



Lesson Plan

Unit 1: Lesson 1 of 2

Introduction to Food Science

Created: 08/2022 by the National FFA Organization

This lesson is designed to introduce students to the food science industry and the National FFA Food Science and Technology Career Development Event (CDE).

Student Learning Objectives:

After completing these activities, students will ...

1. Describe food science.
2. Identify careers in the food science industry.
3. Explore the components of the food science and technology career development event (CDE).

Suggested Grade Level:

Grades 9 and 10 (This lesson is written so instructors can scale up or down based on class needs.)

Suggested Time: 60 minutes (*Time requirements may vary based upon student understanding and class schedule.)

Resources/References:

1. Textbook: *Principles of Food Science*, 4th Edition, Janet D. Ward (Facts/information in this lesson were obtained from the textbook.)
2. Video: Indiana Food Science CDE Intro Video (for teachers to watch prior to this lesson)
<https://www.youtube.com/watch?v=XEvLwnkZETI>
3. Video: https://www.youtube.com/watch?v=_bJYav37-zw
4. Video: [FFA.org/participate/cdes/food-science-and-technology/](https://www.youtube.com/watch?v=_bJYav37-zw)
5. Website: AgExplorer, [AgExplorer.FFA.org/focus/food-products-processing-systems](https://www.agexplorer.org/focus/food-products-processing-systems)
6. Optional Website: <https://FFA.app.box.com/s/yk9q602v8u3l44vjdsbb2t0qtljygvv>
7. Website: AgExplorer (2019), [AgExplorer.FFA.org](https://www.agexplorer.org)

Equipment and Supplies Needed:

1. Bell Ringer/Introduction:
 - a. If you have access to an oven, toaster oven or air fryer, use this: "Heat-and-serve" donuts (<https://www.schwans.com/product/mini-donuts-with-a-cinnamon-sugar-packet/61299>) OR (<https://katzglutenfree.com/collections/donuts/products/cinnamon-donuts>). Give each student a paper plate or napkin to place donuts on. (one donut/student)
 - b. If you have no access to an oven, toaster oven or air fryer, use this: purchased donuts from a bakery. (one donut/student)
2. Activity 1: Worksheet, "My Career in Food Science," one copy/student (may also be given to students electronically).
3. Activity 2: Worksheet "Career Connections," one copy/student (may also be given to students electronically). The teacher needs a whiteboard or other way to write notes for students to follow.
4. Access to internet for YouTube videos plus a projector screen and audio equipment to show students video clips in class.
5. Writing utensil for taking notes.

Lesson Preparation:

1. BEFORE lesson: Prior to starting this lesson, the teacher should watch the following video to learn more about the National FFA Food Science and Technology CDE. This video may be shown to students but is made specifically for teachers training students for the competitive event. *Note: This video depicts the Indiana Food Science & Technology CDE and may not be an exact replica of how the National Food Science & Technology CDE runs but serves as a great reference/resource. <https://www.youtube.com/watch?v=XEvLwnkZETI>
2. BEFORE lesson: Prepare Follow-up review cards (found at the end of this lesson). Cut out and prepare for use.
3. BEFORE lesson: "Exit Tickets" (tickets located at the end of this lesson) Note: Teacher will need to cut each ticket out prior to the start of the class.
4. Follow-up: Lesson 1 Review Cards. *See the attachment at the end of this lesson for directions on how to make review cards.

Vocabulary:

1. Ready-to-eat product
2. Heat-and-serve product
3. Quick-food item
4. Prepackaged food item
5. Food science

Cross-Curricular Connections:

Science	English/Language Arts	Technology
• Students will connect how the study of food is related to science due to spoilage organisms, preservation, processing, etc.	• Student Activity 2 (Reading, Writing, Public Speaking) • Students will be challenged to research a food science career of their choice, record their findings and verbally report back to their classmates.	• Student Activity 1 (Students will use the internet to find and source information.) • Introduction Activity (Donuts are example of "heat and serve" or "ready to eat." This shows how technology has advanced our food industry.)

Virtual Instruction Ideas:

This entire lesson can be taught virtually. All student handouts can be sent/posted electronically. The only portion of this lesson that needs in-person interaction is the bell ringer using donuts; this activity is not essential to the lesson and can be removed if needed.

Student Activity Sheets:

Direct access to student activity sheets without lesson plan or answer key for easy upload to a learning management system or printing for classwork.

<https://ffa.box.com/s/gtb3z77bh0v6iz77dpgp5nhuaxbkmybp> (Word)

<https://ffa.box.com/s/h9m8k57np7br4pqu7vpq6lv1vjfwvr8> (PDF)

<https://ffa.box.com/s/hlocf8pavta23cq7qpphp3ws9hrhj8u4> (Non-Designed)

<https://docs.google.com/document/d/1skRYb0lBeRYVdDnTYPKcf-2Klq5GE0jknIANJwE7oo8/copy> (Google)

These Activities are Aligned to the Following Standards:

FFA Precept

- FFA.PL-A.Action: Assume responsibility and take the necessary steps to achieve the desired results, no matter what the goal or task at hand.
- FFA.PL-C.Vision: Visualize the future and how to get there.
- FFA.PG-J.Mental Growth: Embrace cognitive and intellectual development relative to reasoning, thinking and coping.
- FFA-CS-M.Communication: Effectively interact with others in personal and professional settings.

Common Career Technical Core

- AG-FD4 Explain the scope of the food industry and the historical and current developments of food products and processing.

AFNR Cluster Skills

- CS.03. Examine and summarize the importance of health, safety and environmental management systems in AFNR workplaces.

Common Core – Reading: Informational Text

- CCSS.ELA-Literacy.RI.9-10.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

Common Core – Writing

- CCSS.ELA-Literacy.W.9-10.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

Common Core – Speaking and Listening

- CCSS.ELA-Literacy.SL.9-10.1.A Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
- CCSS.ELA-Literacy.SL.9-10.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

Common Core – Science & Technical Subjects

- CCSS.ELA-Literacy.RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

Common Core – Literacy in Science & Technical Subjects: Writing

- CCSS.ELA-Literacy.WHST.9-10.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

AFNR Career Ready Practices

- CRP.02. Apply appropriate academic and technical skills. Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive.
- CRP.04. Communicate clearly, effectively, and with reason. Career-ready individuals communicate thoughts, ideas and action plans with clarity, whether using written, verbal and/or visual methods.

Partnership for 21st Century Skills

- Information Literacy

Lesson Plan:

1. **Bell Ringer:** *Note: Be sure to read the Introduction prior to starting this lesson so you are prepared!
 - 1) On the board/projector screen, have the following written: “What did you have for breakfast today? No breakfast? What did you have for your last meal? AND When is the last time you ate out? What/where did you eat?” Have students record their answers on a scrap piece of paper.
 - 2) Once the bell rings and all students are in their seats, begin with the lesson introduction. Be sure all students have completed the bell ringer questions (consider walking around to check this).
2. **Introduction:**
 - 1) If you have an oven, toaster oven or air fryer in your classroom, have “heat-and-serve” donuts baking a few minutes before students are to arrive. This will get the aroma in the air. If you do not have access to baking equipment, simply have donuts available for students to eat.
 - 2) Review with students the questions they answered in the bell ringer.
 - a. Ask students, “of the foods you ate for (xyz), were any of them prepackaged or ‘ready to eat’?” Discuss “prepackaged” and “ready to eat.” Packaged foods often require heating first.
 - b. Give each student a donut. Instruct them to break the donut in half. Have students observe the appearance and ask, “how do you think these donuts were made? What ingredients were used? Why?” Lead into the activity/discussion to answer the question “what is food science?”
 - i. Share with students the following information: *One of the common needs that all humans require is food. It unites us. The choices we make can positively or negatively impact our*

lives (optional discussion point on food choices here). Many food items we eat today are labeled fast, quick, instant, heat-n-serve, etc. The donuts you ate are an example of a quick food item (unless they are from a bakery — those are considered a baked item, ready to eat). Many ingredients produced all over the world went into making our donuts. Food science is the study of the nature of foods. Many topics are addressed in food science: food safety, food preparation, chemistry, food processing, improvement of foods, ready-to-eat foods, preservation, human senses, new product development, etc. We will be completing a few activities that will introduce you to the food science industry AND allow you to learn more about an FFA competitive event you may wish to participate in, the food science CDE! Briefly explain what a CDE is if needed (career development event are events in FFA that are designed to provide students with real-world, career-preparation experience. Participating in CDE events may also help students earn scholarship dollars and awards.

c. Transition into student activities. See “Activities 1 and 2.”

3. Activity 1:

- a. Part 1: Discuss with students how professionals in food science careers allow us to be able to enjoy all of the different foods that we have come to expect when we go to the grocery store as well as how foods should be prepared in our own homes. Today we are going to explore some careers in the food science industry so we can see some of the different parts of the food science world. Give each student a copy of “My Career in Food Science.” Show this video to students, https://www.youtube.com/watch?v=_bJYav37-zw (2:05 min), and have them answer the prompt during the movie and then discuss their responses. (The video shows an introduction to what food science is and provides brief information on a college where students can study food science.)
- b. Part 2: Allow students 15 to 20 minutes to complete the research. Next, have students create a 30-second to one-minute presentation about their careers. Have students share their individual food science career choices with the class. Collect student worksheets if desired.

4. Activity 2:

- 1) Prior to starting this lesson, the teacher should watch this video, <https://www.youtube.com/watch?v=XEvLwnkZETI>, to learn more about the FFA food science and technology CDE. This video may be shown to students but is made specifically for teachers training students for the competitive event.
- 2) Show the following video to students: [FFA.org/participate/cdes/food-science-and-technology/](https://www.ffa.org/participate/cdes/food-science-and-technology/) (2:08 min). This video introduces the National FFA Food Science and Technology CDE.
- 3) Hand out the “Career Connection” worksheet. Students should use this worksheet during a group learning and conversation about the Food Science & Technology CDE. Prior to beginning instruction, inform students that they will learn much more about each of these areas of the competitive event at a later date. The objective is to introduce them to the areas of the competitive event in this lesson, show the importance of each, and make connections to the careers they just learned about.
 - a. Components of the FFA food science and technology CDE:
 - i. Team Product Development: Teams develop a new food product and packaging. (Tell students they will get to do this in a few days.)
 - ii. Food Safety/Sanitation Team Activity: Teams look at safety and sanitation situations and determine what the situation represents. (Tell students they will get to practice this in a few days.)
 - iii. Objective Knowledge Exam: This is a written knowledge exam about the food science industry. (Let students know they will have written assessments after each unit of study and that the assessments are similar to what is found on the objective exam for the contest.)
 - iv. Problem Solving/Math Exam: Students use common math equations found in food science. (Students will get to practice this too!)
 - v. Customer Inquiry Letters: Students must read letters that are written to companies from concerned consumers and determine if the concern is a quality or safety concern. (Tell students they will get to practice writing letters.)
 - vi. Product Specification Compliance: Students evaluate food products to determine if they are compliant with weight, labeling, contents, etc. (Tell students they will get to practice this in a few days.)
 - vii. Sensory Evaluation Practicum (Triangle test, Aroma test): In the triangle test, three of the same items are presented; one of the three is slightly different than the other. Students will

use their senses to determine which of the three is different. In the aroma test, students evaluate different aromas and use their senses to determine what the aroma is.

- b. Discuss with students how each of these components of the food science CDE fit into the food science industry and help to prepare a person for the industry or to become a better consumer.

5. **Follow-up:**

- 1) Students will review concepts from today by playing a matching game. Explain how the game works first.

*Directions to share with students:

I will give you each a card. When I say go, you will turn the card over and read it. On the card, you will find a piece of information. You will need to find the classmate that has the other piece of your information to complete the thought or concept from what we learned today. When you find your other piece, stand together at the side of the room quietly. This is similar to a vocabulary matching game except we will be matching concepts, not vocabulary terms. What questions do you have before we begin?

- 2) Using the review cards you made, give each student a card. If a student is absent or you have an uneven number, you may need to play too. Remind students to not look until told to do so. *Ready, set, GO!* Allow students to move about the room to find their other pieces.
- 3) Once all students are standing with their other piece, have students read their cards. Be sure to remind them to read the cards in order if needed.
- 4) Collect cards when finished. Ask students to return to their seats.

6. **Optional – Extended Learning Opportunities (Not factored into time requirement):**

- a. “The Science Behind your Food” video and/or lesson. Video link only: AgExplorer.FFA.org/virtual-field-trip/archive/2017-cargill
 - i. Time required to complete video and Activity 1: 120 minutes total
 - ii. Link to Activity 1 to complete with the video:
<https://FFA.app.box.com/s/yk9g602v8u3l44vjdsbb2t0gtyljqvvy>

7. **Exit Ticket:**

- a. Give each student an “Exit Ticket.” (Note: the teacher will need to have these cut out and ready for students prior to class.)

Name: _____

Aligned to the following standards: FFA.PL-A; FFA.PL-C; FFA.PG-J; FFA-CS-M; AG-FD4; CS.03; CCSS.ELA-Literacy.RI.9-10.1; CCSS.ELA-Literacy.W.9-10.2; CCSS.ELA-Literacy.SL.9-10.1.A; CCSS.ELA-Literacy.SL.9-10.4; CCSS.ELA-Literacy.RST.9-10.3; CCSS.ELA-Literacy.WHST.9-10.4; CRP.02; CRP.04

My Career in Food Science

Part 1:

Directions:

Watch the video "What is Food Science?" (https://youtu.be/_bJYav37-zw) and answer the following prompt.

- What is food science?
- Why do you think food science is important?

Directions:

Food science is a crucial component to the agricultural industry as well as being required for us as consumers to have the variety of food we have come to expect everyday. With food science having such a large role in our lives, you can just begin to imagine how many careers exist within the world of food science! Select a career of your choice and answer the questions below. You may pick any career in food science, but the list below may help you get started:

Food Scientist	Biochemist	Cereal Scientist	Dairy Products Scientist	Director of Quality Assurance	FDA/USDA Research Scientist	Flavor Chemist
Food Engineer	Food Industry R&D	Food Ingredient Sales	Food Inspector	Food Microbiologist	Food Product Consultant	Food Product Developer
General Manager, Research	Laboratory Director	Manager Analytical Lab	Market Researcher	Manager, Meat Applications	Meat Scientist	Natural Products Researcher
Plant Supervisor	Food Technologist	Project Leader	Technology Project/Product Manager	Public Health Official	Quality Assurance Director, Manager or Supervisor	Food Biochemist
Research Scientist	Quality Assurance	Officer Sales Manager	Scientific and Regulatory Affairs	Scientific Research	Senior Food Scientist	Sensory Evaluation Expert
Food Chemist	Food Toxicologist	Plant Manager	Technical Sales Representative	Food Biotechnologist	Packaging Specialist	Research and Development
Sensory Scientist	Technology Development Manager	Food Safety Inspector				

Name: _____

Resources for Researching Your Career Online: Use the following resource to find information on your food science career: AgExplorer.FFA.org/focus/food-products-processing-systems



My food science career choice is _____.

I will need the following schooling/education (What education is required for your career choice?):

List 2 colleges in the United States that offer your career choice:

(1)

(2)

What a day looks like in my career (list and describe 4 specific tasks you may do in your career):

1)

2)

3)

4)

- Why is this career important to the overall goal of the food science industry?
- How does this career impact you?

Draw one emoji to depict how you feel about food science.

Name: _____

Part 2:

Directions:

Once you have completed the above information about your career, prepare a 30-second to one-minute verbal presentation sharing what you learned. Be sure to include the following:

1. Name of the career
2. Why you chose this career to learn more about
3. Education required
4. Three tasks you may complete in this job.
5. Why this job is important

You may want to practice what you plan to say before it is your turn! Your teacher will score your verbal presentation on the factors mentioned above and your voice, posture and overall effect. Wait for your teacher to tell you when it is your turn to present.

My Brainstorm Box: Draft your verbal presentation here!

Name: _____

Career Connection

Directions:

Use the following table to make connections between careers you have just learned about and the components of the food science industry. Note: You may need to research a couple additional careers based upon the careers your classmates shared in the previous activity.

Name of Part of CDE	Purpose/What is learned by participating?	Career(s) this prepares you for.
Team Product Development		
Food Safety/Sanitation Team Activity		
Objective Knowledge Exam		
Customer Inquiry Letters		
Product Specification Compliance		
Sensory Evaluation Practicum		
How does learning food science and being exposed to the careers and different components of the industry make you a better consumer?		

Name: _____

Lesson 1: Review Game Cards

Teacher Directions: Cut along the lines of each card. Use the cards in the Follow-up section of this lesson.

One of the common needs that all humans require

Food

The food choices we make can

Positively or negatively impact our lives

Many food items we eat today are labeled

“Fast, quick, instant or heat and serve”

The donuts you ate are an example of a

Quick-food item

Food Science is the

Study of the nature of foods

Many topics are addressed in food science

Name: _____

Food safety, food preparation, chemistry, food processing, improvement of foods, ready-to-eat foods, preservation, human senses and new product development

A national FFA contest that emphasizes food science

food science CDE

Team Product Development

Teams develop a new food product and packaging.

Food Safety/Sanitation Team Activity

Teams look at safety/sanitation situations and determine what the situation represents.

Objective Knowledge Exam

A written knowledge exam about the food science

Problem Solving/Math Exam

Common math equations found in food science

Name: _____

Customer Inquiry Letters

Letters that are written to companies from
concerned consumers

Product Specification Compliance

Students evaluate food products to determine if
they are compliant.

Triangle Test

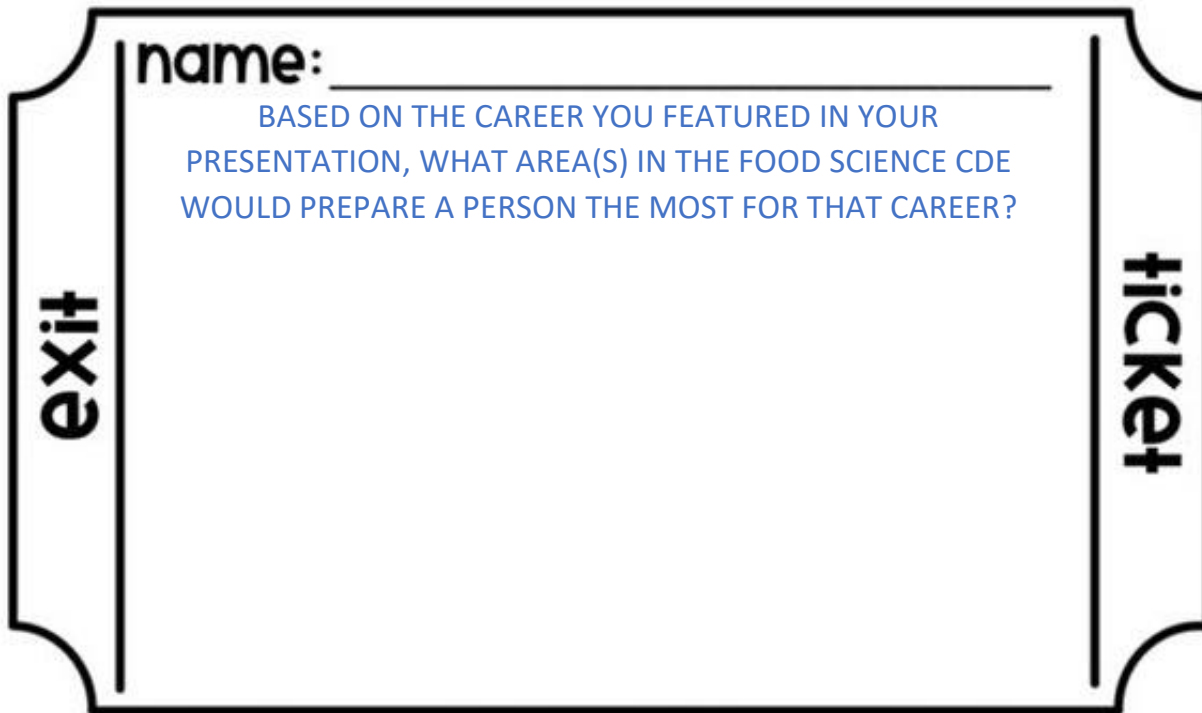
3 of the same items are presented.
1 of the 3 is slightly different than the other.

Aroma Test

Students evaluate different aromas.

Name: _____

Exit Tickets



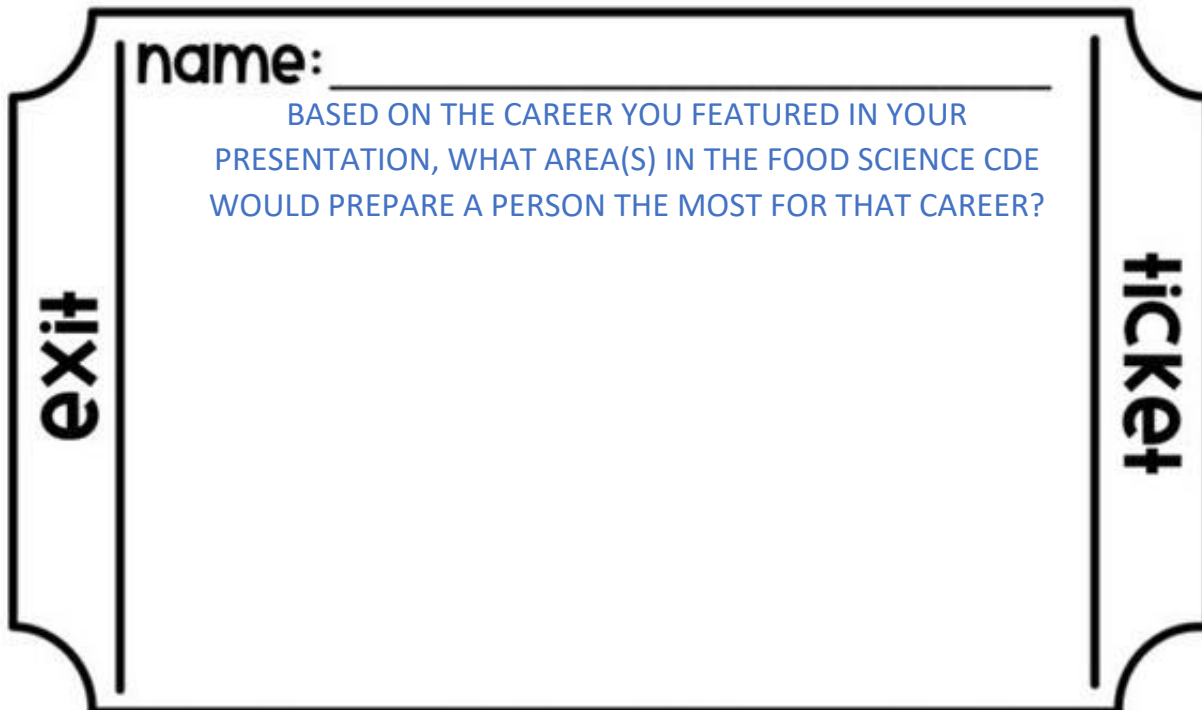
exit

name: _____

BASED ON THE CAREER YOU FEATURED IN YOUR PRESENTATION, WHAT AREA(S) IN THE FOOD SCIENCE CDE WOULD PREPARE A PERSON THE MOST FOR THAT CAREER?

ticket

This is a template for an exit ticket. It features a central rectangular area with rounded corners. On the left side, the word "exit" is written vertically in a bold, black, sans-serif font. On the right side, the word "ticket" is written vertically in a bold, black, sans-serif font. The central area contains a line for a name and a question in blue text.



exit

name: _____

BASED ON THE CAREER YOU FEATURED IN YOUR PRESENTATION, WHAT AREA(S) IN THE FOOD SCIENCE CDE WOULD PREPARE A PERSON THE MOST FOR THAT CAREER?

ticket

This is a second template for an exit ticket, identical to the first one. It features a central rectangular area with rounded corners. On the left side, the word "exit" is written vertically in a bold, black, sans-serif font. On the right side, the word "ticket" is written vertically in a bold, black, sans-serif font. The central area contains a line for a name and a question in blue text.

Name: _____

ANSWER KEY: Lesson 1: Review Game Cards

***NOTE: Left to right as read, statements are correct:**

One of the common needs that all humans require is: Food

The food choices we make can: Positively or negatively impact our lives

Many food items we eat today are labeled: Fast, quick, instant, heat n serve

The donuts you ate are an example of a: Quick-food item

Food Science is the: Study of the nature of foods

Many topics are addressed in food science: Food safety, food preparation, chemistry, food processing, improvement of foods, ready-to-eat foods, preservation, human senses and new product development

A national FFA contest that emphasizes food science: food science CDE

Team Product Development: Teams develop a new food product and packaging.

Food Safety/Sanitation Team Activity: Teams look at safety/sanitation situations and determine what the situation represents.

Objective Knowledge Exam: A written knowledge exam about the food science industry

Problem Solving/Math Exam: Common math equations found in food science

Customer Inquiry Letters: Letters that are written to companies from concerned consumers

Product Specification Compliance: Students evaluate food products to determine if they are compliant.

Triangle Test: 3 of the same items are presented; 1 of the 3 is slightly different than the other.

Aroma Test: Students evaluate different aromas.

Name: _____

Grading Rubric for “My Career in Food Science” Student Activity

Indicator	Strong (5–4 points)	Moderate (3–2 points)	Weak (1–0 points)	Points Earned
States Chosen Career Choice and WHY	Included	Included, but difficult to understand	Not included	
States the Education Required for the Career	Included	Included, but difficult to understand and/or does not provide enough information about the education required	Not included	
Describes Common Tasks in the Career	Describes three tasks he or she may complete in the career area	Describes one or two tasks	Does not mention any work/tasks found in the career choice	
Describes why this career is important	Included	Included, but difficult to understand	Not included	
Overall Impression (Voice, Posture, etc.)	Voice was clear and easy to understand. Student stood up when speaking. Student showed enthusiasm while speaking.	Voice was hard to hear/understand. Student may or may not have stood up while presenting. Enthusiasm was not evident.	Student did not present or was not ready.	
			Total Points Possible: 25	