Green Career Awareness Module

Electrification

Solutionary Phase	Methane Gas
Lesson # and Title	Lesson Six Home Electrification
Duration	60 min

Lesson Overview
In this lesson, students first explore gas appliances commonly found in homes, identify their electric alternatives, and discuss their benefits and drawbacks. They engage in an interactive discussion about the appliances in their homes and learn about the concept of electrification, its importance for environmental sustainability, energy efficiency, and safety. Then, students delve deeper into the topic by focusing on the transition from gas cooktops to induction cooktops. They learn the principles behind induction cooking, its benefits, and get to experience it first-hand by cooking a simple dish using an induction cooktop. The session concludes with a discussion about their observations and experiences, reinforcing the advantages of electric appliances and induction technology. This lesson provides students with a practical understanding of home electrification, promoting more sustainable and energy-efficient choices.
Learning Objectives
By the end of these lessons, students will be able to: 1. identify and list the different gas appliances found in most homes. 2. understand the concept of home electrification, the transition from gas to electric appliances, and its significance in relation to environmental sustainability, energy efficiency, and safety. 3. compare gas appliances to their electric counterparts, understanding the benefits and drawbacks of each.

4. understand the principles behind induction cooking, how induction cooktops work, and the benefits they offer over traditional gas cooktops.
5. apply practical skills to safely use an induction cooktop, gaining hands-on experience cooking a simple dish.
6. reflect on their experiences and observations from the practical activity, further understanding the advantages of electric appliances and specifically induction cooktop technology.

Content Standard(s)

NGSS MS-PS2-3: Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.
NGSS MS-PS3-4: Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.
Health Standard 7: Practicing Health-Enhancing Behaviors (Grades 7-8): Students demonstrate the ability to practice health-enhancing behaviors and avoid or reduce health risks.
CTE Model Curriculum Standards Sector: Hospitality, Tourism, and Recreation, Pathway: Food Science, Dietetics, and Nutrition: Standard B2.2 Understand the principles of food preparation and presentation.
CCSS ELA CCSS.ELA-LITERACY.RST.6-8.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
CCSS ELA CCSS.ELA-LITERACY.RST.6-8.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

Equipment, Instructional Resources, and Materials

1. Slide deck
2. Article: San Francisco Bay area to phase out natural gas heating appliances
3. Induction cooktops
4. Induction-compatible cookware (pots/pans).
5. Cooking ingredients for the chosen simple dish. This could be eggs, bread, cheese, butter (for scrambled eggs or grilled cheese), pancake batter (for pancakes), or pasta and water (for boiled pasta).
6. Cooking utensils: spatula, ladle, flipper, etc.
7. Oven mitts or pot holders.
8. Cleaning supplies for after the cooking activity: dish soap, sponges, towels.
9. Safety equipment: first aid kit, fire extinguisher (ensure the school's normal safety equipment is readily accessible).

Key Vocabulary and Terms

1. Electrification
2. Induction

Teacher Preparation

1. Review Lesson 6: Home Electrification
2. Gather and prepare materials
3. Read this article: San Francisco Bay area to phase out natural gas heating appliances and discuss.

Lesson Procedure

Slide Deck: **Lesson 6: Home Electrification**

Segment Title	Activity/Task, Student Grouping, Special Accommodation, Related Career(s), and Assessment	Time (min)
Electrify Everything!	Activity/Task: 1. Burning and releasing methane gas is harmful to the environment, so the solution is to stop using methane gas and electrify the home. 2. Students brainstorm what “Electrify Everything!” could mean, in terms of the electrification of: a. The house b. The kitchen c. The lawn d. Personal transportation 3. Students explore the electrification of the home, in terms of the above list. 4. Students are informed that considerations must be made related to cost, efficiency, and health and environmental impacts of electrifying a home. 5. Students read this short article: San Francisco Bay area to phase out natural gas heating appliances and discuss. * NOTE: Many students live in apartments or other types of rental residences. The purpose of this lesson is, in no way, to shame students’ families for not owning their residence, and thus not having the power or financial means to electrify their home. The purpose of this lesson is to inform students about the ways that homes can be	20 min

	electrified and the benefits of electrification over using methane gas. In following lessons, students will learn about the different careers involved in home electrification, which is the main goal of this (and all) green career awareness module. Student Grouping: Whole Group Related College Major and Career(s):	
Cooking with an Induction Cooktop	Activity/Task: New CA regulations set for 2030 will ban new construction from including gas space heaters and gas water heaters, but not gas stoves. Students will thus have to determine for themselves the value of switching from a gas stove to an electric coil or induction stove. The purpose of this lesson segment is to introduce students to the operation, safety features, and benefits of induction cooktops compared to traditional gas cooktops. 1. Display Video: Induction Heating: 3D Animation Hands-On Activity Title: Discovering the advantages of induction cooking 2. Review with students what an induction cooktop is and how it differs from a traditional gas stove. Make sure to highlight key benefits such as: ● Faster heating ● Greater energy efficiency ● Increased safety (no open flame, auto-off feature, cooktop surface stays cool) ● Ease of cleaning 3. Materials for this activity: ● Induction cooktops ● Induction-compatible pots and pans ● Water ● Instant-read thermometer (optional) 4. Invite a student volunteer to come forward and try out the induction cooktop, starting with the simplest task: boiling water. a. Step 1: Have the student pour water into the induction-compatible pot.	40 min

	b. Step 2: Ask the student to place the pot on the induction cooktop and set the temperature to bring the water to a boil. c. Step 3: As the student is doing this, reinforce the unique features of induction cooking. For example, note how quickly the water begins to boil compared to a traditional gas stove. d. Step 4: Once the water is boiling, ask the student to turn off the cooktop. Then, invite them to carefully touch the surface of the cooktop (it will be warm, but not hot like a traditional cooktop). This reinforces the safety advantage of induction cooktops. 5. Invite students to discuss their observations and ask questions. Some potential discussion points might include: ● Was the water boiling faster on the induction cooktop than what you've seen on a gas stove? ● How do you think this efficiency could help in a real cooking situation? ● Did you notice anything different about the safety of the induction cooktop? ● How could these advantages impact energy use and safety at home? 6. Now that students have seen a demonstration and discussed the induction cooktop, it's their turn to try it out. 7. Now that students have seen a demonstration and discussed the induction cooktop, it's their turn to try it out. a. Divide the class into small groups and let each group cook a simple dish of their own using the induction cooktops. Here are some options you can choose from, each designed to be safe and easy for middle school students: i. Scrambled Eggs: Provide each group with an induction-compatible pan, a small amount of butter or oil, and a bowl of beaten eggs. Students will heat the butter or oil, add the eggs, and stir until softly set. ii. Grilled Cheese Sandwich: Provide each group with an induction-compatible pan, slices of bread, cheese, and a small amount of butter or margarine. Students will butter one side of each slice of bread, place cheese between the slices, and grill the sandwich on each side until golden brown and the cheese is melted.	

	iii. Pancakes: Provide each group with an induction-compatible pan, pre-made pancake batter, and a small amount of butter or oil. Students will heat the pan, add a ladle of batter, and flip the pancake when bubbles appear on the surface. iv. Boiling Pasta: Provide each group with an induction-compatible pot, a small amount of pasta, and water. Students will bring the water to a boil, add the pasta, and cook until it is al dente. b. In each case, guide the students to notice how quickly the cooktop heats up, how evenly it cooks, and how cool it stays around the cooking pot or pan. As the groups are working, move around the room to offer guidance, answer questions, and ensure that everyone is handling the equipment safely. 8. After the cooking activity, initiate a class discussion based on their experience. Discuss the observations about the speed of heating, the precision of temperature control, and the safety features of the induction cooktop. 9. Wrap up the class by revisiting the key benefits of induction cooktops. Discuss how using such energy-efficient and safe cooking methods can be a part of our everyday efforts to conserve energy and protect the environment. Student Grouping: Individual and Pairs Special Accommodation(s): 1. Visual Accommodations: For students with visual impairments, ensure the cooktop controls have high contrast, tactile markers. They could also be paired with a sighted peer for the hands-on activity. 2. Auditory Accommodations: For students with hearing impairments, make sure all verbal instructions are also written or typed out, either on the board or in handouts. 3. Motor Skills Accommodations: For students with motor difficulties, provide utensils with adaptive grips and ensure that safety measures are doubly checked. Pair these students with a partner who can assist with tasks as necessary.	

	4. Learning Disabilities: For students with learning disabilities, instructions may need to be broken down into smaller, simpler steps. One-on-one assistance might be necessary for these students to follow the process safely. 5. Advanced Learners: For students who may need more challenging tasks, you could ask them to research additional benefits and drawbacks of induction cooking, or challenge them to come up with a more complex dish they could prepare using an induction cooktop. 6. English Language Learners: For students who are English learners, providing visual aids, such as a pictorial guide of the cooking process, could be beneficial. Also, pairing these students with peers who can help explain the process in simpler language might be beneficial. Related College Majors and Careers: College Majors: 1. Culinary Arts: Students in this field often learn about a variety of cooking methods and equipment, including induction cooktops. 2. Hospitality Management: This major often includes aspects of food preparation and kitchen management where understanding different types of cooktops could be beneficial. 3. Environmental Science/Studies: The energy efficiency aspect of induction cooktops could be of interest to students studying environmental impact and sustainability. 4. Engineering (especially Electrical or Mechanical): These majors might study the technology and mechanics behind how induction cooktops work. Careers: 1. Chef/Cook: Professionals in this field could benefit from understanding and using different types of cooking equipment, including induction cooktops. 2. Kitchen Manager: This role involves overseeing kitchen operations, including the maintenance and choice of kitchen appliances. 3. Appliance Engineer: These professionals design and improve kitchen appliances like induction cooktops. 4. Environmental Consultant: These professionals might advise companies on the energy efficiency of their operations, including their choice of kitchen appliances.	

	5. Science or Home Economics Teacher: Understanding the science behind induction and traditional gas cooktops can be beneficial for educators who might teach this in class. 6. Nutritionist/Dietitian: Professionals in this field might need to understand various cooking methods and their impacts on the nutritional value of food, safety, and efficiency. 7. Restaurant Consultant: These professionals often advise restaurants on equipment choices to increase efficiency and safety.	
Extensions	● Have students research: ○ Five careers related to home electrification (last slide of deck) ○ The impact of natural gas vs. electricity on the environment and the cost of production. ○ The impact of electromagnetic fields (EMF) generated by induction cooktops on health. ○ Ways to make cooking more sustainable and eco-friendly.	