



Outdoor Cooking Session Outline For the Outdoor Skills Program

- I. Welcome students and ask group what they remember or learned in the last session.

- II. Outdoor Cooking Lessons
 - A. Activity: Heat Distribution
 - B. Activity: You be the Chef

- III. Review: Ask the students what they enjoyed most about today's session and what they enjoyed the least. (Another way to ask is "what was your high today, and what was your low? As the weeks progress this can be called "Time for Highs & Lows".)

The Outdoor Skills program is a partnership with Nebraska Games & Parks and the UNL Extension/4-H Youth Development Program to provide hands-on lessons for youth during their afterschool time and school days off. It provides the opportunity to master skills in the areas of hunting, fishing, and exploring the outdoors. This educational program is part of the 20 year plan to recruit, develop and retain hunters, anglers, and outdoor enthusiasts in Nebraska.

Inventory

Activity: Outdoor Cooking

Kit Materials & Equipment

- Thermometer
- (4) Water pitchers
- (4) Large cups
- (4) Small cups
- Food coloring
- Aluminum foil
- Pie iron
- (2) Cooking Sticks
- Charcoal chimney
- Hog pan

- Laminated picture of Dutch oven

Supplies Instructor Provides

- Charcoal
- Pencils
- Ice cold water
- Room temperature water
- Hot water
- Rubber bands
- Food for cooking

Session: Outdoor Cooking

Activity: Heat it up!

Objectives:

1. Describe three methods of heating transfer.
2. Identify outdoor cooking methods utilizing different heating transfer methods.

Method: Conduct scientific experiments learning the process of heat distribution.

Materials Contained in Kit:

Thermometer	4 Medium Cups
4 Water Pitcher	4 Small Cups
Red Food Coloring	Blue Food Coloring

Materials Needed to Conduct Activity:

Pencils	Room Temperature Water
Ice Cold Water	Charcoal
Aluminum Foil	Rubber Bands

Hot Water (does not need to be boiling – students will need to be able to touch the hot water).

Field Day Activities: Prepare an outdoor cooking meal using three heat distribution options.

Duration: 1 hour

Group Size: any

Setting: Indoors or outdoors

Key Terms: Temperature, Heat, Conduction, Convection, Radiation

SET Abilities:

Fair Project: Prepare an outdoor cooking menu with recipes and preparation directions.

Background Information:

Imagine cooking bread without a gas or electricity oven? Our ancestors relied on fire and other heat sources to cook meals. Today, we use similar heating methods as our ancestors did for outdoor cooking. When cooking, we heat our food to a desired or safe temperature.

Heat – Transfer of energy from one body to another as a result of a difference in temperature change in phase. Also, defined as to make something (food) warm or hot.

When cooking outdoors; we create heat by burning wood, coals or fuel. Heat is also created by light.

Temperature – Degree of hotness or coldness of the food or environment. Temperature is also defined as a measure of the average kinetic energy of the particles in a sample of matter, expressed in terms of units or degrees designed on a standard scale. We refer to degrees when cooking food, cookies are baked at 350°F or a hamburger is safely done when the internal temperature reaches 145°F.

First, we need to determine how to heat the hamburger. In your backyard, camping or a picnic in the park; there are different options of cooking.

- Wood Fire
- Charcoal
- Gas Grill
- Electric Grill
- Sun

In cooking, there are three general ways that heat can be transferred to the food; conduction, convection and radiation.

Conduction – Heat transfer due to contact of molecules. When flames hit the pan, heat is conducted to the pan and then

moves to the food. Metals are good conductors.

Example: Making popcorn in a pot over the stove.

Outdoor Cooking Examples:

- Frying your hamburger directly on the grate of a grill is an example. The heated metal grate transfers heat to the cold raw meat, cooking the hamburger.
- Cooking a dish in Dutch oven placed over coals. Heat from the Dutch oven transfers up to the food.
- Making a grilled cheese sandwich in a camping pie pan.

Convection – Heat transfer due to the bulk movement of molecules. Food is heated by a moving heat source such as hot air inside an oven or a fluid (water or oil) through the food to cook.

Example: Making popcorn in an air popper.

Outdoor Cooking Examples:

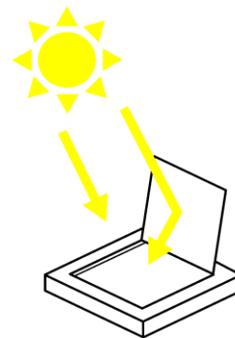
- Stirring chili soup in a Dutch Oven, as it redistributes the heat from the bottom of the Dutch oven throughout the soup.
- Movement of steam in a foil dinner.
- Coals placed on top of the Dutch oven – pushing heat down.

Radiation – Energy transferred by waves of heat or light striking the food. Heating from anything warmer than its surroundings. Two types are infrared and microwave.

Example: Making popcorn in the microwave.

Outdoor Cooking Example:

- Wood fire or glowing coal burn yellow-orange or red, representing infrared radiation cooking. The flame itself is not considered radiation heat.
- Melting Popsicle on a sidewalk.
- S'mores in a pizza box oven



Activity:

Go over the three different types of heat transfer with the students. Explain how heat transfer relates to everyday cooking in the kitchen and outdoor cooking. Then when going through the heat transfer activity, be sure to explain the concept.

Activity #1 (Conduction)

Before the activity

Materials needed for this activity: copy of activity worksheet for each group, thermometer, cup and ice.

Divide students into 4 groups of three students. Each group will need one cup filled 1/2 cup of water, thermometer and ice.

Procedure

Activity #1 (Conduction)

Activity Reference – Bing! Bang! Boom! Utah Education Network. www.uen.org

1. Have the groups write out their hypothesis on the activity worksheet; when will ice melt faster, in a cup of room temperature water or when the ice is held in their hand.
2. Using a thermometer, take the temperature of a cup of room temperature water. Record the temperature on the activity worksheet.
3. Add several ice cubes to the room temperature water and let set for a few minutes. Take the temperature of the water after having ice added to it. Record the temperature.
4. Give a container of ice to each student. Explain to students that

they will all begin at the same time. Give the signal for students to hold the ice in their hand. Ask students “*Why are your hands getting cold?*” *Did the ice make your hands cold or did the heat from their hands cause the ice to melt?*” Record their answers on the worksheet.

5. Explain that the heat from their hands caused the ice to melt. Ask students: “*What outdoor cooking method is an example of conduction?*” Have students refer back to their hypothesis questions. Was their hypothesis correct?

Activity #2 (Convection)

Before the activity

Materials needed for this activity: Large plastic container, small plastic container, red & blue food coloring, ice water, hot water (does not need to be boiling), aluminum foil, rubber bands and pencil.

Activity #2 (Convection)

Procedure

Activity Reference – Science Lesson Plan: Density of Hot and Cold Water.

<http://Voices.yahoo.com>

1. This demonstration will show that hot water rises and cold water sinks. Have students take turns completing each step. You can compare this to making soup in a Dutch oven over a fire. Start the activity with the following questions and discussion.
 - a. *What happens to air when it is heated?* A heated room is warmer near the ceiling than near the floor and a hot air balloon floats because hot air rises.
 - b. *What happens to liquid when it is heated?* Heat affects liquid similar way as air. Liquid evaporates and rises.
2. Hand out activity materials
3. Fill the large plastic container with room temperature water.

4. Fill the small plastic container with ice water and add enough blue food coloring to make the water dark blue.
5. Cover the top of the jar with two layers of aluminum foil and seal tightly with a rubber band.
6. Poke a small hole in the middle of the aluminum foil with a pencil.

Ask student - *What do you think will happen when the ice cold water leaks out and mixes with the room temperature water in the large plastic container?*

7. Cover the hole with your finger and slowly lower the jar sideways into the tank and place it on the bottom. As the cold blue water leaks out the hole, it will sink down and settle on the bottom of the large container.
8. Fill a second baby food jar with hot water (does not need to be boiling).and add red food coloring. Cover and seal the jar, and pole a hole in the foil as you did for the cold water container.

Ask students – *What do you think will happen when the hot water leaks out?*

9. Cover the hole and lay the jar on its side on the bottom of the large container next to the jar containing cold water. As the hot red water leaks out the hole, it will rise to the top of the room temperature water.
10. Discussion with the students –
 - a. *Why does the hot water rise?* - Heating the water adds energy, causing the molecules to move more rapidly; the hot water will expand and become less dense because there is space between the molecules, causing it to rise in the room temperature.
 - b. *Why does the cold water sink?* – When water is cooled, the molecules move more slowly because they have less energy, causing the cold water to contract and become denser (heavier).

11. When outdoor cooking in a Dutch oven, coals are placed on the top and bottom, simulating a convection oven in your house. Coals on the lid pushes heat down through the food. This is why more coals are placed on top.

Activity #3 (Radiation) – optional

Depending on your allowed time, weather, materials and convenience of being outside, students can make a pizza box oven to learn the concept of radiation. If time does not allow, simply explain the process and give them direction to make on their own at home. Instructions are included in the student journal.

Discussion questions:

1. *When would be the best time to cook in the pizza box oven?*
2. *What could they make in their oven?*
3. *Would they be able to use the pizza box oven in the winter?*

Wrap Up

Tossing the beach ball around to students ask the following questions.

1. *In which direction did the hot water move? Why?*
2. *In which direction did the cold water move? Why?*
3. *What is the type of heat transfer is demonstrated?*



Student Notebook

- Heat It Up Activity Worksheet

Heat it up!

Activity #1 - Conduction Activity



1. When will ice melt faster, in a cup of room temperature water or when the ice is held in your hand?

What is your hypothesis to the question? _____

2. What is the temperature of the room temperature water? _____
3. What is the temperature of the water after ice has been added? _____
4. Did the ice make your hands cold or did the heat from your hand cause the ice to melt?

5. What would be examples of conduction outdoor cooking methods?

6. Was your hypothesis correct?

Session: Outdoor Cooking

Activity: You be the Chef

Objectives: Participants will

1. Identify different ways of outdoor cooking.
2. Prepare an outdoor meal menu.

Method: Students will prepare food using outdoor cooking methods; pie iron, aluminum foil and box oven

Field Day Activity: Prepare a meal using the Dutch Oven and other outdoor cooking methods.

Materials Contained in Kit:

Pie Iron Cooking Stick
Charcoal Chimney Hog Pan
Laminated Picture of Dutch Oven

Materials Needed to Conduct Activity:

Food for cooking Charcoal
Aluminum Foil
Box with detachable lid (paper box)

Duration: 1 hour

Group Size: any

Setting: Indoors or outdoors

Key Terms:

SET Abilities:

Fair Project: Prepare an outdoor cooking menu with recipes and preparation directions.

Background Information:

Outdoor Cooking is easy, affordable, safe and provides tasty food that can be enjoyed in the backyard, local park or camping. There are different methods of preparing food in the outdoors. Basically anything that can be cooked in the kitchen can be cooked outside. Our ancestors cooked outdoors – so can we!

Outdoor Cooking Methods:

- Stick
- Dutch Ovens & Cast Iron Skillets
- Cardboard Box Ovens
- Pie Pans
- Foil
- Gas or Charcoal Grill

Stick Cooking

What can you cook: You are limited on what can be cooked on a stick. Most popular food cooked on a stick is a marshmallows and hotdogs.

How to: For best results, hold food on stick over coals or low flames (not in the flame) for an even amount of heat reaching all parts of the food. Rotate slowly and constantly until food is done.

What you need: Green stick (freshly removed or fallen from a tree) or special metal rod specially for cooking over fire. Be sure it is long enough to keep hands aware from flames.

Foil Dinner

What can you cook: Hamburgers, chicken, fish, vegetables, dessert wraps, garlic bread & much more.

How to:

1. Tear off a piece of aluminum foil about two times the size of the food that will be cooked.
2. Center ingredients on aluminum foil.
3. Bring the two long sides together. Fold the sides over, one half inch at a time, crimping together.

4. Follow same folding procedure with remaining ends. When sealing up the foil, the idea is to form an airtight seal so the steam can't escape.



What you need: Heavy duty foil. Tongs for handling foil packet.

Cardboard Box Oven



What can you cook: Muffins, cake, cookies, pizza and much more.

How to: Box oven cooking is trapping heat from charcoal inside an insulated box, placing food in the box along with charcoal.

What you need: Cardboard box, charcoal, aluminum foil, metal container to hold charcoal and wire rack.

Dutch Oven

What can you cook: If it cooks in your kitchen oven, it will cook in a Dutch oven. Examples; cakes, breads, pizza, casseroles, steak, soups, appetizers, vegetables and much more.

How to: Dutch ovens are made from cast iron or aluminum. Dutch ovens made for outdoor cooking will also have legs and a handle. Legs allow the Dutch oven to be placed directly over the heat source, such as coals. The lid has a lip around the outside so it holds coals while cooking.



Successful Dutch oven cooking requires knowledge of heating and flame. The number of coal briquettes determines the

Dutch oven's internal temperature. A simple multiplication method is used when figuring the number of briquettes to reach the desired temperature.

Determining the number of coal briquettes

- For 350° oven, twice the number of the oven equals the number of briquettes to use. For a 12-inch Dutch oven, 24 coal briquettes are used.
- Place $\frac{2}{3}$ of the briquettes on the top and $\frac{1}{3}$ on the bottom.

Example: $\frac{2}{3}$ of 24 equals 16. To reach 350° you will place 16 briquettes on top and 8 under the Dutch oven.

(Students will learn more about coals distribution during the field day)

Pie Iron

What can you cook: Fruit pies, grilled cheese, breakfast sandwiches, tacos, cinnamon rolls, potatoes and much more.

How to: Pie iron is basically a two sided small frying pan intended to cook individual meals. Pie iron can be used on wood fires or in coals.

What you need: Pie iron, cooking spray and meal ingredients.

Activity

Before the activity: Determine what outdoor cooking activities and recipe(s) you will have the students complete. These recipes work for an after school snack or lunch for a day long program. Instructors are responsible for purchasing food and coals for activity. Be cautious of any food allergies for any recipe used. May have to also restock aluminum foil. Check ingredients and cooking gear list before lesson.

Depending on your time for this lesson, you may have to start heating coals prior to class.

How to use charcoal chimney – place a piece of paper towel or newspaper in the bottom of the chimney. Bottom is where

the holes have been created with a bottle opener. Then fill the chimney with coals. Optional: pour lighter fluid on coals. Light coals by lighting the newspaper at the bottom of the chimney. Coals are ready when they are gray.

Please make sure all equipment is cool and cleaned before returning it to the kit box.

Procedure:

Ask students if they cook outdoors? If so, how did they cook outdoors? What did they cook?

Go over the different types of outdoor cooking with the students. Demonstrate gear provided or show pictures.

Activity #1: Box Oven Construction & Baking

1. Construct box oven. Refer to the instructions for directions. Depending on the size of the group and/or supplies students can work as one large group to make one or in teams to make 2 or 3 to use.
2. Prepare a food item to bake in the oven.

Examples:

- Muffins from a mix. (Hint) – Mini muffin pan is quick and makes bite size samples. Use muffin mix that requires water.
 - Pizza using English muffins for crust. Place pizzas on a cookie sheet over coals.
 - Cookies from purchased Pillsbury premade dough. Place cookies on a cookie sheet over coals.
3. Ask students what else they could cook or bake in the oven?

Activity #2: Foil Packets

1. Select at least one of the foil packet recipes.
2. Prepare charcoal for foil packets. A hog pan has been provided if a charcoal grill is not accessible.
3. Students prepare foil recipe.
4. Ask students what else they could make in foil?

Activity #3: Pie Iron

1. Select at least one pie iron recipe from the attached list.
2. Have each student make their own pie.
3. As they are eating their pie, have the students brainstorm their own pie iron recipe. A recipe page is in the journal.

Wrap Up

- Ask student what outdoor cooking method they would like to try at home. Second question, what would they cook?

Student Notebook

- Create an outdoor cooking menu and recipe guide. Encourage the students to use new recipes, not made during the session.

Outdoor Cooking – Activity #1

Box Oven Construction

Materials:

- Paper box with lid
- Heavy duty aluminum foil
- 3 wire hangers (or four empty mushroom cans)
- Scissors (provided in kit)
- Pliers (provided in kit)
- Pie pan

Instructions:

1. Line the inside of your box and lid with heavy duty aluminum foil.



2. (Omit steps 2 -4 if using empty mushroom cans – go step 5) Use scissors to pole three holes in a straight line on each end of the box, about halfway down from the top.
3. Straighten the three wire hangers. Put the three straightened hangers through the holes. These will act as a shelf to place your food on.



4. Bend the wires so that they will remain tight inside the oven. You don't want heavy food bending the wires and sitting directly on the charcoals.



5. Place empty mushroom cans or pop cans in the bottom of the box. Cans will be placed at each corner of your baking pan.

6. Poke some other holes in your box so that the oxygen can get in and gases will escape. No oxygen = no heat. Poke a few holes on top and a couple on the sides. (Poke more holes if wire hangers are not used)



7. Prepare food to be baked.
8. Place charcoal in round aluminum plate. For box oven each charcoal briquette supplies 40 degrees of heat, so 9 briquettes will equal 360° Charcoal chimney can be used to light briquettes.
9. Light briquettes and let burn for a while until briquettes are at least half gray in color.



10. Very carefully, dump charcoal in the bottom of the oven. May also place the pie with charcoal in the bottom of the box.
11. Place food on wire rack and cover with your lid. Do not worry about lid being on tight, this will allow more oxygen to enter the box.
12. Cook food until finished. Don't open the lid to many times, as heat will escape and food will cook slowing.

Outdoor Cooking – Activity #2

Foil Wrap Recipes

Tortilla Dessert Wrap

Recipe is for 16 wraps

Ingredients:

- (16) 8-inch flour tortillas
- 4 cups mini marshmallows
- 4 cups of milk chocolate chips
- Peanut Butter

Optional ingredients: peanut butter cups (replaces chocolate chips & peanut butter), coconut flakes, Nutella (replace peanut butter), butterscotch chips and/or peanut butter chips.

Directions:

If using peanut butter, spread one tablespoon on the tortilla. Sprinkle $\frac{1}{4}$ cup of marshmallows and 2 tablespoons of chocolate chips on top of the peanut butter. Or add any other ingredients you wish to add. Roll up the tortilla, wrap each in heavy-duty aluminum foil, and seal tightly. Cook in the coals for about 5 to 8 minutes, rotating at least once. The tortilla will burn on the bottom if you leave them on the coals too long.

Pineapple Upside Donut Cake

Recipe is for 1 – multiply quantity needed for class.

Ingredients:

- 1 ring of pineapple
- 1 tbs butter, softened
- 1 tbs brown sugar
- 1 cake donut

Directions:

Place donut on sheet of foil. Mix the softened butter and brown sugar together and spread it over the donut. Place the pineapple ring on top. Wrap the donut in a tight foil pack. Place on hot coals and cook for 5-7 minutes.

Outdoor Cooking – Activity #3

Pie Iron Recipes

Pizza Hobo Pie

Ingredients:

- Sliced bread (2 per pie)
- Butter
- Pizza sauce
- Mozzarella cheese
- Pepperoni

Directions:

Spread two pieces of bread with butter. Lay one slice of bread with buttered side down, on pie iron. Put about 1/4 cup of pizza sauce, 1/3 cup of mozzarella cheese, and 4 slices of pepperoni top of bread in iron. Top with remaining slice of bread with the buttered side on top. Place top of pie iron down over "pizza" pie. Put directly in camp fire and bake until browned.

Lay two slices of bread in iron, add your favorite cheese and if you like slice of tomato. Close iron turn, frequently until lightly brown.

You Be the Chef

Your family is preparing to go camping this week. You are in charge of planning supper for one of the nights. Write out a menu your family would enjoy cooking and eating! Utilize the different ways of outdoor cooking. Make your meal fun and yummy. Don't forget the dessert!

Appetizer

Food Item:

Outdoor Cooking Method:



Main Course

Food Item(s):

Outdoor Cooking Method(s):

Side Dish #1 (Example: vegetable, bread or potato)

Food Item:

Outdoor Cooking Method

Dessert

Food Item:

Outdoor Cooking Method:

Other(s)

Food Item:

Outdoor Cooking Method:

Example Menu:

Appetizer - Nacho Cheese Dip (Dutch Oven)

Main Course – Spider Dogs (Stick Cooking)

English Muffin Pizzas (Box)

Side Dish – Green Bean Casserole (Dutch Oven)

Dessert – Tortilla Dessert Wrap (Foil Wrap) and
Cherry Fruit Pie (Pie Iron)