

## Lesson 2: Potatoes and Potato Products

### Instructor Notes—

*Before beginning “Lesson 2: Potatoes and Potato Products,” the instructor should review the goal, objectives, instructor background information.*

**Goal:** Participants will learn about the different types of potatoes and potato products.

**Objectives:** After completing this lesson, participants will be able to:

- 1) Identify the four vegetable color groups of potatoes,
- 2) Identify potato color groups used in three recipes,
- 3) Identify three types of processed potato,
- 4) Use the ingredient list in the Nutrition Facts Label to identify processed potato ingredients in the ingredient list of three products.

### Instructor Background Information

**Lesson Content:** The three main components of the lesson include—

- 1) Potato color groups,
- 2) The eight categories of potato products,
- 3) The three main types of processed potatoes: frozen, chips, and dehydrated.

**Approximate Time to Teach the Lesson:** 45-50 minutes

### **Key Concepts:**

- **Eight Categories of Potato Products.** The United States Department of Agriculture (USDA) and US Department of Commerce collect information on the different potato products we eat. The most recent information (2012 data) revealed that the majority of potatoes that we consume are frozen fries (34%), followed by fresh (26%), potato chips and shoestrings (15%), dehydrated (11%), seed (6%), other frozen products (4%), potato starch and flour (2%), and canned (1%).
- **Potato Characteristics.** Potatoes differ in color, size, shape and weight. Fruits and vegetables fall into one of five color groups: (1) red, (2) green, (3) yellow/orange, (4) blue/purple, and (5) white/tan/brown. There are many different types of potatoes that fall into four of the five color groups: red, yellow/orange, blue/purple, and white/tan/brown. Each of the color groups contains substances called phytochemicals (pronounced *fight-o-chem-i-cals*) that help keep people healthy. For example, some of them are known to keep your heart strong.

- **Fruit and Vegetable Color Groups.** For more information on the color groups, go to the Fruit and Veggies, More Matters website:  
<http://www.fruitsandveggiesmorematters.org/fruit-and-veggie-color-list>
- **How a Potato Can Be Used to Charge a Calculator.** The materials needed for this experiment include: two potatoes, a marker, two pieces of heavy copper wire, two galvanized nails, three alligator clips with wires, and a low-voltage battery operated calculator.
- The Scientific Concepts of How the Potato Charges a Calculator.
  - Each potato works as a "galvanic cell", releasing electrical energy through chemical reactions. Call one potato A (or 1) and the other potato B (or 2).
  - The bulk of the potato serves as a case for the cell, holding everything in place. The potato juice serves as the "electrolyte," in which charged atoms and molecules called "ions" dissolve and can flow over time. The dilute phosphoric acid in it also provides hydrogen ions for the reaction.
  - Some atoms (or molecules) strongly attract extra electrons and become negatively charged ions, called anions (*an-ions*); others are easily stripped of some electrons and become positively charged "cations" (*cat-ions*). Each element attracts electrons with different force, due to the differing charge of protons with which their nucleus attracts electrons and the manner in which the marginal "valence" electrons arrange themselves around the nucleus and other electrons. The potato juice has dilute phosphoric acid, some of which dissolves dissociated into hydrogen cations (basically) and phosphate anions.
  - For more information please go to the following WikiHow website:  
<http://www.wikihow.com/Make-a-Potato-Clock>. They charged a clock, but the concepts for charging a clock or calculator are the same.
  - Here is a link to the video clip that uses potatoes to charge a calculator:  
[www.howcast.com/videos/271435-how-to-make-a-potato-powered-calculator](http://www.howcast.com/videos/271435-how-to-make-a-potato-powered-calculator)
- **Processed Potato Products:** the three most commonly consumed processed potatoes are frozen potatoes, potato chips and shoestrings, and dehydrated potatoes.

Evaluation Tools: During the presentation students will complete:

- Survey questions

Students will complete various surveys throughout the lesson.

- Activities:

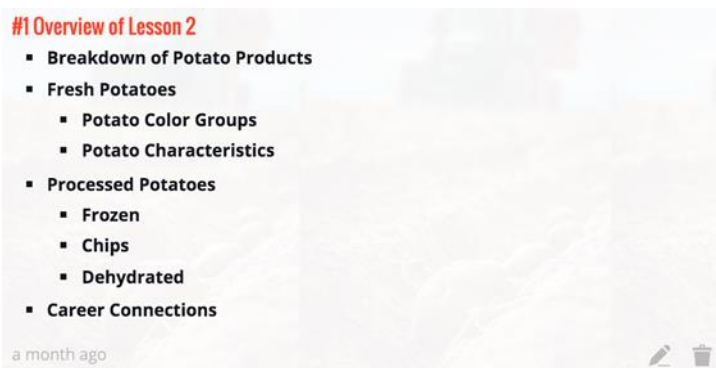
- 1) Students will complete a potato recipe activity and identify the potato color groups used in three recipes.
- 2) Students will determine how potatoes can be used as a ‘battery’ in a calculator.
- 3) Students will identify dehydrated potato products from three food labels’ list of ingredients.

### Lesson 2: How to Use *The e-Potato Program* Instructions

1. Type in <http://www.uidaho.edu/epotato> and click on the link;
2. Click on Lesson 2: *Potatoes and Potato Products*;
3. This presentation uses various software programs- Padlet, Prezi, and EdPuzzle.
4. Please note that *the Instructor Lecture notes are linked*.

## LECTURE NOTES

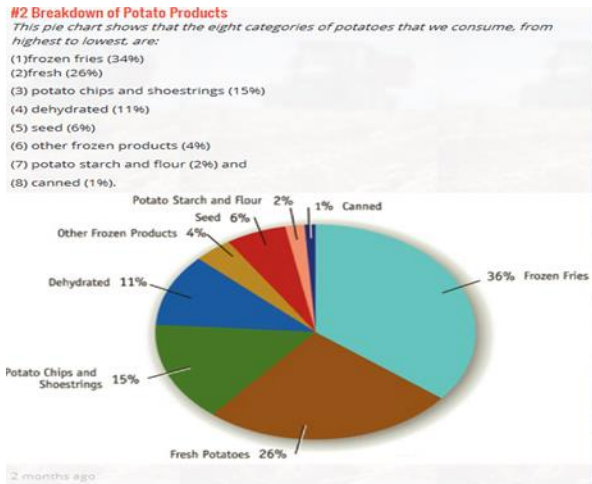
Instructions: Have all students go to the *e-Potato* webpage: <http://www.uidaho.edu/epotato> and click on Lesson 2: *Potatoes and Potato Products*



**#1: Overview of Lesson 2.** *Here is what we will be covering for these four topics:*

- *Breakdown of Potato Products: You will learn that there are eight categories of potato products and how much we consume of these products.*

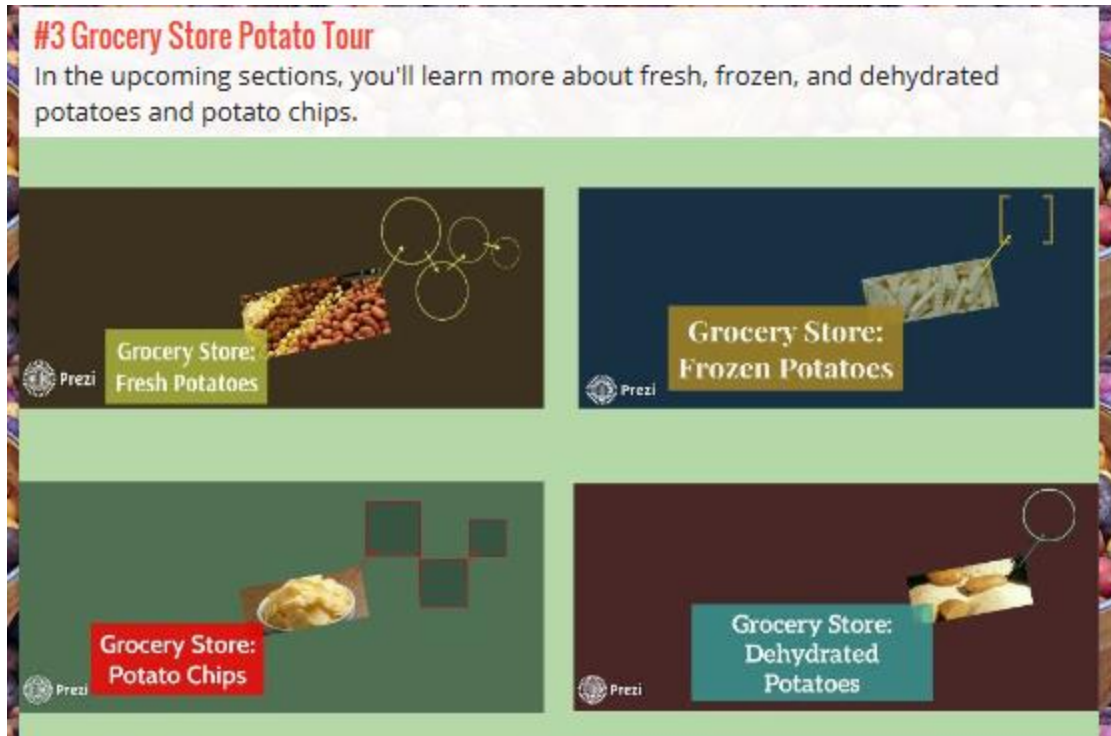
- *Fresh Potatoes: You will learn that potatoes come in a variety of colors and why that is important. You will complete a potato recipe activity where you will identify the potato color groups used in three potato recipes.*
- *Processed Products: You will learn about the three most commonly consumed processed potatoes - frozen, chips, and dehydrated.*
- *Career Connections: After learning about different types of potato products, you will be introduced to the Food Science program possible job opportunities.*



## #2: Breakdown of Potato Products

- *The United States Department of Agriculture (USDA) and US Department of Commerce collect information on the types of potato products we eat and have put them into eight different categories.*
- *This pie chart shows that the eight categories of potatoes that we consume, from highest to lowest, are:*
  - 1) *Frozen Fries (34%)*
  - 2) *Fresh (26%)*
  - 3) *Potato Chips and Shoestrings (15%)*
  - 4) *Dehydrated (11%)*
  - 5) *Seed (6%)*
  - 6) *Other Frozen Products (4%)*
  - 7) *Potato Starch and Flour (2%)*
  - 8) *Canned (1%)*

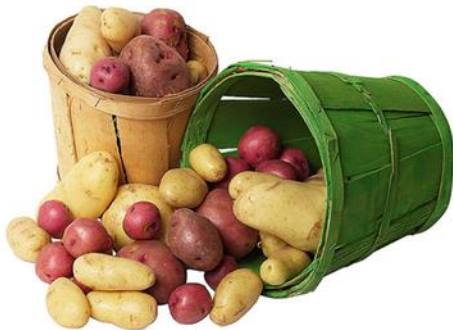
## #3: Grocery Store Potato Tour



*In the upcoming sections, you'll go through the grocery store and learn more about fresh potatoes, frozen potatoes, potato chips, and dehydrated potatoes.*

#### #4 Fresh Potatoes

All different sizes, colors, and shapes



#### #4 Fresh Potatoes

*Let's start by talking about fresh potatoes. As this picture shows, potatoes come in all different sizes, colors, and shapes.*

*What are the different colors of potatoes you see here?*

### #5 Fruit & Vegetable Color Groups

Eating fruits and vegetables from the five color groups helps you stay healthy.

Eat a rainbow of fruits and veggies: red, yellow/orange, green, white/tan/brown, blue/purple.

What color groups are potatoes in?



### #5 Fruit & Vegetable Color Groups

*As this picture shows, fruits and vegetables come in all different colors and they fall into five color groups. These color groups are called: red, yellow/orange, green, white/tan/brown, and blue/purple. Eating fruits and vegetables from the five color groups helps you stay healthy.*

*That is why we tell you to eat a rainbow of fruits and veggies: red, yellow/orange, green, white/tan/brown, and blue/purple.*

*Instructor will lead this class activity: In the fruit and vegetable color picture, ask students to identify fruits and vegetables in the five color groups.*

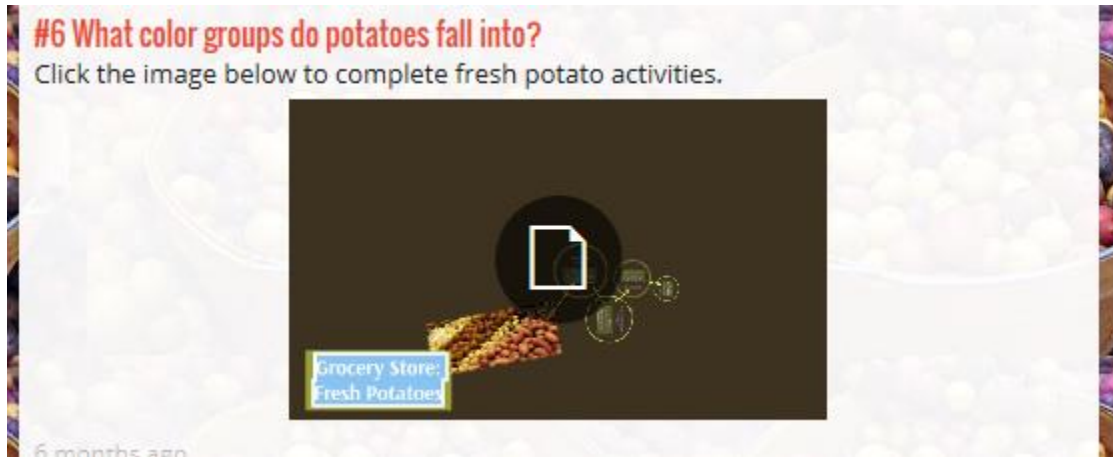
### Answers

- **Red:** strawberries, tomatoes, red apples, watermelon, raspberries, pomegranates
- **Yellow/Orange:** corn, lemon, pear, yellow pepper, orange pepper, peach, carrot
- **Green:** Broccoli, green grapes, kiwi, green apple, kale
- **White/Tan/Brown:** Bosc pear, cauliflower, mushrooms, potato, banana (fruits and vegetables are put in the various color group based on the color of what we eat. That is why even though the banana peel is yellow, the color of the banana that we eat is white and that is why bananas are in the white group.
- **Blue/Purple:** blueberries, eggplant, blackberries, black plums, red cabbage

*In which color groups are these potatoes?*

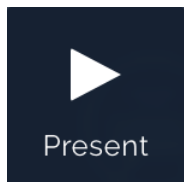
## #6 In which color groups are these potatoes?

Instruction: Click the image below to complete the fresh potato activities.



Instructions: Click on the image above to enter the Prezi Virtual Grocery Store.

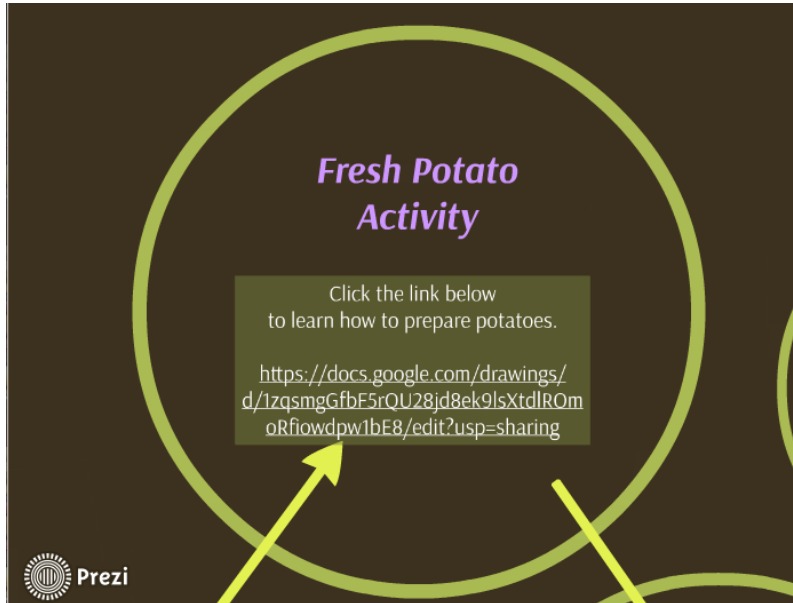
Then click on “Present” to start the Prezi (see below)



Click on the right arrow (see below) to advance through the four circles of activities.






**Circle #1 Activity:** Click on the link (see below) to learn how to prepare potatoes.



This will bring you to a screen that shows three potato recipes.

There are many different ways to prepare potatoes: baked, fried, and mashed are a few examples. Here are three unique ways to prepare potatoes.

	<p><a href="#">Click here</a> to read the recipe for the picture below.</p>	
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There are many different ways to prepare potatoes: baked, fried, and mashed are three examples. Below are three unique ways to prepare potatoes.

**Instructions:** There are three potato recipes shown on this page: (1) a multicolored potato salad (on the left), (2) a caterpillar potato recipe in the middle, and (3) a crash potato recipe on the right. For each recipe, have students click on the link to read the recipe and answer a question.

**Recipe #1 (far left) Answer:** The answer to the potato salad recipe is—there are two potato color groups in this recipe, red and purple.



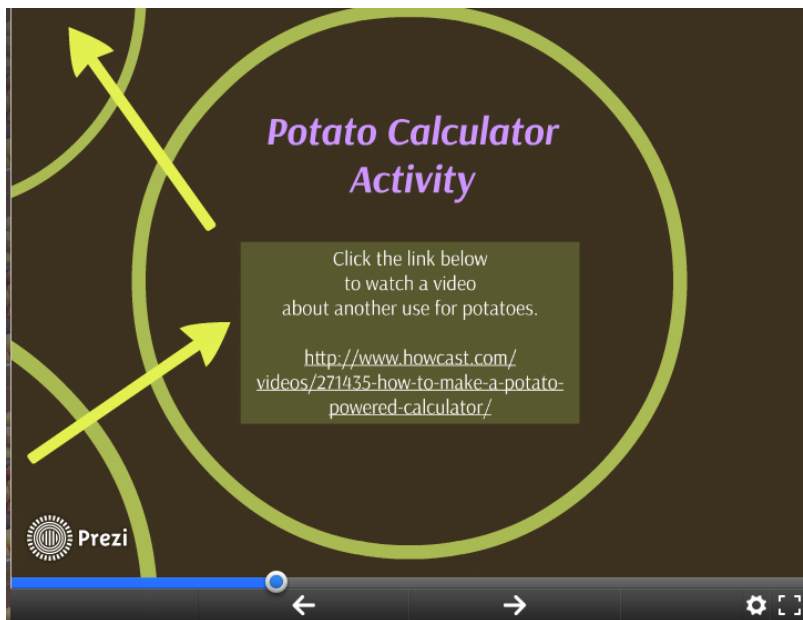
**Recipe #2 (middle) Answer:** The second recipe is a caterpillar potato recipe. The potato color group that is in the caterpillar recipe is white.

**Recipe #3 (far right) Answer:** The third recipe is a crash potato recipe. The potato color group that is in the crash potato recipe is yellow.

*Students will learn how to make the caterpillar and crash potato recipes in lesson 4.*

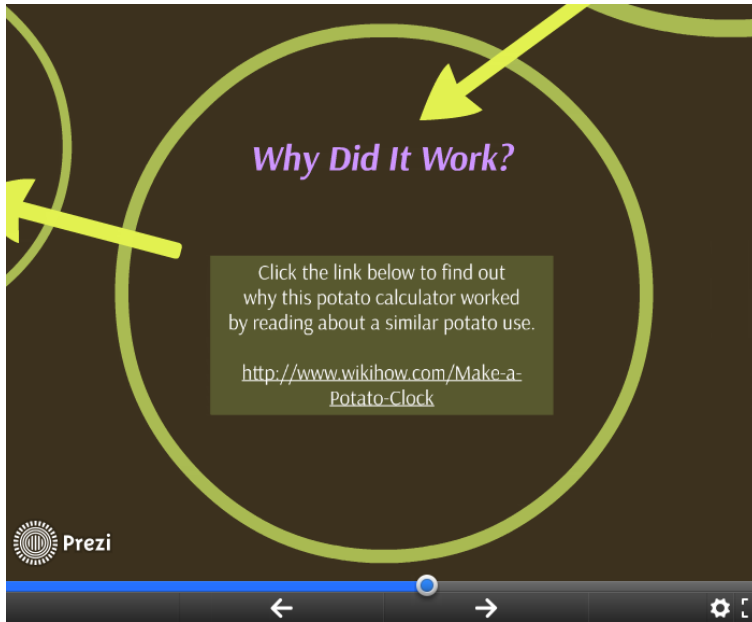
## **Circle #2: Potato Calculator Activity**

Have students click on the link to watch a video clip about another use for potatoes.

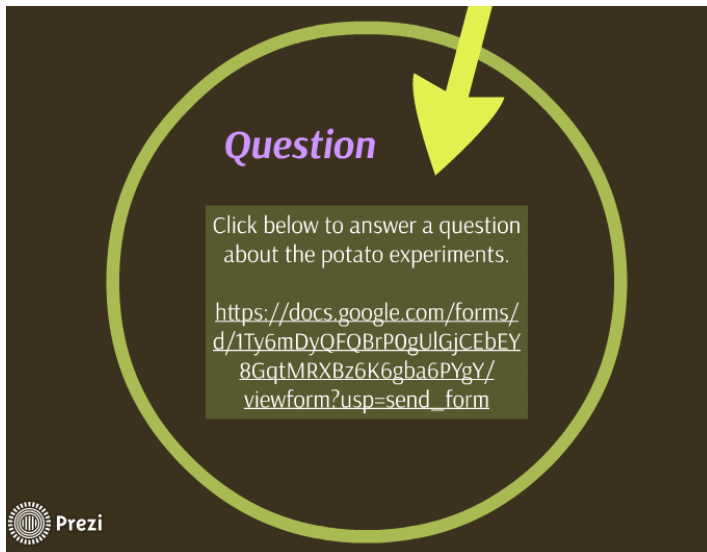


*When they click on this, they will view a video clip that shows how to use a potato to charge a calculator: <http://www.howcast.com/videos/271435-how-to-make-a-potato-powered-calculator/>.*

**Circle #3: Why did it work:** When students click on *Why did it work?* they will be directed to a page that explains the role potatoes play in charging a clock or a calculator. Have students read through this information so they can answer the video question.



#### Circle #4: Video Question



**Instructions:** *The Potato Calculator Video question is an open-ended question that asks students, what part does the potato play in making these experiments work?*

**Instructor:** Refer to the background information.

**Instructions:** *After completing the video question, students will return to the main page to learn about frozen potatoes. They can do this by clicking the back arrow in the upper left hand corner.*

### #7 Frozen Potatoes

Frozen potato products range from whole frozen baked potatoes to frozen fries to dehydrated frozen diced potatoes.



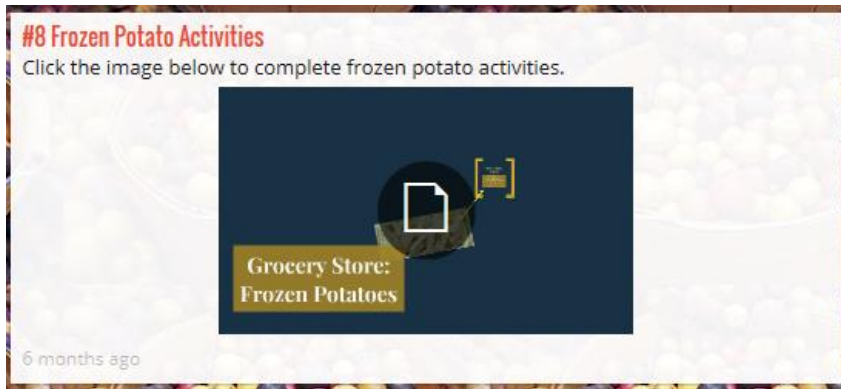
### #7 Frozen Potatoes

*Frozen potato products range from whole, frozen, baked potatoes to frozen fries to dehydrated, frozen, diced potatoes.*

### #8 Frozen Potato Activities

Instructions: Click the image below to complete the frozen potato activities.

*Instructor:* Clicking on the image will take the student to the virtual grocery store where they will complete frozen potato activities.



Instructions: Click on the image above to enter the Grocery Store.

*Instructor:* There is one activity in the frozen potato section of the grocery store. Students will watch a video clip on how frozen French fries are made and answer questions.



Instructor: *As the students watch the video clip, it will stop where the green questions are located to ask them several questions.*

**Answers to Questions in the video clip.** When the students submit their answers to the questions in the video clip, an arrow will show up next to the correct answer.

**Question 1)** What kind of potatoes are used to make French fries?

Answer = Russet

**Question 2)** Why are the potatoes sorted by size?

Answer = because they are used in a variety of products.

**Which of the following statements is false?**

**Question 3)** The potatoes are washed and cut by hand. True or False

Answer = False

**Question 4)** What is blanching?

**Answer** = All of the answers are correct:

When food is put into boiling water, followed by cold water.

It stops enzyme activity and removes excess sugar.

It helps ensure that all the French fries are the same color.

**Back to the Main page**

### #9 Potato Chips

Approximately 15% of the potatoes that we eat are potato chips and shoestring (very thinly sliced and fried) potatoes.

Potato chips are more than 150 years old. The potato chip was invented in 1853.

Potato chips have been America's #1 snack food for more than 50 years; 86% of Americans eat potato chips.

On average, Americans consume about 19 pounds of potato chips per year.



### #9 Potato Chips

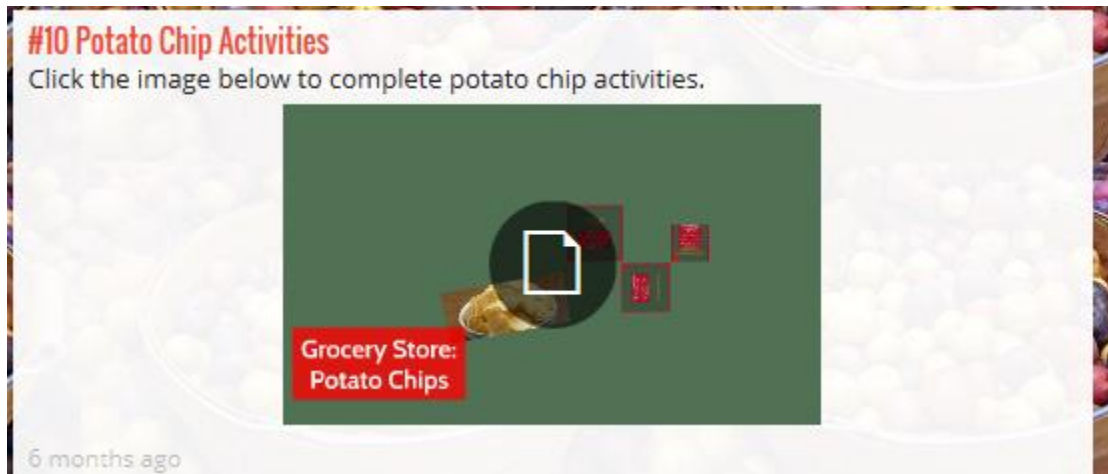
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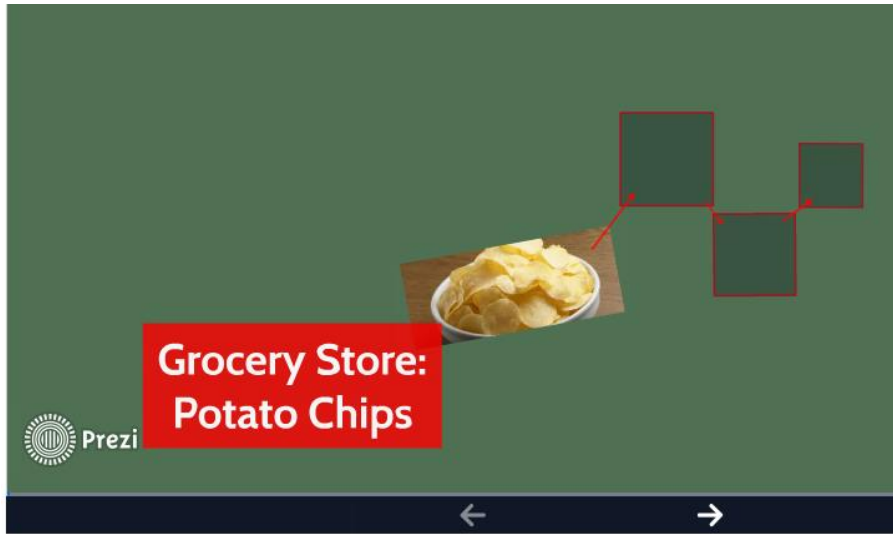
*On average, we consume about 19 pounds of potato chips a year.*

*They are eaten world-wide.*



### #10 Potato Chip Activities

Instructions: Click on the image above to enter the Potato Chip section of the Prezi Grocery Store. There are three squares (see below) in the Potato Chip section. There are three links in the Potato Chip section. Click on each of these right arrows to complete the activities.



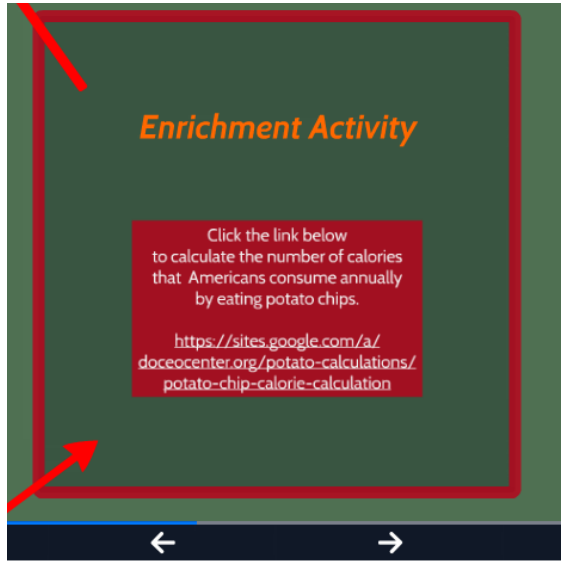
**Square #1:** Potato Chip Activity



Instructions: Click on the link and complete the potato chip math calculation.

**Answer:** 1 bag of potato chips/ounce x 16 ounces/pound x 19 pounds = 304 one-ounce bags of potato chips. Tell students to remember that number (304) because they will need it for the enrichment activity.

## Square #2: Enrichment Activity



**Instructions:** Click on the link and have students calculate the number of calories that Americans consume annually by eating potato chips.

**Answer:**  $304 \text{ bags} / 160 \text{ calories/bag} = 48,640 \text{ calories}$ . Compare that amount to how many calories they need for a day (approximately 1500-1600 calories/day).

## Square #3: Popular Potato Chip Flavors around the World



*Flavorings were added to the potato chip in the 1950s.*

*Today some of the most popular potato chip flavors around the world are:*

- *In the USA: Sour Cream, Onion, and Barbecue.*
- *In Germany the most popular flavor is Paprika.*
- *Indian chips are often exotic spices used in curries, such as Masala, Coriander, and Red Chili.*
- *In Indonesia chips are made from Cassava.*
- *In Greece, Oregano is the most popular flavor.*
- *Japanese chip-eaters enjoy Seaweed, Wasabi, and Soy Sauce & Butter Chips!*

**Instructions:** Have students click on the link and complete the *Which Potato Chips Would You Eat?* survey and discuss the results.

**Instructions:** Have students go back to the Main page.

#### #11 Potato Chip Collection

Click below to watch this amusing video about a woman who collects potato chips.



#### #11 Potato Chip Collection

*Click to watch this amusing video about a woman who collects potato chips.*

#### #12 What are dehydrated potatoes?

Dehydrated potatoes are potatoes with the water removed.

Types of dehydrated potatoes include flakes, granules, flour, pieces, slices, dices, and shreds.



#### #12 What are dehydrated potatoes?

*They are potatoes from which the water has been removed.*



*Dehydrated potatoes can take many different forms. They can be:*

- *Flakes*
- *Granules*
- *Flour*
- *Pieces*
- *Slices*
- *Dices*
- *Shreds*

### **#13 Dehydrated potato products**

Approximately 11% of the potatoes that we eat are dehydrated potato products.

This is the last group of potato products that we will discuss. You will learn:  
What are they?

Examples of dehydrated potato products in the supermarket

- Baked goods*
- Snack items*
- Prepared meals*

Where to find the dehydrated potato products in the Nutrition Facts food label as part of an activity.

### **#13 Dehydrated Potato Products**

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- *What are they?*
- *Examples of dehydrated potato products in the supermarket*
  - *Baked goods*
  - *Snack items*
  - *Prepared meals*
- *Where to find the dehydrated potato products in the Nutrition Facts food label as part of an activity.*

### **#14 Dehydrated Potatoes in Baked Goods**

You may be surprised to learn that dehydrated potatoes are found in bread, rolls, buns, bagels, and donuts.



#### **#14 Dehydrated Potatoes in Baked Goods**

*You may be surprised to learn that dehydrated potatoes are added to all of these baked goods that include bread, rolls, buns, bagels, and donuts.*

#### **#15 Dehydrated potatoes in Snack items**

Dehydrated potatoes are added to many baked potato chip snack items.



#### **#15 Dehydrated Potatoes in Snack Items**

*Dehydrated potatoes are added to many baked potato chip snack items.*

#### **#16 Dehydrated potatoes in Prepared Meals**

Dehydrated potatoes are added to many prepared meals. This is one example:



#### **#16 Dehydrated Potatoes in Prepared Meals**

*Dehydrated potatoes are added to many prepared meals. The items shown in this picture are used to help us prepare a meal. They include Hamburger or Chicken Helper, Banquet Homestyle Bakes, and Betty Crocker Complete Menu package. This is one example.*

## #17 Dehydrated potato activities



Instructions: Click on the image above to enter the Prezi Grocery Store and learn about Dehydrated Potatoes. There is one dehydrated potato activity in the dehydrated potatoes.

### Circle #1: Dehydrated Potato Activity



Instructions: Click on the link to complete the activity

*Complete the Identifying Dehydrated Potato Ingredients Activities survey that looks at three products.*

#### **(1) King's Hawaiian Bread**

*Look at the ingredient list of the King's Hawaiian Bread and find the name of the dehydrated potato product that has been added.*

**Answer:** It is potato flour.

#### **(2) Pringles Potato Chips**

*Look at the ingredient list, find the name of the dehydrated potato product.*

**Answer:** It is the first item in the ingredient list, dried potatoes.

### (3) Hamburger Helper: Potatoes Stroganoff

*Dehydrated potatoes are added to packaged meals, so all you have to do to make this meal, is add hamburger to the contents of this package.*

*Where is the dehydrated potato in the ingredient list?*

**Answer:** It is the first item, *Potatoes*. Notice that there is an asterisk—that tells us that the potato in this box is dried. (NOTE: There are some other dried ingredients in this package, i.e. Ricotta cheese and Blue Cheese.)

## Back to the Main Page

### #18 Click the link below to take a quiz on potato products



**Answer:** The correct answer is Frozen French Fries.



### #19 Career Connection

*Want to develop a new potato food product? Think about a career in Food Science.*

*Click on the image to explore careers in Food Science.*

- *Learn: What is Food Science?*
- *Discover a wide range of careers.*
- *Tour the School of Food Science.*

**#20 Summary & Conclusions**  
Teacher: CLICK THE LINK BELOW TO START A KAHOOT CHALLENGE ON LESSON 2!  
<https://play.kahoot.it/#/k/16e89553-ca0b-498d-9ecb-850a2e93e833>  
Students: CLICK THE LINK BELOW TO PARTICIPATE IN THE KAHOOT CHALLENGE!  
<https://kahoot.it/#/>

- Potatoes fall into four color groups: red, white, yellow, and blue/purple
- Potatoes are eaten in various forms, i.e. as fresh, frozen, and dehydrated

9 months ago

## **#20 Summary and Conclusions**

Instructions for Teacher and Students: Take the Kahoot Challenge on Lesson 2!

*Potatoes fall into four color groups: red, white, yellow, and blue/purple and come in various sizes and shapes.*

*Potatoes are eaten in various forms, i.e., as fresh, frozen, and dehydrated.*