Name: _____ Class: _____

Zap It!

By Tracy Vonder Brink
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In this informational text, Tracy Vonder Brink explains the science behind how microwave ovens work. As you read, take notes on the experiment in the section titled "Do(n't) Try This At Home".

[1] In 1946, a scientist named Percy Spencer was working for a company called the Raytheon Corporation. The company was testing a magnetron, a kind of tube that made power. One day, after earlier working with the magnetron, Spencer reached into his pocket for a peanut cluster bar. He found that the candy bar had melted. He wondered if being near the magnetron had melted his snack. Curious, he put an egg under the magnetron to see what would happen. The egg exploded — all over his face. Then Spencer tried a bag of corn kernels. The corn popped!

This is how the idea for microwave ovens was discovered!

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From Magnetron to Microwave

Spencer's company decided to develop the magnetron as a way to cook food. A year after Spencer's discovery, they made the first microwave oven. It stood more than five feet (1.5 m) tall, weighed 750 pounds (340.19 kg), and cost $5,000. They tried again with another model in 1954, but it still cost $3,000 — too expensive for most people to buy for their homes.

Finally, in 1967, the Raytheon Corporation introduced a microwave oven that could fit on a countertop. It cost $495. It was still expensive, but it could cook a hamburger in 35 seconds. Microwave ovens began to catch on. The price continued to drop over the years. By 1976 more homes had microwave ovens than dishwashers. Today, about 90% of homes have microwave ovens. They're also found everywhere from hotel rooms to convenience stores. But how do microwave ovens cook food?

How Microwaves Work

[5] Microwaves are a type of light energy,[1] although they're not the kind of light you can see. Like other light waves, microwaves carry energy. Microwaves bounce off metal but pass through glass, plastic, and paper. They're also absorbed by food. That makes them perfect for cooking.

The same kind of magnetron that was tested back in 1946 is still used in today's microwave ovens. A magnetron makes microwaves. Pushing the oven's start button turns on the magnetron. The oven's walls are made of aluminum coated in plastic. As the microwaves made by the magnetron move up and down, they bounce off the oven's walls and into the food.

Nearly all types of food have some water in them. When microwaves hit food, the water inside vibrates.[2] The water heats up as it jiggles. That heat cooks the food. How quickly something cooks in a microwave oven depends on how much water it holds. That's why a fresh vegetable — which has a lot of water in it — cooks faster than something like a slice of pizza.

We use glass, paper, and plastic to hold food during this kind of cooking because microwaves pass through them. However, some plastics should not be used in a microwave oven. The microwaves don't harm the plastic, but hot food may melt it. We also don't put most metals in a microwave oven because the wrong kind can spark and even start a fire.

Because microwaves bounce around inside the oven, they don't always cook the food evenly. That's why a slice of microwaved pizza might have both hot and cold spots. Some microwave ovens have a glass plate that turns around as the food cooks. Keeping the food moving makes it more likely that the microwaves will reach every part.

Do(n't) Try This at Home!

[10] If you want to find out where microwaves land in your microwave oven — and where they miss — try this experiment. You'll need four slices of bread and some spreadable butter or margarine. (And an adult's permission, of course!) If your microwave oven has a glass plate, take it out and turn it upside down. Also be sure to remove the ring that turns the plate. If your microwave doesn't have a glass plate, you can use any plate that's safe to put in the microwave.

Spread the butter or margarine over the tops of four slices of bread. You'll want the spread to completely cover each slice. Then lay the bread on the plate, butter side up, with the slices side by side in two rows. They should touch so there's not much extra space between them, covering the whole plate.

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1. **Energy** ***(noun)*** the power needed to do work
2. **Vibrate** ***(verb)*** to move back and forth very quickly and steadily

Put the plate in the microwave oven and cook the bread for 20 seconds. Then take it out. If you see spots where the butter didn't melt, that's where the microwaves missed!

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. What is the main idea of the text?
    A. Only adults should use microwave ovens.
    B. More people have microwave ovens than dishwashers.
    C. Microwave ovens use a certain type of energy to cook food.
    D. Always remember to use a plastic plate when using a microwave oven.

2. How is the information in "From Magnetron to Microwave" organized?
    A. The author explains how the microwave oven got smaller and cost less over time.
    B. The author tells a story to show how the microwave oven was invented.
    C. The author compares a microwave oven to other household inventions.
    D. The author asks questions about microwave ovens and answers them.

3. Why does the amount of water in food change how it cooks in a microwave oven?
    A. Microwaves can spark if a food has too much water, so certain types of food do not cook in a microwave oven.
    B. Microwave ovens run on water to make microwaves, so if there is not enough water the food will not cook.
    C. Microwave ovens heat food by making water inside food move, so foods with more water cook faster.
    D. Microwaves bounce more in hotter water, so foods without hot water cook faster.

4. The word "absorb" in paragraph 5 most closely means —
    A. to take in.
    B. to change.
    C. to push down.
    D. to make stronger.

5. Why does the author include the experiment in the section "Do(n't) Try This At Home"?

Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

1. Have you ever used a microwave oven to cook your food? Did you ever wonder how it worked? How will reading the text change your experience the next time you use a microwave oven?

2. The text says that more people own microwave ovens than dishwashers. What do you think is the most important household technology and why? If you were going to invent a new device for the home what would it be and why do you think people would want it?