



SoCalGas™

Introduction to Cooking with Gas

Lesson 7: Grilling

ADVANCED



Introduction

Welcome to Introduction to Cooking with Gas. Today's topic is understanding how efficient natural gas is compared to other fossil fuels. Once you learn about the efficiency of natural gas, you will learn how to cook with gas to make your own grilled meat and vegetable kebabs.

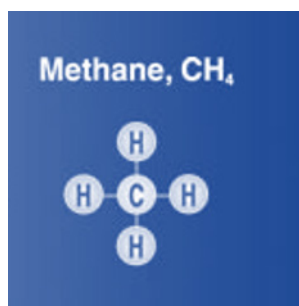
This lesson can be completed in a classroom or at home. Your teacher will provide instructions for completing the assignment from home.

Opening Assessment

1. Which statement BEST describes fossil fuels?
 - a. fuels that come from the absorption of light particles
 - b. fuels that are created by heating uranium atoms
 - c. fuels with high carbon content formed by natural processes
 - d. fuels with high hydrogen content created by capturing wind
2. What does it mean to "grill" food?
 - a. cook food with indirect heat on all sides of the food for long periods of time
 - b. cook food with direct heat above the food for very short periods of time
 - c. cook food on a flat surface at a constant temperature for varied periods of time
 - d. cook food on an open rack with no moisture and direct heat for varied periods of time
3. What is one reason that using natural gas as a fuel source is more efficient than other fossil fuel sources?
 - a. It can be easily stored for later use.
 - b. It is a renewable source.
 - c. It generates more electricity when burned.
 - d. It is easy to transport over oceans.
4. What appliance would you use to grill food in a commercial kitchen?
 - a. plancha
 - b. under fired broiler
 - c. flat griddle
 - d. deck oven
5. Why is the steak put in the marinade before it is put on the grill?
 - a. to prevent the meat from sticking to the grill
 - b. to begin the cooking process before adding heat
 - c. to tenderize and add moisture to the meat
 - d. to remove moisture from the meat before adding heat

How Efficient is Natural Gas?

Electricity comes from different sources such as coal, nuclear and solar power. Some are renewable sources like wind and solar power. Some are not renewable like coal, which is formed from the remains of plants and animals. Similar to other fossil fuels, natural gas was formed millions of years ago deep underground. Decaying animal and plant remains released the gas that was trapped in porous rocks buried deep underground. Because of this, natural gas is a non-renewable fuel source though it is plentiful in the United States.



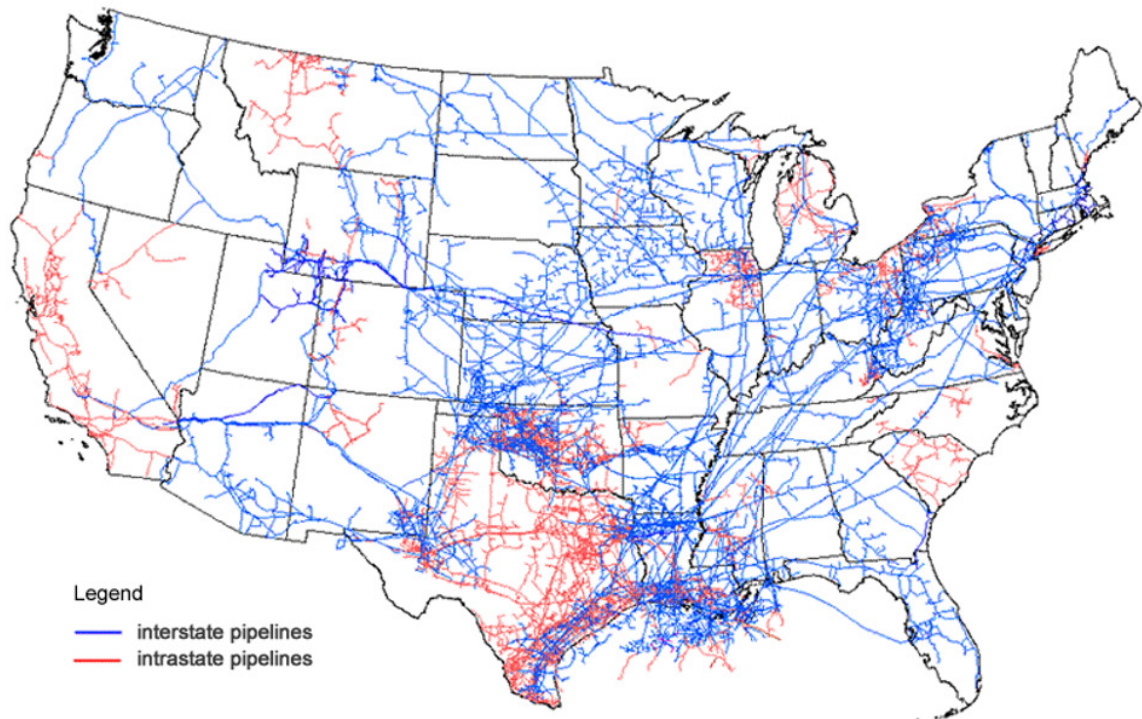
Natural gas is primarily made of methane. Methane contains one carbon atom surrounded by four hydrogen atoms. When it is burned, the gas releases a lot of energy that can be used for many things. Natural gas is used for heating homes and buildings, generating electricity and cooking in the kitchen. When burned, natural gas is the most efficient of the fossil fuels. This means that gas-fired power plants convert the heat energy from burning natural gas into electrical energy at higher rates than with other fuel sources. For example, coal-fired power plants are about 33% efficient while gas-fired power plants are 43% efficient. Newer natural gas combined power plants (which use heat from the natural gas turbine to power a steam turbine) are 60% efficient.

In addition to generating more electricity, natural gas is more efficient than other fuel sources because it can be produced and transported affordably. It is relatively inexpensive and easy to use. It can also be liquified to make it easier to store and ship across the country. The gas is simply cooled to liquify it and warmed back up when it is time to burn it as a gas. By liquifying the gas, it can be transported over water on large tanker ships. This allows it to be transported to places where transporting by pipelines is not possible.

New technologies have been created to make transporting and storing natural gas safer and more efficient. Once processed, natural gas can be stored underground until it is needed. Storing excess natural gas until it is needed helps to ensure plentiful fuel sources are available during times of high demand. The underground storage facilities most commonly used in the United States include depleted natural gas/oil fields, salt caverns and aquifers. Smaller volumes of natural gas can be stored above ground.

The movement of natural gas from storage facilities to where it is used in the market is accomplished with pipeline systems. Larger pipelines are used to transport the gas long distances to where it will be used. Smaller pipelines, often referred to as mains, transport natural gas into the service pipelines that bring gas directly into homes and buildings for use in kitchens and heating.

Map of U.S. interstate and intrastate natural gas pipelines



Source: U.S. Energy Information Administration, *About U.S. Natural Gas Pipelines*

Image Credit: [EIA](#)

Natural gas can also be used to make non-renewable sources more efficient. Wind and solar power plants cannot create a steady amount of electricity because the weather is unpredictable. However, it is possible to use natural gas to power wind turbines as needed to generate electricity that can meet user demands. Additionally, any excess electricity made at a wind or solar plant can now be converted through electrolysis to natural gas and stored for later use. This new technology is called Power-to-Gas and is a way to blend renewable energy sources with an efficient, non-renewable fuel source.

Cooking with Natural Gas

Natural gas is not just an efficient way to produce electricity. Natural gas also provides a very efficient way to perfectly cook food. There are many benefits to cooking with natural gas. Many professional and at home cooks prefer to cook with natural gas appliances instead of with electric appliances. Natural gas appliances, such as an under fired broiler, are easy to use, control and clean, making them a great choice for all commercial kitchens.

When cooking, there is greater control over the temperature used to prepare the food. Cooks have more control over the heat they need. Natural gas ovens and ranges distribute the heat more evenly. This means that the food gets cooked evenly as well. Natural gas saves more energy than electric units because natural gas appliances only use the gas while the appliance is in use. This is important especially in large commercial kitchens where many units are being used at once. In certain situations, a natural gas rangetop can also be used in the event of a power outage simply by lighting the gas with a match. Heavy caution is advised when doing this, and it is never recommended that a gas oven be lit with a match at any time.

The key to an effective and efficient kitchen is to maintain both the cleanliness of the equipment and the upkeep of the equipment by regularly checking for damaged parts. Natural gas appliances are preferred by many chefs because they have hotter burn temperatures and cook food faster and more thoroughly. This saves time, energy and money and helps reduce wasted food.

On average, equipment that runs on natural gas will save money in operating costs. It is dependable, durable and overall requires very little maintenance. To make sure that the equipment is running optimally, you should check the gas line for leaks. This can be easily done using a commercially made gas leak checking product. This product is like a "goo" that you rub on the gas line and watch for bubbles to appear. If there are bubbles, you will know that the gas is leaking out. It is also important to keep the equipment clean. Grates that are covered in grease not only pose a fire hazard but also cause the appliance to work harder and use more energy. Another important energy saver for gas appliances is to avoid using the lowest setting where the flame is barely visible. This can lead to the flame going out and the gas to remain on. Always make sure that the knob is turned completely to the off position when the unit is not in use. Avoid bumping the knobs or the unit. This can also cause the gas to leak if the gas connections come loose.

In general, natural gas powered appliances are easy to use and to clean. Because the heat comes from a flame instead of a heating coil, it is easy to wipe up spills without having them stick and burn to the unit. To clean a natural gas appliance, first turn off the heat and allow the appliance to cool. Once cool, use a damp cloth to wipe up all the surfaces. Make sure to clean the ceramic grates but do not submerge them in water. Make sure that all venting areas are clean of dust and grease. This will help to keep the appliance running well and working efficiently.

The recipe in this lesson refers to the use of an under fired broiler to grill meat and vegetables. Just like with cleaning other appliances, when cleaning an under fired broiler, you must first turn off the gas and allow it to cool. Once cool, scrape off all the built up food on the unit and completely wipe the drip shields. Don't forget to wipe and clean the burners and empty and clean the grease pan. The ceramic briquettes in an under fired broiler must be regularly checked and periodically turned to maintain their efficiency. They can be washed as needed and should be replaced every six to eight months. This will help your under fired broiler work well for a long time.

Cooking Methods

There are three types of cooking methods that utilize natural gas:

1. **Moist cooking** involves cooking with moisture in either liquid or steam form.
2. **Dry cooking** involves cooking without any moisture.
3. **Combination cooking** combines moist and dry heat cooking.

Today, you will be learning about and preparing food using a dry cooking method.

Dry Cooking: Grilling

Dry cooking methods include broiling, grilling, griddling, roasting, baking, sautéing and deep frying. Each method utilizes the circulation of hot air, or in the case of sautéing and deep frying, the use of fat to transfer heat in order to cook the food. Dry cooking results in the browning of food. This happens when the amino acids and sugars found in food turn brown when they are heated. This lesson will utilize an under fired broiler or a cast iron grill pan on a range top and the *grilling* cooking method. A natural gas **under fired broiler** or **charbroiler** in a commercial kitchen radiates heat upward from ceramic or volcanic briquettes, much like charcoal briquettes that would be used with an outdoor grill. These units might also have stainless steel radiants that are elevated and heated by the burners below.



Another way to grill in the kitchen is to use a cast iron grill pan, also called a riffle pan, to grill vegetables and meats on the range top. In this instance, the grill pan is placed over the gas burner and the burner is ignited to the highest temperature to get the grill pan very hot. There are ridges on the grill pan spaced evenly across the bottom of the pan to create the lined markings made when grilling on an outdoor grill.

When food is grilled, dry heat is applied to the surface of the food either above, below or to the side of the food. The food often sits on an open wire grid so that the heat can be directly applied to the food. Grilled food has lined markings where the wire grids touched it and browning has occurred. Because the food is directly applied to the heat, grilling times are often not very long for cooking food.

Foods like hamburgers, steaks, pork chops, ribs, chicken, salmon and halibut cook well on the grill. Most fruits and vegetables can easily be grilled and will add flavor and color to make a well-balanced meal. You will learn how to grill, as well as how to conduct other forms of dry heat, to cook various proteins, vegetables and starches throughout your lessons on dry heat cooking.

Instructor Demonstration

Watch the instructor demonstration on proper natural gas range safety and how to grill meat and vegetables on a range top using a grill pan, an under fired broiler, or on a gas grill on steel grates. Answer the following questions as you watch the demonstration.

- What safety tips did the instructor give during the demonstration?
- How did the instructor prepare the grill pan on the range top?
- What meat and vegetables did the instructor use and how did the instructor prepare them for grilling?
- What tips did the instructor give for grilling the meat and vegetables that were smaller or hard to place on the grill?
- How did the instructor determine how long to cook the meat and vegetables?
- What cooking tips did the instructor give during the demonstration?

Selecting and Preparing a Recipe

The following section can be completed at home if the preparing and cooking can be performed safely. Residential and commercial cooking equipment vary; while the information focuses on natural gas equipment, electric ranges and stoves may also be used to complete the cooking assignment.

Now you are going to make your own grilled meat and vegetable kebabs using grilled meat and vegetables of your choice. Once cooked, the kebabs can be eaten by themselves. Or, you can optionally serve them with seasoned rice, salad or French bread.

Your teacher will review your recipe and dish based on the criteria listed below. If you are learning remotely, your teacher will provide you with instructions on how to submit your recipe and images or video(s) of your completed dish.

Criteria	Excellent 3	Proficient 2	Emerging 1
Procedure	clearly followed given instructions and the example provided in the demonstration	somewhat followed given instructions and/or the example provided in the demonstration	did not follow given instructions and/or the example provided in the demonstration
Content (submitted photos, procedure, videos, etc.)	content and explanations were thorough and well detailed	included content and explanation but included few specific details	included little to no additional content or explanations and/or no specific details
Organization	organized when preparing and making their recipe	somewhat organized when preparing and/or making their recipe	not organized when preparing and/or making their recipe

Create Your Recipe

For this recipe you will need to choose a meat and a variety of vegetables from the list and at least one item from the oil category. You will need to choose a variety of seasonings from the fourth list as well to make your marinade for the meat. You can choose to add any additional seasonings and flavors based on your preference, dietary restrictions, allergies and available ingredients. Before starting to cook, it is important to have all of your ingredients, tools and equipment prepared ahead of time, what chefs call “mise en place” or “everything in its place.”

Select a meat or meat substitute to be grilled:

sirloin steak
beef tenderloin
strip steak
vegan seitan

Select a variety of vegetables to be grilled:

zucchini
yellow squash
onion (red, yellow or sweet)
mushrooms
red, green, yellow or orange bell peppers

Select an oil (¼ cup):

avocado oil
canola oil
olive oil
safflower oil
vegetable oil

Select optional marinade seasonings:

soy sauce – ¼ cup
tamari (gluten free) – ¼ cup
lemon juice – 1¼ tbsp
red wine vinegar – 1¼ tbsp
Worcestershire sauce – 2½ tbsp
honey – 1 tbsp
maple syrup – 1 tbsp
agave syrup – 1 tbsp
salt – a dash
pepper – a dash
dijon mustard – 2 tsp
red pepper flakes – 1 tsp
garlic powder – 1 tsp
fresh minced garlic – 2 cloves
onion powder – 1 tsp
cumin – 1 tsp

Safety first:

- Always keep a Class ABC fire extinguisher nearby.
- Practice knife safety when cutting the meat and vegetables and use knives that are properly sharpened.
- Have an oven mitt on hand to protect your hands from getting burned.
- Use metal tongs to flip the kebabs on the grill. Do not use your fingers to turn or remove the kebabs from the grill.
- Be aware of any plastic, paper or other flammable objects near the open flame. Move these items away from the range.
- Be sure that the grill sits firmly in place over the open flame.
- Do not lean over the grill or the grill pan.
- If you are using wooden skewers, soak them in water for at least 30 minutes prior to grilling.
- Never use wet or moist potholders, oven mitts or towels as they will conduct heat, burning your hands.

Equipment:

- Cutting board
- Sharp knife
- Grill pan, or riffle pan
- Metal tongs
- Metal or wooden skewers
- Gallon-size resealable plastic bags
- Mixing spoon
- Oven mitts
- Small bowls for mixing marinade
- 9x13 casserole dish or large plate to place kebabs on prior to cooking
- A clean 9x13 dish or large plate to place kebabs on after cooking
- Under fired broiler, gas range or cooktop, or gas grill
- Plate
- Utensils
- Napkins

Ingredients:

- Choice of meat or meat substitute cut in 1¼-inch pieces for grilling
- Choice of vegetables cut in 1¼-inch pieces for grilling
- Choice of oil and seasonings for the marinade
- Optional side dishes such as prepared seasoned rice, fresh green salad or French bread
- Optional choice of salad dressings or butter for side dish

Preparation:

1. Make the marinade. Use $\frac{1}{4}$ cup of the oil of your choice, $\frac{1}{4}$ cup of soy sauce or tamari and $1\frac{1}{2}$ tbsp of an acidic liquid such as lemon juice or red wine vinegar. For this recipe you can use both. If you are choosing to use only one, use 3 tbsp of the acidic liquid of your choice. You may also substitute other vinegars or citrus juices. Use the recommended amounts of the seasonings of your choice as listed in the ingredients section of this lesson. Note that Worcestershire sauce is not always vegetarian and often contains fish. Be sure to read the label if you are a vegetarian and choose one that does not contain fish. Set the marinade aside.
2. Prepare the meat by taking it out of the wrapping and cutting it into $1\frac{1}{4}$ -inch pieces.
3. Place the cut meat into a gallon-size resealable plastic bag and pour the marinade over the meat. Remove the air from the bag and tightly seal the bag.
4. Gently shake the bag to distribute the marinade over the meat. Place the bag in the refrigerator and let it rest for at least one hour. The meat can be left in the refrigerator overnight.

Procedure:

1. If you are carrying out the recipe in the classroom, the preparation steps have already been completed for you by the teacher. Gather your prepared items.
2. Take a moment to wash or rinse the vegetables. If using mushrooms, brush them gently with a paper towel to remove the dirt, or rinse them under cold water.
3. Prepare the vegetables. Cut the vegetables into $1\frac{1}{4}$ -inch pieces.
 - » Slice zucchini and yellow squash in large quarter-inch slices or half-moon shapes.
 - » Cut the onion into quarter pieces leaving the root side in place. This will help the onion stay together and not separate on the grill.
4. Once the vegetables are cut, put them into a resealable plastic bag and add a tablespoon of the oil of your choice and any seasonings you choose. Carefully seal the bag and gently shake it to evenly distribute the seasonings.
5. Before you grill your food, prepare the grill pan. Carefully place the grill pan on the range top burner. Turn the knob and ignite the flame. Use high heat to get the grill hot, then turn the heat down to medium-high. If you are using an under fired broiler, ignite the flames and preheat the broiler. If you are using a gas grill, make sure that the steel grates are clean. Use a grill brush to remove anything off of the grill. Turn the grill on.

6. While the grill is heating, construct your kebabs. Be sure you have soaked your wood skewers before grilling with them. Alternate pieces of meat and vegetables on each skewer, aiming to get four to five pieces of meat on each skewer. Place each kebab on a plate or 9x13 casserole dish.
7. Arrange the kebabs on the grill. Make sure you have turned the heat down. A too-hot grill will burn the outside of the meat and vegetable while leaving the inside raw. You will know when the veggies are done when they are pliable or wiggly and have dark marks on the outside. Use the following guidelines for grilling the kebabs.
 - » Meat: 8-10 minutes for a “medium” steak
 - » Peppers and onions: 8-10 minutes, flipping halfway through cooking time
 - » Squash and mushrooms: 7-8 minutes, flipping halfway through cooking time
 - » Softer fruits and vegetables: 4-6 minutes, flipping halfway through cooking time
8. When the kebabs are done, carefully remove them from the grill and put them on a clean plate. Cool them slightly before removing them from the skewers.
9. Serve immediately.

Tips:

- Avoid wrapping foil around hot vegetables. This will make them soggy.
- Try to cut the meat and vegetables about the same size so that they will cook uniformly.
- Cooking times will vary depending on the size of the meat and vegetables. Use the time guides, but add cooking time if necessary.
- Space the peppers slightly apart. This will help cook them faster and keep them from getting too crispy.
- Additional seasonings can be added after the veggies are cooked.

Activity

After you have completed cooking your kebabs, select one of the writing prompts below to write about.

1. Describe your experience grilling the kebabs. How does cooking the meat and vegetables on a gas grill or range top compare with other ways you have cooked meat and vegetables before? Do you think that marinating them beforehand made a difference in the end product? Would you do anything differently if you were to make this recipe again? How would you describe this experience to another person and what tips would you share with them?
2. Plan a party. Use the basic recipe for kebabs to create a themed recipe for an imaginary party you are hosting. What foods would you include in your grilling (making your kebabs)? How would this change the grill time or way you prepared your kebabs? For example, a "Home on the Range" party might include adding parboiled potatoes to the kebabs and would require an extra step of precooking them before grilling. These kebabs could be served with baked beans and grilled corn on the cob.

4	3	2	1
<p>The student response ...</p> <ul style="list-style-type: none">• fully responds to each part of the writing prompt with relevant, strong details• has logical organization• uses effective language and word choice for purpose and audience• contains no errors in usage or grammar	<p>The student response ...</p> <ul style="list-style-type: none">• addresses each part of the writing prompt with sufficient details• has sufficient organization• uses mostly effective language and word choice for purpose and audience• contains minor errors in usage or grammar that do not affect meaning	<p>The student response ...</p> <ul style="list-style-type: none">• addresses some of the writing prompt with weak details• attempts organization• uses some language and word choice for purpose and audience• contains minor errors in usage or grammar that slightly affect meaning	<p>The student response ...</p> <ul style="list-style-type: none">• does not address a large portion of the writing prompt• lacks organization• rarely uses appropriate language and word choice for purpose and audience• contains major errors in usage or grammar that greatly affect meaning

Final Assessment

1. Which statement BEST describes fossil fuels?
 - a. fuels that come from the absorption of light particles
 - b. fuels that are created by heating uranium atoms
 - c. fuels with high carbon content formed by natural processes
 - d. fuels with high hydrogen content created by capturing wind
2. What does it mean to “grill” food?
 - a. cook food with indirect heat on all sides of the food for long periods of time
 - b. cook food with direct heat above the food for very short periods of time
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 - d. cook food on an open rack with no moisture and direct heat for varied periods of time
3. What is one reason that using natural gas as a fuel source is more efficient than other fossil fuel sources?
 - a. It burns more cleanly.
 - b. It is a renewable source.
 - c. It generates more electricity when burned.
 - d. It is easy to transport over oceans
4. What appliance would you use to grill food in a commercial kitchen?
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5. Why is the steak put in the marinade before it is put on the grill?
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Introduction to Cooking with Gas—Advanced

Lesson 7: Grilling

Teacher Guide

(1 class session with some preparation done ahead of time)

Introduction

This lesson covers a basic understanding of natural gas and why it is more efficient than other fossil fuels in general and in the kitchen. Then, students will learn how natural gas is used either on an under fired grill, gas grill or a range top with a grill pan to grill and cook meat and vegetable kebabs. Keep in mind that students may have dietary preferences, restrictions or allergies that may need to be accommodated in order for them to complete the recipe. Note that students may have different types of appliances at home, such as an electric or induction range, which will not prevent them from completing the assignment. If the student is preparing food at home, ensure that appropriate adult supervision will be available.

This lesson could be completed in a classroom or at home. Suggestions and instructions will be given for both scenarios.

Opening Assessment Answer Key (3 minutes)

Use these questions to obtain a baseline for what your students know before beginning the lesson. The correct answers are highlighted.

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How Efficient is Natural Gas? (5 minutes)

Students will read about the efficiency of natural gas compared to other fossil fuels and how it is used in the kitchen. Generate discussion with the students using the following for guidance.

- Natural gas burns more cleanly than other fossil fuels. This means there are less harmful gases released and no ash or particulates are released as a byproduct.
- Natural gas is a fossil fuel, which means it is not renewable. However, there is new technology that can convert excess electricity created by solar cells and wind turbines to natural gas to be stored and used later.
- Natural gas has fewer leaks and has less waste during storage and transportation. This means that more product can be delivered to the customer.
- Because natural gas is easy to get and is fairly abundant in the United States, it costs less to use than other fuels like coal for energy.

Maintaining the Efficiency of Natural Gas Appliances (5 minutes)

Students will read about the benefits of using natural gas in the kitchen and learn how to clean and maintain natural gas appliances. The following questions could be used for a class discussion or given to students to complete individually.

- Why is it important to clean and maintain all natural gas appliances in the kitchen?
- Why might a person designing a kitchen opt to have appliances that use natural gas?
- What is a good way to check for gas leaks on the various units?
- Why might it be easier to cook with an appliance that uses natural gas than an electric appliance?
- What is one way to clean an under fired broiler?
- How can a natural gas appliance be useful in a power outage?

Cooking Methods (2 minutes)

Students will understand that there are three cooking methods that utilize natural gas: moist cooking, dry cooking and combination cooking.

Dry Cooking: Grilling (5 minutes)

Students will read about cooking with dry heat and the grilling technique. The following questions could be used for a class discussion or given to students to complete individually.

- What are the benefits to cooking with dry heat?
- What happens to food cooked with dry heat when the sugars and amino acids in the food are exposed to the heat?
- Why is grilling a good way to cook food when you don't have a lot of time?
- What foods are good for grilling?
- Which foods might be hard to grill?

Instructor Demonstration (10 minutes)

The demonstration can either be performed in class or recorded for remote use. If the demonstration is done in person, some preparation of the meat and vegetables will be necessary. The meat or meat substitute should be marinated for at least one hour.

If the students are preparing this recipe at home, they will need to start either the day before or at least two hours before grilling so that the meat has at least an hour to marinate in the refrigerator. Since there is limited time, consider having the meat and vegetables pre-cut and marinated ahead of time, but have some available to demonstrate to the students how they should be cut and how the marinade should be prepared.

The demonstration should include:

- how an under fired broiler and a gas range top with a grill pan work
- safety tips when using an under fired broiler or a grill pan
- knife techniques and safety when cutting meat and vegetables
- how to grill, including tips for how to adjust the temperature for perfectly grilled meats and vegetables
- benefits of using grilling as a cooking technique, especially when there is limited time for cooking
- how to assemble and cook meat and vegetable kebabs, noting how to check them for doneness
- safely removing the kebabs from the grill
- a reminder to the students that skewers are not swords and should not be used as weapons during this lesson
- finishing the kebabs with seasonings and incorporating other optional side dishes

Students will use the following questions as a guide to either a class discussion after the demonstration or note taking during the demonstration:

- What safety tips did the instructor give during the demonstration?
- How were the kebabs assembled and how many did the instructor put on the under fired broiler or grill pan?
- How high did the instructor have the flame?
- How did the instructor determine how long to cook the kebabs so that the meat and vegetables were fully cooked?
- What cooking tips did the instructor give during the demonstration?
- What was the importance of marinating the ingredients before grilling them?

Selecting and Preparing a Recipe (20 minutes)

If the students will be cooking in the classroom, ensure that the ingredients are available to the students ahead of time or have some meat and vegetables pre-prepared in the marinade for students to grill. Make sure that student allergies, dietary restrictions and preferences are taken into account. Also be sure to plan a few minutes at the end of class for cleanup. Have the students heat their grill pans and soak their wooden skewers (if applicable) while they are assembling their kebabs.

If the students will be cooking at home, be sure to provide the list of ingredients or the “mise en place” ahead of time to give the students time to marinate and assemble the ingredients. Take into consideration the time the recipe typically takes to cook and the ability for students to purchase their ingredients from the grocery store. If the students are preparing this meal at home, suggest to them that they cut and marinate the meat and vegetables the night before or in the morning so that they will be ready to grill right out of the refrigerator.

Students will use the instructor demonstration as a guide to cook their own kebabs. Students will select an assortment of meat, vegetables, a fat and marinade ingredients from the list in order to complete their recipe.

Students cooking at home can submit a description of the ingredients and procedure they used along with pictures of their completed dishes or a video of themselves cooking the recipe. Be sure to share instructions with your students on what to submit and how to share it with you.

Scoring Rubric:

Criteria	Excellent 3	Proficient 2	Emerging 1
Procedure	clearly followed given instructions and the example provided in the demonstration	somewhat followed given instructions and/or the example provided in the demonstration	did not follow given instructions and/or the example provided in the demonstration
Content (submitted photos, procedure, videos, etc.)	content and explanations were thorough and well detailed	included content and explanation but included few specific details	included little to no additional content or explanations and/or no specific details
Organization	organized when preparing and making their recipe	somewhat organized when preparing and/or making their recipe	not organized when preparing and/or making their recipe

Activity (10 minutes or as homework)

This activity is provided to be used either in the classroom during any down-time, or as homework. Students will use one of the writing prompts to complete the writing assignment.

1. Describe your experience grilling the kebabs. How does cooking the meat and vegetables on a gas grill or range top compare with other ways you have cooked meat and vegetables before? Do you think that marinating them beforehand made a difference in the end product? Would you do anything differently if you were to make this recipe again? How would you describe this experience to another person and what tips would you share with them?
2. Plan a party. Use the basic recipe for kebabs to create a themed recipe for an imaginary party you are hosting. What foods would you include in your grilling (making your kebabs)? How would this change the grill time or way you prepared your kebabs? For example, a "Home on the Range" party might include adding parboiled potatoes to the kebabs and would require an extra step of precooking them before grilling. These kebabs could be served with baked beans and grilled corn on the cob.

4	3	2	1
<p>The student response ...</p> <ul style="list-style-type: none">• completely addresses each part of the writing prompt with appropriate, strong details• is well organized and logical in the way it is put together• uses appropriate language and word choices• contains no errors in usage or grammar	<p>The student response ...</p> <ul style="list-style-type: none">• addresses each part of the writing prompt with appropriate and sufficient details• is somewhat organized• mostly uses appropriate and effective language• contains minor errors in usage or grammar that do not change the meaning of the passage	<p>The student response ...</p> <ul style="list-style-type: none">• addresses some of the writing prompt with a few, or weak details• is not organized well and arranged appropriately• somewhat uses appropriate language and word choices• contains minor errors in usage or grammar that slightly change the meaning	<p>The student response ...</p> <ul style="list-style-type: none">• does not address most of the writing prompt with few or no details• is not well organized• does not use appropriate language and word choices• contains many errors in usage or grammar that greatly change the meaning of the passage

Final Assessment: Answer Key (3 minutes or as homework)

Use these questions in conjunction with the discussion questions in each section to formatively assess student growth over the course of the lesson. Address any student misconceptions that remain at the end of the lesson. Consider having students compare their opening assessment with their final assessment to see how their understanding of cooking with gas improved over the course of the lesson.

1. Which statement BEST describes fossil fuels?
 - a. fuels that come from the absorption of light particles
 - b. fuels that are created by heating uranium atoms
 - c. fuels with high carbon content formed by natural processes
 - d. fuels with high hydrogen content created by capturing wind
2. What does it mean to “grill” food?
 - a. cook food with indirect heat on all sides of the food for long periods of time
 - b. cook food with direct heat above the food for very short periods of time
 - c. cook food on a flat surface at a constant temperature for varied periods of time
 - d. cook food on an open rack with no moisture and direct heat for varied periods of time
3. What is one reason that using natural gas as a fuel source is more efficient than other fossil fuel sources?
 - a. It burns more cleanly.
 - b. It is a renewable source.
 - c. It generates more electricity when burned.
 - d. It is easy to transport over oceans
4. What appliance would you use to grill food in a commercial kitchen?
 - a. plancha
 - b. under fired broiler
 - c. flat griddle
 - d. deck oven
5. Why is the steak put in the marinade before it is put on the grill?
 - a. to prevent the meat from sticking to the grill
 - b. to begin the cooking process before adding heat
 - c. to tenderize and add moisture to the meat
 - d. to remove moisture from the meat before adding heat

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