



## Operating Kitchen Equipment

Curriculum Unit 89.07.04  
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Many adults buy home appliances oblivious of operating techniques and choices available to them. Students in the upper grades of middle school frequently use these appliances without having it demonstrated, and without having read the instruction manual. This unit addresses the needs of these students while taking an interdisciplinary approach to educating teens in the home economics classroom who are actively undertaking greater responsibility in their households.

### HOW ELECTRICITY WORKS

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Electricity is the energy source which powers all of the kitchen appliances we use from refrigerators to the smallest appliances such as the electric carving knife or can opener. What makes each of these appliances run cannot be seen with the naked eye. It involves a very very tiny particle called the atom. Each atom contains even tinier particles called electrons, protons and neutrons. Protons and neutrons stick with their atoms, but electrons jump from one atom to the next. It is only called electricity if the electrons are moving from one atom to the next. Without movement, no force is created. A simple game will illustrate this concept to the students.

### DEMONSTRATING WHAT ELECTRICITY IS

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The teacher will only need a penny for each person participating. Each student will represent an atom while each penny represents an electron. The teacher shall be the starter of the group. While each atom holds an electron, everything is in balance; but to make electricity, there must be movement. So the starter will hand an electron to the next player who has two electrons. The rule says that each atom can have only one; consequently, the player passes it to the next person until it reaches back to the starter and everything is in balance again. <sup>1</sup> Electricity is made as long as the electrons are traveling through the circle or current. If the starter receives it again and sends it in the opposite direction around the circle, it is called an alternating current. An alternating current (or movement through the circle) is what powers our kitchen appliances.

## **ELECTRICITY IN THE HOME AND KITCHEN**

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When discussing kitchen appliances, it is necessary to understand two terms: Volts and Watts.

Volts and Watts are ways of measuring different aspects of electricity. <sup>2</sup>A volt measures the amount of pressure used to send the penny through the circle. When it is sent with little force, it is similar to a faucet with lightly running water. When it is sent with great force, it's like running water which comes out hard because the knob is turned all the way. Watts measure the strength needed to do each job. More strength or watts are needed to lift a chair than are needed to lift a coffee cup.

The standard amount of pressure used to send electrons through the path in our homes is 120 volts. The amount of strength needed to power a kitchen appliance depends on the unit. For example, an electric hand mixer may require 100 watts of strength to thoroughly combine a batter mixture; however, a blender may require 1000 watts of strength because it must be able to cut or chop hard raw foods. This requires much more effort on the part of a unit. Both convert electricity to mechanical energy with varying degrees of strength. Once the unit is "on," the function performed may be done by changing the electricity power to heat energy (e.g. toaster, crockpot, or skillet); or electricity may be converted to motion or mechanical energy such as in a blender, food processor, or mixer. Electricity can be converted to short wave energy in the home; appliances utilizing this kind of energy conversion would be televisions, radios and microwave ovens. The energy conversion in kitchen appliances can be categorized according to the needed usage:

*(figure available in print form)*

## **SELECTING THE APPROPRIATE EQUIPMENT TO PREPARE A QUICKBREAD**

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The first experiment will be in selecting appropriate equipment for making a quickbread. Both blender and mixer utilize conversion from electric to mechanical energy. Muffin mixes are unusually quick and inexpensive to prepare because they require few additional ingredients and mixing time is held to a minimum. In this experiment, students will discover that mixing ingredients which are predominantly dry with some liquid are more efficiently mixed with an electric mixer rather than a blender. Blenders should primarily be used for beating liquid items together.

## **USE OF BLENDERS AND MIXERS**

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When using blenders and mixers, the utensils used with these products will include a rubber scraper, mixing bowl and a wooden spoon. Cleaning and maintenance include learning to separate blades from the unit for thorough cleaning as well as learning the parts of the appliance which can be put in water to be washed. Safety measures must be followed at every step. They can be found in the manufacturer's operating instructions. Basic guidelines include unplugging the item when it is to be cleaned or is not in use. Extreme care must be taken when removing the blade to be cleaned. A sponge is desirable when washing to avoid cuts.

## USE OF ELECTRIC TOASTER OVENS AND MICROWAVE OVENS

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Both microwave and toaster ovens can be used for warming and cooking most foods. The factors determining which one is most appropriate are preparation efficiency, the quality of taste, the texture, and the quality of appearance. Depending on the size of the toaster oven, many small items can be baked, broiled, or toasted with utensils such as metal or glass baking pans, broiler pans, casserole dishes, roasting pans and drip trays. Microwave can be operated with these same utensils as long as the material composition is heat proof plastic or glass. Most microwaves cannot function properly when metal containers and utensils are used; arcing (lightning like flashes) may occur. Metals can be identified by their shiny appearance, or by names like aluminum, stainless steel, cast iron, or copper etched on the utensil, not all plastics and glassware can be used in the microwave. Some plastics will melt or breakdown, and glass may crack or break under the heat of hot food substances. <sup>3</sup>

In order to determine if a glass item is safe for microwaving, read the label on the container; it should specify “microwave safe” or “heat resistant.” A simple test will determine if a given or purchased glassware or plastic is suitable for microwave use. Fill a glass or ceramic measuring cup with water, and place it in the center of the microwave oven. Place the container to be tested next to the cup. Microwave on high power for 2 1/2 minutes. The container is microwave safe if it is cool to touch and easily handled. If the container is warm or hot, it means that the container has absorbed the microwave energy. In this case, it should not be used because the utensil may melt, crack or break. <sup>4</sup> Ceramics should be avoided because some may contain small traces of metal which can cause damage to the magnetic tube over an extended period of time. Ceramics are those utensils which are made of clay or pottery. Brand names may include Earthenware or Farberware.

## OPERATING THE ELECTRIC TOASTER OVEN

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When operating an electric toaster oven a student must pre-heat the oven for no less than 5 minutes to be sure the oven compartment has reached the temperature the food needs to be cooked in. On a toaster oven, there will probably be cooking choices which determine which heating devices in the unit will come on. Normally these choices are “bake,” “toast”, or “broil”. Baking cause the heating element in the bottom of the stove to warm up, broiling causes the top element to heat up, and toasting causes both top and bottom elements to become hot. When the type of heating needed is selected, the unit is on and the correct temperature must be selected. <sup>5</sup>

In a microwave oven, there is no preheating necessary because the oven cavity does not heat up to cook the food. Electricity is converted to shortwaves as in a radio.

These waves penetrate and bombard the molecules of food causing them to move around rapidly. This movement causes heat which cooks the inside of the food to the outside through conduction. Since these short waves cannot penetrate metal, utensils needed to use in a microwave must be made of heat proof plastic or glassware and glazed ceramics. These utensils can be used in the microwave oven because the short waves can pass through these items to the food. Other materials (which are not necessarily utensils) can be used in the microwave such as paper towel, plastic wrap, roasting bags, and napkins because the short waves can pass through these also. When operating the microwave, food to be cooked is placed in the oven cavity, the door is shut tightly, and the oven can be turned on. Microwave ovens in proper working order

cannot used if the door is open or if the seal is damaged. Depending on the type of stove, basic operations include the timing device and power levels. <sup>6</sup>The use of each depends on several factors. The length of time food cooks is influenced by the volume of the food, the density, fat, sugar, moisture content of the food, and the shape of the food and starting temperatures. <sup>7</sup>

A teacher demonstrated experiment can be conducted using two potatoes. This will illustrate the difference in the way toaster ovens will heat food and the way microwaves will heat food. Before preparing the potatoes, pre-heat toaster oven on bake at 400. Prepare the similar size and shape potatoes by scrubbing them with water, drying them, and lightly oiling them to keep surface tender.

Place one potato in the center of oven rack in toaster oven. Place the other on a paper towel in microwave. Shut the door and program 2 1/2 minutes on high power. <sup>8</sup> Remove both potatoes from ovens. Cut potatoes in quarters. Visually, students will be able to tell that the microwave potato is much hotter, although it is not completely cooked. This is an example of how microwaves penetrate food to a depth of 1/2-2 in.

## **FOOD SUBSTANCE INFLUENCES ON MICROWAVE COOKING TIME**

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Another experiment can illustrate the influence of fat and sugar on cooking time. Take 3 1-pt. liquid measuring cups and measure 1 cup of running tap water in all 3. Use a microwave thermometer to record the starting temperatures. As much as possible, each cup should read the same. A microwave temperature probe will not work for this particular experiment unless other food thermometers are available. Measured water should stand for 1 minute before taking a reading.

Insert microwave thermometer in cup and let it rest in the spout of the cup. Program on high for 3 minutes. Open door of microwave when the temperature reaches 100°C. Record the amount of time this took. Add 1/4c. sugar to the other cup of water. Stir until it is dissolved completely. Insert thermometer in that cup and let the top rest in the spout. Reprogram microwave for 3 minutes on high. Open the oven door when the temperature reaches 100°C. Record the amount of time this took. Repeat this procedure with the last cup of water. Add 1 Tbsp. oil this time. Insert thermometer to rest in the spout. Re-program for 3 minutes; open the oven door when the temperature reaches 100 C. Be careful because the water will be very hot. Have pot holders ready.

Since foods containing fat and sugar heat quicker than other molecules, it will take less time for the water containing these ingredients to reach 100 degrees.

## **CARE AND MAINTENANCE FOR THE TOASTER OVEN AND MICROWAVE**

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Proper care and maintenance for both the toaster oven and microwave include keeping the oven cavity clean and free of grease build-up. In the microwave oven, this is extremely important around the door because the seal must stay in tact. Microwaves in proper functioning will not operate if the door does not shut completely; if it does, it needs to be serviced immediately to avoid further exposure.

With some microwaves, closed glass jars, whole eggs (even pierced), and bottles with narrow necks should not be used because they may explode during cooking. <sup>9</sup> There are also air vents located on the top or sides of microwave ovens. Make sure these vents are kept open and free of food particles and debris. These vents are necessary to keep the oven's mechanical parts from overheating. <sup>10</sup>

To reduce the risk of fire in the oven cavity, don't overcook food. If cooking food does ignite, keep oven door closed, turn off oven (or cancel timing device), and disconnect power cord or shut off the power from fuse box. In the unlikely event these precautions must be exercised, have the oven serviced to evaluate the possibility of further usage. <sup>11</sup>

## **UTILIZING MANUFACTURER'S INSTRUCTIONS**

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Although it would seem quite obvious to follow the manufacturer's instructions, many students (adults do this too) will attempt to operate products without it. If someone creates a product, it is tested thoroughly and completely for strengths and weaknesses. Since the designers of the product know what it can and cannot do, the instructions, guidelines and maintenance information is offered for the product to operate satisfactorily for the entire life-span of the product.

Utilizing appliance instructions will keep the warranty valid, as well as maximize the life of the product, and keep users from developing practices which may cause the product to become inoperable. Warranties generally cover products with defects in workmanship or materials which render the product unusable with proper operation and maintenance. Most products are not covered when misuse, misapplication, neglect, or abuse are involved in its handling. <sup>12</sup>

Manufacturer's instructions also give information on where to write for servicing, questions or problems with the particular product. This manual usually includes the product specifications which can also be found on a sticker placed somewhere on the product

## **TEACHING OBJECTIVES**

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At the end of this unit, students will be able to cite examples of kitchen appliances utilizing electricity's conversion to mechanical energy as a function. Students also will explain the energy conversion taking place in a microwave oven. When operating appliances, students should be aware of how it operates so they can select appliances which will give them the desired results. The students will also be able to give verbal instruction to others on how to operate the microwave, toaster oven, blender, and electric mixer. Along with their understanding of the operating procedures, students will be able to compose a list of utensils needed to use each of these appliances. If students use inappropriate utensils with any of those previously mentioned, serious damage to the product may occur, as well as creating a hazardous condition for the student. For example, paper towels made with synthetic or manmade fibers may ignite if used in a microwave oven; <sup>13</sup> however, paper towels are normally a product which can be safely used inside the microwave. Students will also be able to recall the safety precautions for each appliance by the end of the unit. Part of understanding the safety precautions means students will also have to know proper cleaning techniques for the product, and

the maintenance tasks which will maximize the life of each appliance.

In addition to learning the operating procedures, care, and the maintenance of each product, students will learn some of the cooking techniques which will increase their household's usage and build upon the students' understanding of how the appliances work. A list of recipes are given toward the end of the unit, but it is strongly urged to select other recipes if they are more suitable for your specific group's taste.

## TEACHING THIS UNIT

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This unit is structured to be taught in 11 50-minute class periods, including one quiz and one test. Most of the classroom materials are those found in the average home economics food preparation lab. Reading materials for teachers can be found in public access libraries. The large color photos included in these resource books make them useful to have during demonstrations and teacher lead instruction. The children's reading list is made up of library books and recent periodicals. The articles can be duplicated for educational use only. This should be done before beginning the unit. The questions written for these articles and books are in the back of this unit in the order they will be used in the teaching plan. All worksheets and supplements are labeled HA#. The primary reading book for class and homework must be ordered two weeks (minimum) from the address listed in the bibliography. These books are free from General Electric. At the teacher's option, one booklet can be ordered by a toll-free number which would usually be received within three days. The teacher would then be free to make as many duplicates as necessary.

The lessons for this unit have daily objectives which serve as building blocks to achieving unit objectives. These are not performance objectives, therefore they are not paired with conditions or degrees of accuracy. Teachers who are not comfortable grading with this system are welcome to restate them for the children in this manner. For the convenience of the teacher, daily objectives have been listed along with equipment needed for that particular day, and the preparation which will be needed for the following class period.

## TEACHING PLAN—INTRODUCING the UNIT

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Day-1 As students come into the classroom, hand them one penny with the verbal instruction to hold onto it. Ask them to get into groups of 4 or more and come up with a list of as many many appliances as they can think of collectively (5-7 min.). As a group, compare lists to compile a complete chart for *kitchen* appliances (5 min.). Discuss the kinds of mechanisms in these appliances, what they do, and what might happen if they they were used inappropriately (5-7 min.). Ask students, "What makes all of these appliances work?" When someone says electricity, ask a few of them to describe their understanding of electricity and how it works (5 min.). Begin teacher-lead instruction explaining atoms and electrons and their relevance in the formation of electricity. Show a picture of an atom with its component parts to help students visualize what takes place (10 min.). Explain and play the Electricity Game described earlier in the text 2-3 min.). Discuss electricity's affect on the appliances displayed to define the process of various kinds of electricity conversion (5 min.). Complete the worksheet HA-1 (5-7 min.).

**LESSON OBJECTIVES—** *At the end of the class period, students should be able to name the various*

***elements of an atom, and their relationship in forming electricity; they should be able to explain how electricity is made, classify various kitchen appliances into conversion categories, and classify the conversion categories into food preparation performance and uses.***

***MATERIALS NEEDED— The teacher should be prepared before class by having a penny for each student, examples of an appliance for each conversion category, a picture of an atom with the component parts, Worksheets HA-1, paper for compilation lists, and chalk. Preparation for the following day includes numbered scraps of paper, objectives visible, a blender and mixer visible, copies of manufacturer’s instructions for the appliance being demonstrated, and ingredient supplies ready and measured.***

Day-2 As students arrive, ask two of them to lead the review for the day according to the lesson objectives written on the board or somewhere where all students can see them (3-5 min.). Discuss the various tasks the blender and mixer are capable of performing (5 min.). Ask children “If they both mix things, how can you tell when you should use one instead of the other?” Describe and demonstrate the operation instructions, safety precautions, and cleaning procedures of each unit to the class.

Be sure to specify what the blender is used for, and what the mixer is used for (7-10 min.). Read over instructions for Experiment I—worksheet HA-2. (5 min.). Have the ingredients for both recipes measured separately before class. Have the students read the instructions to teacher while he or she demonstrates the the use of the blender or mixer. Demonstrate the same ingredients using the other appliance. Pour contents of blender into a large bowl. Have students examine bottom of blender, then compare the two batters. Do *NOT* stir batters until comparisons have been made. Students should answer questions on the experiment worksheet. Teacher should re-mix batter and bake according to package instructions (20 min.). Ask students to assist in the clean up (5 min.).

***LESSON OBJECTIVES— By the end of the class period, the students will be able to discriminate when the mixer should be used, and when to use the blender. Students should be able to follow written procedures for operating the blender and mixer, as well as execute appropriate safety precautions and proper dismantling for cleaning.***

***MATERIALS NEEDED— Before class, be sure learning outcomes are visible on the board, the blender and mixer also need to be visible by the group also. Copies of the instructions from the manual should be distributed for each appliance being used. Have supplies ready, and ingredients measured before class. Advance preparation required for day 3: Ingredient supplies for chosen recipe, copies of the recipe list, necessary utensils, additional copies of the manufacturer’s instructions, & lesson objectives visible.***

DAY-3 Students will prepare recipes (HA-3) according to recipe instructions using the appropriate appliance. Distribute recipe with the list of necessary utensils on it. Allow 5 minutes for students to assign who will do what preparation tasks in their groups. Allow 5 minutes for students to prepare themselves (e.g. aprons, wash hands, take out utensils, get supplies, etc.). Make sure students know to get a teacher to okay their measurements before combining any ingredients. Students will need about 10-15 min. for preparation time, and 8-10 minutes for cleaning up and putting dishes away. Conduct a 5 min. review of lesson objective. Discuss the utensils which can be used with each product and why (5 min.). Assign manufacturer’s instruction manual questionnaire for homework (HA-4) so students can prepare for the quiz on day 4.

***LESSON OBJECTIVES— At the end of the class period on day 3, students will be able to operate the blender safely and appropriately, utilizing them to complete the preparation tasks they are***

*designed for.*

**MATERIALS NEEDED—** *Teacher preparation for day 3 requires having copies of the recipes, having food supplies, additional copies of operating instructions, lesson objectives visible, manufacturer’s questionnaire ready to distribute for homework. A VCR and monitor are needed for day 4. Make sure the videocassette, Microwave: Tips, Tricks, and Techniques has been secured for this day also. Copies of the quiz are needed as well as copies of the movie study guide (HA-6).*

DAY -4 Before distributing the quiz, ask if there are any questions. Make sure there are answers exposed around the room, then distribute the quiz. Allow about 10 minutes. At the teacher’s option, once everyone has submitted their paper, he or she can go over and answer the questions while students still have the ones they are unsure about in their minds. Distribute and go over the questions for the video study guide. Students grasp a broader understanding when they’re told which information is important to know before the film. Students are to complete the study guide during the tape. Allow 10 minutes for study guide review, and about 15 minutes from the video. Go over answers after the video; explain concepts discussed on the worksheet; review performance similarities with the toaster oven.

**LESSON OBJECTIVES—** *Students should be able to name the energy conversion taking place in the microwave oven, and describe how short waves heat food by the end of class period four. They should also be able to name at least one example of when metals are appropriate to use inside the microwave, and verbalize at least two factors which influence microwave cooking time.*

**MATERIALS NEEDED—** *Equipment needed for day 4 are listed above. The preparation which will be necessary for day 5 is the equipment needed for Experiment II (HA-8). Materials needed are two potatoes which are the same size and shape, copies of the experiment, and copies of the manufacturer’s operating instructions. Make sure the toaster oven and microwave are visible to the group, and have lesson objectives visible. Have copies of homework (HA-7).*

DAY 5 Have a student conduct a review of objectives learned on the previous day. Take about 20 minutes to demonstrate the operating procedures, how it works, and the care and maintenance for the toaster oven. Explain the similarities and differences between the two appliances, and conduct Experiment II (HA-8) while students observe and complete the questions. Allow 5-7 minutes to clean up. Pass out homework.

**LESSON OBJECTIVES—** *At the end of the class period, students will be able to verbally explain the operating procedures for each appliance, compile separate lists of utensils which are used with the product, name several safety precautions necessary for safe use, and explain the difference between the way a microwave cooks food, and a conventional toaster oven cooks food.*

**MATERIALS NEEDED—** *For the experiment on this day, be sure to have all utensils and equipment positioned for easy access. When evaluating each potato, point out to students where the potato from the microwave is cooked. It will further illustrate how microwaves penetrate from a depth of 1/2–2 inches inside of the food, and that which is thicker cooks by conduction. In preparation for the following day, there should be enough microwave thermometers for each group. The lesson is designed for 3 ovens in one room. If there are not enough microwaves, it can be changed to a teacher-lead experiment. Copies of the worksheet are still needed so students can follow along. Each group will need 3 1-pt. liquid measuring cups, a set of measuring spoons, food supplies, and microwave thermometer. For recording times and temperatures, see HA-11.*

DAY-6 Review previous day’s objectives, allow students to prepare for the lab. It will take about 20 min. to



complete all three experiments. Allow students to take about 10 minutes to draw conclusions. Then clean up.

**LESSON OBJECTIVES—** *At the end of this class period, students will be able to explain what parts of a food cook faster than others and why. They will also be able to determine what factors influence microwave cooking time, and how to distinguish the difference between the microwave thermometer and a candy or meat thermometer.*

**MATERIALS NEEDED—** *Materials for day 6 are listed above. Students will have a comparison lab on day 7. They will make yellow cake. At least one group will bake theirs in the microwave, and one in the toaster oven. Utensils needed are on worksheet HA-9. These supplies should be ready to us upon students' arrival to class. Ingredients should be ready to use also.*

DAY 7 5 min. Review

5 min. Lab preparation—get supplies, wash hands

30 min. Make cake—suggested recipe on HA-7

10 min. Clean up

**LESSON OBJECTIVES—** *Students will recognize that baked goods can be prepared the same for the microwave oven as they are for the conventional toaster oven.*

**MATERIALS NEEDED—** *For the following day, supplies needed include the stored cakes from previous day, copies of the food evaluation form (HA-9), instruction manual, one glass, liquid measuring cup, and a variety of different kinds of dishes. Students will do the dish test.*

DAY 8 10 min.—Compare food products, write conclusions for the appropriateness of toaster oven baking and microwave oven baking.

10 min.—Discuss utensil usage & care of toaster

15 min.—Microwave utensil usage & experiment

10 min.—Review safety and manual instructions before unit test on day 10.

**LESSON OBJECTIVES—** *At the end of the class, students will list specific procedures for maintaining and caring for toaster and microwave ovens, they will be able to evaluate the importance of using the appropriate utensils with the given appliance, and explain why the microwave dish test is effective for finding out if a utensil is microwave safe.*

**MATERIALS NEEDED—** *For the microwave breakfast on day 9, the supplies needed will be food supplies and microwave-safe glass bowls and pie plate or broiling dish to allow fat to drain.*

DAY 9 10 min.—Review for unit exam

5 min.—Prepare for lab

5 min.—Prepare food supplies for microwaving (HA-10)

10 min.—Cooking time

10 min.—Test food

10 min.—Clean up

**LESSON OBJECTIVES—** *At the end of the day, students will be able to explain what is meant by “standing time,” they will be able to identify when eggs are ready for standing time, and will be*

**able to identify when sausage is fully cooked in the microwave oven.**

**MATERIALS NEEDED— The unit quiz will be given on the following day. Make sure there are enough copies for all students.**

DAY-10 —Unit exam. Ask students if there are any questions before the exam begins. Going over questions helps clarify for some students, but this is the teacher’s choice.

## Notes

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<sup>1</sup> Beryl and Sam Epstein, *Electricity* , pp. 5-6.

<sup>2</sup> *ibid.* , pp. 12-13.

<sup>3</sup> Hunter, “Microwave Utensils,” *Consumers’ Research Magazine* , Vol. 68 (October, 1985), p. 8.

<sup>4</sup> ———, *Panasonic Microwave Cookbook* , p. 4.

<sup>5</sup> Mary Pickett, Mildred Arnold, and Linda Ketterer, *Household Equipment In Residential Design*, p. 305.

<sup>6</sup> *ibid.* , p. 140.

<sup>7</sup> ———, *Panasonic Microwave Cookbook* , p. 8

<sup>8</sup> ———, *General Electric Microwave Guide* , p. 5.

<sup>9</sup> *ibid.* , p. 20.

<sup>10</sup> ———, *Operating Instructions*, p. 4.

<sup>11</sup> *ibid.* , p. 4.

<sup>12</sup> Pickett, Arnold, and Ketterer, pp. 22-23.

<sup>13</sup> Hunter, p. 8.

## TEACHER READING LIST

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Davidson, Homer. *Practical Microwave Oven Repair*. Blue Ridge Summit, PA: Tab Books, Inc., 1984.

Contains exhaustive information on microwave oven operations. Includes microwave parts and an explanation of their function. Provides an excellent list of safety and maintenance list.

Pickett, Mary, Mildred Arnold, and Linda Ketterer. *Household Equipment In Residential Design* . New York: John

Wiley & Sons, 1986.

Contains extensive information on every household appliance, includes consumer concerns, energy use, electricity, material composition of appliances. The end of each chapter has numerous ideas for related experiments and learning experiences.

———. *Panasonic Microwave Cookbook*. Secaucus, NJ: Matsushita Appliance Co., 1984.

Provides information on microwave techniques and operations. Includes recipes.

———. *The General Electric Microwave Guide*. Peoria, IL: Bennett Publishing, 1984.

This is an informational book about all aspects of operating and owning a microwave oven. Discusses safety, utensils, cleaning & care & provides large color photos of examples. Includes recipes.

## CHILDREN'S READING LIST

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Epstein, Beryl and Sam. *Electricity*. New York: Franklin Watts, Inc., 1977.

This book explains electricity at a level where children can comprehend these concepts. Begins with atoms, and ends electricity experiments and projects.

———. *How to Buy A Microwave*. Louisville: General Electric Co., 1984. This free booklet has valuable information at children's reading level describing the microwave and its functions. Includes descriptions of optional features and what they do.

Hunter, Beatrice. "Safe Microwave Oven Use." *Consumers' Research Magazine*, Vol. 71 (December, 1988), pp. 8-9. This article explains techniques to avoid burns from microwave heating, as well as cautions regarding uneven cooking in the microwave.

### **HA-1** Questions

- A) Write the final list of kitchen appliances here.
- B) Put each appliance written above into one of the electricity conversion below.
  - MECHANICAL ENERGY
  - HEAT ENERGY
  - SHORTWAVE ENERGY
- C) What kinds of tasks do the appliances in the mechanical category perform?  
What tasks do the appliances under heat energy do? What tasks do those listed under shortwave energy perform?
- D) What do electrons have to do with electricity?
- E) \_\_\_\_\_ is the amount of force by which electricity enters a household \_\_\_\_\_ is the strength it takes to power an appliance.
- F) Place a line under the item you think would require the most wattage (greatest strength) to power it.

food processor or carving knife

dishwasher or blender

mixer or dough kneader

mug warmer or electric skillet

### **HA-2 BLENDER/MIXER EXPERIMENT**

UTENSILS—blender	<i>UTENSILS—mixer</i>
rubber scraper	rubber scraper
custard dish	custard dish
liquid measuring cup	liquid measuring cup
a mixing bowl will be used for evaluation purposes	wooden spoon mixing bowl

## **Word List**

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arrangement heated

poultry whole eggs  
moisture sealed containers

pork

## **SCRAMBLED SQUARES**

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Place the groups of letters in squares by starting at the tops of the columns. The groups do not go into the squares in the order listed, but each line of letters must stay in the same order. If done correctly, you will find a statement about uneven cooking. One row of letters has been placed in the right place to start you off.

*(figure available in print form)*

### **HA-8 POTATO EXPERIMENT**

Supplies Needed:

2 potatoes (same size & shape)

1 vegetable brush

paper towels 2 paper plates labeled  
knife pot holders

### **Preparation**

- 1) Preheat toaster oven to 400°F.
- 2) Wash and scrub both potatoes thoroughly, then dry them with the paper towels.

- 3) Pierce both potatoes generously with knife. This is done to reduce the risk of scalding from explosion.
- 4) Place one potato in the center of the microwave oven on top of a paper towel.
- 5) Place the other potato in toaster oven. Program microwave for 2 1/2 minutes on high power.
- 6) After cooking, remove both potatoes from ovens and place on their respective plates. Cut into quarters so students can answer questions.

## **QUESTIONS**

- A. Which potato has steam escaping when cut into quarters?
- B. Hold the potato from toaster oven. Touch the potato from the microwave. Describe the temperature difference?
- C. Use a fork or toothpick to poke potato. Which is harder to poke?
- D. Evaluate the microwave potato. What part of the potato is fully cooked? Which part is not? Suggest a reason why this might have happened.
- E. Based upon the information in your answers above, write 2-3 statements about the way microwave ovens heat food.

## **HA-9 YELLOW CAKE**

### **UTENSILS**

mixing bowl  
wooden spoon  
rubber scraper  
liquid measuring cup prepared Icing (any flavor)  
custard dish  
electric mixer

### **INGREDIENTS**

1 box Jiffy yellow cake mix  
eggs  
milk

1. Prepare cake mix as directed on box.
2. Pour batter into baking dishes(microwave group must use appropriate utensil).
3. The toaster oven group should bake as pkg. instructs. Microwave group should program on high power for 2 1/2 minutes. Rotate dish. Program on high for 3 more minutes, or until shiny

surface dissipates.

4. Icing can be put on the cakes *AFTER* they have been compared with the other cake and evaluated.

## QUESTIONS

A. Which cake has a golden brown top?

B. Cut a small piece from both cakes. What do they look like?

Are their textures the same ? What is the difference?

Describe the microwave cake

Describe the Toaster cake

Note: It is a general rule that only darker color cakes look equally as appetizing as cakes baked in conventional toaster ovens.

## HA-10 MICROWAVE BREAKFAST

### UTENSILS

whisk

knife

liquid measuring cup 1 Tbsp. margarine

1/4 dry measuring cup 1/4 c. milk

mixing bowl

pie plate or broiling dish

### FOOD SUPPLIES

4 sausage patties or links

4 eggs

1/4 c. grated cheese

1. In a glass, microwave-safe bowl, beat eggs with butter and milk.
2. Place sausage on the outer perimeters of the pie plate or broiling dish Cook 2 1/2 min. on high power. Rotate dish and turn patties over. Cook for 1 1/2 min. on high. Drain fat.
3. Microwave eggs on medium for 2 min. Stir well, scraping sides of dish. Sprinkle on cheese .
4. Heat on medium for 1 1/2 minutes longer. Let stand undisturbed for 1 min. Serve.

Note: Sausage should be cooked covered with wax paper or paper towel.

INFLUENCES  
ON  
**HA-11** MICROWAVE  
COOKING  
TIME

(figure available in print form)

1. Which ones took the least time to reach 100 C?
2. Which one took the most amount of time?
3. Based on the information you found, \_\_\_\_ seemed to attract microwaves because they heated the \_\_\_\_ faster.

## CLASSROOM MATERIALS

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*Microwave: Tips, Tricks, & Techniques.*

Distributed by Karol Media Co.

35 North Pennsylvania Avenue

P.O. Box 7800

Wilkes-Barre, PA 18773-7600

Contains loads of information about microwave cooking.

Write to the address above to schedule a free loan.

*How To Buy A Microwave .*

Distributed by General Electric Co.

The GE Answer Center

9500 Williamsburg Plaza

Louisville, KY 40222

1-800-626-2000

Describes how microwaves work, what features are available, and energy and safety facts. Write for multiple copies, call for single copies.

## FOOD SUPPLIES

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Jiffy muffin mix	eggs	
Jiffy yellow cake mix	milk	
frozen sweetened strawberries	bananas	
graham cracker tart shells	potatoes (same size)	
vegetable oil		plain or vanilla yogurt
sugar		sausage patties
flavored puddings		

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