



TV411 WHAT'S COOKING?

Teacher's Guide: Introduction

TV411 What's Cooking? is a real cooking series, with a real chef, that blends basic science and math concepts with healthful recipes. The series consists of **6 videos** and **12 correlated web lessons**.

To use these free multimedia materials, you must have access to the internet and to computers in your classroom. The materials can be enjoyed with your class as a whole, or assigned to individual learners for independent study.

The **TV411 What's Cooking?** video segments and their running times are:

- 1) Salt (10:12)
- 2) Bacteria (9:29)
- 3) Carbohydrates (8:17)
- 4) Photosynthesis (7:42)
- 5) Heat (8:05)
- 6) Water (8:17)

Playing the Videos:

If you plan to watch one or more videos with the entire class, the following guides suggest warm-up questions that tap into learners' background knowledge of each topic; post-viewing discussion questions that reinforce the main ideas in the video; and general discussion questions. A glossary at the end of this document lists the science terms used in each segment.

When showing a video, you can play it all the way through, pause it whenever you wish, or replay portions of it if your audience needs more time to absorb the information.

Doing the Web Lessons:

Each video connects to two web lessons that give learners a deeper understanding of the science and math concepts embedded in the cooking demonstration. After watching the video, learners can do the web lessons during class time and/or on their own at home or at a library (i.e., wherever they have access to the internet). Learners can also download the recipes featured in the videos.

We Want to Know!

TV411.org is a free website designed specifically for pre-GED/GED adult learners and their teachers. How did you use TV411 What's Cooking? What worked? What didn't? What did your class learn from the materials?

Email us at tv411@edc.org.



SALT

Vocabulary (can be discussed before or after viewing):

- Sodium
- Chlorine, Chloride
- Element
- Compound
- Milligram
- Periodic table of elements

Teaching Tools:

- 1g packet of artificial sweetener,
- 1small paper clip
- 1 measuring teaspoon

I. Pre-viewing Questions

Ask:

Do you know anyone on a low-sodium diet?

What does “low-sodium” mean? [If anyone says “Salt,” ask if s/he knows the difference between salt and sodium].

What stories have learners heard about salt or sodium in the news?

SHOW SALT VIDEO (ten minutes)



SALT

II. Post-viewing Questions

Ask:

Can anyone explain the difference between salt and sodium?

[Sodium is a chemical element that in combination with the chemical element chlorine makes up sodium chloride, or table salt.]

Is table salt an element?

[No, it's a compound of two elements: sodium and chlorine.]

Can anyone give examples of other elements in the universe? [aluminum, silver, gold, carbon, hydrogen, oxygen, etc.]

What is the periodic table of elements?

[A list of all the known elements in the world. So far scientists have identified about 118 elements.]

What are considered the health risks of eating too much salt?

[High-blood pressure, stroke, etc.]

How can you tell how much sodium is in packaged food?

[The sodium content is listed on the food label as sodium, in milligrams, per single serving size.]

How much is a milligram?

[Grams are a measure of weight, like pounds or ounces. Milligrams are 1/1000 of a gram. *Hold up a packet of artificial sweetener and a small paper clip.* There are 1,000 milligrams of artificial sweetener in this 1-gram packet—about the same weight as the paper clip. A teaspoon of salt contains about 2,000mg of sodium.]

General Discussion:

What else did viewers learn from the video? Was it enjoyable? Ask for examples of what was clear/confusing. How did the recipe relate to the science topic? What else do learners want to know about this topic? Would they show it to their children?

Web Lessons: On tv411.org/Science, note the science and math web lessons that correlate to **SALT**. Use them as part of your lesson or encourage learners with outside access to the internet to visit tv411.org where they can review the videos, learn more about the topic through the related web lessons, or explore other videos and lessons.



BACTERIA

Vocabulary (can be discussed before or after viewing):

- Microbe
- Cell
- Single-cell organism
- Reproduce
- Room temperature

Teaching Tool:

- container of yogurt

I. Pre-viewing Questions:

Ask:

What do learners know about bacteria?

What news stories have they read or heard about bacteria?

Are bacteria mostly harmful?

In what ways?

Can anyone think of ways bacteria are helpful or useful to us?

SHOW BACTERIA VIDEO (ten minutes)



BACTERIA

II. Post-viewing Questions

Ask:

What did you learn about bacteria that you didn't know? In what ways are they useful to us? [They play a role in making yogurt, cheese, and other foods. Bacteria also aid in digestion.]

Are there bacteria in our bodies?

[Yes—trillions of them! There are more bacterial cells in our bodies than human cells.]

The video says that bacteria are single-cell organisms. What does that mean?

[A cell is the basic unit of life. Each individual bacterium is only made up of one cell. Our bodies are made up of trillions of cells.]

How do bacteria reproduce?

[They divide: one cell splits in two, then two becomes four, and so on.]

Do most bacteria grow faster at warmer or colder environments?

[warmer]

What happens to the bacteria on food if you leave it at room temperature?

[The bacteria keeps dividing and doubling in numbers. Pretty soon you'll have colonies of millions.]

What happens to the bacteria if the food is refrigerated?

[The cold temperature of the fridge slows down bacterial growth but doesn't stop it completely.]

General Discussion:

What else did viewers learn from the video? Was it enjoyable? Ask for examples of what was clear/confusing. How did the recipe relate to the science topic? What else do learners want to know about this topic? Would they show it to their children?

Web Lessons: On tv411.org/Science, note the science and math web lessons that correlate to **Bacteria**. Use them as part of your lesson or encourage learners with outside access to the internet to visit tv411.org where they can review the videos, learn more about the topic through the related web lessons, or explore other videos and lessons.



CARBOHYDRATES

Vocabulary (can be discussed before or after viewing):

- Carbohydrate (Carbon, Hydrogen, Oxygen)
- Molecule
- Glucose
- Blood sugar
- Fructose
- Sucrose
- Fiber

Teaching Tools:

- Cookie, apple, celery

I. Pre-viewing Questions:

Ask:

Do you know anyone on a low-carb diet?

What does “carb” mean?

What kinds of foods have carbohydrates in them?

Where do carbs come from?

What news stories about carbs have learners heard recently?

OR:

Does anyone know someone who has diabetes and must control his/her blood sugar?

What is blood sugar?

What kinds of foods should diabetics avoid?

SHOW CARBOHYDRATES VIDEO (eight minutes)



CARBOHYDRATES

II. Post-viewing Questions

Ask:

What exactly is a carbohydrate?

[A molecule made of carbon, hydrogen, and oxygen that is found in most foods, particularly vegetables, grains, and fruits. A cookie, an apple, and celery all contain carbs.]

Why do people think of carbohydrates as “sugars”?

[Sugar is a type of carbohydrate. Most carbs we eat break down into a simple sugar, glucose, in our bodies. Glucose is a type of sugar that is one of the ingredients of table sugar.]

Why is glucose called “blood sugar?” What does glucose do for us?

[Glucose is the most common type of carbohydrate. It is the “fuel” that we take in through the bloodstream after we digest food. We break down glucose for energy. Glucose is a carbohydrate that plants make through the process of photosynthesis, and which the plants use for their own “fuel.”]

What is a starch?

[Starches are made up of long chains of glucose molecules. Starchy foods include potatoes, rice, and bread. When we digest starches, our digestive system breaks them down into individual glucose molecules in order to absorb them.]

What is fiber?

[A large web of glucose molecules. It is an important nutrient in food – you can see it in the tough strands of the celery stalk. It helps keep our digestive systems healthy.]

What’s the difference between carbohydrates found in sweet snacks and carbohydrates found in fruits and vegetables?

[Sugary snacks and drinks have little or no fiber or vitamins and minerals like the fruits and vegetables do.]

General Discussion:

What else did viewers learn from the video? Was it enjoyable? Ask for examples of what was clear/confusing. How did the recipe relate to the science topic? What else do learners want to know about this topic? Would they show it to their children?

Web Lessons: On tv411.org/Science, note the science and math web lessons that correlate to **Carbohydrates**. Use them as part of your lesson or encourage learners with outside access to the internet to visit tv411.org where they can review the videos, learn more about the topic through the related web lessons, or explore other videos and lessons.



PHOTOSYNTHESIS

Vocabulary (can be discussed before or after viewing):

- Photosynthesis
- Glucose
- Phytoplankton
- Chlorophyll
- Carbon Dioxide (CO₂)
- Oxygen
- H₂O
- Food chain (or food web)

I. Pre-viewing Questions:

Ask:

How has ever grown tomatoes or vegetables or herbs or other kinds of plants?

What do these plants need to grow?

Does anyone know how “photosynthesis” plays a part in the growth of a plant?

SHOW PHOTOSYNTHESIS VIDEO (eight minutes)



PHOTOSYNTHESIS

II. Post-viewing Questions:

Ask:

How do plants make their own food so they can grow?

[Through photosynthesis.]

Who can describe how photosynthesis works?

[Energy from the sun, water — H_2O — from the soil, and carbon dioxide — CO_2 — from the air are processed in the chlorophyll of the plant. Chlorophyll is the pigment that makes plants green.]

What kind of food do the plants make for themselves?

[Glucose—a basic sugar, or carbohydrate.]

When we eat plants, or animals that have eaten plants, what happens to that glucose?

[It goes through our digestive system and into our bloodstream to be transported to all our cells. Our cells break down glucose for energy, just like plants do.]

What does photosynthesis have to do with the air we breathe?

[During photosynthesis, plants “breathe” in carbon dioxide (CO_2) and release (breathe out) oxygen (O_2) into the air.]

Why is it important to keep our planet “green”?

[Because we need plants for food and for a way to take carbon dioxide out of the air and produce oxygen.]

General Discussion:

What else did viewers learn from the video? Was it enjoyable? Ask for examples of what was clear/confusing. How did the recipe relate to the science topic? What else do learners want to know about this topic? Would they show it to their children?

Web Lessons: On tv411.org/Science, note the science and math web lessons that correlate to **Photosynthesis**. Use them as part of your lesson or encourage learners with outside access to the internet to visit tv411.org where they can review the videos, learn more about the topic through the related web lessons, or explore other videos and lessons.



HEAT

Vocabulary (can be discussed before or after viewing):

- Molecule
- Conduction
- Radiation
- Electromagnetic spectrum

I. Pre-viewing Questions:

Ask:

Who cooks with a microwave?

Who uses an electric or gas oven?

Can anyone explain how these different appliances cook food?

Have learners heard negative stories about microwaves?

What are their reactions to those stories?

SHOW HEAT VIDEO (eight minutes)



HEAT

II. Post-Viewing Questions

Ask:

What happens when we cook food?

[Technically speaking, when we heat the molecules in food, the heat changes the taste and texture of the food.]

What is conduction?

[Heat transfer through solid objects. For example, in the video, we see the heat of the burner heating the metal of the pot.]

How did the potato Jamika cooked in the oven get hot through conduction?

[The heat in the oven gets the molecules in the potato moving faster and faster, layer by layer. So heat is a measure of how fast the molecules are moving: a fast molecule is a hot molecule.]

How did the microwave heat the potato?

[Microwaves are a form of electromagnetic waves, or radiation. They directly deposit energy into the food. The air in the microwave doesn't get hot like it does in the regular oven.]

What do you think of when you hear the word "radiation?"

[It doesn't just mean scary things, like nuclear melt-downs. Radiation is a form of energy that comes in waves of different lengths. Radio waves bring us music. Microwaves cook our food. Even visible light is a form of radiation.]

What does the electromagnetic spectrum show us?

[Different types of radiation, or electromagnetic waves, organized by wavelength from large radio waves to tiny waves called gamma rays.]

General Discussion:

What else did viewers learn from the video? Was it enjoyable? Ask for examples of what was clear/confusing. How did the recipe relate to the science topic? What else do learners want to know about this topic? Would they show it to their children?

Web Lessons: On tv411.org/Science, note the science and math web lessons that correlate to **Heat**. Use them as part of your lesson or encourage learners with outside access to the internet to visit tv411.org where they can review the videos, learn more about the topic through the related web lessons, or explore other videos and lessons.



WATER

Vocabulary (can be discussed before or after viewing):

- H_2O
- Hydrogen
- Oxygen
- Molecule
- Solid
- Liquid
- Gas
- 3 States of matter

I. Pre-viewing Questions:

Ask:

Who has heard the term “ H_2O ”?

What does that mean? [Water].

What does the H and the O stand for?

SHOW WATER VIDEO (eight minutes)



WATER

II. Post-viewing Questions

Ask:

What is H₂O exactly?

[A molecule of water made of two parts hydrogen and 1 part oxygen. Hydrogen and oxygen are important elements on Earth. If you showed the SALT video, people may remember the explanation of elements.]

Scientists talk about the three states of matter: solid, liquid, and gas. How did Chef Jamika use all three forms of water in her cooking?

[Solid—frozen strawberry ice cubes; liquid—she boiled the pasta in liquid water; and she steamed the artichokes. Water in the form of an invisible gas is present whenever you see steam.]

What happens to the molecules in water when you boil it?

[The molecules start to move around faster and faster, bumping into each other. A fast-moving molecule is a hot molecule.]

What happens to the molecules in the water when you freeze it?

[They move slower and slower and get locked into a crystal pattern. They cannot slide around freely like they in the liquid state.]

Can we see water as a gas?

[No. Where there is steam, there is water in a gas form, but you can't see it. The white puff we see are actually tiny droplets of liquid water.]

[Note that many people use gas to heat their homes and cook on gas stoves. This type of gas, such as propane or butane, is different from water vapor. Because natural gas is invisible and has no odor, a smell has been added to it so that leaks in the gas pipe can be detected.]

Almost everything in the universe comes in the form of a solid, a liquid, or a gas. Can you name some examples of each? [Solid: a table, a book, a hat, an umbrella...etc. Liquid: oil, milk, blood, water droplets in the air that you can see as a white puff. Gas: oxygen, helium, carbon dioxide, carbon monoxide, ozone.]

General Discussion:

What else did viewers learn from the video? Was it enjoyable? Ask for examples of what was clear/confusing. How did the recipe relate to the science topic? What else do learners want to know about this topic? Would they show it to their children?

Web Lessons: On tv411.org/Science, note the science and math web lessons that correlate to **Water**. Use them as part of your lesson or encourage learners with outside access to the internet to visit tv411.org where they can review the videos, learn more about the topic through the related web lessons, or explore other videos and lessons.



GLOSSARY FOR TV411 WHAT'S COOKING?

SALT

Element – a substance that cannot be broken down into simpler substances through chemical processes

Compound – a substance made up of two or more different elements

Sodium – a soft, grey, metallic element that is essential for our bodies

Chlorine – a gaseous element, often used to disinfect water

Sodium Chloride – table salt, a compound of sodium and chlorine

Milligram – a measure of weight that equals 1/1000 of a gram

Periodic table of elements – a chart listing all the elements known at this time and grouped according to their characteristics

BACTERIA

Microbe – a microorganism, such as a bacterium (plural: bacteria)

Cell – a basic unit of life

Single-cell organism – a living creature consisting of only one cell, such as a bacterium. Animals and plants are multi-cellular organisms.

Reproduce – to breed, create offspring

Room Temperature – a common indoor temperature, somewhere around 73 degrees Fahrenheit (23 degrees Celsius)

CARBOHYDRATES

Molecule – a group of atoms bonded together, such as 2 hydrogen atoms and 1 oxygen atom that bond to make a water molecule (H₂O)

Carbon – an abundant element on Earth that occurs in all known forms of life

Hydrogen – a highly flammable gas, the lightest and most abundant element in the universe

Oxygen – a colorless, odorless, gaseous element that makes up about 21 percent of the Earth's atmosphere and is an important part of the air we breathe

Carbohydrate – a compound of carbon, hydrogen, and oxygen in the form of sugars, starches, and fiber, found in most foods

Glucose (Blood Sugar) – a simple carbohydrate (sugar) that is the product of photosynthesis and that gives our bodies energy

Fructose – a simple carbohydrate (sugar) found in fruits, some vegetables, honey, and high fructose corn syrup

Sucrose – table sugar, a compound of glucose and fructose

Starch – a type of carbohydrate made up of a long chain of glucose molecules and found in such foods as potatoes, rice, and bread

Fiber – a carbohydrate found in most plant-based foods that plays a role in digestion and that helps keep our bodies regular



PHOTOSYNTHESIS

Chlorophyll – the green pigment in plants that absorbs sunlight and plays a key role in photosynthesis

Hydrogen – a highly flammable gas, the lightest and most abundant element in the universe

Oxygen – a colorless, odorless, gaseous element that makes up about 21 percent of the Earth's atmosphere

Carbon Dioxide – (CO_2), a gas in the atmosphere that is produced when carbon-based fuel is burned and when animals and humans exhale

H_2O – the chemical formula for water: 2 hydrogen atoms bonded to 1 oxygen atom

Molecule – a group of atoms bonded together, such as 2 hydrogen and 1 oxygen atoms that bond to make H_2O

Glucose – a simple carbohydrate (sugar) that is the product of photosynthesis and that gives plants and our bodies energy

Food web – a group of organisms connected by their feeding habits. A food web begins with a producer (such as a plant which produces its own food, glucose) and ends with different types of consumers (organisms that can't produce their own food)

Phytoplankton – tiny organisms that live in water and produce glucose through photosynthesis

HEAT

Molecule – a group of atoms bonded together, such as 2 hydrogen and 1 oxygen atoms that bond to make H_2O

Conduction – the transfer of heat through a solid substance

Radiation – energy in the form of electromagnetic waves

Electromagnetic spectrum – a chart that shows the range of electromagnetic energy in the universe, from tiny gamma rays to giant radio waves

WATER

H_2O – the chemical formula for water: two hydrogen atoms bonded to 1 oxygen atom

Hydrogen – a highly flammable gas, the lightest and most abundant element in the universe

Oxygen – a colorless, odorless, gaseous element that makes up about 21 percent of the Earth's atmosphere and is an important part of the air we breathe

Molecule – a group of atoms bonded together, such as 2 hydrogen and 1 oxygen atoms that bond to make H_2O

3 states of matter – Almost everything on earth is made up of matter in the form of solids (such as salt), liquids (such as water), and gasses (such as oxygen).