



Food Safety Curriculum for Secondary School Students

Lesson 5: Chill!

Major Concepts from Unit:

- Chill
 - *Refrigerator and Freezer Temperatures
 - *Refrigerator Storage Times
 - *Methods of Defrosting Foods
 - *Purchasing Guidelines
 - *Cooling and Storage when Traveling

Terminal Objective: To explain proper cooling and storage of foods when traveling

Establishment of Set: Give students a picture of a thermometer on a handout. Thermometer should have degrees Fahrenheit ranging from -40 to +220, identified on the thermometer at 20-degree intervals. Ask them to use a red crayon to draw in the danger zone for food. Have them share answers. (40°-140°)

Objective 1 – To explain proper temperatures for the refrigerator and freezer. (C-C)

Objective 2 - To explain guidelines to use in chilling foods. (C-C)

Content	Learning Experience
<p>1. The fourth and final step in food borne illness prevention is to refrigerate promptly. Cold temperatures help to keep most bacteria from growing and multiplying. The sooner you get foods in to proper refrigerator temperatures, the better.</p> <p><i>Proper refrigerator temperatures</i> Remember the danger zone! (40°to 140°) Set the refrigerator at 40°F and the freezer at 0°F. If your refrigerator doesn't have temperatures associated with the settings, check the manufacturer's manual to see what setting is best. Periodically, you should check and make sure the temperatures stay at these levels, in case something is wrong with your refrigerator. Appliance thermometers are available at most stores that sell appliances. Did you know that 23% of people's refrigerators are not cold enough? Check yours!</p> <p>2.Guidelines for Chilling Food</p> <p>➤ Refrigerate or freeze potentially hazardous foods within two hours.</p>	<p>1 & 2. Student will listen as teacher explains about proper refrigerator/freezer temperatures. Students will view guidelines for chilling food on a transparency as they are discussed.</p> <p>Students will divide into lab groups and complete the "Cooling Counts!" Activity (See Attached A) and fill in Attachment A. Discuss the results.</p>



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<ul style="list-style-type: none"> ➤ Never defrost food on the kitchen counter. Use the refrigerator, cold water that is changed frequently or the microwave. (see section on Defrosting) ➤ Divide large amounts of leftovers into smaller, shallow (i.e. less than 4 inches deep) pans for quick cooling in the refrigerator. ➤ With poultry or other stuffed meats, remove the stuffing and refrigerate in a separate container. The stuffing may not cool quickly enough to stay out of the danger zone if you leave it in the meat. It is really safest not to stuff a bird and to make the stuffing separately. ➤ Don't overpack your refrigerator or freezer. The cool air must be able to circulate in order to cool the food to a safe temperature zone and keep it cool 	
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Objective 3: To explain refrigerator storage times for common foods. (C-C)

Content	Learning Experience
<p>3. Even though the cold temperatures help reduce or slow the growth of harmful bacteria, you can't leave food in the refrigerator indefinitely! After a period of time, foods can become unsafe to eat, even if they have been in the refrigerator. Frozen foods are generally safe, but quality deteriorates after time. The "Cold Storage" table (Attachment B-1) provides safe refrigerator and freezer storage time limits for many common foods.</p> <p>If you are unsure how long something has been in the refrigerator or freezer, it's best to practice the motto, "When in doubt, throw it out!" If a food looks or smells strange or bad, just throw it out. Never taste it to find out! If there is mold on it, you should throw it out. Even if you only see a little bit of mold, the rest of the food could have poisonous mold spores growing on it. With some hard foods like hard cheeses and firm fruits or vegetables,</p>	<p>1. Students will listen to teacher give an overview on length of cold storage and fill in Attachment B-2 length of storage chart as teacher show Attachment B-1 on overhead or slide. Will discuss statement on a poster, slide, overhead, or board – "When In Doubt, Throw It Out!"</p>



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<p>you can cut out the moldy part (and at least an inch or so around that) and it is OK to eat. Again, remember "When in doubt, throw it out."</p> <p>*Teacher need to make into overhead or slide (B-1)</p>	
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Objective 4 – To describe acceptable methods of defrosting food. (C-C)

Content	Learning Experience
<p>4. <i>Defrosting</i></p> <ul style="list-style-type: none"> ➤ Defrost food in the refrigerator. This is the safest method. ➤ If you need a quicker method, place meat or poultry in an airtight (water tight) container and put in cold water. Change the water every 30 minutes. ➤ You can defrost by using the “defrost” setting in the microwave, but only if the food will be cooked right away. Read your microwave directions on defrosting. ➤ You can also defrost food as part of the cooking process (i.e. in the hot oven or cooking it on the stove top). Just make sure the food reaches the proper internal temperature (refer to earlier chart on minimum internal cooking temperatures) ➤ Never defrost in hot water ➤ Never defrost by leaving food on the counter 	<p>4. Students will listen as teacher discusses proper techniques for defrosting foods. View examples of ways to defrost shown by teacher.</p>

Objective 5 - To describe proper cooling and storage of foods when traveling. (C-C)

Content	Learning Experience
<p>5. <i>Eating out or on the road</i></p> <p>If you're packing food to take along on a road trip, picnic, barbecue, etc. you need to keep the danger zone in mind. Keep cold foods cold and those you will reheat cold too.</p>	<p>5. Students will listen and watch as teacher demonstrates different techniques of cooling and storing foods when traveling.</p> <ul style="list-style-type: none"> - Such as viewing different ice chests, ice packs, and appropriate foods for a picnic.



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<ul style="list-style-type: none"> ➤ Keep foods in the refrigerator or freezer until the very last minute ➤ Pack on ice or with cold packs in your cooler. (a full cooler maintains a colder temperature than a partially-filled one) ➤ Try to avoid leaving the cooler in a hot car. ➤ Remember the 2-hour rule. Don't leave foods in the danger zone for more than 2 hours. ➤ If you are bringing home a doggy bag from a restaurant, you must get it home and refrigerated within two hours. Otherwise, throw it out. <p><i>Serving food</i></p> <p>Ever been to a picnic and notice the food is sitting out all day? Yuck! It's a great way to make the bacteria happy!</p> <p>When serving cold food at a buffet, picnic, barbecue or other event, keep these tips in mind.</p> <ul style="list-style-type: none"> ➤ Cold foods should be kept at 40°F or lower ➤ Keep all perishable foods chilled right up until serving time ➤ Place containers of cold food on ice for serving to make sure they stay cold ➤ Keep custards, cream pies, and cakes with whipped cream or cream-cheese frostings refrigerated. Don't serve them if there is not a way to keep them cold 	
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Objective 6 – To describe proper techniques for purchasing food. (C-C)	
Content	Learning Experience
6. <i>Purchasing Food</i> Check the refrigerated food that you buy to	6. Students will complete Attachment C, related to purchasing food. Go over answers.



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<p>be sure it feels cold and that frozen foods are not soft. Avoid buying frozen foods that have ice crystals on them. Often, that means they have thawed and been refrozen.</p> <p>Plan your shopping in the store so that your frozen, refrigerated, and ready-to-serve hot items are purchased last and do not remain the danger zone while shopping. This keeps them at room temperature for as short a period of time as possible.</p> <p>If you are grocery shopping, try to make it your last stop so that you are headed home right away and can get foods refrigerated quickly. Use insulated bags if the store provides them.</p> <p>If you are not going straight home after shopping, you should pack an insulated cooler for your potentially hazardous foods.</p> <p>When you get home from shopping, you should properly store all food items immediately.</p>	<p>ANSWERS</p> <ol style="list-style-type: none">1. A2. B3. B4. B5. A6. B7. B8. A9. B10. A <p>Students will discuss guidelines to follow when purchasing food.</p>
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Resources Needed:

- Handout with picture of thermometer for each student
- Attachment B – Cooling Counts for each student
- Hot Water source for each group
- Measuring Cup for each group
- Shallow container (1 cup/500 ml minimum) for each group
- Tall container for each group
- Food thermometer for each group
- Wire or string for each group
- Attachment B-1 as overhead or slide
- Attachment B-2 for each student to fill in
- A variety of ice chests, ice bags, and appropriate example of foods safe to take on a picnic
- Attachment D for each student
- Poster, overhead, or slide with “When In Doubt, Throw It Out!”
- Bingo Clues and Answers (Attachment D-1)
- Bingo Card for each student (Attachment D-2)



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ATTACHMENT A

USDA Fightbac[®] Activity:
EXPERIMENT: Cooling Counts!

Question? Does the shape of a container affect the rate at which cooling takes place?

My Hypothesis:

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Materials Needed:

Hot water
Measuring cup
Shallow container* (1 cup/500 ml minimum)
Tall container*
Food thermometer
Wire or string

*Containers should be made from the same material, like plastic or glass.

Procedure:

1. Pour 1 cup hot water into each container. (water temperature should be the same for each container)
2. Check the temperature of the water in each container at 5-minute intervals, and record the times and temperatures. (See tip below)

Tip: For tall containers, you may need to use wire or string to lower the thermometer into the water.

My Observations:

This is what I observed about the water cooling in each container:

Shallow: _____

Tall: _____



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Chart the results for temperatures at 5-minute intervals.

My Conclusions:

It took the taller container longer to cool because:

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It is important for leftover food to be cooled down quickly when stored in the refrigerator because:

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If the water were clam chowder and it took a long time to cool down, this is what could happen:

Tell Your Family ...

Check to see how leftovers are stored in your home. Encourage family members to use shallow containers.

Another experiment to try:

Make some very thick breakfast cereal like oatmeal or cream of wheat. Put half in a shallow pan (like a pie plate), and half in a deeper pan (greater than 4 inches in height). Record the temperature of both. Then refrigerate both and measure the temperature every 30 minutes for up to 2 hours (more if you have the time in class). Students will be surprised to see the difference in the temperatures. They will also see that after 2 hours, the temperature of the cereal in the deeper pan is probably still in the danger zone!



ATTACHMENT B-1

Consumer Guidelines

Cold storage times for Ground Meat and Ground Poultry

Refrigerator (40 F or below)	
Product	Days
Uncooked ground meat and ground poultry (bulk or patties)	1 to 2 days
Cooked ground meat and ground poultry (hamburgers, meat loaf and dishes containing ground meats)	3 to 4 days
Freezer (0 F or below)	
Product	Months
Uncooked ground meat and ground poultry (bulk or patties)	3 to 4 months
Cooked ground meat and ground poultry (hamburgers, meat loaf and dishes containing ground meats)	2 to 3 months



ATTACHMENT B-2

Consumer Guidelines

Cold storage times for Ground Meat and Ground Poultry

Refrigerator (40 F or below)	
Product	Days
Uncooked ground meat and ground poultry (bulk or patties)	
Cooked ground meat and ground poultry (hamburgers, meat loaf and dishes containing ground meats)	
Freezer (0 F or below)	
Product	Months
Uncooked ground meat and ground poultry (bulk or patties)	
Cooked ground meat and ground poultry (hamburgers, meat loaf and dishes containing ground meats)	



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ATTACHMENT C

REMEMBER FOOD SAFETY WHEN GROCERY SHOPPING

Directions: Next to each item on the shopping list below place an “A” for an item that you would pick up first in the store, and a “B” for an item that you would get just before checking out.

1. _____ Bread
2. _____ Ice Cream
3. _____ Milk
4. _____ Hot Deli Chicken
5. _____ Cereal
6. _____ Frozen Pizza
7. _____ Ground Hamburger
8. _____ Bag of Chocolate Chips
9. _____ Yogurt
10. _____ Canned Peaches



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Closure – *Review the following information from the unit

Foodborne illness is a serious disease caused by eating food contaminated with large numbers of harmful microorganisms. You can prevent foodborne illness by remembering some key steps.

- Know the conditions favorable for bacterial growth (FATTOM) and how to avoid or prevent these conditions
- Know the major microorganisms involved in foodborne illness
- Know the Danger Zone for food storage
- Know the 4 steps in the prevention of foodborne illness

- Clean
 - Personal cleanliness
 - Clean utensils and equipment
 - Clean food
- Separate
 - Avoid cross-contamination
 - Keep food safe to eat by handling it right when you shop and when you store it
- Cook
 - Control food's temperature from purchasing through serving so bacteria can't thrive.
 - Know the minimum internal temperatures for cooked food.
- Chill
 - Keep food safe to eat by storing properly in the refrigerator and freezer
 - Keep food safe to eat by defrosting properly

*Play Bingo Game

Directions: Use the clues and answers on Attachment D1. Put each clue on an index card. Write the answers on the board. Ask the students to fill in a Bingo Card (Attachment D-2) using any 24 of the words placed in any blocks on the bingo card. Randomly pull index cards and read a clue. Students will cover or put an "X" through the word associated with the clue if they have the correct answer on their Bingo Card. Student who first completes a diagonal, vertical or horizontal line of correct answers wins. Have student read back answers and discuss associated clues. Game can be repeated. Prizes are recommended.



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ATTACHMENT D-2

FOOD SAFETY BINGO

		FREE		



ATTACHMENT D-1

Bingo Game Attachment

CLUE	Answer
1. The “F” in FATTOM.	1. Food
2. The “A” in FATTOM.	2. Acid
3. The 1 st “T” in FATTOM.	3. Time
4. The 2 nd “T” in FATTOM.	4. Temperature
5. The “O” in FATTOM.	5. Oxygen
6. The “M” in FATTOM.	6. Moisture
7. Microorganism found in raw and undercooked meat and poultry, raw milk, and untreated water.	7. Campylobacter jejuni
8. Microorganism found in canned foods that aren’t processed or stored properly.	8. Clostridium botulinum
9. Microorganism found in meat, especially undercooked or raw hamburger, unwashed produce, raw milk, unpasteurized apple cider.	9. E.coli
10. Microorganism found in unpasteurized milk, ready-to-eat foods contaminated during processing such as soft cheeses and hot dogs. Also in raw and undercooked meat, poultry, and seafood.	10. Listeria monocytogenes
11. Microorganism found in raw and undercooked eggs, undercooked poultry and meat.	11. Salmonella
12. Microorganism found in prepared foods left too long at room temperature.	12. Staphylococcus aureus
13. Microorganism found in salads, milk, and dairy products, and unclean water due to poor hygiene.	13. Shigella
14. Microorganism found in undercooked meat, especially pork.	14. Toxoplasma gondii
15. Microorganism found in raw or undercooked seafood.	15. Vibrio vulnificus
16. Microorganism found in pork, dairy products, and produce.	16. Yersinia enterocolitica
17. Foods left between the temperatures of 40° and 140° F. are said to be in the _____.	17. Danger zone
18. First step to prevent foodborne illness.	18. Clean
19. Second step to prevent foodborne illness.	19. Separate
	20. Cook
	21. Chill
	22. Foodborne
	23. Microorganisms
	24. Warm & moist
	25. 20 seconds
	26. 2 Hours
	27. Cross contaminate
	28. 165
	29. Aerobic



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<ol style="list-style-type: none">20. Third step to prevent foodborne illness.21. Fourth step to prevent foodborne illness.22. This is a type of illness you get from eating food that is not safe to eat.23. These are tiny living creatures that can only be seen with a microscope.24. Bacteria grow “best” in this type of environment.25. To prevent the spread of foodborne illness, you should wash your hands in warm soapy water for at least this long.26. Prepared foods and leftovers shouldn’t be left at room temperature for more than this long.27. Using the same plate for cooked and uncooked burgers without washing it is an example of this.28. You should reheat leftovers to this degree.29. Bacteria that need air to grow are called this.	
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