFE, take the next three minutes to brainstorm safe good-handling practices that will fit under each of these categories. These good practices should be tips and tricks that we can all use to keep us safe from **microorganisms**. What questions are there?

SAFE!

At the conclusion of three minutes, direct students to find another group to share their ideas.



Bring it back in 5, 4, 3, 2 and 1. Find the group closest to you and share them the tips and tricks your group has just brainstormed. We will meet back in four minutes.

GO!

At the conclusion of four minutes, bring the class back.



Let's hear those ideas.



Ask for two responses for each of the four words.



Great ideas on how to keep **microorganisms** away from our food!



REVIEW / SUMMARY



Today we dove into the growth of **microorganisms** and developed some quality techniques to use to stop those **microorganisms** from growing on our food. The last step in our journey today is to campaign for others to practice these same safe good-handling practices. In order to do this, we must persuade others to jump on board with our ideas about safe food handling. What does it mean to persuade someone?

Solicit responses and ideas from the class



To persuade someone means that we are encouraging them to do something or act a certain way. We are pushing them to do something. Being able to persuade others in a positive manner is a valuable quality. It can help keep our friends, family or classmates on the right track. Let's practice these skills. In order to persuade someone, we must be passionate about the topic and believe in it. Today, we must believe in the need to safely handle our food in order to keep it free of harmful **microorganisms**. Using our partner groups, we will be conducting an Eye Witness News e-Moment® about the importance of our safe good-handling techniques. Your job as a reporter is to persuade your audience to use these techniques on a daily basis. Remember, when we persuade someone, we must use facts and data. Keep in mind the experiments we just completed to help persuade the audience. What questions are there?

REPORT!

Give students five minutes to conduct their report.



Who will be the first to persuade us to use these safe good-handling techniques?

Allow two or three groups to share their reports.

APPLICATION



Small Group Idea

Create posters depicting the four safe good-handling techniques and display them around the school so they can be practiced by all students and teachers.



One-on-One Idea

*Research specific **microorganisms** found in food and create a poster depicting their growth habit, characteristics for growth and harmfulness to humans.*



EVALUATION

ANSWERS TO EVALUATION:

At the conclusion of class, verbally assess the students by asking them to recall the four safe good-handling techniques discussed today during class.

Clean
Separate
Cook
Chill

PALS3.2.LG.AS.A

Raw Meat	Raw Meat	Cooked Turkey	Cooked Turkey
Banana	Banana	Strawberry	Strawberry
Ham	Ham	Cheese	Cheese
Milk	Milk	Bread	Bread



PALS3.2.LG.AS.B

Yeast Balloon Blow-Up

After five minutes and 20 minutes, record your observations.

Warm Water Bottle –

Five minutes:

Twenty minutes:

Cold Water Bottle –

Five minutes:

Twenty minutes:

Cooling Counts

Hypothesis:

Observations:



PALS3.2.LG.AS.C

Clean

Separate

Cook

Chill



PALS3.2.LG.TM.A

1. Dissolve sugar and yeast in eight ounces of room temperature water.
2. Pour sugar and yeast mixture evenly into two separate plastic bottles.
3. Carefully place an un-inflated balloon over the neck of each bottle.
4. Pour ice water and warm water into separate bowls. Use thermometer to determine the temperature of the water in each bowl.
5. Place one bottle into the bowl of warm water, making sure the water is just high enough to cover the yeast mixture.
6. Place the other bottle into the cold water, making sure the water is just high enough to cover the yeast mixture.
7. Make observations after the first five minutes and 20 minutes.



PALS3.2.LG.TM.B

- Improperly cooked food
- Failure to keep food hot
- Handling cooked food after handling uncooked food