









FOOD TO FARM TRUCK

Challenge Guide

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Challenge Rationale

Two percent of the U.S. population is directly involved in production agriculture. Too often, people do not truly understand where their food comes from. This challenge addresses the lack of awareness around agriculture production and the process that food takes from farmer to consumer. The final product of this challenge is to create a food truck that analyzes the farm to fork process. Through this challenge, students will become more aware about how food travels from the farm to their community through this exciting challenge.

Establishing The Challenge

Identify a Challenge

Americans enjoy an affordable and abundant food supply thanks to farming and ranching families. The families involved in production agriculture make up 2% of the U.S. population. Farms and ranchers come in all different sizes and with different production practices. Farm and ranches across the country provide safe low-cost products for American consumers. “One U.S. farm feeds 169 people annually in the U.S. and abroad.” The future of farming is a growing concern in America as the average age of farmers increases, the number of individuals entering the farming occupation decreases, and the global population dramatically increases causing a higher demand for food produced annually. Through this challenge, students will become more informed about food production and sourcing.¹

¹ American Farm Bureau Foundation for Agriculture Food and Farm Facts
<https://www.agfoundation.org/resources/food-and-farm-facts>

Establishing The Challenge

Challenge Question

With the challenge of the general population being disconnected from where their food comes from, your team has been selected to design a food truck that addresses the journey of food from farm to food truck.

THIS SOLUTION MUST ADDRESS THE FOLLOWING NEEDS:

- Track where the food for your menu comes from
- Provide a cost analysis for food items
- Understand labeling and marketing of food items
- Emphasize sourcing local ingredients when possible

SUCCESS WILL BE DETERMINED BY:

- Construction of a food truck menu of three to five items based on a selected food truck theme.
- Creation of a budget for all items needed for the menu.
- Providing an analysis of the farm to food truck journey for all ingredients in one menu item.
- Producing a marketing campaign that advertises the foods sourced in your food truck business.

Standards Addressed

Next Generation Science Standards

nextgenscience.org

- 5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
- 5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.
- MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
- MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
- MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
- MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
- MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Common Core Standards

corestandards.org/mathematics-standards

- CCSS.MATH.CONTENT.5.OA.A.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.
- CCSS.MATH.CONTENT.5.NBT.A.1 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
- CCSS.MATH.CONTENT.5.NBT.A.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
- CCSS.MATH.CONTENT.7.EE.A.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
- CCSS.MATH.CONTENT.7.SP Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.

Guiding The Challenge

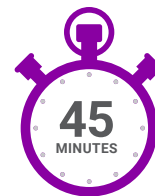
Each Purple Plow Challenge can be implemented in a variety of methods, time frames, and programs. Follow the steps below to help determine how this challenge will best fit the current situation and educational environment.

1. **REVIEW** the Purple Plow “Design Process” (next page) and the “Lesson Packet” documents. Note that the lessons are encouraged but not required.
2. **EXAMINE** the suggested timeline to determine ways to integrate the challenge and lessons to fit your needs.
3. With the time frame in mind, **USE THE GUIDANCE PROVIDED** in this section to help students progress through the challenge. This guidance includes suggested student prompts, guiding questions for students, signs of step completion, and journaling opportunities. The student prompts, guiding questions, and journal prompts are found in the “Student Guide.” Facilitators or students may determine the method by which they record their research and discoveries found for these prompts and journal reflection questions.

SUGGESTED TIMELINE

This sample pacing guide is created for a 90-day calendar with a 45-minute class. It is important to remember that timing may vary on student’s pace, as well as how much time you dedicate to each of the steps listed below. Your students may return to certain steps and repeat the process, no journey is the same!

DESIGN PROCESS STEP	TIMELINE
Identify	5 days
Imagine	8 days
Design	5 days
Create	6 days
Test & Improve	61 days
Share	5 days



Guiding The Challenge

SUGGESTED TIMELINE (CONT.)

To fulfill the requirements of the challenge, you will need time beyond the allotted program time above. Possible options for completing include:

- Sending the constructed growing structure and related materials home with students wishing to compete (participating in regular progress monitoring of project with facilitator)
- Developing continuation options in an after-school or extra-curricular club with facilitator
- Including parents in the process of continuing the investigation (with option of providing space at school to keep project)

Challenge Design Process



IMAGINE

Brainstorm solutions to the problem. List all ideas – don't hold back! Discuss and select the best possible solution.

CREATE

Follow the design plan and build the prototype.

SHARE

Communicate what was learned. Share the design, data, and conclusions. Present results.

IDENTIFY

Define the problem and how it is affecting life globally, nationally, and locally. Research and consider how others have approached solving the problem. Describe why this problem needs a solution. Determine constraints (e.g., time, space, resources, etc.).

DESIGN

Diagram the prototype. Identify the materials needed to build the prototype. Write out the steps to take. Describe the expected outcomes.

TEST & IMPROVE

Test the design and collect quantitative and qualitative data. Discuss results and compare with the expected outcomes. Seek areas of improvement and make changes where needed.



Materials list

Suggested Materials list

The items listed below are suggested materials needed to conduct the challenge. Facilitators and students are encouraged to be creative and inventive in acquiring the materials needed to complete the challenge (e.g., purchased, recycled, donated, etc.).

MATERIALS REQUIRED	SUGGESTED MATERIAL OPTIONS
<ul style="list-style-type: none">• Computer with internet access	<ul style="list-style-type: none">• Printer• Variety of paper (e.g., poster board, presentation board, construction paper, etc.)• Creative materials (e.g., scissors, glue, etc.)• Coloring Supplies• Calculator

STEP ONE

1 | IDENTIFY



Purpose of Step

Define the problem and how it is affecting life globally, nationally, and locally. Research and consider how others have approached solving the problem including how people have addressed this problem historically. Describe why this problem needs a solution. Determine constraints (e.g., time, space, resources, etc.).

Student Prompts and Guiding Questions:

- How are agricultural products processed?
- Why is farming and ranching an important occupation?
- Is there a potential for food sources to run out globally?
- What would happen if Americans ran out of food?
- Why is it important for food sources to be sustainable?
- Are Americans curious about where their food comes from? Why or why not?

Signs of Step Completion

Students will present a description of the challenge to the facilitator. They should include how this problem affects communities globally, nationally, and locally. The description should also include ways in which others have addressed finding a solution and constraints to be considered (e.g., time, space, resources, etc.).

AT THE COMPLETION OF THIS STEP, DIRECT STUDENTS TO THE REFLECTION QUESTIONS IN THE "FOOD TO FARM TRUCK" STUDENT GUIDE.

STEP TWO

2 | IMAGINE



Purpose of Step

Brainstorm solutions to the challenge. List all of your ideas – don't hold back! Discuss and select the best possible solutions.

Student Prompts and Guiding Questions:

- Where does your food come from?
- What types of food do you eat from countries outside of the U.S.?
- What kinds of foods grow in the local community?
- How does food travel from farms to your community?
- How do growing seasons for crops impact the availability and affordability of food?
- How are food products marketed?
- What type of information can we find on the packaging of a food product?
- How are food labels beneficial to consumers? How could they be misleading?

Signs of Step Completion

Students will present a list of possible solutions to the identified challenge to the facilitator.

AT THE COMPLETION OF THIS STEP, DIRECT STUDENTS TO THE REFLECTION QUESTIONS IN THE "FOOD TO FARM TRUCK" STUDENT GUIDE.

STEP THREE

3 | DESIGN



Purpose of Step

Develop a possible solution and identify the materials needed to provide evidence for why the solution is creative, unique, and sustainable. Write out the steps to take and describe the expected outcomes.

Student Prompts and Guiding Questions:

- How does cost influence what products consumers purchase?
- How can you identify the journey a food product takes to get from the farmer to the consumer?
- How do eating establishments determine what products to purchase?
- How can a restaurant or food truck keep production costs down?
- How does buying local ingredients directly impact agriculture production?
- Why is maintaining a food budget important for an emerging restaurant or food truck?

Signs of Step Completion

The students will present a detailed description of the solution as well as a written plan of how it could be carried out. Look for the following in the plan: a materials list with budget (if building a physical model or conducting lab research), detailed directions, and expected outcomes.

AT THE COMPLETION OF THIS STEP, DIRECT STUDENTS TO THE REFLECTION QUESTIONS IN THE "FOOD TO FARM TRUCK" STUDENT GUIDE.

STEP FOUR

4 | CREATE



Purpose of Step

Follow the design plan and construct the solution.

Student Prompts and Guiding Questions:

- How do you create a budget for the menu on your food truck?
- In what ways can you advertise your food truck?
- What are the different ways you can map the journey food products take to get to you?
- Revisit any of the previous steps for clarification or refinement as needed.
- Consider the parameters of the challenge and what needs to be accomplished for it to be successful.

Signs of Step Completion

The students will construct the solution and share with the facilitator.

AT THE COMPLETION OF THIS STEP, DIRECT STUDENTS TO THE REFLECTION QUESTIONS IN THE "FOOD TO FARM TRUCK" STUDENT GUIDE.

STEP FIVE

5 | TEST & IMPROVE



Purpose of Step

Test the design and collect qualitative and quantitative data. Discuss results and compare with the expected outcome. Seek areas of improvement and make changes where needed.

Student Prompts and Guiding Questions:

- How successful was the business plan in addressing the Farm to Food Truck challenge requirements?
- Were there any missing project components from the business plan?
- How successful do you feel the food truck menu provided was supporting the chosen theme?
- In what ways were local ingredients used to develop the menu?
- Was the Farm to Food Truck process complete? Did it highlight the one menu item selected?
- Were the sources of the one menu item ingredient identified accurately?
- Was the food truck budget calculated accurately?
- Based on their marketing/advertising tool, would you purchase the food truck menu items?
- What suggestions do you have for improvements to their business plan?
- What changes will you make to your design, based on feedback from your peer reviewers?

Signs of Step Completion

The students will keep records of all test trials and share data with the facilitator. Entries should include both qualitative and quantitative data. The students will also share recordings of any improvements made to the solution and the effect they had on the outcome.

AT THE COMPLETION OF THIS STEP, DIRECT STUDENTS TO THE REFLECTION QUESTIONS IN THE "FOOD TO FARM TRUCK" STUDENT GUIDE.

STEP SIX

6 | SHARE



Purpose of Step

Communicate what was learned throughout the challenge. Share the design process, data, and conclusions on how the solution answers the challenge question.

Student Prompts and Guiding Questions:

- Develop a presentation of your final business plan, food truck design, improvements made throughout challenge, and menu cost analysis.

Signs of Step Completion

The students will present what was learned through the design process, including sharing how the solution addresses the problem, key aspects of design, data from test trials, and end results.

Extension Possibilities

- Partner with a local restaurant to discuss how they budget and buy menu items.
- Visit a local farm or ranch to find out how they contribute to the food system.
- Visit a local food pantry to find out where their food comes from.
- Meet with your cafeteria staff to find out how they purchase food on a budget.
- Meet with your cafeteria staff to plan a catering event based on your food truck menu.
- Use your food truck menu for a fundraiser; donate proceeds to a hunger-relief group.
- Partner with a food preparation and/or nutrition class to prepare your food truck meal.
- Partner with a physical education, health, and/or nutrition class to determine the nutritional value of your food truck menu.
- Visit a local food processing company to learn how they use commodities to make or develop new products.

AT THE COMPLETION OF THIS STEP, DIRECT STUDENTS TO THE REFLECTION QUESTIONS IN THE "FOOD TO FARM TRUCK" STUDENT GUIDE.



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