National 4-H Curriculum
BU-08087

Microwave Magic

Bag of Tricks

Level A

Microwave Project Youth Activity Guide

Name _____ County _____

Purdue University Cooperative Extension Service • West Lafayette, Indiana

REVIEWED & RECOMMENDED
National 4-H Curriculum

Note to Project Helper

Congratulations, a young person has asked you to be his or her helper. Your role as a helper is very important to the total educational experience of the young person. Not only will you be providing encouragement and recognition, you will also be the key person with whom the young person shares each of the experiences outlined in this activity guide.

The "Microwave Magic" curriculum series is full of exciting hands-on activities that focus on using the microwave to prepare everything from simple snacks to complete meals. The curriculum is designed around four major categories: techniques and equipment, healthy food selection, food preparation, and meal time magic.

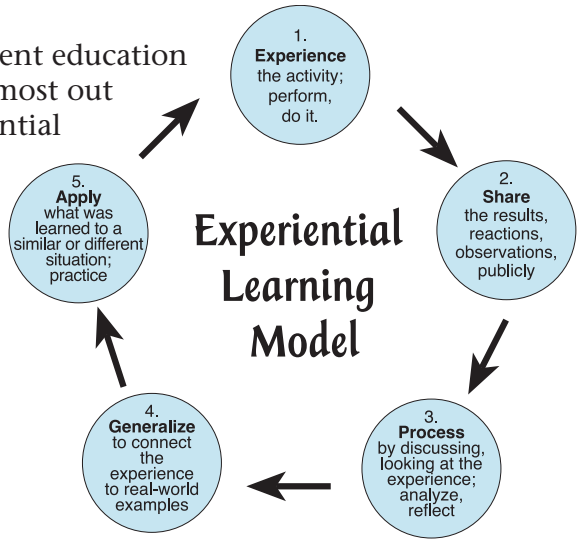
A total of five pieces are available in the "Microwave Magic" curriculum series. The four activity guides – *Bag of Tricks*, *Micro Magicians*, *Amazing Rays*, and *Presto Meals* – have been designed to be developmentally appropriate for grades 3-4, 5-6, 7-9, 10-12 respectively, but may be used by youth in any grade based on their project skills and expertise. The fifth piece, the *Project Helper Guide*, has been designed to provide you with some additional background information and some tips on helping youth through the activities in their guide.

The Experiential Learning Model

Experiential learning distinguishes 4-H youth-development education from many formal educational methods. Youth get the most out of each experience and activity by following the experiential model's five steps.

1. Youth "learn by doing" an activity. (Experience)
2. They share their experience and reactions. (Share)
3. They discuss or reflect on what they did. (Process)
4. Youth relate skills they practiced to everyday situations. (Generalize)
5. They apply their experience to other real-world situations. (Apply)

Project helpers guide youth as they explore an activity. Questions at the end of each activity help students reflect on the experience.



Pfeiffer, J.W., & Jones, J.E., "Reference Guide to Handbooks and Annuals" © 1983 John Wiley & Sons, Inc. Reprinted with permission of John Wiley & Sons, Inc.

Acknowledgments:

"Bag of Tricks" was written by Susan Barkman and Amy Wright, Purdue University, along with a curriculum design team comprised of Foods and Nutrition specialists Bill Evers and Charles Santerre and Extension Educators Nancy King, Anne Wilcox, Joanne Lytton, Peg Ehlers, Dianne Roell Paris, and Barbara Bowman, and volunteers Cara Gibson, Lyneen Burrow, Ruth Palmer, Linda Jones, and Deanna Engleking. Subject matter editor, Virginia Servies.

Editing and production coordination was done by Frank Koontz, Purdue University Agricultural Communication Service. Page layout and design by Pro Design, Lafayette, IN.

Bag of Tricks

When a word that is listed in the Glossary first appears in the text, the word is in *italic* type and is underlined.

Important

Microwave oven cooking times vary based on the output wattage of the microwave oven. You should always check the item(s) being cooked when the recommended minimum cooking time has been reached. You can add additional cooking time, if needed.

Having Fun with Microwave Magic!

Are you ready?

Are you ready to do hands-on activities and use the microwave oven to prepare simple snacks and complete meals? That's what "Microwave Magic" is all about. You'll have fun learning about the microwave and using it to make lots of foods.

Your project manual is divided into four "bites": *Tricks of the trade, Once you swallow, Kitchen magic,* and *Magnificent meals*. Use the achievement sheet to plan your activities. After completing an activity, write the date completed and have your project helper initial it.

Your project helper

Your project helper is an important part of your experience in the microwave project. This person may be your project leader or advisor, a neighbor, a family member, a friend, or anyone who has the interest to work with you to complete your activities. You need to involve your helper as you work with each activity and answer the questions. They are there to give you support and help you be successful. Write the name and phone number of your project helper here:

My project helper _____

Phone _____

E-mail _____

Action demonstrations

An action demonstration is a fun way to share what you have learned with others. The key is getting your audience involved in doing what you are doing, not just showing them. An action demo can be given anywhere there are a lot of people, like a county or state fair or a shopping mall.

An action demo can be on almost any topic. Here are some questions to ask yourself when choosing a topic.

- Is it something that can be done in 3 to 5 minutes?
- Is it something that would interest the general public?
- Is there something "hands-on" for the audience to do?
- Can the supplies for the "hands-on" activity be used over and over again or will they have to be replaced every time? (Note: If they have to be replaced, this will add to the cost.)

Your demonstration should last about 3 to 5 minutes, and you need to be able to do it over and over again with many different people. There is no prepared speech in an action demo, it is a two-way conversation. Your goal is to involve the audience, and you can do this by having them:

- Do what you are doing.
- Play a game.
- Answer questions.
- Do a hands-on activity.

"Bag of Tricks" Achievement Sheet

Each year, you should complete a minimum of three activities, each from a different "bite" category. Within the two-year project period, you should have completed at least six activities and at least one activity from each of the four "bite" categories. Write the month, day, and year beside each of the activities you completed. Ask your project helper to initial the form after you have discussed the activity with them.

Tricks of the trade

	Date Completed Month/Day/Year	Helper Initial
1a Testing 1, 2, 3	___/___/___	_____
1b Hot spots	___/___/___	_____
1c Keep it clean	___/___/___	_____

Kitchen magic

	Date Completed Month/Day/Year	Helper Initial
3a Popcorn treats	___/___/___	_____
3b Snacks in a snap	___/___/___	_____
3c Fabulous fudge	___/___/___	_____

Once you swallow

	Date Completed Month/Day/Year	Helper Initial
2a Scrambled start	___/___/___	_____
2b Awesome apples	___/___/___	_____
2c Micro snacks	___/___/___	_____

Magnificent meals

	Date Completed Month/Day/Year	Helper Initial
4a Breakfast bites	___/___/___	_____
4b Chili dip	___/___/___	_____
4c Add a dessert	___/___/___	_____

Did you do an action demonstration? ❒ Yes ❒ No Location _____

Title of action demonstration given _____

Name_____ Grade _____

Club/School _____

I certify that this youth has completed all requirements for Level A of the "Microwave Magic" project and is ready to move on to Level B.

Project helper's signature_____ Date _____

Tricks of the trade

Introduction

How a microwave works

A microwave oven is a metal-lined box that holds a microwave-generating tube called a *magnetron*. Each microwave oven has double safety locks so that microwaves won't leak or escape. It also has an air vent, which allows steam to escape, but not microwaves.

Microwaves, which are a kind of radio wave, cook by causing food *molecules* to rub and vibrate against one another. The constant rubbing produces heat inside the food. The cooking of food occurs throughout the food, instead of from the outside as in a regular oven. This makes foods cook very quickly, but makes it challenging to cook thick foods such as a meat roast. Thick foods can be cooked on a lower power level for a longer period of time.

How are microwaves different from ovens and stoves? Each method cooks food in a different way. For example, in stove and oven cooking, the container helps heat the food. But the container used in microwave cooking is only to hold the food as it is zapped with microwaves. Look at the chart below for other differences.

Cooking method	Description
Range top (stove)	Heat source is from an electric coil or gas burner. Heat warms the pan, and then the pan warms and cooks the food.
Oven	Heat source is from the hot air in the oven. Food cooks or bakes in a pan placed in the hot oven.
Microwave	Microwaves cause molecules in the food to rub and vibrate against one another. This causes friction, which then causes heat. The heat then cooks the food.

What's a watt?

Watt and wattage are terms used to describe the microwave's power. The higher the number of watts, the faster the microwave oven will cook food. Find your microwave's output wattage by looking in the owner's manual or reading the name plate/serial number label on your microwave oven. The number should be between 650 and 1,200 watts. A 650-watt microwave oven may take twice as long to cook something as a 1,000- or 1,200-watt microwave oven.

Microwave safety

Cooking with a microwave can be a lot of fun. However, it is important to play it safe. There are a few safety rules you should follow when using a microwave.

- Always get permission before you cook, and make sure an adult is nearby in case you need help or run into a problem.
- Have an adult teach you how to operate the microwave. Learn how to open and close the door properly, program the time, and turn the microwave oven on and off.
- Never operate an empty microwave. If you want to practice using the microwave, place a cup of water inside to absorb the microwave energy.
- Never operate the microwave with the door open.
- Never operate the microwave if it is damaged. This could be a bent door, broken or loosened hinges and latches, broken door seals, or broken inside surfaces.
- Never wedge an object in the oven door.
- The microwave should be repaired only by a qualified repairman.
- Use only microwave-safe dishes.
- Do not use metal cookware and metal utensils in the microwave. Don't use aluminum foil pans or dishes and utensils with a metal trim.
- Use potholders when removing dishes from the microwave.
- Carefully remove coverings by lifting the side farthest away from you first. Steam is very hot and can cause burns.
- Keep the inside of the microwave clean. If spills occur, wipe them up immediately.

1a. Testing 1, 2, 3

Project skill
Testing to determine microwave-safe dishes

Life skill
Mastering technology

Dish test supplies

- glass dish
- plastic dish
- 1 or 2 other kinds of dishes
- 1- or 2-cup glass liquid measuring cup
- 1 cup water

There are many shapes and styles of dishes you may use in microwave cooking. First, you must decide which dishes will fit in your microwave. If your microwave has a built-in turntable, choose dishes that won't bump into the walls as they turn.

Next, you must test the dishes to see if they are microwave-safe. Some dishes may say microwave safe, others may not. That doesn't mean they can't be used in the microwave. Here are some examples of dishes that can be used in the microwave:

- Glass.
- Ceramics such as pottery, stoneware, porcelain, china, and stone cookware.
- Plastics (be careful; some may melt).
- Paper products.

Here are some examples of dishes that **can't** be used in the microwave.

- Plastic storage containers.
  Note: Containers such as margarine tubs, take-out containers, and whipped topping bowls should not be used in microwave ovens. These containers can warp or melt.
- Cracked dishes – they may shatter.
- Metal dishes or cookware.
- Any glassware, china, pottery, stoneware, or other dish that has a metal trim.

Gather some dishes in the kitchen and test to see if they are microwave safe.

1. Place the dish to be tested inside the microwave. Remember, do not test any metal dish or cookware, or any dish that has metal, gold, or silver trim on it.
2. Measure 1 cup of water into the 1- or 2-cup glass liquid measuring cup.
3. Place the filled measuring cup beside the dish to be tested. If your dish is large, you may have to place the measuring cup inside the dish. If you do, make sure the cup is steady and won't tip or fall during cooking, especially if your microwave has a turntable.
4. Microwave on *High* (100%) power for 1 minute.

5. If the dish is cool and the water is warm, the dish is microwave safe. Be careful, the water or dish may be hot.
6. If the dish is hot and the water is cool, do not use the dish for microwave cooking.
7. Repeat steps with another dish. Record your findings in the chart under Micro Talk.

Micro Talk

1. What types of dishes did you test?

Type of dish	Microwave safe	Not microwave safe
Glass		
Plastic		

2. Which dishes were not microwave safe?

_____

_____

3. What did you learn about the different dishes?

_____

_____

4. How would you explain to a friend why it is important to use only microwave-safe dishes?

_____

_____

Use construction paper and markers to make a list of microwave-safe dishes in your family's kitchen. Hang the list near your family's microwave or on the refrigerator.

Hot chocolate

Use the hot water from your dish test to make a mug of hot chocolate. First, prepare the mix.

Ingredients

- 1½ cups instant nonfat dry milk powder
- ¼ cup nondairy creamer powder
- ¼ cup sugar
- ¼ cup unsweetened cocoa powder

Supplies

- medium size microwave-safe bowl
- measuring cups
- storage container

1. In a medium size bowl, *mix* together the nonfat dry milk, nondairy creamer, sugar, and cocoa.
2. Transfer mixture into a storage container.
3. Put ⅓ cup of mix into a microwave-safe mug.
4. Pour 1 cup hot water from the dish test into the mug. Stir. If the water is too cool, microwave on High (100%) power for 30 seconds to 1 minute.
5. If you would like to add marshmallows to your hot chocolate, put them in the mug and heat for about 10 or 15 seconds.
6. Enjoy! Be careful, it may be very hot.

1b. Hot spots

Project skill
Determining microwave hot spots

Life skill
Processing information

When you cook in the microwave, does one section of food always seem to bubble and get hot first? If so, your microwave may have a *hot spot*. A hot spot is where a greater amount of microwaves hit that specific area. This means that one section of food may cook more quickly than the other sections. You can cook around hot spots by using different shapes and sizes of dishes that avoid the hot spot.

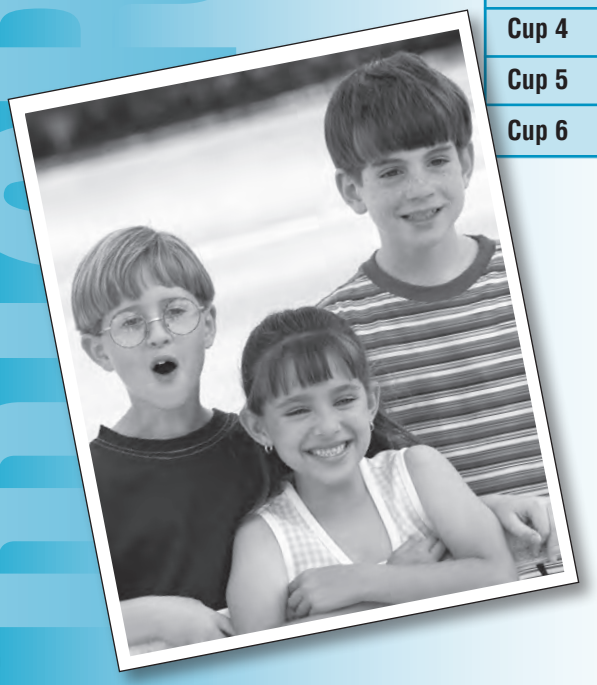
Let's find out if your microwave has a hot spot.

Hot spot supplies

- 6 foam cups
- permanent marker
- water

1. Use a permanent marker and label the foam cups 1 through 6.
2. Fill each cup half full with water.
3. Arrange each cup in the microwave oven.
4. Microwave on High (100%) power for 5 minutes. During the 5 minutes, pay close attention to when each cup of water begins to boil. Record the boiling time for each cup in the chart below.

Cups	Boiling time	
	Minutes	Seconds
Cup 1		
Cup 2		
Cup 3		
Cup 4		
Cup 5		
Cup 6		



Micro Talk

1. Draw a picture to show the cups as you placed them in the microwave oven. Number the cups.

2. Using a different color pen, label the cups in your drawing in the order in which they began to boil: 1st, 2nd, 3rd, 4th, etc.

3. What did you learn about microwaves and how they are absorbed?

_____

_____

_____

4. How will you cook differently to avoid microwave hot spots?

_____

_____

_____

Cooking with hot spots

Don't let your microwave's hot spots keep you from cooking. You can cook with hot spots by stirring and rotating. Halfway through the cooking time, stir and *rotate* the food. Stirring from the outside to the center of the dish helps to even out the temperature of the food. Rotating also helps the food to cook more evenly. Rotate the dish one-half turn by turning the dish until the side which was to the back of the microwave is to the front.

Go to a friend's or another family member's house and do the hot spot test in their microwave. Are their microwave's hot spots the same as yours? How are they different?