

AP[®] Computer Science Principles

FOOD INSECURITY AND HUNGER

Student Workbook



AP[®] with WE Service



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Getting to Know the Topic

Food Insecurity and Hunger: Globally

People are considered food secure when they have availability and adequate access at all times to sufficient, safe, and nutritious food to maintain a healthy and active life. Food security is a complex sustainable-development issue, linked to health through malnutrition, but also to sustainable economic development, environment, and trade.

Food insecurity can occur when the cost of food is too high in certain regions, or a family is struggling to make ends meet. At times, the challenges are related to a community's geography. A community located in a dry climate may have difficulties with farming, while others can be affected by natural disasters like floods or drought, which might destroy an entire season's crops.

Fast Facts

- ▶ If female farmers had the same resources as male farmers according the Food and Agriculture Organization of the United Nations (FAO), up to 150 million more people would be fed—that's roughly the population of Russia.
- ▶ Additionally, the FAO states that approximately 60% of people are employed by agriculture services in less developed countries.
- ▶ According to the United Nations, world would need an additional \$267 billion per year to end world hunger by 2030.

Taking Action Globally

There are a number of ways that students can take action in their own school and community to help developing communities around the world improve their food security. Some ideas include:

- ▶ Volunteer at an organization that works for global issues—many organizations offer ways to get involved on their websites and in their offices.
- ▶ Create a podcast or website that educates people about food insecurity in a particular region or country.
- ▶ Develop a social media campaign targeted at the United Nations, government bodies, and other leaders to ask for added resources on the issue.



According to the United Nations, more than 2 billion people do not have enough food to lead a healthy, active, productive life.

Getting to Know the Topic

Food Insecurity and Hunger: Locally

Over the past decade, reliance on supplemental nutrition programs has more than doubled, and the strain to afford healthy, nutritious food has been felt in communities across America.

Hunger is an issue that can affect people in different situations. Some people need support over longer periods, but most require help only occasionally or for a short period of time. For those who cannot find support, hunger leads to long-term health conditions, especially in young children.

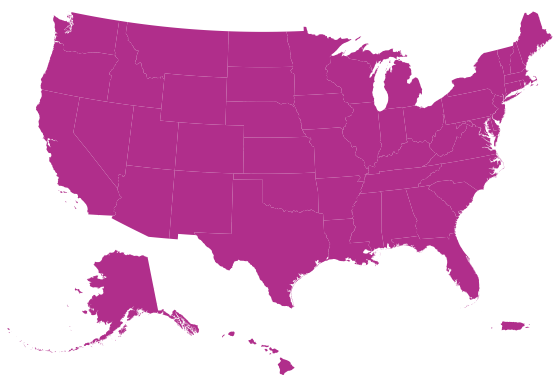
Fast Facts

- ▶ According to the USDA, more than 11 million children live in food insecure homes.
- ▶ Oxfam states, approximately 25 million individuals who access food banks in the U.S. are from working households, and most report having to depend on the food bank as a regular part of their survival.
- ▶ According to Feeding America, more than 70 billion pounds of food from manufacturers, growers, and retailers goes to waste—more than enough food to feed the 42 million people struggling with hunger in the U.S.

Taking Action Locally

Within their local or national community, students can:

- ▶ Work with a local organization such as food banks, community gardens, local farms and other community based organizations that are addressing the topic.
- ▶ Collect goods and items that support the needs of organizations and their local beneficiaries (e.g., non-perishable items for food banks, warm clothes and personal hygiene products for the local homeless shelter, etc.)
- ▶ Create and deliver an educational workshop to raise awareness about the topic and its local impact with a strong call to action that leads to enacting change.
- ▶ Attend a meeting of a local government authority, such as the school board or town council, and learn about how these groups are working to solve the issue. Suggest changes or voice support for additional funding to address food insecurity and hunger.



According to the USDA, 12% of American households live in a state of food insecurity.



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Identifying Questions about Food Insecurity and Hunger Worksheet

To have a meaningful data investigation, the questions we pose need to be non-trivial. These questions should reflect the rationale and overall direction for your investigation.

Below is an example question that is trivial as it doesn't really provide a rationale or direction for why we are conducting our investigation. Revise this question to be more meaningful.

QUESTION	REVISED QUESTION

We can use publicly available data to better understand the current issues around food insecurity and hunger to answer our questions and develop a story about the challenges.

Explore the following list of resources that contain Excel data files that may be useful in answering your questions related to food insecurity and hunger:

- ▶ Food and Nutrition Service U.S. Department of Agriculture: <https://www.fns.usda.gov/pd/overview>
- ▶ United States Department of Agriculture Economic Research Service: <https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/key-statistics-graphics.aspx#foodsecure>

In small groups, develop a list of 3 questions below. Record your questions in the first column. After you have taken a first draft of brainstorming questions, look at each question and revise it to ensure that you have included a rationale and direction to focus your investigation. Put your revised questions in the second column.

QUESTIONS	REVISED QUESTIONS

Select 2–3 questions from the collaborative class list of questions. These questions should be related and meaningful to you so that they can be used as the basis to tell a story or solve a problem through your data investigation. The questions you select do not have to have been developed by your group.

In the chart below:

- ▶ List the questions in the left column.
- ▶ List the data set you will use in your investigation and the columns in the data set that will be important for your investigation in the middle column.
- ▶ List your answer to each question in the right most column.

QUESTIONS	DATA SETS	COLUMN(S) IN THE DATA SET
1.		
2.		
3.		

Write a paragraph that goes beyond the answers to your questions and demonstrates your discovery of information or creation of new knowledge to tell a data story. A data story builds a narrative around the data. This narrative could be used to educate someone on an issue, sway opinions, or present a solution to a problem.



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Jigsaw Reading Worksheet

As you are reading your assigned text or passage, record an overview to describe the computing innovations and what beneficial effects they could have on food insecurity.

My resource:

Reading Overview:

As your classmates share out, make sure to record a summary of the reading and any important points.

1. Resource: _____

Summary:

2. Resource: _____

Summary:

3. Resource: _____

Summary:

4. Resource: _____

Summary:



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Problem Tree

In your Problem Tree graphic organizer, start by writing the problem in the trunk of the tree, and then look at the causes and effects of the issue. Keep digging to go deeper on the issue to find its supporting and root causes.

Leaves/branches: Effects

These are the results created by the problem. At first, this part of the issue appears easy to tackle, but when leaves and branches are trimmed, they grow back quickly. Consider the multi-layered effects, or “effects of effects,” that can arise when a problem goes unaddressed. Always ask: “Then what happens?”

Ex. Diet-related chronic diseases

Trunk: Problem

This is the key issue that is being studied. Because it is not as apparent as the leaves, the core problem itself sometimes takes a little longer to identify.

Ex. Nutrient-deficient diet

Roots: Causes

These are the situations or factors that have led to the problem. When exploring the root causes of a problem, ask yourself “Why does this problem exist?” Dig deeper to consider the “causes of causes”—the multiple layers of factors that contribute to a problem.

Ex. Insufficient income



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Needs Assessment

The following series of questions helps you to analyze and identify ongoing areas of need within organizations addressing your issue.

1. Identify three organizations working on issues related to the issue your team is working on.

2. What does each organization do well in response to the issue and/or related issues locally?

3. What does each organization do in response to the issue and/or related issues globally?

4. Compare each organization's approach to tackling the issue and assess the effectiveness of each approach.

5. Identify a criticism of or what's lacking in each organization's approach. Site the source and share their argument.

6. What could all three organizations do better?



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Solution Tree

In your Solution Tree graphic organizer, start by rewriting the problem from your Problem Tree, and reframing it as a goal at the trunk of the tree. Then consider the different solutions (the roots) and possible outcomes of the solutions (the branches).

Leaves/branches: Outcomes

These are the results created by the solution. Results may appear as straightforward as having achieved goals, but when you consider the ripple effects and outcomes of sustainable results, the impact is far-reaching and long-lasting. Always ask: “Then what happens?”

Ex. Increasing the capacity for agricultural productivity and sustainable food production systems is necessary to help alleviate the perils of hunger. If done right, agriculture, forestry, and fisheries can provide nutritious food for all and generate decent incomes, while supporting people-centered rural development and protecting the environment.

Trunk: Problem

Ex. Poor diet based on food insecurity.

Trunk: Goal

Ex. Increase security of nutritious and sufficient food that leads to a healthier diet.

Roots: Solutions

These are the actions needed to solve the problem and achieve the goal stated at the center of the Solution Tree. When exploring solutions, ask yourself “How will this solve the problem?” Dig deeper to think holistically, so that you are looking beyond the short-term and addressing not only the symptoms of the problem but the root causes as well.

Ex. Increase production and double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists, and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets, and opportunities for value addition and non-farm employment. Ensure sustainable food production systems and implement resilient agricultural practices to improve land and soil.



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Smarties Simulation Worksheet

A software designer was creating a simulation of the Smarties Simulation. The designer created a procedure `remainingValue` to determine how much money you have left. The procedure is intended to return `remaining` which is the amount remaining after making a series of spending choices given a budget of 15. The parameters `a`, `b`, and `c` represent how many in each choice. Remember from the simulation Choice A cost 1 candy, Choice B cost 2 candies, and Choice C cost 3 candies. The procedure `remainingValue` is shown below.

```
PROCEDURE remainingValue(a, b, c)
{
  spent ← 1 * a + 2 * b + 3 * c
  remaining ← 15 - spent
  RETURN(remaining)
}
```

Given a situation where there are 2 candies in Choice A column, 1 in Choice B column, and 2 in Choice C column. Write a call to this procedure using the example:

What value would be returned?

Write a call to the procedure based on the choices you made in the simulation.

What is the return value for your procedure call above?

The software designer wants to modify this procedure so it would return the remaining value given a different starting budget. Modify this procedure so that it works for any beginning budget not just 15.

Explain how the modified procedure does a better job of managing complexity than the original. [3 WOLS]



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Procedures and Lists for the Food Bank

A computer program is used to organize stock at a food bank. Think about how this program could utilize procedures and storing data. Use the following statements to design a program to help organize the food bank's stock of food.

Create your designs using diagrams of your choice or you can use the AP CSP Exam Reference Sheet to represent your program code.

A. A local supermarket has sent a list of counts of different types of cans they plan to be donating. For example, `canCounts` could contain `[5, 10, 5, 15, 23, 30]`. You know that if the number of cans that need to be shelved is more than 1000 you will need to get more volunteers. Write the procedure, `totalInventory` that will find the sum of all items in the list `canCounts`.

B. The food bank wants to make sure they are well stocked. They would like to be alerted when the number of items they have in inventory is below 40 but greater than 10. The food bank has a list called `itemsInventory` which has the inventory for each item stored in a separate index. Write the procedure `stockNeeded` that will return `true` if the inventory of any item is between 40 and 10 inclusively and `false` otherwise.

C. The food bank has a list of all items stocked in the warehouse. Write the procedure `itemAvailable` so that when given a list and an item to search for in the list it returns `true` if the item is found and returns `false` otherwise.

D. You just received deliveries from two local farms. The local farms give you a list of items in the delivery. The `wardsFarmList` contains the names of all items Ward's Farm delivered and the `allendaleFarmList` contains the names of all items delivered by Allendale Farm.

Write a procedure called `combineLists` to return a new list that is the combination of the two lists. To avoid listing items in the combined list twice, use the procedure `isFound(list, name)`, which returns `true` if `name` is found in `list` and returns `false` otherwise.

For example, if `wardsFarmList` contains

```
["beets", "carrots", "apples", "potatoes", "onions"]
```

And `allendaleFarmList` contains

```
["radishes", "pears", "carrots", "onions", "turnips", "sweet potatoes"]
```

Then `newList` will contain

```
["carrots", "onions"]
```

E. Deliveries from three different local farms are coming into the food bank. Each farm will provide a list of items they will be delivering. The food bank would like to consolidate these three lists into one list which contains the names of all items, in alphabetical order, with all duplicates removed, as illustrated below.

For example:

```
list1
```

```
["beets", "carrots", "apples", "potatoes", "onions"]
```

```
list2
```

```
["radishes", "pears", "carrots", "onions", "turnips", "sweet potatoes"]
```

```
list3
```

```
["carrots", "beets", "cabbage", "turnips", "cucumbers"]
```

newList would contain

```
["apples", "beets", "cabbage", "carrots", "cucumbers", "onions", "pears", "potatoes", "radishes",  
"sweet potatoes", "turnips"]
```

Using the following provided procedures, write the `combineLists` procedure that will return a new list of all the items in `list1`, `list2`, and `list3`, in alphabetical order, with all duplicates removed.

PROCEDURE CALL	EXPLANATION
<code>sort(list)</code>	Sorts list in alphabetical order and returns the resulting list.
<code>combine(list1, list2)</code>	Create a new list consisting of the entries from <code>list1</code> and <code>list2</code> .
<code>removeDuplicates(list)</code>	If any two or more entries in list have the same value, the duplicate entries are removed so that all entries appear at most once. The resulting list is returned.



Approaches to Taking Action Information Sheet

(1 of 1)

DIRECT SERVICE

WHAT IS IT?	Personally engaging with and providing hands-on service to those in need (usually in conjunction with an organization).	
EXAMPLE GOAL	By the end of the semester, we will support a local food bank and shelter by packing and serving food to people in the community. We will also visit our neighboring elementary school and teach a lesson on food insecurity in our community.	
ACTIONS	<ul style="list-style-type: none"> Reach out to local shelters and food banks to arrange a day for the class to visit and provide hands-on support Once a date has been decided, make sure students all have permission to travel to the food bank (if during school hours) 	<ul style="list-style-type: none"> Connect with teachers/administration at local elementary school and arrange to visit a classroom to teach a lesson to young students on food insecurity Create and print worksheets to use with younger students

INDIRECT SERVICE

WHAT IS IT?	Channeling resources to the needs of a community—locally, nationally, or internationally.	
EXAMPLE GOAL	By the end of the year, we will create a storage and donation system for local families in need, where they can access furniture and other household items. We will develop a system for donations, pick-ups, and inventory.	
ACTIONS	<ul style="list-style-type: none"> Conduct research into which items are most needed by community members (e.g., bed frames, dining tables, household goods, etc.) Reach out to local businesses to try to get a storage space donated Connect with school social workers/administration to gain their support Put up flyers around school and in the community, asking for donations (list specific items needed), including instructions on how/where to donate 	<ul style="list-style-type: none"> Develop an online database for tracking donations and pick-ups, and maintaining inventory Share pick-up information with local shelters, churches, community centers, etc. Share the donation system with school social workers, so that they can maintain the project in future years

ADVOCACY

WHAT IS IT?	Educating others about an issue to increase visibility and following up with an action that focuses on enacting change. Actions around advocacy often look like raising awareness, but without a strong call to action within the initiative as a whole. Educating others is not considered service in and of itself.	
EXAMPLE GOAL	Through an informative art piece, we will educate our school community about the waste created by single-use plastic water bottles, and the impact they have on the environment. Then, we will sell reusable water bottles at school, and the proceeds from the sale will go toward clean water projects in developing countries.	
ACTIONS	<ul style="list-style-type: none"> Research the impact of single-use plastic water bottles around the school and in the local community Plan out and create a 3D sculpture that incorporates informative text on the issue of single-use plastics Seek permission from school administration to display the piece in a common area of the school 	<ul style="list-style-type: none"> Design and order water bottles to sell at school Research and select an international organization that focuses on clean water projects Organize a selling schedule for the water bottles, donate profits



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Creating the Action Plan

This outline serves as a basic template for your action plan. Use additional space and resources to help you build out each part with the right amount of detail and flow to ensure you have the strongest action plan that you and your team can implement with ease. Remember, this is your road map for your service project!

TEAM GOAL:

MEASURES OF SUCCESS:

Required Network and Resources

In order to complete this goal, our team will need to develop the following network and access the following resources:

NETWORK:

RESOURCES:

ROLES AND RESPONSIBILITIES

Each team member will take on the following roles and associated responsibilities:

TIMELINE

Our team will use the following timeline to complete tasks and successfully carry out the action to meet our goal(s):



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Five Action Planning Pitfalls Tip Sheet

Once your team has completed the major components of your action plan (creating your teams and setting goals, timeline, and network), review the five action planning pitfalls provided below to ensure these have been avoided. Review your plans—individually first, then together as a team. After the review, rework your action plans, if necessary.

Setting an unclear goal

The first and most important part of any action plan is defining the goal, or what you want to achieve. It should be clear and easy to understand, for example, “we want to collect 500 cans of food,” or “we want 200 people to learn about WE Villages.” If the goal is not clearly defined, proper planning will be difficult if not impossible. As a best practice, have a peer from another team review your goal to ensure it is as clear as you hope.

Planning unrealistic actions

After the goal is set, begin planning the actions necessary to achieve it. It is important that the steps make sense and are achievable. Do not plan unrealistic actions, such as working at times that will interfere with schoolwork, overestimating how many people can help out, or planning to go to places that would be difficult for you to reach. Consider each team member’s school and community schedule, such as work and extracurricular activities. Before planning an action, ask yourself, “Is this action realistic?”

Rushing the process

Do not be too hasty in planning actions. While you may be excited to start, proper planning takes time. The better the planning and organization, the more success you will achieve. Even if it means slowing down to figure out details, do not rush and leave out important steps.

Not asking for help

Do not be afraid to ask for help. When a network is created, bigger goals can be achieved faster. Reach out to friends, parents, and mentors. People generally enjoy helping, especially if it is for a worthy cause.

Not learning from mistakes and giving up too quickly

We all make mistakes—it is normal and healthy. Mistakes allow us an opportunity to learn and grow. So, learn from the mistakes. Ask, “Why did this happen?” and “How can I avoid this problem next time?” Actively think about the mistakes and how it will be better the second time around. If something does not go as planned, do not stop!

Notes

Notes

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